COMMUNICATIONS
SATELLITE
USER REQUIREMENTS
WORKSHOP

FINAL REPORT
JANUARY 14, 1977

Communications and Navigation Division
Goddard Space Flight Center
Greenbelt, Maryland 20771
PUBLIC SERVICE COMMUNICATIONS SATELLITE
USER REQUIREMENTS WORKSHOP

FINAL REPORT

January 1977

Edited by
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Communications & Navigation Division
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GODDARD SPACE FLIGHT CENTER
Greenbelt, Maryland 20771

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PUBLIC SERVICE COMMUNICATIONS SATELLITE
USER REQUIREMENTS WORKSHOP

1. INTRODUCTION

A workshop was held to obtain information on user requirements for public service communications. This information will provide the basis of a study to determine the optimum satellite system to satisfy user requirements. The concept for such a system is described in Appendix 1. The workshop examined requirements for data and message services, elementary and secondary education, extension and continuing education, environmental communications, library services, medical education, medical services, public broadcasting, public safety, religious applications, state and local communications, and voluntary services. Information was also obtained on procedures to follow to make the transfer to commercial services. The workshop was held at the Tidewater Inn in Easton, Maryland beginning Sunday evening October 17 and ending Tuesday evening October 19, 1976. This workshop was attended by 147 people. Approximately ten additional people attended the presentations on the morning of the second day to hear the results of the workshop.

The workshop approach was to start with a description of the workshop objectives and the approach to be followed by the participants. Workshop participants were requested to submit preliminary thoughts on user requirements prior to arriving at the workshop. Following the workshop description the workshop panels convened to consider the advance submissions, make additional recommendations and critique these suggestions. Included in these panel deliberations was an examination of the potential benefits to be obtained from a public service communications satellite (PSCS) system.

Once the panels had reached their conclusions, they presented their results orally to the entire workshop and documented these conclusions for this report.

The Commercial Services Panel considered the relationships that should exist between industry and a government-sponsored public service communications satellite system. The panel concluded that such a government-sponsored system should not be done unless new technology is required or a new satellite is required to reduce user terminal costs. A demonstration system would provide the necessary market validation. NASA should provide user assistance for the entire system and involve industry from the beginning. The demonstration system parameters should be as close as possible to the succeeding operational configuration. The users should make some financial commitment and be made aware of the eventual total system cost.

The panel on Data and Message Services described requirements for the relay of data from sensors, between data terminals and between computer files. They also described needs for data inquiry, response, electronic mail and high resolution image transfer. User commonality was considered where packet switching might be applied for applications such as medical and weather sensors, digitized voice, bulk data transfer, inquiry systems, interactive data processing and electronic mail. Applications involving direct delivery to the user included programmable hand calculators and a digital citizen's band radio. The panel considered user community problems involving human communications, reconfiguration and growth and modularity.

The panel on Elementary and Secondary Education described present communications applications such as the Catholic TV network. Needs mentioned include access to industrial diagnostic specialists, access to remotely stored instructional material, supplements to the teaching staff, instruction to home-bound students, promotion of computer-assisted instruction, facilitation of enrichment activities and aid to handicapped students. Also included were in-service courses for teacher education, teleconferencing for educational professionals and organizations and communications for a variety of other teacher needs. The need for communications between school and parents was also described.

The panel on Continuing and Extension Education described the needs for occupational training, continuing professional education, military training, in-service institutional training, education in sparsely populated areas, education for immobilized people and the news distribution of the content of professional society meetings. Opportunities for satellites to make a contribution included market aggregation and equality of access.

The Environmental Communications Panel considered the dissemination of information on space, atmospheric, edaphic and oceanic conditions. They described the need for small messages from many sensors.
and the transfer of large amounts of information between major collection points and between collection and data processing centers

The Library Services Panel described the need for data base building, information retrieval, information broadcast, access to emergency information, library teleconferencing and facsimile transmission.

The Medical Education Panel described the needs for telediagnosis, mass information transfer to medical schools, computer data band information transfer, health education for the public and physician-patient communications.

The Medical Services Panel described health care needs including improvements in emergency medical services, teleconsultation, remote patient care (telediagnosis), basic and continuing medical education, supervision of allied health care workers, and administration and management of health care resources.

The Public Broadcasting Panel described its present system and its need for additional communications services, for flexibility, and for new services for public radio and television. Included were needs for specialized audiences such as instruction for special groups, sequential origination of materials, interactive capabilities for educational services, data transfer for broadcast management, and resource storage and sharing.

The Public Safety Panel described the needs for disaster alerting, two-way radio, national emergency coordination, record traffic, television for education and disaster monitoring, facsimile for arrest fingerprints and identification photographs, data transfer for data base generation and retrieval, and vehicle tracking and location.

The Religious Applications Panel described the need for in-service training for professionals and teachers, data transfer in and out of data banks, software distribution, teleconferencing, interconnection of libraries and educational facilities, off-air broadcast distributing, news dissemination to press and broadcasters, disaster relief coordination, missionary communications, direct broadcast to homes, and health care information.

The State and Local Government Panel discussed the need for communications planning at the national, state and local levels, increasing demand for services, and funding limitations.

The Voluntary and Social Services Panel described the needs for the non-profit sector including communications with members and social service recipients, and between organizational units.

The requirements documented in this workshop will be used as the basis of more detailed user study, a market study and a satellite system study. The results of these studies are expected to be available for presentation to the users by the middle of next year.

Descriptions of the workshop and the process used to arrive at the recommendations are given in this report.

2. WORKSHOP DESCRIPTION

The workshop was held at the Tidewater Inn in Easton, Maryland from October 17 through October 19, 1976.

The workshop was attended by 147 participants as listed in Table 1. The participants were each invited by telephone. Those accepting invitations were then mailed detailed instructions. A copy of this advance mailing is given in Appendix 2. Each participant was asked to make some preliminary suggestions regarding the possible user requirements for communications on the form provided in the advance mailing.

The workshop participants were organized into thirteen panels to concentrate on the various disciplines as shown in Table 2.
Table 1
Workshop Participants

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<td>Dr. Richard Jameson</td>
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<td>Council of Christian Communications</td>
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<td>1836 Fairmont Avenue, Cincinnati, Ohio 45214</td>
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<tr>
<td>Donald Jansky</td>
<td>Office Telecommunication Policy (OTP)</td>
<td>1800 G Street, N.W., Washington, D.C. 20036</td>
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<td>C. R. Jones</td>
<td>Hughes Aircraft Company</td>
<td>909 Sepulveda Boulevard, El Segundo, California</td>
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<td>James Justice, M.D.</td>
<td>Indian Health Service</td>
<td>Tucson, Arizona 85706</td>
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<tr>
<td>Dr. Ruth Katz</td>
<td>Denver Research Institute</td>
<td>2155 E. Wesley, Denver, Colorado 80210</td>
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<tr>
<td>Donald Kavanagh</td>
<td>Associated Public-Safety Communications Officers</td>
<td>P.O. Box 669, New Smyrna Beach, Florida 32069</td>
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<td>Barry Kerne</td>
<td>Operations Research, Inc.</td>
<td>1400 Spring Street, Silver Spring, Maryland 20910</td>
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<td>GSFC/NASA</td>
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<td>Jeffrey R. Kurland</td>
<td>Western Union</td>
<td>1 Lake Street, Upper Saddle River, New Jersey</td>
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<td>Gordon Law</td>
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<td>Howard Lefkowitz</td>
<td>Operations Research, Inc.</td>
<td>1400 Spring Street, Silver Spring, Maryland 20910</td>
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<tr>
<td>Leo L. Leveridge, M.D.</td>
<td>Department of Medical Education</td>
<td>American Medical Association</td>
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<td>555 North Dearborne, Chicago, Illinois 60610</td>
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<tr>
<td>Lorraine Luckl</td>
<td>ECON Incorporated</td>
<td>900 State Road, Princeton, New Jersey 08540</td>
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<td>Coast Line Community College</td>
<td>KOCE-TV, 10231 Slater Avenue, Fountain Valley, Calif. 92708</td>
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<td>Herbert Magower</td>
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<td>Ralph Marcotte</td>
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<tr>
<td>Enrico Mercanti</td>
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<tr>
<td>James Michalak</td>
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<td>Douglas Millar</td>
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<tr>
<td>Bernard P. Miller</td>
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<td>Keith L. Monroe</td>
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<td></td>
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<td>11 Firstfield Road, Gaithersburg, Maryland 20760</td>
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<td>F. Lee Morris, Director</td>
<td>Mississippi Authority for ETV</td>
<td>P.O. Drawer 1101, Jackson, Mississippi 39205</td>
<td>(601) 982-6376</td>
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<tr>
<td>Dr. Harold E. Morse</td>
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<tr>
<td>William B. Morton</td>
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<td>(301) 344-2013</td>
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<tr>
<td>Dr. Rose Mukerji</td>
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<td>Brooklyn, New York 11210</td>
<td>(212) 780-5941</td>
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<td>Jean Marie Neal</td>
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<td>Drawer 6668, Greenville, South Carolina 29606</td>
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<tr>
<td>Edward Nehman</td>
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<td>West Gate Research Park, McLean, Virginia 22102</td>
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<td>Frank Norwood</td>
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<td>Richard Oldham</td>
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<td>(206) 543-2000, ext. 61</td>
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<td>Dr. Marvin H. Runerman</td>
<td>Mayor's Office of Telecommunications Operations Center</td>
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<td>National Federation of Community of Broadcasters</td>
<td>3423 Parkview Avenue, Pittsburgh, Pennsylvania 15213</td>
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<tr>
<td>M. Roy Schwarz, M.D.</td>
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<tr>
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<td>George Selz</td>
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<td>1400 Spring Street, Silver Spring, Maryland 20910</td>
<td>(301) 586-6180</td>
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<td>Nathan Shoehalter</td>
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<td>Joseph N. Sivo</td>
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<td>Emanuel Suter</td>
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<td>Division of Educational Resource and Programs</td>
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<td>Sidney Tishler</td>
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<td>Dr. Andrew Viterbi</td>
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<td>Charmaine Wiscarver</td>
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<td>Workshop Organization</td>
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<td><strong>3. Elementary and Secondary Education</strong></td>
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<td><strong>10. Public Safety</strong></td>
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| **John Boning, Hal Braham, Charles Breg, Eugene Cacciamani, Richard Davies, Joseph Freitag, Dick Jones, Jeffrey Kurland, Howard Lefkowitz, Neal Pike, Stanley Rzewnicki** |
| **Dorothy Deringer, Eugene Feinberg, John Ferretti, Donald Grace, Estil Hoversten, Joseph Hull, Gordon Law, Ralph Marcotte, Andrew Viterbi** |
| **Alice Beckman, Ed Blackburn, Brian Brightly, Ted Dixon, Pierre DuMame, Donald Gray, Patricia Ho, Rose Mukerji** |
| **Kevin Arundel, Virginia Gentle, Harold Morse, Frank Norwood, Kenneth Polcyn, Nathan Shoehalter** |
| **Robert Bermer, Walter Duncan, Walter Hogge, James Jenkins, Barry Kerne, Joseph Schiesl, Clifford Spohn** |
| **Paul Andereck, Allan Deschere, Priscilla Gotsick, Steven Herman, Mary Huffer** |
| **Mary Backer, Richard Berglund, Robert Bird, Frank Douglas, Elmer Friman, Leo Leveridge, Emanuel Suter** |
| **Cecil Burge, Robert Egwood, Leon Greenhouse, Arthur Griffith, Howard Hupe, James Justice, Edward Nehman, M. Roy Schwarz, Robert Shamaskin, Dean Siebert, Jon Wempner** |
| **George Allan, Gerald Carp, Helen Clearwater, Alva Cooper, Donald Kavanagh, Lois McCoy, Keith Monroe, William Morton** |
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<td>Gianpiero Forcina, Gary Fereno, Joe Fleming, Anthony Flores, Jean-Marie Neal, Ted Reams, Jane Richards, Mason Riegel, Marvin Rimerman, Elizabeth Young</td>
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Unassigned:


The workshop was sponsored by the National Aeronautics and Space Administration, Goddard Space Flight Center (GSFC) and conducted by Operations Research, Inc. (ORI). A management team was formed consisting of the Workshop Coordinator, GSFC Technical Officer and the Chairmen and Secretaries of each of the panels. The panel secretaries were responsible for insuring that each panel session was properly documented and for keeping track of the session timing. The management team met together before, during and after the workshop to coordinate workshop activities. The purpose of each of these management meetings is shown in Table 3.

Table 3

Management Objectives

Workshop:

To provide an opportunity to compile a description of user requirements for public service communications:

Sunday Management Team Meeting:

To acquaint workshop leaders with the workshop plan and with their roles.

Sunday Social Hour:

To assist participants in getting acquainted.

Tuesday Management Team Breakfast:

To review highlights of previous day, to acquaint leaders with the plan for the day, and to discuss any problems that can be anticipated.
The workshop program consisted of three parts:

- A short presentation of workshop objectives and approach
- A formulation of user requirements and
- A final presentation and documentation.

The arrangement of this program is shown in Table 4 and the objective for each of the sessions is shown in Table 5.

An effort was made to have the participants think about the problem prior to the workshop and to give the other participants the benefit of their thought. Accordingly, they were asked to send information on their preliminary thoughts on user requirements. These initial requirements descriptions (given in Appendix 3) provided the framework for the panel deliberations. The final recommendations of the panels are given in Appendix 4 and are described in the following section.

Table 4
Workshop Program

<table>
<thead>
<tr>
<th>Time</th>
<th>Sunday Oct 17</th>
<th>Monday 18</th>
<th>Tuesday 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
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<tr>
<td>8 00-9 00 am</td>
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<tr>
<td>9 00-12 00 am</td>
<td>Breakfast</td>
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<tr>
<td>12 30-1 30 pm</td>
<td></td>
<td>Panel Presentations</td>
<td></td>
</tr>
<tr>
<td>1 30-5 00 pm</td>
<td>Panel Discussions</td>
<td>Public Service Communications Needs Potential Benefits of Satellites</td>
<td>Panels Write Reports Workshop Adjourn Committee Critique</td>
</tr>
<tr>
<td>6 00-8 00 pm</td>
<td>Banquet</td>
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<td></td>
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<tr>
<td>8 30 pm</td>
<td>Get Acquainted Reception (Cash Bar, Pool-side)</td>
<td>Social (Cash Bar, Pool-side)</td>
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</tr>
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</table>
Table 5

Workshop Objectives

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<table>
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<tbody>
<tr>
<td><strong>Monday Morning:</strong></td>
<td>To orient the participants and provide them with an opportunity</td>
</tr>
<tr>
<td></td>
<td>to brainstorm on user requirements.</td>
</tr>
<tr>
<td><strong>Monday Afternoon:</strong></td>
<td>To generate user requirements, critique these suggestions, and</td>
</tr>
<tr>
<td></td>
<td>develop panel recommendations.</td>
</tr>
<tr>
<td><strong>Tuesday Morning:</strong></td>
<td>To allow the workshop to hear and critique the panel recommendations.</td>
</tr>
<tr>
<td><strong>Tuesday Afternoon:</strong></td>
<td>To document the recommended experiments.</td>
</tr>
</tbody>
</table>

3. WORKSHOP RESULTS

The workshop began with a short description of workshop objectives and approach. The workshop panels then considered the need for communications without regard for whether or not the communications should be transmitted via satellite. The panels' main consideration was the importance of information transfer to their respective disciplines.

The workshop panels were asked to consider various types of communications such as voice (telephone), record message (telegraph, letter), one-way television (i.e., educational broadcast) to one or many terminals, interactive television (voice or video interactive), facsimile, teleconferencing (audio; audio and video; audio and facsimile; audio, video and facsimile), and data transfer (high and low data rates).

The workshop panels were asked to give attention to substituting electronic communications for other forms as well as augmenting existing electronic communications. The panels were advised that people doing marketing studies wanted information on what users are presently paying for all types of communications (by category) and what users would be willing to pay for new or augmented services.

The rationale used by each panel and a summary of their results are given in the following paragraphs. These paragraphs were prepared by the individual panels.

3.1 COMMERCIAL SERVICES

3.1.1 Overview

This panel consisted of representatives from domestic satellite common carriers, spacecraft manufacturers, communications equipment manufacturers, and government regulatory agencies.

The panel, after considerable discussion, agreed on the primary question it should address in the content of the workshop, as follows:

Determine the relationship between industry and a Government-sponsored Public Services Communications System.

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The approach that was taken is illustrated in Figure 1. The panel completely concurred that NASA should determine the user needs, develop requirements and then aggregate the requirements into a viable system requirement. From these requirements a system (or systems) should be designed and specifications prepared.

The panel felt that the system specifications should be carefully examined and coordinated with the common carriers to determine if they can satisfy the needs. This would include both performance and economic considerations. If there are applications which can be satisfied by existing commercial satellite systems, then they should be so channeled and not be considered for the PSCS.

To be considered for a PSCS an application should meet one of the following criteria:

1. A new spacecraft system is required to meet the user needs which represents an extension of current operational technology.
2. New spacecraft or ground terminal technology is required.
3. The cost of the user equipment is not currently economically feasible thus requiring new system designs.

The panel felt that regardless of what form PSCS takes, the commercial services industry should be brought into the program early enough to insure that a smooth transition to an operational system can be achieved. The users should also participate in the early system design phase to gain an understanding of all of the problems associated with achieving a full or partial commercial system.

Assuming that the above criteria are met and NASA undertakes the development of a PSCS, the panel felt that the program should constitute a market validation effort. The market would be established and verified through the use of an actual demonstration approach which could, for some users, take a year or more. The demonstration system provided should be quasi-operational with high reliability and be virtually identical (as far as the user is concerned) with the operational system. The stability of system parameters is of major importance, particularly as regards policies and regulations (for example, frequencies). Users should not be forced to purchase entire new terminal equipments when making the transition to an operational system. NASA should consider the total user system (end-to-end) and provide the required technical assistance in hardware specification, training, operation, test and maintenance needs, program development, etc. NASA should involve industry to establish the optimum crossover points to a full commercial system for each of the user application areas.

In the implementation of a PSCS various alternatives should be examined by NASA in establishing a quasi-operational system as follows:

1. Use existing communications capabilities (space segment, ground terminals, terrestrial links).
2. Provide incentives for industry to develop the services (policies, taxes, subsidies, etc.).
3. Use a Government system in cooperation with commercial services (perhaps renting capability from industry).

The panel felt that the ground terminals could easily be handled by industry with NASA specifying the various configurations and then making an initial buy. Additional terminals could then be provided by industry on a purchase and/or rental basis. Terminals with an add-on modular performance capability could be provided so that a user would only have to pay for his explicit needs.

The panel addressed the question of how the user should participate in a PSCS. The consensus was that the user should make some financial commitment to the system. Users should also be made aware, early in the program, of the ultimate operational costs of their service. For some users a gradual increase in financial commitment should be established to ease the transition to a full commercial system. The participation of the users would significantly help to insure a viable operational capability long after government participation was concluded.
Figure 1. Approach to Determining the Relationship Between Industry and a Government Sponsored PSCS


3.1.2 Policy Questions

Policies of the Federal Government impact in several ways on the utilization of satellites for the provision of public services. It is Federal Government policy to place full reliance on the private sector. This is manifested in OTP Circular 13, and OMB circular A-76. An illustration of the application of this philosophy has been the NASA TDRS Program, in which the requirement of a Federal agency was functionally defined, and the private sector then bid on providing the specified service.

In regard to the question as to what extent NASA should or should not provide such public services, the guiding policy would be that indicated above. Given a particular user need, the first question to be asked is, to what extent the indicated requirement could be provided by the private sector. If it cannot be provided, then consideration could be given to determining the extent to which the Federal Government should perform a market definition function. This is a basic policy issue which, while real, is beyond the scope of this conference. However, a determination in this area is fundamental to determining the role of NASA in the area of providing public services via satellite.

1. At what point does the private sector become involved?

2. What cost should be incurred by the user?

These policy issues should be clarified at the earliest opportunity in order to provide appropriate guidance to NASA.

In considering any new kind of service which may be delivered via satellite, an important aspect is spectrum conservation. Both the amount of bandwidth necessary and its location in the spectrum are important. Provided that the role of the satellite system is that of a fixed point-to-point service, existing satellite bands may be used and the only question is the availability of such spectrum. This problem is one that is handled within existing allocations and within existing regulations.

In those cases in which the new services require new spectrum allocations in spectrum space now allocated and used for services other than satellite services, definite and difficult problems arise. For example, it has been proposed that one possible new service might be a satellite-to-vehicle (mobile satellite) service to operate in the 806 to 947 MHz band. This poses a number of problems both domestically and internationally. Domestically this spectrum has been allocated for the growth of terrestrial mobile services. Since international use of a given frequency will permit thousands of users across the nation while one satellite will preclude reuse of its frequency anywhere else in the country, the efficiency of spectrum use decreases rapidly for satellite use. As a result, there will be serious objection among users to the use of satellites in the mobile bands.

Internationally, there are more serious problems. The 806 to 947 MHz band has been allocated for land mobile usage under an international treaty (the ITU Radio Regulations). In region 2, this spectrum is allocated to broadcast and fixed radio services. Therefore, mobile use of this spectrum within the U.S. is secondary to broadcast and fixed services in neighboring countries. Consequently, we cannot use terrestrial systems in this band closer than 250 miles of the Canadian or Mexican borders. Satellite use of these frequencies has even more consequences to systems in the neighboring countries who will most certainly be opposed to such use.

The procedure for making such allocations changes is to cause the ITU Radio Regulations to be changed to accommodate such uses. This can only be done at a general World Administrative Radio Conference (G-WARC) or in a special conference which are scheduled at infrequent intervals (up to 20 years). One such G-WARC is scheduled for 1979 and we have an opportunity to modify the international allocation tables to reflect new uses such as this. However, this is not an easy procedure because the ITU now has a majority of under-developed nations who are not always in sympathy with the needs of more developed nations. Therefore, in order to get changes approved in this forum, these changes must have some appeal to the underdeveloped members. This leads to the conclusion that those changes most likely to be adopted are those that have rural applications. For example, such uses as rural telephone service, delivery of medical information
to remote areas, educational services delivered by satellite, etc., will be those that most appeal to the majority of the ITU members and will give the greatest potential for success in changing the international table of allocations.

3.1.3 Common Carrier Viewpoint

The panel reflected an opinion that today's technology is (in general) adequate to satisfy the presently defined requirements of the public service sector. These requirements generally fall into the categories of voice transmission from fixed or mobile locations, television, data, or facsimile transmission. However, it was noted that some of these requirements are highly specialized, involve limited applications, and are not aggregated. To become cost competitive, needs must be correlated to provide cost attractive offerings.

The Public Service Communications Satellite User Requirements Workshop may identify requirements involving technology not now commercially available. In that event, the carriers noted that they have in the past, and are continuing to assume the responsibility for technology development for supplying communications service when adequate incentives exist.

There is a role for the government to offer incentives that will encourage private industry to continue the technology developments and implementation to satisfy new user needs. Should these incentives prove inadequate to stimulate private industry development, there could be a role for NASA to develop the needed technology.

The carriers felt that there is a role for NASA in assisting users in defining hardware requirements, preparing operating specifications, and aggregating user needs that have a degree of commonality. The resulting specification should be made available to private industry for competitive bid submission for NASA evaluation. If private industry does not respond acceptably, the service would be a candidate for government development.

3.1.4 Industry Viewpoint

The Public Service Communications Satellite user needs must ultimately be satisfied by commercially viable services. The issue is the process by which this goal is to be achieved.

The panel concluded that NASA, as an agency which is capable of translating user needs into specific system requirements, should perform the total system studies for potential users and specify the system element requirements, i.e., programming, related hardware and/or ground equipment, as well as the satellite system performance and cost goals. The potential users and the commercial suppliers are limited in resources to perform this function and NASA can act as a catalyst in bringing the user and supplier together. Furthermore, NASA can specify the total system requirements of which the satellite link may be a small part in many Public Service Communications Satellite user needs. Upon completion of a detailed definition of the total system requirements, NASA and the potential users can approach the commercial service supplier and determine as discussed below, whether the service is now available or whether a new service must be developed in the private sector or as a last resort in the public sector.

3.1.4.1 Technology Development

The next step is for NASA to determine whether the service can be provided at the desired cost with existing technology. If not, then NASA should sponsor development programs in industry to develop the required technology.

Three types of technology development are anticipated. One is the development of user peculiar equipment, such as special displays, necessary to make a particular service cost effective. Another is advancing the state-of-the-art of ground terminal technology to reduce cost of improved performance. An example might be the development of a new type of low noise amplifier. The third type is the development of new satellite technology, again to reduce cost or improve performance. Examples might be a multiple-beam antenna, power amplifiers in a new frequency band, or a high efficiency solar cell.
3.1.4.2 Demonstration in Orbit

If all parties concerned are convinced that a proposed service is needed, technically feasible and economically viable, then an in-orbit demonstration would not be required, and an operational system can be implemented. In-orbit demonstrations, if required, can be achieved with one or more of the following objectives:

a. To demonstrate technical feasibility, user utility, and cost performance

b. To create a user demand by allowing potential users "hands-on" experience to convince themselves that the proposed service is worth while.

c. In the case where new technology was developed (especially new satellite technology), to verify its performance.

An in-orbit demonstration program in its simplest form would consist of leasing an available transponder from a common carrier, and implementing the ground segment using off-the-shelf equipment. If user peculiar equipment and/or new ground terminal components were developed, these would be added. NASA could take an active role in this stage of the program, procuring the equipment and running the experiment for the user, who would evaluate the data.

There are three methods of procuring a new satellite:

- NASA could procure the satellite from industry and place it in orbit. After the demonstration test phase was completed, NASA could sell or lease the satellite to a common carrier for operation.

- A second method is for NASA to guarantee a minimum lease period of a satellite which is developed by private industry. (The TDRS uses this procurement method.)

- A third method is to allow private industry to develop the satellite and place it in orbit. This method would most likely be a joint venture between the satellite manufacturers and the users.

The method used in procuring a new satellite would depend largely on the amount of risk involved. Obviously, a high risk program with large uncertainty in either technology, user demand, or cost, would not likely be implemented by private industry alone.

3.1.4.3 Operational Phase

A successful demonstration in-orbit would normally lead directly to an operational phase. Regulatory factors (tariff rates, frequency allocations) could present problems and must be considered. The process is shown diagramatically on the following page.
3.2 DATA AND MESSAGE SERVICES

3.2.1 Introduction

There are two overriding socio-technical factors which determine the value of satellite systems for public service user applications. The first of these is the social value of small amounts of data provided at the right place and at the right time. The second factor is the bilateral broadcast nature of the satellite channel which allows communications to take place in broadcast mode to large numbers of users and (less well understood) in broadcast mode from large numbers of users connected in a two-way broadcast network.

Some simple calculations can serve to illustrate both of these points.

3.2.1.1 Data Rates

First consider a single video transponder such as that available on ATS-6 with a total available bandwidth of 30 MHz. The total data rate available from such a transponder could perhaps be as high as

<table>
<thead>
<tr>
<th>STEP 1</th>
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<tbody>
<tr>
<td>NASA WORKS WITH POTENTIAL USERS OR COMMUNICATIONS SERVICE BUYERS SAME FOR EACH APPLICATION</td>
</tr>
<tr>
<td>- EDUCATE USERS ON SATELLITE POTENTIAL AND AGGREGATE USERS (PSSC HELPS)</td>
</tr>
<tr>
<td>- ELICIT FROM USER OR COMMUNICATION PROCURER THE AMOUNT THEY ARE WILLING TO PAY FOR SERVICE</td>
</tr>
<tr>
<td>- CONDUCT STUDY ON PRELIMINARY SYSTEM IMPLEMENTATION (SATellite, FREQUENCY, EARTH STATION TERRESTRIAL INTERFACE, PROGRAMMING ETC) AND ROUGH COST SOLICITING AID FROM OTHERS AS NEEDED</td>
</tr>
<tr>
<td>- ITERATE ABOVE TO TRY TO MAKE A &quot;VIABLE&quot; SOLUTION, WHERE USER CAPABILITY TO PAY IS ATTRACTIVE TO COMMON CARRIER COST TO PROVIDE SERVICE WHERE APPROPRIATE, COMBINE MORE THAN ONE APPLICATION ON SAME SPACECRAFT TO CUT COSTS.</td>
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DECISION POINT 1:
IF SOLUTION IS CLOSE TO VIABLE, PROCEED TO STEP 2

<table>
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<tr>
<th>STEP 2</th>
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<tbody>
<tr>
<td>COMMUNICATION PROCURER PUTS OUT BID PACKAGES TO COMMON CARRIERS (NASA HELPS)</td>
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<tr>
<td>INTERESTED CARRIERS BID</td>
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<tr>
<td>DECISION POINT 2</td>
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<tr>
<td>PROCURE SATELLITE FROM A CARRIER IF PRICE ACCEPTABLE</td>
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<tr>
<td>&quot;NO-GO&quot; ON SATELLITE SERVICE IF PRICE EXCESSIVE</td>
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Alternative situations for "No-Go" at Second Decision Point (or First Decision Point). (NASA need conduct study to determine whether situation B or C exists, maybe with carrier help on price for B-1 below.):

A. Satellite common carrier can meet cost/performance requirements of communication procurer, but terrestrial bid is cheaper.

B. Satellite cannot now meet cost/performance requirements of communication procurer, but could do so competitive to terrestrial if either:
   1. More users aggregated (share costs such as programming)
   2. Advanced technology available to drive cost down (more satellite EIRP makes earth stations cheaper; improved satellite has more channels, less cost per channel; etc.)

C. Satellite cannot now meet cost/performance requirements of communication even with major technology predicted improvements.

Only in situation B does process continue.

Situation B at Decision Point 2:

B-1. More users need to be aggregated

Alternatives:

B-1.1 Further NASA "education" as Step 1

B-1.2 Simple pilot program demonstration, using transponders on existing common carrier satellite

B-1.3 Major demonstration program, using new satellite procured by NASA (operational-like frequency, EIRP, ground station, etc.)

Whenever possible, avoid B-1.3.

B-2. Advanced technology needed to drive cost down

B-2.1 Common carrier develop then provide service. Unlikely because of risk and long time before payoff.

B-2.2 NASA develop technology on R and D flight program. Then repeat step 2, and common carrier profitably provides service on advanced satellite. (Note NASA-developed advanced technology typically usable for several applications.)

B-2.3 NASA develops/launches operational satellite of high new technology, and leases same, then transfers to common carriers.

Emphasis on B-2.2 (or B-2.1 if carriers willing)
100 x 10^6 bits/second. But if we are interested in large numbers of user earth stations, such stations must be small and available at low cost, operating at a lower data rate of perhaps 5 x 10^6 bits/second. User requirements for data transmission however could vary from an average data rate of 0.1 bit per second for sensors to average data rates of 1000 bits per second for file transfers among information processors. Peak data rates could be 1000 or more times these values. Thus user requirements in the public sector must consider the satellite resources consumed by each of these uses, and user requirement considerations must weigh the relative social value of satellite communications for small numbers of high resolution images against the social value of 10,000 times as many low data rate devices.

3.2.1.2 Packet Broadcasting

Satellites communications is often viewed as a substitute for ground microwave or cable channels — a big cable in the sky. Satellite channels, however, can provide a different set of user characteristics as well as the conventional form of point-to-point communications now available from land based communication nets. Nowhere are these capabilities, unique to satellite communications, of more value than in the area of digital communications and message services. The key difference from the point of view of data and message services is the broadcast capability of satellites, providing the ability to link directly a large community of users with two-way digital communications. The necessity of using the broadcast mode of digital transmission for a satellite communications community of many users can be seen with a simple example.

Consider a public service system with many small digital earth stations and say 100,000 users. Then, in order to provide complete connectivity of this community by means of conventional channelized (FDMA or TDMA) communications architecture, we require

\[
\frac{100,000 \times 99,999}{2} = 5,000,000,000,000 \text{ channels}
\]

The impractical nature of this requirement needs no comment. The point we wish to make is that the user requirement of complete connectivity among a large user community can be met by one of the packet broadcasting digital architecture modes now being investigated. And the importance of this form of bilateral digital communications increases as the square of the size of the user community.

3.2.2 Types of Needs

3.2.2.1 State Communications

Computer to Computer

The State of Florida is currently combining the use of its educational computing centers. Large regional centers are being developed that will share computing and software resources with the smaller end user. There are 9 state universities, 20 community colleges and approximately 70 elementary and secondary school districts that will eventually link together. Some of the institutions are multi-campus.

Eventually, the State of Florida will have all 9 State universities linked together covering the entire geographical region of Florida. The links will be from computer to computer with one large administrative computer center plus one large research center with all other universities becoming nodes in the network. Data rates would range from 100b/s to >19.2 kb/s. Of course there could be more than straight point-to-point links, there could be multi-point links and multiple lines associated with each link-up.

Computer links would range from simplex to full duplex and would supply batch and interactive services.

The elementary/secondary schools (K1-12) will eventually share computer resources between themselves and the community colleges. This will be accomplished by dividing the state up in geographical regions.
When the combining of resources is accomplished, there could be as many as 100 computer to computer end-users for batch and time sharing and many (5?) thousand interactive terminals for instruction methods such as learning basic programming languages, information retrieval, and computer assisted instruction.

Fortunately, this "spreading of the wealth" around the state will bring great economic relief to the taxpayers of the State of Florida as well as making the smaller computer center "equivalent" to the larger computer centers in terms of computing capability.

However, this movement toward combined computing capability is not without its drawbacks. To link several educational facilities together to share data there are presently only two choices: telephone land lines and microwave transmission.

Because microwave is so costly, the telephone land line system will almost always be used to establish computer links. This presents many problems. Frequently, land lines "fail" just when they are most needed and they are quite costly. Each additional computer link-up usually takes several lines covering distances upward of a hundred miles.

Perhaps by using a public service satellite system as a method for linking computer centers for the State of Florida (or any other State), the cost to the taxpayers could be kept down to a reasonable level while still allowing growth in education computing within tight budget parameters.

The use of satellite communications would have to be economically justifiable as well as reliable to 99.9% as compared to land line and microwave transmission.

The potential is there for educational data links as well as video links; however, more detailed study is required to establish parameters for a public broadcast satellite (network). It seems that satellite transmission has the potential to fulfill the above described network needs in education; however, it would seem that satellites have unlimited potential in other educational applications.

Interconnection Within Organizations

State and local government as a user group—The interconnection within Georgia exemplifies the class of user to which a Public Service Communications Satellite could be put. The state lists 600 or so "cities" (population of 200 or more); there are 159 counties and 18 Area Planning and Development Commissions (APDC's) composed of groups of counties (some with line responsibilities, others acting more as a service — but each having a hired staff of 10-50 people). The State Government has a myriad of bureaus and divisions whose interests often overlap, e.g., energy, environment, taxation, land use, conservation, development These interconnect with each other and through the system downward. Above this superstructure is the Federal Government with data demands, requirements, and funding sources.

There is, then, a real need for data collection, processing, storage, and transmission at a variety of levels within this structure — sometimes vertical and hierarchical, probably more often useful if it could be channeled selectively, laterally and interactively between elements with a mutual interest.

A more specific example—HUD 701 requires a State Development Plan from the State Office of Planning and Budget. Some portions of the data will be obtained with Landsat technology. Some collection from low orbit satellites, some from ground terminals. The number, variety, accessibility location, and reliability of land sensors could be enormously impacted by collection of data unattended through a Public Service Communications Satellite and transmission of data to interested parties from the same satellite.

Another state office, Department of Natural Resources, is required by another Federal Government agency (EPA, Sections 208 and 303) to provide information on soil erosion. Some of the above data would be useful, but probably additional sensors are needed.
The State would like spatially oriented land use maps, with varying resolution (urban, farmland, forest, wasteland). More data needs to be collected and combined with some of the above.

State and counties working on computer retrieval of land characteristics use 27 different categories of data. Satellite data services operating in a selective matrix format on pertinent data for storage, retrieval, transmission would aid enormously.

Expansion of the example—Once hardware and software procedures are developed for one State's data services regarding land management for all levels of interest, not only can the model be extrapolated to the needs of other states, but interaction at horizontal interest levels on the data becomes feasible with satellite; e.g., water quality on streams that flow from one state to another, forestry service interaction, migration of birds. The value of such horizontal interaction in exchange of data is perceived to be more than technological, but also psychological in expanding the interrelation of individuals with similar interests and concerns. Additionally, knowledge of other approaches, successes, and problems through interchange can be expected to upgrade quality of services as well as improve efficiency of production.

Hands on utilization of data services without requiring enormous technical knowledge, effort or cost — at the working level in local government — can aid greatly in accelerating public knowledge, acceptance and desire to participate in data services.

Government/public interaction—Much data available from government would be of more public interest if it were easily accessible when needed. Details of building codes, noise regulations, demographics, interpretation of new laws, location of specialized services, land ownership information, etc., would be more useful if they could be elicited on demand, especially in non-urban settings where a personal trip to the source would be a hardship.

Conversely, Government polling of public opinion, of public concerns, of public understanding could serve as a positive feedback while preserving anonymity if desired by the citizens. Low cost, simple digital terminals could transmit to a satellite directly, or perhaps to an intermediate repeater site, permitting remote as well as urban participation.

Linkage of affinity groups—Not only from government to citizens, but among citizen groups, interchange of data service on a timely basis could be revolutionary on progress. Examples include medical diagnostics, marketing information among small to medium sized businesses (e.g., the Georgia poultry industry), determination of availability of components and/or materials for small industries, optimizing distribution of agricultural products to retail outlets. The key difference in this as in many of the previous examples from existing available systems (telephone, radio, etc.) is the many-source to many-user capability on a selective interest basis without the requirement or necessity for intermediaries. Satellite appears to me to be the most feasible approach, especially in view of the generally low data rate which permits large numbers of senders and receivers of the data services in an essentially simultaneous mode.

Miscellaneous comments—Whatever develops as guidelines from this conference should be widely disseminated at least among sample user communities for additions, priorities and comments.

Continuous monitoring of other groups and individuals should take place through some identified focal point in NASA, e.g., there's a Conference on Communications and Rural America, sponsored by the Office of Technology Assessment November 15-17 in Washington. Someone should specifically seek their reactions to this conference's output.

The State of Georgia will release its communication needs study within 1-2 months. It should get to the right people to have an influence as expeditiously as possible.

While NASA views the proposed satellite as quasi-operational, it should be designed with a great deal of user flexibility because users will perceive initial use as experimental for them and they should be able to innovate on the system. It would be tragic to eliminate this.
Whatever the value of the documentation produced, NASA has done a real service just by getting this many people together to explore, brainstorm, and air their views. The contacts will be invaluable to me and provide channels for future interchange and action.

Multi-State Organizations

At a recent meeting, July 5, 1976, the Mountain-Plains governors held at Hershey, Pennsylvania, they determined to do two things specifically related to the proliferation of multi-state and regional organizations:

1. Agreed to form a 10-state "Governors Task Force on the Organization and Management of Multi-State and Regional Activities in the Mountain-Plains Area" and to assign key staff personnel to the Task Force;

2. Requested the Task Force (a) to examine the problems for State government connection with the proliferation of State executive branch associations and interstate compacts, and (b) to develop options for consideration by the Governors for increasing the efficiency and strengthening the effectiveness of regional organizations and interstate compacts in the Mountain-Plains area, including ways and means to streamline procedures for regional cooperation and options for consolidating various multi-state organizations.

This concern, as outlined above, was precipitated by a number of factors, the most important being:

1. Lack of accountability to State government.

2. Programs and strategies which were often counter-productive to an individual State or its executives.

3. The horrendous cost to State governments in both dues structure, manpower and travel costs.

4. The heavy dependence upon Federal funding by many of the multi-State organizations which consequently led to risk of the MSO becoming an extension of Federal policy and not the States' capability.

This determination to amalgamate State resources, specifically into one regional entity to reduce costs and/or increase the benefits of State support for multi-state organizations, will emphasize remedies that involve the joint efforts of the region's States.

While a number of management/administrative formats can solve the current proliferation; the quantity and quality of services rendered to various constituents will have to be addressed. It seems obvious at this time that a viable option to the member States is to consider the use of a communications satellite in any one of all the tested formats used on all previous ATS missions and also CTS.

Attached are listed a sampling of a number of multi-state organizations in a five state consortia, the Federation of Rocky Mountain States. Preliminary data on the 10-state compact will push the number close to 400. Amalgamation and/or reduction of many of these institutional arrangements will necessitate an alternative system to State government — a quick cross section of the agencies requiring support is also attached, however, no attempt has been made to determine the type of service — terminal — or format required. It is however assumed that many agencies can and will use or share a terminal — both fixed and mobile, and further that remote sensing will be a mandated service by others.

There has been no effort to define the type of service needed or guess at the number of terminals required. Initially a terminal at each State House — up and down-link is a must. Hours of usage can be determined upon a survey of consortia needs, but is a massive study in itself and guessing at use and format of use at this time would only further confuse the issue.
### Types of Service - Quantity of Terminals

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<th>Broad Band</th>
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<td>Legal (Lead)</td>
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<td>Natural Resources</td>
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<td>Transportation</td>
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3.2.2.2 Federal Communications

Electronic Mail Service System (EMSS)

Constraints and Problems—The United States Postal Service (USPS) is studying the possible implementation of a new message system called the Electronic Message Service System or EMSS. If implemented, it is planned as a national digital data system offering partial or complete replacement of the present first class letter mail system with new equivalent EMSS services to business, government and household customers of the present first class letter mail system. In general, it would provide the equivalent of all present message services, i.e., message, transaction, advertising or a combination of two or more of the above. Messages or data could be inputted in digital (tape disc, magnetic card) format in hand copy (paper, microfilm) form. Cross copy services would be provided so that different input and output forms could be provided to the EMSS user.

It is possible that EMSS, as described above, incorporates many of the needs of the various panel users and that EMSS could possibly use and be a principal subscriber to a Public Service Communications Satellite. However attractive this might be, there are at present USPS policy positions which preclude the present use of the Public Service Communications Satellite for EMSS.

Present USPS policy limits consideration for communication services to common carriers, specialized common carriers and DOMSAT filers. Several other options including (a) the launch and use of a USPS satellite and (b) use of satellites launched and operated by other government agencies were considered but excluded in the final program planning.

Despite present restrictions on USPS participation in the Public Service Communications Satellite System, it is apparent that such a satellite system would be enhanced by the participation of the USPS and the possible use of this satellite for the EMS System. In particular, many of the Public Service Communications Satellite users (educational institutions, medical services, state and local governments) have data and message needs which could be provided within EMSS.

In summary, while the USPS is limited to use of common carrier, specialized common carriers, and DOMSAT tariff filers, this meeting has identified other communication opportunities that should be considered in the planning and implementation of the EMSS System.

EMSS Traffic Trends—According to USPS planning objectives, EMSS will consider providing a partial to complete replacement of first class letter mail with equivalent EMSS services. These would provide transaction message, advertising services or combinations of these services to USPS customers. Possible market penetration due to public acceptance can only be estimated. In the light of such uncertainties, the USPS has chosen to specify EMS traffic requirements and the related modal sizing in traffic and size ranges. EMSS with a minimum market penetration would have a minimum estimated traffic requirement of $5 \times 10^9$ messages per year. On the other hand, a highly accepted EMS System might anticipate annual traffic volumes in the $50 \times 10^9$ message range. Because of the uncertainty in EMS traffic requirements, the USPS has chosen to plan EMSS parametrically within the bounds just stated. Additional USPS marketing studies should enable the USPS to zero in more closely on traffic requirements. Also, the identification of feasible communications subsystem implementations for EMSS requires further expansion of message traffic requirements based upon (a) message mix (i.e., digital, facsimile, OCR read), (b) input options offered, and (c) technological implementation.

On the matter of modal sizing, any EMS System would be a national system providing service to CONUS plus Alaska, Hawaii and Puerto Rico, but the total number of modes would be governed by the cost/economic feasibility associated with the market penetration achieved. According to the best estimates, EMS could contain anywhere from 25 modes nationwide up to 5000-10,000 modes for an EMSS offering full replacement for first class letter mail. In this latter case, the modes would most likely be hierarchical and include (a) remote terminals (either privately owned and interfaced with EMSS, or USPS provided public input terminals), (b) EMSS stations which would be the equivalent of a first or second class post office and (c) EMSS centers which would be primarily message (S/F) centers.
3.2.2.3 Consumer

Aggregated Services

Since the objective of this effort is to move toward an operational public service communications satellite which will prove to be economically self-supporting, at least on the ground segment portion, it is necessary to move away from the anecdotal experiment format. Individual data services considered as individual networks will most likely not be profitable unless many services such as library information, educational services, public safety, etc., can be aggregated in such a way that several institutional resources can be combined to make the satellite system viable.

Such aggregation of services appears both reasonable and desirable in the public interest when one considers the trend of our labor force which is rapidly moving toward the generation and handling of information products—records, billing, inventory, accounting, correspondence, etc. Current assessments indicate that about 46% of the U.S. labor force is in such activity. Coupled with this change from industrial-service oriented societal activity is the deterioration (disillusionment) of metropolitan-urban communities and a desire to relocate people to rural communities. Last year 1.6 million net people moved into rural communities from metropolitan communities. This has been augmented by the availability of broadband communications services which permit the functions of business to be carried out remotely and accessed from headquarters by communications networks. The quality-of-life factors such as health care, education, entertainment and public safety are recognized as necessary by many of the people engaged in this "reverse" migration. Rural communities are often familiar with cooperatives and community programs so that institutional arrangements for multi-user system support is more readily developed. For example, a broadband communication system has been developed by a county in Wisconsin to provide entertainment TV, educational instruction, banking communications, and other minor services. The institutional problems were difficult but appear to be surmountable. The Office of Technology Assessment, an arm of Congress, has recognized this as a specific example of innovative planning and implementation which may become an example to be followed in future rural communications development programs.

This aggregation of community or regional needs requires extensive technological development in terms of protocols, packet message transmission, switching and addressing to accumulate non-real time traffic. Many of the desirable data and message services which appear to be personalized and desirable from a consumer-user point of view are generally of very low data rate when considered in the context of satellite communications and as such can only be supported in the public interest as far as the space segment of such satellite systems are concerned. Equal attention needs to be given to the ground stations, particularly if these serve the needs of a region or community (i.e., county), and the low-cost terminal devices which may require additional message or data processing (storage or editing) at the ground terminal in order to provide the necessary access for transmission. Such SBS-type systems will most likely be required as forerunners to an ultimate digital broadcasting public satellite.

Personal Communications

Personal, Accessible System—This is a discussion of a point-of-view or a design goal in the construction of a Public Service Communications Satellite System. For a technological system to be successfully used, it has to be easily accessible to individuals.

This goal of easy access for individuals is based first in a belief that it is in society's interest for a large number of individuals to use and understand and benefit directly from technological advancements and second, on the observation that it is the use of technology by a large number of individuals which insures widespread impact and continuity of private as well as public support.
Communications and the communications industry have a very strong influence on our day-to-day existence. Two massive communications systems illustrate how communications technology can either advance or restrict us as individuals. The television is in our kitchen; dens, living rooms, and bedrooms. It has literally millions of output terminals and tells us what to think about politics, religion, sex, and unemployment. In fact, it tells us how to think about almost everything but gives us very little if any opportunity to put anything into the system. There are Speak Out programs (for which one must request time) and opportunities to appeal to the FCC but there is really very little that the ordinary citizen who is not exceptionally dedicated can do to influence the broadcasting industry.

The telephone, on the other hand, is an instrument that is easily operable and available to all. We talk to our friends, parents and colleagues easily and frequently. The system is designed and operated for quick, easy and unrestricted access. This same ease of use should apply to satellite use.

The ubiquitousness of the hand calculator and the CB radio—For years we have written and talked about the potential influence of computer aided instruction (CAI) and computing in general on education. However, we have had many abortive and fitfull starts, high expenses and many administrative barriers to effective use of computing in schools. The hand calculator has changed all of this. It is no longer necessary to convince school boards or unions or teachers. The students are appearing in class with calculators and/or checking their homework with them. They, as individuals, are changing the system from within. Soon it will be a personal computer rather than a hand calculator that students will bring to school.

The citizen's hand radio has had a similar impact in voice communications. It has changed law enforcement practice, government agencies such as the FCC and has improved the ability and desire of people to communicate among themselves.

One of, if not the major, impact of these devices is that they allow people to solve their problems themselves rather than to go through one or several levels of bureaucracy. It helps to de-bureaucratize our society.

The Goal: A Personal System—The most important thing to keep in mind is that personal does not mean only recreational. One tends to forget that in discussing the sharing of data bases, accessing library resources or using medical services that it is always one person or a small group of people who are attempting to solve some problem. In fact, in the examples of the hand calculator and the CB radio this problem is most frequently work-related.

What are the possible uses for such a service? First, things that have been successful in the past in a restricted geographical area should be experimented with on a wider area. This is particularly important for groups with special needs and requirements. For example, there is an interesting experiment funded by the State of New York and the Bureau of the Education of The Handicapped at Amherst, New York for both physically and mentally handicapped students. It is the provision of, in computing-in-education times, a standard service-drill and practice in mathematics and reading. This could be provided easily as a computing service. However, there is also the experience of the parents and the students of using such a service in the home which is also an extremely valuable experience to be shared with other families of handicapped children. It is this community which could be enlarged and enriched with improved communications facilities. This particular experiment seems likely to be terminated for lack of funds. However, if it were possible to appeal to a larger population over a larger geographic area it may be possible to define a user group that might generate continuing support for such a service. The innovation and creativeness here is in designing ways to use a service. We presently know very little about how to do this.

Other services are law enforcement activities connected with gossip such as that that the CB radio buffs currently support, national computing activities currently supported by national networks, message sending and conferencing and games. The most important criteria for applications are providing an environment in which people and institutions can discover for themselves what is of use and interest to them.
Needed Research—This goal of personal access to communications is one that requires broad research support to go beyond the current practices that we might transfer from activities in computing and communications. The first avenue is one which would be of use specifically to satellite users—the development of an inexpensive hand-held receiving and transmitting station. This is concurrent research that could significantly impact the potential use of such a satellite. Even if NASA itself does not sponsor such an activity, the statement of the desirability of such an activity will facilitate such an activity by other agencies.

The second and final areas of research are valuable with or without the use of a satellite. The two capabilities which must be better developed are better communications protocols for accessing systems and better techniques for browsing in and using large data bases. If these continue to be cumbersome activities it will limit the growth of the more sophisticated applications that individuals may wish to pursue.

It is through this kind of open access to communications technology that the greatest impact will be made. It will serve our short term goals of better emergency service, better library service, and better elementary and secondary education. It will also produce a more technologically literate society and one more capable and willing to communicate with its members.

3.2.3 Problems and Opportunities

Throughout most of the public service data and message services areas, implementation policy when considering alternatives to common carrier and DOMSAT files presents a policy problem. For example, present USPS (United States Postal Service) policy limits consideration for communications services to common carriers. Options which consider other means have been excluded to date. Thus electronic mail implementation which is technically well suited to a PSCS concept, while also being compatible with mission objectives and goals, could not be implemented by a PSCS system without considerable policy deliberation. Since an EMSS System could easily be extended to offer additional services, in the public service area, this issue is of foremost importance.

Additionally, data services are by nature multi-organization or multi-discipline activities which cross all known boundaries in Federal, State and local sectors. Therefore, it is anticipated that commonality of service, agreements between organizations and a multitude of institutional barriers will present formidable problems.

In addition to those problems the use of a public service satellite for electronic mail service could offer certain opportunities if provided to a limited community. The opportunities we see here involve the investigation of the social factors and user characteristics and user statistics factors which must be understood if the general system envisaged by the U.S. Postal System is to be successfully implemented. The reason for this concern is that a conservative approach to the implementation of a large, general purpose electronic mail system will require the accumulation of knowledge on those sociological factors which determine the use of such a system. The human factors seem to us much less clear than the technological factors, and a pilot system included in a public service satellite could clarify these factors.

3.2.4 Digital Distribution Network Concept

There is a very large spectrum of basic data and message communication services which can be characterized in terms of connectivity and data rate. For example, basic services include digital access lines, digital trunks, switched data service, data collection, data broadcast and data networks.

A Public Service Satellite Communications System would probably have to provide many of these basic services to satisfy the various user applications which are envisioned. On the other hand, if such an undertaking is to adequately serve as a precursor to a continuing commercially viable service, it seems important to especially emphasize those services which represent the largest risks from the technology, cost, utility, and user acceptance point of view.
A prime example of such a service is a satellite-based distributed data network. Such a data network might provide terminal-to-computer, computer-to-computer, or terminal-to-terminal communications in support of educational, health service, informal message system and other specific applications. Satellite-based data networks offer unique possibilities for providing flexibility by removing topology constraints, serving geographically distributed and potentially mobile users, accommodating modular growth, and integrating a number of specific applications. The terrestrially based ARPANET and planned and operational networks such as Autodin II and Telenet, which are based on ARPANET technology, provide evidence of the utility of such computer and message networks for some applications. There are, however, significant questions about the economics of such networks and about the level of user sophistication required to effectively utilize them. Specifically, there are currently no satellite-based networks. Further, while it is likely that satellites will be used to provide trunking for some commercial networks, it is not likely that satellite terminals will be used to provide access to individual or small groups of users in the near future because of cost and market uncertainties. A fully distributed system which provides user access directly to the satellite without the requirement for the use of terrestrial facilities would be particularly well matched to many of the public service applications, particularly those involving service to sparsely populated areas.

Thus a service which should receive careful attention as an important building block for a Public Service Communications Satellite System is satellite-based distributed data networking. Prime goals should be to establish and demonstrate the economic viability of such a service and to develop and convincingly demonstrate the utility and human engineering of applications based on such a service. Packet broadcast satellite ideas provide the fundamental technology. In addition, ground based packet broadcasting, currently being demonstrated by ARPA, may be a useful adjunct to provide economical and flexible access to earth terminals, i.e., some concentration.

3.2.5 Preliminary Technology and Considerations

The realization of a Public Service Communications Satellite System depends on merging the needs of a wide variety of potentially fragmented users with a wide range of needs for data rate, urgency, connectivity and frequency of use. Satellites have the unique capability to service such a widely varied and widespread community of users because of the multiplex accessibility and broadcast nature of the satellite channel. Yet in order to meet the needs of the majority of prospective users, two guidelines emerge for economic consideration. First, the few extremely large users should be excluded from common use of the satellite with the many smaller users. Thus, in fact, excludes only the continuous video user with data rate in the megabits or tens of megabits per second, for his needs drive the requirements of the system and hence change its basic character. The second more general requirement is for inexpensive terminals with a high degree of commonality. Thus, for example, interactive graphics terminals, medical sensor terminals, bulk data transfer terminals and even a limited number of digitized voice circuits should be able to coexist over the same satellite without the need for dedicated transponder channels or even necessarily the separation of different classes of users onto separate transponders.

The technique for achieving the commonality requirement is at hand. It is known as demand-assignment multiple access communications, or simply as packet transmission, and provides a common format for all users to share a common frequency allocation with efficient use of the channel capacity (i.e., bandwidth and power) in a very cost effective manner. Users with urgent needs or time-continuous needs (such as voice) can be allowed to preempt the channel for short periods, with normal traffic or bulk background low priority and low urgency traffic allowed to fill the gaps.

The challenge is the utilization of existing and developing digital technology (low cost processors and memories) to furnish inexpensive terminals capable of implementing the multiple access and demand assignment tasks required by such a system. Even here a wide variety exists in the complexity of such tasks, very simple techniques permit common operation of many users with low efficiency, while somewhat more sophisticated methods provide considerable improvement in efficiency during peak usage.
The rapid evolution of digital technology, greatly accelerated in the past half decade, gives promise of very inexpensive implementation of even sophisticated assignment and multiple access algorithms. The cost of the earth terminal segment can be further reduced by greater investment in the space segment. The economic advantage of such a tradeoff is continuously increased as more and more users enter the satellite network.

An essential step in the evolution of a Public Service Communications Satellite prior to the formulation of a definitive program is the conceptual design of such a satellite network serving a large community of diverse users with small-to-medium requirements. This would provide the economic yardstick with which to measure the degree of user acceptance and the extent to which the system can achieve the identified needs.
3.3 ELEMENTARY AND SECONDARY EDUCATION

3.3.1 Objectives

3.3.1.1 Discipline Objectives

To recognize and support the principle of cultural pluralism which is rooted in our common concerns as humans as well as the differences that enhance the strength and diversity of peoples.

To provide programs, resources and services to children, to youth and to their educators for the purpose of fostering their comprehensive development as individuals and productive members of a changing society.

To plan, diagnose, develop, implement, evaluate, and reassess instructional programs for elementary and secondary students based upon individual needs.

3.3.1.2 Statutory Requirements

Federal, State and local mandatory education laws and corresponding regulations, i.e., Public Law 94-142, Education of All Handicapped Act.

3.3.1.3 Objectives to which Satellites Can Make a Contribution

a. Making resources available to remote isolated areas which otherwise would not have access to them (i.e., making available a physics teacher to an area which has none)

b. Enabling schools and teacher associations to exchange ideas and teaching practices nationwide and worldwide (i.e., New Zealand and Lexington, Kentucky).

c. Lessening the sense of isolation many teachers feel when teaching in remote places (harsh physical environment makes teachers eager for outside contacts).

d. Providing opportunities for teachers to participate in projects of significance both nationally and internationally

e. Developing relationships with teachers in other lands

f. Providing in-service educational opportunities for teachers and other educators.

g. Providing a mechanism whereby students can exchange ideas with other students from widely separated places

h. Reaching isolated, mobile, and disperse populations as easily as we reach dense population centers.

i. Providing the opportunity to build closer relationships between individual teachers and their national and state associations, especially where distances present an almost insurmountable problem to effective intra-organizational communications

j. Making possible the development of a new kind of organization for problem solving — one based on a community of interests rather than on geography (i.e., language similarity; urban problems, rural problems, mobility).

k. Making resources available to overcome insularity of impacted urban areas.

1. Linking established delivery systems for increased flexibility in storage, distribution and utilization of materials and resources.

m. Providing access to individualized instruction programs and resources for students with various types of handicapping conditions.

3.3.2 Communications Needs

3.3.2.1 Types of Communications Needs

a. Instructional services for student use.

b. Professional development of teachers and administrators.

c. Storage, distribution and utilization of resource data.

d. Parent/community understanding of educational needs and programs.

e. Educational program development and evaluation

Charts on each of the above categories of needs are shown on the following pages.

3.3.2.2 Communications Networks

Present

- Public Broadcasting
- Instructional Television
- Fixed Service Cable
- Telephone
- Eric Clearinghouse
- CBRU (Computer Based Resource Unit)
- PEACESAT Satellite Network
- Appalachian Regional Satellite
- Regional and State networks (microwave leased lines)
- Commercial broadcast networks
- PLATO System

Short Term

- NIMIS (National Instructional Materials Information System)
- Special Education Learning Resource System
- Commercial Satellite networks

Long Term

- Public Service Satellite networks
- Fiber Optics
- Lasers

3.3.3 Problem Areas/Constraints

a. Copyright and Residual Rights Problems on materials distributed by satellite.

b. Invasion of privacy.

c. Spillover of satellite signals into unwanted areas.

d. Free-loading of satellite signals.

e. Reluctance of educational institutions to grant academic credit beyond the walls of the institution.

f. Fear of the unknown, especially technology that doesn't work.

g. High start-up costs.

h. Educational authority rests at the local level, raising concern that control of the delivery system will lead to control of the curriculum and a reduction of local autonomy.
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<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Elementary</td>
<td>Written</td>
<td>Audio Transceiver</td>
<td>65,000</td>
<td>NATION-WIDE:</td>
<td>The system should be operational 7 hours per day, 5 days a week: Total of 35 hours per week.</td>
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<tr>
<td>Secondary</td>
<td>Messages</td>
<td>Computer Terminal 2-way Video</td>
<td>1,000</td>
<td>Fixed, Mobile</td>
<td>A. A system with this configuration will:</td>
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<tr>
<td>Instructional needs of elementary and secondary students</td>
<td>Slow-Scan Video</td>
<td>Fixed, on the number of hours days a week:</td>
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<td>a) have independent access to instructional programs and resources when needed.</td>
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<td></td>
<td>Audio</td>
<td>Teletype</td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td>b) have remote access to specialists to aid in the diagnosis of educational problems of their students.</td>
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<td></td>
<td>Audio</td>
<td>Video Tape</td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td>c) obtain immediate access to remotely stored instructional materials, resources, and programs.</td>
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<td></td>
<td>Audio</td>
<td>Tape</td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td>d) provide computer assisted instruction for their students.</td>
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<td>Simplex</td>
<td>Recorder</td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td>e) use multi-channel capability to provide differentiated instruction for various ability groups.</td>
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<td></td>
<td>Duplex</td>
<td>Multi-Channel Recorder</td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td>f) to obtain expert consultation services related to educational problems.</td>
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<td></td>
<td>Facsimile</td>
<td>Capibility</td>
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<td>Fixed, Mobile</td>
<td>2) Provide students with opportunities:</td>
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<td>Mobile</td>
<td>Fixed, Mobile</td>
<td>a) to see/hear/participate in special events that have limited appeal to commercial media.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Computer</td>
<td></td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td></td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Data</td>
<td></td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Television</td>
<td></td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Television and Two way audio</td>
<td></td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TV Teleconferencing</td>
<td></td>
<td>Mobile</td>
<td>Fixed, Mobile</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6 (continued)

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
</table>

b) for computer assisted instruction (CAI) that will enhance individualized instruction and increase efficiency of teacher/student instructional time.

3. With mobile receiving terminals, a system such as this can also be used to provide temporary instruction for home-bound students or long term instruction for students who require an alternative to public/private school instruction.
<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teleconferencing for Teachers &amp;</td>
<td>Audio/Video</td>
<td>2-Way Voice/Video</td>
<td>1 per</td>
<td>U.S. 50 States and the Territories</td>
<td>2 hour transmissions</td>
<td>Need: legislative briefings; Bd. of Dir. Meetings; Public policy reeducation; interviewing public officials Inner-Association Communication, Education &amp; Related Professions.</td>
</tr>
<tr>
<td>other Educators 4 M</td>
<td>Multiple</td>
<td>RO Terminals</td>
<td>300</td>
<td></td>
<td>5 days/wk</td>
<td></td>
</tr>
<tr>
<td>In-Service Courses for Teachers &amp;</td>
<td>Video RO</td>
<td>School house termi-</td>
<td>NA</td>
<td>U.S. 50 States and the Territories</td>
<td>5 courses/wk (1 hour each course, 3 times per wk)</td>
<td>Need: Professional growth &amp; Development of teachers re: instructional matters re: cultural interchange (National &amp; global) re: Expert consultation re: home instruction for teachers.</td>
</tr>
<tr>
<td>Other Educators 4 M</td>
<td>Audio 2 Way</td>
<td>- 1 per each</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital Data</td>
<td>school building</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Telex-Mailgrams Telegrams</td>
<td>Data Link</td>
<td>500/day to the field</td>
<td>Each state and regional office and central office</td>
<td>U.S. 50 States and the Territories</td>
<td>130,000 Telexes Mailgrams, Telegrams</td>
<td>Need: Intra-Association Communications Ex.: NEA AASA etc. (See: NEA Model Attached)</td>
</tr>
</tbody>
</table>
Table 8
Professional Development Needs

(Prototype of requirements of one national professional teachers association)

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teleconferencing for Teachers</td>
<td>Audio/Video Multiple simultaneous Terminals</td>
<td>2-Way Voice/Video RO terminals in NEA regional offices</td>
<td>Present: 0, Planned: 2,000</td>
<td>U.S. 50 States and the Territories</td>
<td>2 hour transmissions, 5 days/wk</td>
<td>Need: for legislative briefings, Board of Directors meetings; UNISERV training sessions</td>
</tr>
<tr>
<td>In-Service Courses for Teachers</td>
<td>Video RO; Audio 2 Way Color; Digital Data</td>
<td>School house terminals - 1 per each school building</td>
<td>Present: 0, Planned: 0, Needed: 65,000</td>
<td>U.S. 50 States and the Territories</td>
<td>3 courses/wk (1 hour each course, 3 times per wk)</td>
<td>Need: for professional growth and development of teachers</td>
</tr>
<tr>
<td>Telex, Mailgrams, Telegrams</td>
<td>Data Link</td>
<td>25/day to the field, 25/day from the field</td>
<td>Present: 0, Planned: 2,000</td>
<td>U.S. 50 States and the Territories</td>
<td>15,000 Telexes Mailgrams, Telegrams</td>
<td>Need: Intra-association communications</td>
</tr>
<tr>
<td>Data Transmission Computer Uses</td>
<td>Video, RO Audio 2 Way Digital Data</td>
<td>NEA UNISERV offices nation-wide</td>
<td>Present: 0, Planned: 0, Needed: 2,000</td>
<td>U.S. 50 States</td>
<td>500 uses daily</td>
<td>Need: Research data, membership surveys</td>
</tr>
</tbody>
</table>

School districts: 17,000
School buildings: 65,000
Professional orig.: N/A
### Table 9

Information Storage, Distribution and Utilization of Materials and Resources

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No.</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Retrieval Distribution and Utilization of Educational information</td>
<td>2-way digital, 1-way audio, 1-way video, 1-way facsimile</td>
<td>Input/Output terminals with print-out capability; audio, video, and facsimile read out capability</td>
<td>1 in each school</td>
<td>65,000</td>
<td>Available on demand could possibly be processed after school hours.</td>
<td>Information to be stored:</td>
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<tr>
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<td></td>
<td></td>
<td>1. Student data</td>
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<td></td>
<td></td>
<td></td>
<td>2. Programs of studies</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>3. Instructional Objectives</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>4. Learning activities</td>
<td></td>
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<td></td>
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<td></td>
<td>5. Learning modes</td>
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<td></td>
<td>6. Media Resources</td>
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<td></td>
<td>7. Measurement Instruments</td>
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<td></td>
<td>8. Diagnostic/Remedial procedures</td>
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<td></td>
<td></td>
<td>9. Management Information</td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Inter-school teleconferencing with</td>
<td>2-way video</td>
<td>Audio/video receivers in regional</td>
<td>50</td>
<td>U.S. States</td>
<td>60 min. each week</td>
<td>Method: Regional active participation by schools. Home viewer participation via phone to regional site if desired.</td>
</tr>
<tr>
<td>home-viewing</td>
<td>2-way audio</td>
<td>sites</td>
<td></td>
<td></td>
<td>or 30 min. 3 x/wk</td>
<td>Purposes: 1. To aid parents in dealing with their children 0-18 years.</td>
</tr>
<tr>
<td></td>
<td>video</td>
<td>Video receiver in each home</td>
<td>65,000</td>
<td></td>
<td></td>
<td>2. To develop public participation in educational policy.</td>
</tr>
</tbody>
</table>

*Table 10: Public Information Needs*
<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No.</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional program development and selection of programs Elementary and Secondary Schools</td>
<td>Video/Audio</td>
<td>Point to Point Video School Terminal for U.S.A.</td>
<td>65,000</td>
<td>U.S. 50 States and the Territories</td>
<td>8 a.m. - 3 p.m. Mon. - Fri. 180 days of school 1260 hours</td>
<td>Need: Increased delivery of nonprint curriculum in addition to present PBS system. The volume of program activity prohibits viewing because of the last of delivery systems and access to products. Most stations could provide double their present delivery if there were more space available.</td>
</tr>
<tr>
<td>Additional program development and selection of programs for parents of students</td>
<td>Video/Audio</td>
<td>Point to Point PBS Commercial Networks 200 35,000 students Approx. 12 million homes</td>
<td>156 hours per year</td>
<td>U.S. 50 States</td>
<td>3 hours per week</td>
<td>Need: For increased understanding by parents of the educational curriculum used by schools</td>
</tr>
<tr>
<td>Additional program development and selection for pre-school early childhood grade level 2-4 years old</td>
<td>Video/Audio</td>
<td>Point to Point Video for U.S.A. Day Care Centers or Home Market</td>
<td>10,000 (approx)</td>
<td>U.S. 50 States and the Territories</td>
<td>Potential capacity 3 hours per day 1000 hours per year</td>
<td>Need: To provide additional pre-social program material for pre-school children</td>
</tr>
</tbody>
</table>
Table 11 (continued)

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Audience programming in Elementary and Secondary Education</td>
<td>Video/Audio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Need: Provide special programming to target groups for equal educational opportunity in school districts, - minority ethnic - special education - vocational education</td>
</tr>
<tr>
<td>a) Block and Spanish</td>
<td></td>
<td>Point to Point Major urban areas 10,000 school buildings</td>
<td>85,000 school bldgs.</td>
<td>50 States</td>
<td>2 hours per day Mon - Friday</td>
<td></td>
</tr>
<tr>
<td>b) Special Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@ 180 days per year 1,800 hours</td>
<td></td>
</tr>
<tr>
<td>c) Vocational Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 hours per day 2,190 hours per year</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 hours per day 720 hours per year</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five Programs Simulation example - Toronto Moon Vigil</td>
<td>2-way Video audio</td>
<td>Regional groups interconnecting with PBS stations by terrestrial links Elementary and Secondary Schools</td>
<td>6 up-links</td>
<td>150 receivers</td>
<td>50 States</td>
<td>Need: The sharing and collaboration of key educational professionals in a broad geographic area</td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
</tr>
<tr>
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<td>---------</td>
</tr>
<tr>
<td>USER in-</td>
<td>2-way video/audio</td>
<td>NEA Regional Officers 50 States 2 hours per week (realistic potential)</td>
<td>2,000</td>
<td>2 hours per week (realistic potential)</td>
<td>Need: Involvement by users of product to participate in program planning of the development of curriculum product</td>
<td></td>
</tr>
<tr>
<td>public</td>
<td></td>
<td>Teachers - 50 States 2 hours per week (realistic potential)</td>
<td>2,000</td>
<td>2 hours per week (realistic potential)</td>
<td>Need: Involvement by users of product to participate in program planning of the development of curriculum product</td>
<td></td>
</tr>
<tr>
<td>policy</td>
<td></td>
<td>PBS Stations or Regional Networks 50 States 2 hours per week (realistic potential)</td>
<td>150</td>
<td>50 hours</td>
<td>Need: Involvement by users of product to participate in program planning of the development of curriculum product</td>
<td></td>
</tr>
<tr>
<td>Teleconferencing for variety of Associations and audiences a) teachers b) supt/ administrators c) students</td>
<td>2-way video/audio</td>
<td>Point to Point Confering Maximum 20 Participants for groups terminals 50 States Depends upon availability Potential 1,000 hours per year.</td>
<td>20</td>
<td>20</td>
<td>Need: Establish better lines for communication; bringing together groups from large distances without necessary travel expenditures.</td>
<td></td>
</tr>
</tbody>
</table>
3.3.4 Potential Benefits of Satellites (economic and social)

a. Substituting communications for travel in the delivery of public services, particularly in rural remote areas.

b. Enabling organizations to train their personnel in far-away places and avoid having to bring them to the headquarters locations.

c. Developing an appreciation of other cultures and life styles and stimulating the use of other languages by Americans.

d. Improving the economic and social conditions in underdeveloped or economically deprived areas through improved communications.

e. Helping to alleviate the financial burden of transporting students great distances in rural areas. (Many rural communities have minimum economic resources with which to finance their educational systems, reduced accessibility of schools to both teachers and students, and a need for a wider array of educational services. Satellites can help with these problems.)

f. Making more effective the delivery of services to large, thinly populated areas. (Communications satellites are particularly effective in delivering services to a large area whereas terrestrial techniques are more effective in delivering service to points or small areas.)

g. Increasing options for individual learners by providing more choices (e.g., teaching languages not offered at student’s school).

h. Linking highly specialized diagnostic services and educational procedures with handicapped children in low incidence categories.

3.3.5 Recommendations

a. Make an in depth study to translate educational needs into quantifiable data for the purpose of making accurate projections for satellite communication systems.

b. Develop a high powered satellite so that inexpensive earth terminals can be made available.

c. Develop low cost mobile and fixed terminals. (This might be done by either public or private means.)

d. Establish a cooperative within the Federal Government that enables a variety of agencies to respond to the necessary hardware needs that educators will have in order to properly implement satellite program activity.

e. Identify and support those resources necessary for program development. It is the panel’s opinion that NASA should support Congressional action to increase resources beyond experimentation, as a people’s dividend in the space effort.
3.4 EXTENSION AND CONTINUING EDUCATION

This report follows the outline prepared for use by the twelve panels to ensure some relatedness in the findings of these panels. Since the group had no part in construction of the outline, it has imposed some constraints on the way the report has been prepared.

All panel members contributed to the writing contained in the report. This resulted in some duplication which is not to allow to be edited out but which, for the reader, serves to emphasize important points.

3.4.1 Objectives

3.4.1.1 Discipline Objectives (services to be provided)

In developing discipline objectives for a satellite based communications system, two basic assumptions must be made: first, satellite coverage must be area-wide or broadband and two, the development of such a system will require the fullest development of every possible service (entertainment, public and commercial).

The potential for developing truly open-ended and flexible continuing education through the creative use of satellite systems is high. Specific areas that present an immediate demand for broadband satellite technology are:

1. Business and commercial services offer the greatest potential in fast growing rural and small town communities.

2. Medical and health services pose a special problem for most communities not only in terms of continuing education for medical and health personnel, but also in providing for the consumer's need. The medical and health personnel include physicians, nurse practitioners, mental health personnel, dentists and allied health personnel. Consumer needs include both education and services, e.g., emergency medical services, primary care and pre-natal care.

3. Education needs of most communities involve the full range of education personnel and students. Continuing and adult education services have been identified from various studies (Delker Study, ARC Needs). Adult literacy programs have a high priority. Consumer education services in budgeting and family management are clearly identified. Continuing education for parents and educators in parent skills including child development and family relationships is another high priority.

4. Government operates at many levels. The need to inform and include the public in various governmental program formulations is vital. Training and information services to local, state and federal government in data processing, fiscal and administrative operations, and coordination of social services, are some of the services needed.

5. Human resource development is one of the most pressing needs of this country. Areas of development using satellite technology include education for employment, vocational rehabilitation for the medically and physically disabled, employment services, nutrition and housing, continuing education for social services personnel, and education for America's recreational development.

By using the catalytic and broadband capability of a satellite, the process of reintegrating the education institutions to the needs of the community it serves can be accelerated. Accessibility of citizens to more information to assist in dealing with immediate career, health and recreational needs can be enhanced.

It is apparent that satellites and gradual community based programs do not provide a panacea for all organizational and program ills. They do, however, constitute an effective alternative for regional community based program development, since they are multi-disciplinary by nature and are therefore capable of responding to a totality of needs that transcend one discipline.

3.4.1.2 Statutory Requirements

Post secondary educational institutions are, obviously, required by law to provide instruction, though the specific curriculum offered may not necessarily be defined by law with regard to specific content. Accreditation agencies stipulate certain requirements, however, individual states may define specific roles for certain types of institutions. For instance, the community college system in many states are charged with providing a university parallel program for those who will ultimately complete a four-year degree but, in addition, are also charged with the responsibility of responding to community needs for occupational, vocational and technical training programs which are usually structured within a one or two year certificate of "terminal" degree program.
A great variety of instruction provided by post-secondary education is made available to meet community needs — preparation for license examinations in a number of fields, in-service training for occupations faced with changing methodologies and technologies, continuing education for a number of professions and occupations that require recertification, and courses that provide information and/or skills necessary for job advancement. Such instruction may not be assigned, by law, to a particular institution, but post-secondary institutions respond to the needs of those individuals in certain professions and occupations who are required by law, by regulatory agency, or by professional standards to meet specified requirements.

Other instructional responsibilities such as providing for the needs of ethnic minorities (e.g., blacks, or Spanish speaking populations) or groups such as the physically handicapped or those confined to institutions (e.g., prisons or rehabilitation centers) are defined or implied by equal access/equal opportunity legislation.

Institutions, then, find themselves faced with the challenge of meeting a wide variety of needs for a very heterogeneous population. Meeting these needs is greatly facilitated by the use of one or more forms of educational telecommunications that allows instruction to move off the campus, into the community, the industry, the institution and often even the homes of individuals with special problems and requirements. A wide variety of technologies are in current use meet these needs: video (both open and closed circuit); radio; two-way interactive audio, and to a lesser extent, two-way interactive video; computer-assisted instruction; computer managed instruction; telephone interaction; audio with telephone interaction; video with telephone interaction; plus the usual array of audio-visual equipment such as film, video cassette and audio cassette.

3.4.2 Communication Needs

A number of the needs of post-secondary institutions are described in other sections of this report: Data and Message Services; Environmental Communications; Library Services; Medical Education; Medical Services; and Public Safety. In addition, specific groups such as Business and Industry and Professional Societies are discussed from the perspective of their on-going services, particular needs and willingness to participate in financing arrangements.

3.4.2.1 Types of Communications Needs

The Health Professions

The health professions have a membership of about 4.5 million persons. Approximately 2.6 million of these are full-time employees of about 34,000 in-patient health care facilities.

In recent years the health professions have been subject to considerable criticism, much of which stems from the concern about professional obsolescence and the resultant impact on quality of patient care. As a result, peer review, audit of charts and records, self-assessment by test or computer, and mandatory continuing education are becoming common practice in the search for a method to assay clinical competence.

In 1967, the National Advisory Commission on Health Manpower broached the subject of relicensure, and since then sentiment in support of some means of updating qualifications has grown within the professions. At the national level the American Academy of Family Practice, the American Dental Assistants Association, the National Board for Certification in Dental Laboratory Technology, the American Dietetic Association, and the American Registry of Clinical Radiology Technicians require their members to obtain a number of continuing education credit hours each year to receive continued certification. The American College of Physicians has established a program of self-administered, self-assessment examinations, while the American Medical Association provides a special award for physicians completing 150 hours of continuing education within a three-year period.

At the state level, currently five state medical associations require completion of a number of continuing education credit hours each year to be eligible for membership. In a number of states, regulations have been established or statutes enacted requiring evidence of continuing "qualification" for optometrists, osteopathic physicians, dentists, dental hygienists, and nurses. Thus, a considerable amount of money is being spent on continuing health education; however, no figures are available.
The health professions recognize that if they do not establish and enforce educational standards, the public may demand sweeping legislation that will bring about such standards. However, the professions do understand the shortcomings of both the legally required and voluntary continuing health education.

Because of the nature of the professions and the distribution of the members, continuing education can bring hardship to health professionals and the public. Members of the medical professions are as widely dispersed as the population of the United States, but are few in number relative to the demands of the population. For example, for every 100,000 people there are approximately 152 physicians, 48 dentists, and 370 registered nurses. Moreover, the distribution of health personnel does not necessarily coincide with the availability of continuing education programs. The availability of time to attend such programs is a major consideration. In light of the caseloads for doctors, dentists, and nurses, and in view of the understaffing of many health care facilities, attendance at continuing education classes (particularly for members of the professions who must travel a considerable distance to attend such classes) can further contribute to the shortage of health care professionals and undoubtedly increase the cost of health services. Consequently, means for meeting the continuing education requirements of the health professions have been and are being explored.

Although not the only distribution systems being explored by the health professions, combined terrestrial and broadcast satellite systems have undergone experimentation and are still being explored as a feasible and desirable means of providing equal continuing health education opportunities to all practicing health professionals. Starting in 1971, Hawaii and Alaska used the first Applications Technology Satellite (ATS-1) on a limited scale to explore the possible value of the technology to continuing health education. During 1974 and 1975, the ATS-6 was used by some experimenters in Alaska, the Rocky Mountain States, and the Appalachian States for the same purposes. This experimentation is continuing during 1976 and 1977 on the CTS, during which the Association for Western Hospitals, Laster Hill, HEW and the States of Washington, Alaska, Montana, and Idaho (WAMI) are involved.

Thus, the health professions are establishing a foundation for the use of communications satellites and other telecommunications systems to meet their needs for continuing education. If such use of the satellites is proven practical and economical, the health professions may be a major user of satellites for continuing education.

Correctional Institutions

The correctional institutions, because of their purpose and characteristics, could possibly benefit from the use of communications satellites for education and training. While the correctional institution population is small, the population's cost to society is extremely high.

The number of individuals incarcerated in the United States is roughly 417,000. There are approximately 23,000 in 47 Federal institutions, 252,000 in over 400 state institutions, and close to 142,000 in 4,037 county and local institutions. These figures do not include individuals in institutions for the criminally insane.

The individuals who make up the prison community are as diverse in age, experience, aptitude, interests, and learning styles as the population from which they came. As a consequence, when penal institutions attempt to provide education and training programs for this diverse group, they are faced with the impossible task for providing an almost universal range of programs. Nevertheless, many state and local correctional budgets make no provision for full-time teachers or other resources necessary for meaningful education or training programs. With the dearth of funds available for rehabilitation, programs are quite limited.

*Includes Doctors of Medicine (333,000) and Doctors of Osteopathy (12,000)
**The health professions are also experimenting to determine the value of satellites and other distribution systems as a means of directly improving practice of health care
***The 252,600 includes roughly 77,000 in training schools for juvenile delinquents
At the local level, 89.2 percent of the county and municipal jails have no education programs. Where programs do exist, many classrooms are make-shift, poorly lighted, inadequately ventilated, and drably furnished. In addition, the traditional modes and methods of instruction are used by "second career" educators, or "day-end-worn" teachers from local schools. This is not to say there are no exceptions to what is being described, for there are.

On the positive side, Texas, Connecticut, and Illinois have created school districts that include correctional institutions. In these districts correctional institutions are allotted budgets, staffs, materials, and other resources similar to those available to other educational institutions in the districts. In addition, some state and Federal institutions have many exemplary educational and vocational training facilities and spend an average of $23 million a year on educational and vocational programs. Interestingly enough, the Federal prisons plan to drop the requirement that all prisoners choose in some educational or vocational program for the duration of their incarceration; those who wish to may do so. This decision is based on the belief that it is a waste of time to attempt rehabilitation of inmates who do not wish to be rehabilitated.

The concern over education and training in penal institutions continues to grow. Inadequate educational and training programs is a grievance listed by prisoners, and the journals associated with correctional education and training are replete with articles addressing the problem. One thing is clear: the current educational and vocational programs of penal institutions have not been very successful at rehabilitation, which is attested to by the high recidivism rate of inmates. The reasons are not known; many individuals may not want to be rehabilitated. However, for those inmates who desire rehabilitation, conditions and programs should be made available to help reduce the cost of crime to society.

One step in improving the rehabilitative effort may be the use of communications satellites. Correctional institutions could pool their resources to obtain services for inmates and employees that are not possible today within current budgets. Excellent courseware, instructors, computer systems, and career counselors could be made available to all who wish to participate. A logical extension of this concept could be the tapping of public service and educational institution programs. Availability of educational programs would decrease the use of Study Release programs and minimize the requirement for instructor personnel to come into the institutions.

The two-way interaction possible with communications satellite technology offers potential for opening up correctional institutions by permitting access to persons, places, and things that is not possible now. This potential could be capitalized on to aid in rehabilitation by providing some half-way house or socialization experiences while the inmates are still confined.

Individuals within the correctional field are becoming aware of the potentials of communications satellite technology for starting or improving educational and training programs for inmates and employees of institutions, among other applications. However, little has been done by the correctional community to explore these potentials. Nevertheless; as their awareness and understanding increase, correctional institutions may become major users of satellites for inmate and employee education and training programs.

Legal Profession

The legal profession has many characteristics and problems similar to those of the medical profession. Members of the legal profession are widely dispersed, the content of the profession is constantly changing, and members have limited opportunities for continuing their legal education once they leave law school.

Lawyers, like doctors, are few in number relative to the population. The legal profession of the United States is comprised of approximately 355,000 members of the bar. The majority are in private practice. Slightly over 23,000 serve in a judicial capacity. There are about 161 lawyers per 100,000 population.
With the increasing rate of crime, the jammed court dockets, and recent events in the Federal and certain state governments, the profession has received considerable criticism and is being scrutinized. Demands are being made for a better organized, more responsible and responsive legal profession. Recently, state and local courts came under attack from the Law Enforcement Assistance Administration (LEAA) of the U.S. Department of Justice for the courts' fragmented and overlapping jurisdictions, lack of sufficiently trained personnel, inconsistencies in handling various classes of proceedings, and shortage of judges. As a result of this, other attacks, and problems in general, there is growing concern about the continuing education programs of the profession and how to keep members current and responsive.

Over the past 3 years, continuing legal education has become an issue in almost all states. Two states, Iowa and Minnesota, have made continuing legal education mandatory. And, according to a recent survey by the Continuing Education of the Bar Office of the American Bar Association, all states except 16* and the District of Columbia are at some point of deliberation about mandatory continuing legal education. One state, Wisconsin, has the proposed requirement before the state supreme court; six states have drafted plans which are currently under review by the state bar association; and 21 states have the subject under study by bar association boards or committees.

Continuing legal education courses are offered by the American Bar Association, state bar associations, local bar associations, and commercial firms. Generally, attendance is voluntary and the courses are paid for by the attendees. Because of the location and cost of courses ($400 to $4,000), many are prohibited from attending.

Some state legal systems do require attendance at certain intensive training sessions once or twice a year, but normally these meetings address "the hot issue of the day" rather than the total training needs of the attendees. Most of the training comprises lectures, workshops, discussions, seminars, and the use of videotape cassettes; there is considerable variation in the quality of the programs. Consequently, the adequacy of current educational offerings may be questioned as continuing education becomes increasingly required in the legal profession.

If continuing legal education becomes mandatory, the legal profession will be faced with the same basic problem as the health profession. Institutions or programs are not readily available or convenient to a great number of the profession. However, the criteria for obtaining credit will be of great importance. If videotape courses or local bar association meetings are accepted for credit, problems will be greatly reduced.

Currently, the legal profession is exploring alternative means for making continuing education programs available to its members. Satellites are being considered as one alternative distribution system for providing members of the profession with the required courses.

Business and Industry

Business and industry are not newcomers to the use of communications satellites. The domestic satellite business is a reality because of these users, and it will continue to grow as a function of their desire for services. Training is one of these potential services.

Business and industry, excluding the health and legal professions and government employees, employ about 64 million people. With the downturn in the economy and increasing competition from foreign business, U.S. business and industry are attempting to attain a more competitive posture by eliminating unnecessary workers from their payrolls, improving production practices, and increasing the capability of personnel they retain.

To aid personnel development, business and industry have placed more emphasis on training and development programs and each year more programs are being instituted, with nearly $1 billion now

*States in which no study or action is currently contemplated are Alabama, Arkansas, Delaware, Florida, Hawaii, Kentucky, Louisiana, Maine, Mississippi, Montana, New Jersey, New York, Ohio, Oklahoma, Tennessee, West Virginia.
being expended annually on training-education equipment and materials. Today, a large percentage of the work force is provided opportunities to participate in training or career development programs.

Firms prefer to offer inhouse training, under their own direction. They use a variety of methods and media, with TV videotapes increasing in use. For larger firms, training locations are usually centralized, but generally there is a mix of centralized and decentralized training. Centralized is preferred not only for content control, but also because of the limited number of available qualified training personnel. However, large conglomerates having widely dispersed facilities realize the cost inherent in centralized training and are exploring ways to achieve desired results through decentralized training programs. Videotape cassettes are being tried as one possible means; teleconferences in conjunction with previously distributed training materials is another. Communications satellites have strong possibilities for marrying the good points of both centralized and decentralized training.

The use of communications satellites for education and training may not be too far in the future for large firms establishing comprehensive national and international communications networks using microwave, satellite, and cable systems. For example, International Harvester has just implemented a nationwide communications system that meets internal and external communication requirements. System capabilities include data transmission, telephone conversation, radio transmission, closed-circuit and so on. The corporation spends over $15 million a year for communications and addition of a training and educational capability that uses communications satellite technology is within the realm of possibility.

Consequently, as large firms establish national communication networks using satellites and microwave systems, consideration may be given to incorporating broadcast satellites into these communication systems to meet the firms' training and educational needs.

**Military Training**

The military is noted for its fine training programs. Satellite technology is not new to the military—the Department of Defense has directed communications satellite programs for over a decade. A number of military satellites are in orbit and additional systems are scheduled for launch in the near future. The military also uses domestic satellite systems.

Recent political events that created an all-volunteer military may provide impetus for use of satellites to aid the military in overcoming some resultant training problems. With the advent of the all-volunteer military, there has been a decrease in the variation of mental ability of those volunteering, with most falling in the average-mental-ability grouping. Consequently, the mental ability of the military appears to be decreasing as military technology becomes more complex. In every service the equipment is becoming increasingly sophisticated, and along with it the required knowledge and skills for equipment operation and maintenance. For example, automated data processing is a major tool in intelligence, logistics, and weaponry; aircraft have increasingly complex avionics; electronic surveillance systems are becoming the tool of all services; and antiaircraft, tank, and personnel carrier weapon systems are now common in the infantry.

There are roughly 2.2 million persons in the military today, with 785,000 in the Army, 612,000 in the Air Force, and 732,000 in the Navy and Marine Corps; over 1 million are enlisted. The overall replacement rate of personnel averages 25 percent annually. Approximately $6.5 billion was budgeted for training in FY75 and again for FY76; this $300-million increase over FY74 was required to help restructure the training program to meet the needs of the new, all-volunteer force.

Total training systems now must be adjusted to the new military population. Training personnel are finding it difficult to deal with the new enlisted corps; curricula materials are too complex, requiring a major change; curricula are geared to a faster pace, thus requiring extensive readjustment of objectives, information presentation, and media usage; and, for the caliber of personnel who must be trained, a more personalized and centralized approach may be required.

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Another major problem facing the military is continuing training. This training is required to enable field units to receive the latest information on use and maintenance of equipment as improved procedures are devised. Particularly where remote installations and ships at sea are concerned, moving personnel to training installations or maintaining training personnel and equipment involves significant expense.

Some research has been undertaken by the military in an attempt to address these problems. Use of satellite technology is one solution being considered. Centralized on-line CAI systems, CMI, one-way video systems, and two-way audio systems are being viewed as a means for meeting special training needs of recruits. Also under consideration is the use of satellites for meeting continuing training requirements of widely dispersed operational units. The cost of returning personnel to training units for updates is high and reduces operational strength, which is particularly critical in light of the current posture of U.S. forces vis-a-vis our adversaries. Consequently, the military is very interested in satellites as a means to meet domestic and non-continental United States training requirements.

Business and Industry Training Requirements

The trade and technical fields have the major training requirements in business and industry. Both business and industry spent roughly the same amount of money for all levels of training, but in terms of hours devoted to training, Table 12 shows a different story.

<table>
<thead>
<tr>
<th>Topic</th>
<th>% of Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Knowledge and Skills</td>
<td>35%</td>
</tr>
<tr>
<td>Managerial Knowledge and Skills</td>
<td>14%</td>
</tr>
<tr>
<td>Understanding or Administering Specific Programs</td>
<td>11%</td>
</tr>
<tr>
<td>Formal Pre-Supervisory</td>
<td>10%</td>
</tr>
<tr>
<td>Employee Relations</td>
<td>8%</td>
</tr>
<tr>
<td>Labor Relations</td>
<td>7%</td>
</tr>
<tr>
<td>Personal Skills</td>
<td>5%</td>
</tr>
<tr>
<td>Organization or Policy</td>
<td>3%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>7%</td>
</tr>
</tbody>
</table>

Thirty-five percent of the training hours goes to technical knowledge and skills and 40% to managerial knowledge and skills.

Instructional Delivery in Business and Industry

A variety of instructional delivery methods are used in business and industry but the emphasis continues to be the classroom lecture supplemented with audio/visual aids and self-paced instructional materials. The instructional media most commonly used in business and industry are ranked in Table 13. Sixteen-mm film is first, followed by overhead slides and then 35-mm slides. Although not listed in the Table, it should be noted that programmed instruction materials are the most widely used medium. Video-tape usage is on the increase in combination with programmed instruction texts and has proven to be most effective when used in this manner.

Looking at large instructional delivery systems, television per se was not referred to in any of the surveys; however, closed-circuit television (CCTV) was found to be an adjunct to training, although not used frequently it is ranked 5th. While computer based instructional systems have produced good training results, they are not widely used in business and industrial training due to the required large capital investment. Further, there is a reluctance to invest in computer based systems for courses which have a short lifetime.

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Table 13

Ranking of Instructional Delivery Equipment Used by Business and Industry

<table>
<thead>
<tr>
<th>Delivery System</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 mm motion picture</td>
<td>1</td>
</tr>
<tr>
<td>Overhead slides</td>
<td>2</td>
</tr>
<tr>
<td>35 mm slides</td>
<td>3</td>
</tr>
<tr>
<td>Audio cassettes</td>
<td>4</td>
</tr>
<tr>
<td>Closed-circuit TV</td>
<td>5</td>
</tr>
<tr>
<td>Film strips</td>
<td>6</td>
</tr>
<tr>
<td>Reel to reel audio tape</td>
<td>7</td>
</tr>
<tr>
<td>Video tape</td>
<td>8</td>
</tr>
<tr>
<td>8 mm motion picture</td>
<td>9</td>
</tr>
<tr>
<td>Opaque</td>
<td>10</td>
</tr>
<tr>
<td>Computer assisted instruction</td>
<td>11</td>
</tr>
<tr>
<td>Audio/visual cassettes</td>
<td>12</td>
</tr>
<tr>
<td>Record player</td>
<td>13</td>
</tr>
<tr>
<td>Teaching machines</td>
<td>13</td>
</tr>
<tr>
<td>Programmed instruction electronic video disk</td>
<td>13</td>
</tr>
</tbody>
</table>


The growth of business and industrial instruction distribution systems over the next five years can be discerned from Table 14. Although projections show a major investment in videotapes and closed-circuit TV systems, 16 mm projectors still rank fourth and software investment is primarily in the motion picture area. It is highly likely that there is a close relationship between the closed-circuit TV and the 16 mm motion picture investments. It is also interesting to note that there are no projections for training and education computer hardware or software.

The amount of money spent to train employees varies with the type of business and industry. It is difficult to obtain accurate figures because firms tend not to keep track of this information. However, one study of 37 firms showed that on the average $161 was spent per employee per year, but the range was considerable. One-third spent less than $50, another third $50 to $150, and the rest from $175 to $1,067 per employee during 1974.

Table 14

Estimated Domestic Sales Trends of Selected AV Equipment and Software in Business and Industry

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Videotape recorder/player</td>
<td>$20.9</td>
<td>$30.8</td>
<td>$56.7</td>
<td>Motion pictures</td>
<td>$256.9</td>
<td>$327.4</td>
<td>$417.9</td>
</tr>
<tr>
<td>Closed-circuit TV</td>
<td>20.0</td>
<td>29.6</td>
<td>54.6</td>
<td>Prepared materials</td>
<td>41.5</td>
<td>69.8</td>
<td>117.5</td>
</tr>
<tr>
<td>Filmstrip/slide projectors</td>
<td>16.8</td>
<td>24.6</td>
<td>36.2</td>
<td>Filmstrips</td>
<td>41.1</td>
<td>69.1</td>
<td>116.5</td>
</tr>
<tr>
<td>16 mm projectors</td>
<td>19.6</td>
<td>26.3</td>
<td>32.3</td>
<td>Supplies</td>
<td>35.9</td>
<td>50.2</td>
<td>70.4</td>
</tr>
<tr>
<td>Tape players</td>
<td>10.0</td>
<td>16.1</td>
<td>25.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 mm projectors</td>
<td>6.6</td>
<td>10.6</td>
<td>17.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record players</td>
<td>5.4</td>
<td>7.3</td>
<td>9.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead projectors</td>
<td>4.3</td>
<td>5.9</td>
<td>7.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opaque projectors</td>
<td>1.2</td>
<td>1.6</td>
<td>2.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub Total</td>
<td>$104.8</td>
<td>$152.8</td>
<td>$242.6</td>
<td>Sub Total</td>
<td>$375.4</td>
<td>$516.5</td>
<td>$722.1</td>
</tr>
</tbody>
</table>

Adapted from: Frost & Sullivan Inc., The Education and Business Training Market, New York: November 1973, Table 1-1, p. 10.
Another study looks at cost, among other categories, in terms of dollars spent per student hours. In three types of training, sales and management, airline ground school and utility company technician, it was found that $20.46, $22.06 and $16.09 were spent respectively per student hour for 71,500, 170,000 and 25,000 student hours per year respectively.

Instructional Communications Needs

Throughout this section, needs are defined in terms of instruction rather than education. "Education" has a broad connotation that usually includes general public service or public information materials. The concern here is a description of ways by which telecommunications can facilitate the delivery of instruction that results in some form of credit — the accumulation of college credits, licensing and/or certification, re-certification, skills and/or information for job advancement or meeting professional requirements.

Specific instructional priorities can be identified at any given time. A brief listing of current priorities might include such diverse efforts as upgrading teachers in strategies and methods to more effectively teach basic skills such as reading and arithmetic — skills in which student performance, as measured by standardized tests, has evidenced decline over the past several years; instruction in the use and manipulation of the metric system; adult basic education; occupational training; or the use and handling of pesticides. Because priorities change with time, the purpose here is not to define current priorities. Priorities are being continuously defined by a number of responsible agencies and will be readily available if and when institutions have greater access to telecommunications that will help them quickly, and with cost-effectiveness, respond to these priorities.

Needs which can be met, in part, by telecommunication systems are course sharing and monitoring and evaluation of student achievement.

Course Sharing—Many schools are currently producing packaged courses that include a variety of media in different configurations - video, audio and print. Production of such packages is expensive, and becomes cost-effective only when completed materials are utilized by a number of institutions and costs are amortized over a larger student population than is possible within a single institution. The willingness of one institution to adopt materials produced by another has shown a marked increase, though barriers remain.

Access to convenient and inexpensive methods of reviewing course materials, particularly audio and video components, allows individual institutions the opportunity to evaluate course objectives, materials and content. The same methods would provide for the in-service training of instructors in both the content and the methodologies of mediated instruction. This requires:

a. Downline feed of audio and video materials that can be recorded for evaluation and review purposes, as well as for later instructional uses provided all copyright restrictions are carefully observed, and

b. Teleconferencing with two-way audio for in-service training. Video and facsimile would perhaps be useful here, but required only in specialized situations.

In addition to the economies of cost amortization with course and materials sharing, such courses often allow smaller institutions to increase the diversity of courses available. In other cases, mediated courses, particularly those associated with widely publicized national broadcasts such as Ascent of Man and Adams Chronicles, generate high enrollments which provides an "individual subsidy" for specialized campus-based courses that are important but do not generate high enrollments. Here, cost advantages through affordable telecommunications networks can have a great impact on both the quality of educational experiences and the diversity of the curriculum.

Monitoring and Evaluation of Student Achievement—As instruction moves from a central location such as a campus to increasingly smaller units within the community, monitoring student performance and providing instructional services becomes increasingly difficult and increasingly expensive.
if each institution is to bear these costs alone. Telecommunications technology would allow for cooperative efforts in meeting such needs.

a. Regional or area media centers could be established so that pooled resources would increase the variety of media available to students, with provisions for dial access or advance scheduling for the closed circuit broadcast of specific materials at specific times.

b. Shared use of computerized instructional materials. Computer Assisted Instruction (CAI) has been used successfully at a number of institutions and the software for specific courses is currently available. Computer Managed Instruction (CMI) is achieving wider application and several such programs are available. Many schools want to use these instructional systems but cannot because (1) the cost of the program itself is prohibitive, or (2) the hardware and expertise to implement them is not within the economic scope of the institution.

An affordable network that allowed a pooling of resources and a sharing of computer facilities would allow smaller institutions to utilize computerized instructional programs housed at some larger facility or regional center. With the advent of low-cost minicomputers, and decreasing costs for terminal hardware, the sharing of a computerized instructional system becomes feasible if the costs for linking the system are not prohibitive.

Many of the academic obstacles related to mediated or independent study courses, as well as the capability to deal with specific needs in academic or occupational skill building, would be better handled when discrete evidence of student participation and learning gains are substantiated through the use of such systems.

**Instructional Needs Priorities**

1. Teleconferencing
   a. Audio
   b. Audio, video (less often required)

2. Data Transfer
   a. Sharing of computerized instructional programs
   b. Data and records transfer
   c. Dial access and scheduling from media centers

3. One-way Color TV (to one or many terminals)

4. Interactive
   a. Voice
   b. Voice and color video (less often required)

3.4.2.2 Volume of Communications

This section covers what may be termed only a best guess as to the volume of communications for the present, the short-term future and the long-term future.

We first discuss these time frames, then attempt to give some idea of the time or volume of traffic required, but specifically aimed at satellite transmission time. Finally, a rough chart addresses in summary form the mixes involved in the estimates given.
Present

Given the objectives as detailed in Section 3.4.1, the volume of use of communications satellites at the present time in the extension and continuing education areas is quite limited. Ground based systems are fairly well used as in such instances as the University of California at San Diego, University of Mid America (UMA), the Chicago TV College, some ITFS and cable systems, together with the bicycling of videotapes for both continuing and extension education. Added to these basically video systems are audio systems such as the Wisconsin telephone network together with computer involvement in other applications, mostly in the administrative data area.

Imminent, however, is a greater use of communication satellites in the transmission of instruction and services via ATS-6 to Appalachia through the Appalachian Education Satellite Project (AESP). Too, Alaska is planning on a sophisticated narrow band application of communications satellites, however with little extension or continuing education involvement currently envisioned, except for some teacher-related training as a possibility.

The AESP currently projects approximately 20 hours per week via satellite to remote Appalachian sites, all within the rubric of extension or continuing education. While basically one-way video and two-way radio oriented, it is projected that a mix of computer utilization (data) and materials delivery will be used.

While the AESP is a reality, the current scene, at least through 1977, appears devoid of applications addressing large areas via satellite with extension or continuing education materials. Certainly there is an increasing need in the recertification area for courseware. The most prominent areas are in medicine, dentistry, law and engineering. It would appear that a needs analysis and feasibility study of how a communications satellite might address the recertification problems would reveal a large potential group of users. Until such work is done it will be difficult to assess the volume requirements relative to the use of a communications satellite.

In business and industry there is a heavy involvement of telecommunications technology for training personnel. Here too, an assessment of how much technology transfer can be accomplished via a satellite has to be studied. However, with 64 million people employed in the work force, a large number quite obviously at any given time would benefit from upgrading their skills. However, immediate satellite usage by these groups is remote unless it is stimulated by demonstrated effectiveness and available funding, hardware and courseware.

The continuing education aspect involved in leisure learning, as is evidenced in the local schools, community college and college programs, is another potentially large volume user of satellite time. Here again stimulus may be gained by demonstrated effectiveness, available funds, hardware and courseware.

Short Term (1978-1986)

The short term projection for the use of satellite communications for continuing and extension education appears to depend very much on the same conditions mentioned above, demonstrated effectiveness, available funds, hardware and courseware. But it also appears that successful ATS-6 and CTS experiments will stimulate the required interest as a first step. It may be that a significant factor in the technology transfer will then be how actively dissemination and diffusion strategies are implemented. Also, developing technologies such as new hardware components and/or techniques involving satellites, terminals and methods of video and audio compression will help determine the speed with which users will adopt the satellite as an educational delivery vehicle.

Long Range

Given the probable advances that will almost certainly be made and adequate dissemination and diffusion strategies, it is hard to see why large scale use of satellites in delivering extension and
continuing education instruction and materials can miss. The following chart shows the progression of use from the present to the future.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Recertification</td>
<td>25 hours</td>
<td>100 hours</td>
<td>200 hours</td>
</tr>
<tr>
<td>Business &amp; Industry</td>
<td>5 hours</td>
<td>80 hours</td>
<td>160 hours</td>
</tr>
<tr>
<td>Leisure Learning</td>
<td>5 hours</td>
<td>20 hours</td>
<td>140 hours</td>
</tr>
</tbody>
</table>

3.4.2.3 Communications Networks

Present

Although much of continuing and extension education has been carried out in the traditional classroom environment typical of American education since Colonial days, there have been applications of communications technology significant for their innovation and their possible portent if not for their overall impact on this vast and diverse field.

Not surprising, practitioners of engineering education have been chief among the pioneers who have applied communications networks to the needs of continuing professional education. Utilizing microwave relay and the multi-point Instructional Television Fixed Service which is capable of multi-channel, multi-point distribution of television, such institutions as the University of Florida (the now-defunct Genesys System), Stanford University (the Stanford Instructional Television Network), the mid-Texas TAGER Network, the University of Southern California, Georgia Tech and others have established communications networks which link the campus to a wide variety of in-plant teaching locations and permit working engineers to continue their graduate education by participating in courses without the necessity of commuting to the campus.

In continuing medical education are to be found other examples of the application of communications to meet continuing education needs. Like their colleagues in the School of Engineering, doctors have established landmark ITFS networks to link medical schools and teaching hospitals. For more than two decades the Albany Medical College of New York has used the capacity of its public radio station, WAMC (FM), to transmit medical grand rounds to doctors in hospitals in New York, Massachusetts, and Connecticut via FM subcarrier while regular listeners hear the station's regular programming, totally unaware that professional physician training is also being transmitted.

Similarly, professional courses for nurses have been broadcast by non-commercial public television stations. This application, once extending from Boston to San Francisco and Los Angeles sometimes broadcast such materials in the conventional manner, open to viewing by any interested party. Sometimes privacy was maintained by transmitting such programs late at night or in a scrambled fashion, requiring viewing hospital locations to be equipped with special decoder devices. In all, the practice has virtually disappeared with increased demand for station time for public TV's growing general audience and the emergence of new technological approaches.

The recent growing availability of video cassettes and the recent encouraging experimentation with satellite communications clearly portend a new era in the development of communications networks for continuing education.

In summary, communications networks in continuing education have tended to operate within the narrow geographical constraints imposed by technology and economics. Terrestrial networks can bring educational opportunities to engineers in the San Francisco Bay area and to medical practitioners in Atlanta, but they are not available on any cost-effective basis to extend such valuable opportunities to those furthest from the metropolitan areas where the needs are the greatest.
Short Term Projections

The availability of video recording devices, particularly the video cassette, are providing new opportunities to escape from the limitations of hard wire and over-the-air networks. Here, a leadership role is being assumed by business and industry where several large national and multi-national corporations have already gained success in establishing "video cassette networks," off-line, on-demand systems which provide employee and customer training to widely dispersed users. The Ford Motor Company's "Ford Network" includes more than 5000 video tape players at Ford dealers and service centers in every state. IBM and PepsiCo are also among the business and industry users of video cassette and the Hewlett-Packard Corp. serves a worldwide network of plants, sales and service installations and users with its video tape operation at corporate headquarters in Palo Alto.

Within business and industry there is emerging a small but growing sector called "video publishing." Time-Life has produced for sale or rental a video cassette-based course in speed reading, and several less well-known companies have developed extensive catalogs of courses, particularly in the computer science and allied fields. Such academic institutions as Colorado State University, with its SURGE (State University Resources for Graduate Education) have circulated video tapes in engineering education to meet a need similar to that served by the Stanford Instructional Television Network.

Such video networks, free from the constraints of both time and geography, seem certain to grow as professional educators become better acquainted with the technology available and more aware of the record of success of their partners in business and industry. Short term growth of communications network is also sure to include a still-more exciting technology: communications satellites.

The health and education telecommunications experiments already conducted on NASA's ATS-6 and CTS satellites are described in more detail in other sections of this report. Of particular importance to continuing and extension education is the example established by the Appalachian Regional Commission (ARC) in its use of ATS-6 to provide continuing graduate education in the teaching of reading and in career education to rural elementary school teachers in a multi-state area. The success of the project is evidenced by ARC's greatly expanded plans for continuing education for a variety of professional and sub-professional groups.

Other ATS-6 experiments, including those in Alaska and the Rocky Mountains, and those conducted by the Veterans Administration and the WAMI (Washington-Alaska-Montana-Idaho) Project help to point the way for continuing education and the distance-free communications networks which satellite technology makes possible.

A number of experiments relevant to continuing education are already underway and/or planned for CTS and ATS-6 after its return to US service early in 1977. The next step is necessary to move from the status quo of the present and immediate future to the vastly greater possibilities of the short- and long-term future.

Long Term Projections

The technology already exists for audio, data, television and other forms of transmission from high power satellites into small and relatively inexpensive earth stations. Exciting opportunities are presented by the availability of NASA experimental satellites, and these opportunities are being exploited by health and education interests including continuing education. But like a bridge firmly anchored only at one end, an essential condition for further progress is missing.

At the present, successful experiments in the application of communications satellites to continuing education and other needs point to what might be done, but provide no means of moving toward desirable but unobtainable goals. NASA, by its Congressional mandate, can provide opportunities for experimentation, but is barred from providing the basic for operational service. None of the existing commercial Comsats has the technical capability to provide follow-on service to establish, on an on-going basis, the kinds of daily service which ATS-6 and CTS experiences reveal to be technically feasible and socially desirable.
At the far horizon of our view of the future it is possible to perceive communications satellites capable of transmitting direct to learners in their homes and places of work. Such satellites for individual reception are unlikely in this country to replace conventional news and entertainment television, commercial or noncommercial, but the technology does hold great promise for public service applications.

What such satellites, likely to be technologically available within the next 10–15 years, can and should do for continuing education and other needs within the public interest sector cannot be defined in advance. What will be needed in the short term is the opportunity to explore through first hand experience the public services which community reception satellites along the lines already established by ATS-6 and CTS can do.

To get to the long term, we need to pass from the present to the short term future. To do so, continuing opportunities to experiment and to establish continuing services on an operational basis are indispensable. Without such opportunities, we cannot get there from here.

3.4.3 Constraints and Problems

3.4.3.1 Statutory (legal or constitutional prohibitions)

Privacy and confidentiality must be given careful consideration. These principles apply to areas such as the transmission of data relative to student performance and student records, as well as to the content of particular specialized courses. Privacy and confidentiality must be protected where required.

Copyright laws must be carefully observed in the use of all types of media — film, audio, video, and facsimile distribution of print material.

The acceptability for credit of mediated instruction has not been clarified by various states, individual institutions, and for certain groups whose instructional program is subject to evaluation by an external agency (e.g., veterans who must spend a specified proportion of their credit hours in a supervised classroom situation, or for certain professions whose requirements state that instruction or in-service training, to be acceptable, must be provided by a specified type of institution and/or that an instructor be physically present.

Post-secondary institutions, particularly those receiving state funds, are subject to restrictions in the ways funds can be used, the types of cooperative arrangements that can be established with other institutions and/or agencies; and the services or practices that can be implemented within their communities. For instance, state-sponsored institutions are often prohibited from the negotiation of leased-time-arrangements for computer services with businesses in the community, institutions with facilities for the production of audio, video or other media are prohibited from contracting for, or producing at no cost, such materials for businesses or public interest groups where these are not utilized in specific instructional situations.

Some institutions are prohibited from enrolling and awarding credit to students who reside outside defined geographical boundaries — e.g., some schools cannot accept the registration and award credit to a student living in another state even though all materials for a particular course may be packaged in such a way that course requirements can be completed through independent study and evaluation of academic performance can be monitored and evaluated by mail or some other form of telecommunication.

3.4.3.2 Regulatory

All instructional programs are directly or indirectly subject to the requirements of various regulatory bodies.

  a. Educational regulations within the state.
  b. Accreditation requirements.
  c. Boards or committees defining transfer-of-credit agreements among institutions.
d. Open circuit mediated instruction is subject to FCC regulations and, where satellites are in use, to NASA regulations and specifications.

e. Where institutions are providing in-service or continuing education, such programs must comply with the regulations or standards of the professional organization or licensing agency for whose constituency is being served by the program. In addition to meeting specified requirements, such courses often involve private, confidential or protected information to which the general public must be prohibited access.

3.4.3.3 Institutional Constraints and Problem Areas

Not all institutions will accept for credit courses offered over radio or television. While such obstacles are gradually being overcome, the problem continues to exist where faculty committees and/or groups of administrators are not yet convinced that the academic credibility of such courses has been protected and provided for. Attention must be given here to methods for the monitoring and evaluation of student progress and learning.

Designation of the area within the institution to be assigned responsibility for course implementation and student evaluation sometimes creates conflict between departments or divisions. Differences of opinion are as likely to be based on the insistence of a particular area to assume responsibility as it is on their refusal. Delineation is often not clear because there is wide variation among institutions in the structuring of departments and the division of content material among them.

Faculty are often resistant to mediated instructions. Reasons range from fear of the compromise of academic standards to a feeling that such instruction constitutes a threat to their continued employment. Intermediate on this spectrum is a general sense of discomfort with a system in which the instructor's role shifts from center stage to that of learning manager.

Institutional utilization of telecommunications technology is usually constrained by the budget. Needs and aspirations usually exceed financial capability.

Under-utilization of telecommunications technology may result from any of a number of factors. Information on what's available, its costs and its instructional benefits tend to increase utilization. As in many other areas (e.g., the growth of computer utilization) use accelerates use.

3.4.4 Potential Benefits of Satellites

There are vast areas in the United States which still do not receive messages or electronic signals efficiently. This despite the fact that there are radio and TV networks, TV cable television stations, telephones, and other electronic gadgetry extant. It has been demonstrated, however, that these geographic areas can be reached through a satellite communications system.

The ultimate benefit of a satellite communications system is that it will link land based communications systems and provide coverage for everyone — geography and conditions of servitude notwithstanding.

From a social aspect there is a need not only to connect the nation electronically, but also a need to transmit bits of educational information for particular interest groups. Technology can provide that kind of service through a satellite system. It has the capability to be able to transmit not only digital information but also information in the audio and visual spectra.

It is a wide area dispersal system, which at one time can transmit messages to either large or small audiences, to other electronic devices or to specially directed and programmed information receivers.

The satellite communications system can bring together through its transmission capabilities a market aggregation. By market we mean a special interest group — doctors, mechanics, adult illiterates, for example. Therefore in one transmission, special interest groups can receive information anywhere and at the same time.
The technology can permit the aggregation of dispersed demand for services, in other words, the technology allows large numbers of widely dispersed individuals to simultaneously share services, personnel, equipment, materials, or other scarce resources. In this same vein, the technology also can permit individual or personalized service, perhaps more cheaply, by letting a larger number of dispersed individuals with unique needs come together as an aggregate to use services.

By acting in aggregate, institutions might have an academic curricula developed by a renowned, centrally located university that could be accessed through a communications satellite. Moreover, this approach could help to eliminate the requirement that each institution obtain accreditation for its programs, that responsibility would be placed in the hands of the university. Consequently, students' credentials could be acceptable nationally by business, industry, and educational institutions.

Another benefit is that information can be pooled and shared simultaneously. To cite an example, there is a need to teach the metric system. Many schools and colleges are preparing relevant courses—but the project can (and should be) shared. Through the utilization of the best teachers and the preparation of visual aids the effort of such a massive undertaking could be transmitted by but one institution with special inputs by experts who reach the whole country at one time through satellite and ancillary transmission.

It has been demonstrated by the Appalachian Project that the use of satellite transmission has acted as a catalyst to effect and achieve change. Project programs generated other educational program ideas and the demand for satellite transmission has increased many times simply by being used.

Although there is some question as to the need of two-way visual communications the potential is there and assuming that costs are not excessive it could be beneficial in many educational activities—the critical examination by a teacher of a student's work, the teacher in one area, the student at a remote site, for example, showing his work by two-way color TV satellite transmission.

An inhibiting factor in current network educational programming is the cost of land lines for transmission.

"The advantage of satellite communications increases with the size of the area to be serviced and amount of information to be transmitted. This advantage is due to the satellite's capability to use multiple information transmission and reception routes, as opposed to the single routine capabilities of earth communication systems. Earth communications systems have interconnecting links that follow specific routes along the surface of the earth, and their cost increases with the number of locations they connect. The volume of information between any two points justifies the cost of the link; further, the cost per information-circuit diminishes as the number of circuits increases. It is the anticipation of heavy increases in information volume that justifies the investment in additional circuits and links.

In a satellite system, the expense of a communications link between a satellite and an earth station is the cost of the transmitting or reception station, and this cost is generally uniform. Consequently, the basic cost to link two earth stations, using a satellite, does not depend on the distance separating them. In addition, since the same satellite can transmit to or receive from many stations simultaneously, the basic investment per communications route diminishes as the number of such routes increases on a per-station basis. It would be misleading, though, not to point out that variable costs for satellites and earth stations increase with the number of routes served. However, the number of routes has less impact on the total cost because the satellite system does not require numerous duplications along the transmission path. Table 15 provides a cost comparison for the lease of private phone lines between the Westar satellite system and the AT&T Terrestrial system. This shows that it can be less expensive to communicate using satellites.*

The potential benefits of satellites is limited by cost and the imagination of the user. It has been demonstrated that satellite transmission is increasing. Western Union has 70 companies contracted to use WESTAR services. "The rates for full transponder service range from $1.2 million per year to $2.17 million per year depending on backup and other specific terms of the lease." The satellite carries 12 transponders—each of which is capable of relaying color TV signals with accompanying audio.

*From "Instructional Delivery Systems in Business and Industry: The Use of Communication Satellites as a Comprehensive Delivery System, by Kenneth A Polcyn, Ph.D., PRC Information Sciences Company*
### Table 15
Annual Charges for Private Phone Lines

<table>
<thead>
<tr>
<th>Between</th>
<th>AT&amp;T</th>
<th>WESTAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlanta and New York</td>
<td>$9,060</td>
<td>$7,440</td>
</tr>
<tr>
<td>Dallas and Washington</td>
<td>13,488</td>
<td>10,440</td>
</tr>
<tr>
<td>Chicago and Los Angeles</td>
<td>19,176</td>
<td>10,440</td>
</tr>
<tr>
<td>Washington and San Francisco</td>
<td>26,256</td>
<td>13,440</td>
</tr>
<tr>
<td>New York and Los Angeles</td>
<td>26,359</td>
<td>13,440</td>
</tr>
</tbody>
</table>

Charges are for full-time, unlimited use, and include all service terminals.

Adapted from: Communicator: Vol. 4, No. 1, Spring 1975.

RCA has launched SATCOM and has begun service this year. These two specific instances of satellite use demonstrate that there is potential for education as well as other public service groups to use satellite transmission to achieve mutual goals.

#### 3.4.5 Recommendations (not concurred in by all in panel)

1. NASA should undertake an active study of applications of satellite systems and make recommendations for benefit of government and potential users.

2. There should be a detailed study of the continuing education needs of the professions which could be served by satellites.

3. There is a need for a clearinghouse to provide information exchange about the present availability and potential of satellite systems.

4. There is need for a means to inform potential users about possibilities of satellite systems.

5. Government should convene a meeting of all federal agencies involved with satellites to establish policies for the federal government role in development of satellite systems.

6. NASA should continue its efforts to develop high powered satellites so that necessary earth terminals can be obtained inexpensively and used widely in the many applications appropriate to continuing education.

7. NASA should encourage further research in the higher frequency spectrum so as to increase the frequency spectrum available for public service transmission.

8. So that the learnings from this workshop are not lost, a similar workshop should be convened periodically to update and extend the information and recommendations of an informed group.

#### 3.4.6 References


3.5 ENVIRONMENTAL COMMUNICATIONS

3.5.1 Objectives

3.5.1.1 Environmental Communications Objectives

Environmental Communications must provide for the collection of data required to permit the monitoring, analysis, prediction and long term study of those environmental parameters affecting human life, and for the dissemination of the data and of processed information derived therefrom to the various users requiring it. This includes data pertaining to space, atmospheric, edaphic and oceanic conditions. It affects, among others, the disciplines of meteorology, oceanography, hydrology and seismology.

Some of the agencies involved at the federal level are the Corps of Engineers, The Geological Survey, The Forestry Service, EPA, NOAA and NASA. At the state and local level are such agencies as state water resources boards, city air pollution monitoring agencies, state agricultural advisory agencies and many others. The environmental communications systems must provide for a full exchange of data and information among this variety of users.

3.5.2 Environmental Communications Needs

3.5.2.1 Type of Communications Needs (Categories of Environmental Communications)

Collection of Data

Data are collected from more than 100,000 remote and populated locations throughout the United States. Most of these are fixed "in-situ," however, some reports are received from mobile platforms such as ships, buoys, and aircraft. These observations vary according to the service requirement, e.g., aviation, agricultural, severe storm, and water resource management. Service frequencies vary from once per minute to once per day. The variation in the number and frequency of data is required in order to monitor environmental conditions on a local and/or national scale.

All these data must be collected in real time by a communications system and forwarded to collection points, either locally or nationally, depending on the phenomenon. This characteristic of handling large volumes of data in real time is necessary for the monitoring, analysis, and forecasting of short lived environmental phenomena.

In addition to regular data collection, the communications system must be capable of collecting more frequent data as required by abnormal environmental conditions such as storms, floods, earthquakes, tidal waves, etc.

Large volume periodic bursts of remotely sensed* data are also collected for real time use in both digital and analog form. Typical applications are for weather forecasting, wetland identification, pollution contamination, etc.

Dissemination of Data and Information

The data collected must be processed at central processing facilities and disseminated to pre-specified users on a scheduled basis. One piece of data may be shared by many users simultaneously or many pieces of data may be needed by only one user.

When adverse environmental conditions warrant, an increased volume of data may need to be distributed on a selected basis to users in geographical areas of concern.

*In-situ sensing: sensors located at a site which measure environmental parameters at that site
After the initial dissemination of data, the data generally has to be relayed to other processing centers for further use. This may be accomplished in real-time or non-real time. This type of traffic flow fluctuates (peaks and valleys) periodically. These data are both alphanumeric and graphic.

Communications are used for briefings at high administrative levels in local emergency situations, where real time decisions are required. International telecommunications must have as high a degree of reliability as within the U.S. These communications must have a priority override feature to handle emergency situations that could involve loss of life and property.

3.5 2.3 Telecommunications Systems

There are many environmental telecommunications systems that support governmental missions and corporate charters. To the extent these systems can be identified by the Environmental Communications Panel, they are presented in three temporal categories as follows:

Present

The environmental telecommunications systems that currently exist and which can be identified by this Environmental Communications Panel are divided into those serving the Federal Government, Local and state governments, and the private sector.

Federal Government—The Executive Office of the President, Office of Telecommunications Policy, established by OTP Circular No. 12 dated October 12, 1973 a program for coordination of communications planning among Federal agencies. In accord with this program the Department of Commerce was designated the "Lead Agency" for coordinating environmental communications planning. Accordingly, the National Oceanic and Atmospheric Administration, acting on behalf of the Department of Commerce, created the National Environmental Communications Committee (NECOM) on December 14, 1973. Other member agencies are the Department of Agriculture, Department of Defense, Department of Interior, Department of Transportation, and Environmental Protection Agency. NECOM is the focal group within the Federal Government for coordination of communications planning among Federal agencies that provide or use communications in support of agency environmental missions.

The attached document, National Environmental Communications Summary Report (Part 1, Systems Inventory) dated August 1975, is the latest inventory of environmental telecommunications systems reported to NECOM by the member agencies.

Local and State Governments—No panelist was qualified to address the present environmental telecommunications systems serving the needs of local and state governments. Generally, it can be said that such existing systems would not involve great distances since most systems would be limited to state or smaller jurisdictions. California is perhaps the greatest user of environmental telecommunications systems. The shortage of fresh water and the need to manage such a resource has led to a rather sophisticated data collection system. Florida is perhaps the second largest user of environmental telecommunications systems for state flood control and water supply requirements. Many states rely on the Federal Government for services of environmental telecommunications systems.

Private Sector—Power generation companies, particularly those utilizing coal, are monitoring their local environment for ecological purposes. The mining and manufacturing industries also are users of in-situ and remotely sensed data for purposes of planning and operation.

Short Term (next ten years)

The short term environmental telecommunications systems that can be identified by the Environmental Communications Panel are divided into those serving the Federal Government, the local and state governments, and the private sector.
Federal Government—From the attached NECOM inventory, systems listed in Column A in Table 16 will be disestablished during the short term and systems listed in Column B are planned for implementation during the next ten years.

Existing systems that are expected to continue in existence over the next ten years are not listed here but are contained in the NECOM inventory.

Local and State Governments—The Environmental Communications Panel could not address this subject.

Private Sector—The Environmental Communications Panel could not address this subject.

Long Term (over ten years)

The Environmental Communications Panel could not specifically identify any communications systems that might be required in the long term. The following forecast of long term needs should provide some indication of the "blue sky" environment communications systems that might be postulated.

Energy—Offshore oil and gas exploration will have increased activity and require additional telecommunications support.

Minerals—Recovery of deep seabed minerals, e.g., manganese, copper, nickel, cobalt will require considerable telecommunications support. Industrial activities (oil and minerals in the oceans) may require new needs for communications support in several disciplines including extensive monitoring of the environment.

Food—Fishery Conservation and Management Act of 1976—provides jurisdiction over fisheries within a 200 mile zone off our shores, expect increase in telecommunications to effect controls.

Coastal Environment—The growing national concern for a balanced management of our coastal environment including energy facilities, ocean transportation, wetlands, and habitats will lead to communications needed for monitoring and control.
Ocean Pollution—There is increasing recognition that the oceans and great lakes are fragile ecosystems that we are damaging. Monitoring, via communications, must be developed and implemented.

Oceans and Climate—There is a new awareness that the oceans are critical in determining the character of the world's weather and climate. Additional remote and in-situ sensing of oceanographic environmental parameters is required for input to simulation models.

Maritime—Present ship-to-ship and ship-to-shore communications may not meet the communications requirements that expanded oceanic activity can be expected to generate. Present shipboard communications may have to be expanded or other systems, such as satellites, used to monitor position location, direction and identification.

Seismology—There are relatively few sensors today that are connected into a communications network for real time reporting. The thousands of reporting sites - individuals and universities around the nation and in other countries - usually report seismic activity by mail and often many weeks after the event. As scientists develop more information on seismic activity, the expectation is that real-time reporting will be a must and possibly lead to enhanced seismic activity prediction.

Tsunami—Today the Tsunami warning system alerts coastal areas throughout the Pacific Ocean area to prevent loss of lives due to tidal waves created by ocean floor seismic activity. Such messages must be delivered in less than an hour. The warning system presently uses radio and commercial cable and telephone systems, as well as government owned systems to meet the requirement. Although the system may benefit by improvements in technology, requirements are expected to remain at present volumes and number of users, but speed of delivery requirements may increase.

Data Collection—Within the conterminous United States, Alaska, Hawaii, and Puerto Rico areas environmental data collection is expected to increase at about 5% per year. Additional read points may be included beyond today's level toward increasing the input variables in computer prediction models - all toward more accurate prediction techniques in meteorology, hydrology and seismology.

Dissemination of Data and Information—Present systems of 100 words per minute teletypewriter networks and facsimile (2400 b/s) will be slow to evolve to higher bit rate systems. Near term plans are evolving toward allowing the option for users to request the information reports they need or want rather than take only what is put out today. In this long term the selection options will be greater. Users will be able to afford implementation of high bit rate digital systems for narrative and graphic information as greater economies of operation are made possible by new and larger networks. The timely occurrence of this is constrained only by the cost of transition from the near term systems to the more advanced systems. Satellites hold great promise toward meeting these requirements should the expected cost reduction occur.

3.5 2.4 Non-Environmental Communications Capabilities of Interest

The various categories (previously listed) of what is generalized here as communications capabilities needed to support environmental areas but not characteristically environmental communications, are expected to grow at about 5% per year, but the emphasis may change from one mode to another. There is expected to be an up-surge in digital systems which also transmit voice communications. With any change in emphasis from centralized computer capabilities to distributed computer systems, relative short duration (interactive) connections may result in an increase in dial-up services and decrease in dedicated circuit capabilities.

Graphic—In the area of graphic communications, remote sensing (e.g., satellite to earth) will evolve to systems of increased resolution (greater detail in the pictures) with a resultant demand on telecommunications systems for increased bit rate and bandwidth.
3.5.3 Constraints and Problem Areas

3.5.3.1 Statutory

It is important to note the difference between Federal statutes which set forth mission requirements such as collection of taxes, enforcement of laws, forecast of weather, or monitoring the environment and statutes which address the provision of communications services. The Communications Act of 1934 is the basis for regulation of commercial common carriers. No agency of the Executive Branch is by Federal statute required to provide communications services. Quite frequently the use of electronic communications means is implicit in the statutory activity, however, the selection of specific communications services is done by the agency in accordance with Federal Procurement Regulations (FPR) and the Federal Property Management Regulations (FPMR).

3.5.3.2 Regulatory

Two policy circulars from the Executive Office of The President are relevant. OMB Circular A-76 establishes the general policy of obtaining goods and services from the private sector. OTP Circular 13 applies the OMB policy specifically to communications.

A regulatory consideration of major impact on any NASA undertaking in the field of communications satellites is the outcome of the Federal Communications Commission's Computer Inquiry. The Computer Inquiry is necessitated by the growing use of computers as communications devices as well as data processing devices. The communications (common carriers) industry is regulated, the data processing industry is not regulated. As the two technologies merge, it becomes more desirable to integrate data processing and communications functions. The FCC inquiry seeks to define the regulatory line between the two.

Since all of the environmental disciplines discussed herein require various amounts of both data processing and communications, it would be logical to postulate future system concepts around an optimum configuration of both disciplines. This could possibly result in certain ADP functions being performed aboard the satellite. Such a result would most likely preclude the transfer of NASA developed technology to the private sector due to inconsistency with the expected outcome of the FCC's inquiry.

3.5.3.3 Problem Areas

Any organization that uses communications is under budgetary constraints. The decision whether to implement any telecommunications capability must be based on cost comparison or cost effectiveness analysis.

In the Federal Government, the option to purchase a system rather than lease a service must be clearly defined under OMB Circular A-76 and OTP Circular 13. The objective to obtain services is clear but in cases where industry — more accurately Regulated Commercial Communications Common Carriers — prices its services too high, a government agency may prove its own system to be the most economical. Government agencies do not desire to own their own systems. They prefer leasing them, yet the present high cost of satellite service in general, is driving users to implement their own systems.
3.6 LIBRARY SERVICES

3.6.1 Overview

The Panel believes that a major objective of its deliberations should be to enhance NASA's understanding of the complexities of library operations and services and of the roles that libraries can have in community and institutional environments.

The Panel on Library Services takes the broadest possible view of the library mandate of acquisition, organization and dissemination of materials or the information contained therein, as well as the production and examination of new information. Libraries seek to serve the informational, educational and recreational needs of a broad-based population consisting of individuals and institutions.

In achieving its objectives, a multiplicity of library systems exist which seek to meet the needs of library users. Among these are public libraries (under state or local jurisdictions), university and large research libraries (both public and privately financed), special libraries and information centers (associated with various organizations both public and private), and Federal libraries.

In achieving its mandate, the library must deal not only with the individual as indicated above, but also with related organizations and institutions, including other libraries and social services units. There is a need for librarians to aggressively seek linkage roles—librarians as information brokers.

This need is evidenced in part by the many panels whose topical areas include an information or library element but whose membership did not include a librarian or information specialist.

It is essential for libraries to consider four areas in the planning and provision of service: needs of users, categories of users, format of storage of material/information and methods of material/information transmission.

3.6.1.1 Needs of Users

The needs are bibliographic, reference, referral, research, analysis and interpretation, recreational, and educational.

3.6.1.2 Categories of Users

The categories of users are individuals (in all their various life roles) and institutions (collections of individuals) including government, schools and political, social, business, scientific, and technical units.

3.6.1.3 Formats for Material/Information Storage

The formats include printed word, phonograph records, cassettes, films; magnetic tapes, videotapes, cartridges, maps, charts, microforms, objects, and photocopies.

3.6.1.4 Methods of Material/Information Transmission

The methods of transmission include telephone, telefacsimile, personal contact, mail, computer terminal, courier service (walk-in), radio (wire/wireless), television, cable television, travel, workshops, conferences, bookmobiles, and satellites.

3.6.2 Possible Applications of Satellite Assistance in Improvement or Expansion of Service

3.6.2.1 Sharing of Resources/Facilities

Sharing of resources includes coordination with other community groups, services and organizations, and sharing facilities and staff.
3.6.2.2 Education/Training

Education and training services include services to undereducated adults, adult and continuing education, in-service training, individualized learning, individualized counseling, and elementary and secondary education.

3.6.2.3 Outreach Services

Outreach services include service to remote areas, homebound and institutionalized services, handicapped services, and extension services.

3.6.2.4 Cooperative Library Functions

Cooperative functions include databank sharing, databank building, standardization and compatibility, and utilization of shared resources and data (networking).

3.6.2.5 Referral Services

3.6.3 Parameters/Constraints Which Must Be Considered in Planning

1. Shrinking library budgets.
2. Censorship/intellectual freedom - court guidelines permitting communities to establish their own standards. Broadbased transmission must take into account the local differences.
3. Multiple jurisdictions - local constraints on funding and sharing of resources and facilities.
4. Enabling legislation - legal requirements to provide the service including the scope of services.
5. Copyright.
6. Lack of prior satellite experience/experimentation, necessary in developing baseline data for planning.
7. Selectivity
   a. Confidentiality and material/proprietary rights. Transmission of classified or restricted documents/diplomatic information to a specific clientele.
   b. Restricted user groups. An example may be seen in the legal restriction of material recorded or brailled for use of the blind and physically handicapped, to be used only by those certified as eligible.
   c. Cultural experiences. Material aimed at one cultural groups might prove inappropriate for others.
   d. Intellectual. Grade level of material and content must be geared to the recipient.

3.6.4 Recommendation

A variety of areas exist in which the library profession envisions great benefits from satellite communications. The overlapping with the recommendations of many of the other panels provides further evidence of this fact.

The panel is, however, keenly aware of its constraints both timewise and knowledgewise in its ability to prepare a document truly reflective of the entire universe of possible application to the library community. We therefore recommend strongly that this panel continue to function as a liaison between the library community (which it intends to involve heavily in the provision of input) and NASA (which should keep this panel well informed as to current developments and input requirements from the library community).
Table 17
Library Needs

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library Services</td>
<td>Color Video</td>
<td>Library</td>
<td>Urban &amp; Rural need for access</td>
<td></td>
<td>Libraries gaining experience with video but, so far, not with Satellite-delivered video.</td>
</tr>
<tr>
<td>(to public of</td>
<td>1-way Audio</td>
<td></td>
<td>&amp; for Local Programming will</td>
<td></td>
<td></td>
</tr>
<tr>
<td>users)</td>
<td>2-way Audio</td>
<td></td>
<td>differ</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Trans</td>
<td>Library (Individ.) or State/Regional Library Center</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-way Audio</td>
<td></td>
<td>Initially - likely to be used by Library</td>
<td></td>
<td>Implications differ if transmission of compressed bibliographic data and/or full text are cost-effective.</td>
</tr>
<tr>
<td></td>
<td>two-way</td>
<td>Audio/Video</td>
<td>Likelihood for communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teleconference</td>
<td>Any accessible location in community on shared basis</td>
<td>from one urban center to another, at first</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-way Audio</td>
<td>Audio/Video</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-way video</td>
<td>Shared location possible - would encourage libraries to be Community's Center for cont. ed.</td>
<td>Focus on rural areas where access to ED is now limited.</td>
<td></td>
<td>Library experience to date derives from Alaska and Appalachia, with Rocky Mt. area a possible, next test site.</td>
</tr>
<tr>
<td></td>
<td>2-way audio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Further refinement and answers to "?" will be future, on-going objectives of panel.
3.7 MEDICAL EDUCATION

The Medical Education Panel Report is a statement of the future (next decade) needs of health care professionals for health science education which will be most effectively met by information transfer systems via a communications satellite. The Panel recognizes the magnitude of health education needs of both the patient and the general public but did not include that aspect in the discussion upon which this report is based.

3.7.1 Objectives

3.7.1.1 Discipline Objectives

The objectives of medical education are to maintain and improve professional services through the education and training of physicians and other health professionals and through biomedical and health services research. The major educational phases for the health professions are undergraduate, graduate and continuing education with different emphases on these phases in each specific discipline (medicine, dentistry, nursing, allied health professions, pharmacy, etc.).

3.7.1.2 Statutory Requirements

There are no federal statutory requirements for the practice of health professions. Each state regulates the practice of these professions and particularly of medicine through its medical practice act.* Some states have introduced a statutory requirement of continuing medical education as a prerequisite for relicensure of physicians and other health professionals. All other requirements for educational or professional standards in medicine are established by voluntary organizations.**

3.7.1.3 Objectives to which Satellite Telecommunications can make a Contribution

The objective is to provide a wider distribution to regional geographic areas for interconnection to terrestrial systems in order to more efficiently reach a wider specialized audience. It would also enable a national coordinating facility to more efficiently provide the programming input to such a system via a multiple capability uplink.

3.7.2 Discipline Communications Needs

3.7.2.1 Types of Communications

<table>
<thead>
<tr>
<th>Purposes</th>
<th>Type of Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telediagnosis and selected mass information transfer as in medical school classroom, multiple branches of a school or multiple schools, etc.</td>
<td>Audio-video-color 2 way (option - may be used with teleprocessing)</td>
</tr>
<tr>
<td>Computer Data Banks Example - data for purpose of determining prognosis in chronic diseases</td>
<td>High Data Rate (Digital)</td>
</tr>
<tr>
<td>Business/Educational*** Requirements for hospitals, clinics, groups. (Eventually may be practical for individuals)</td>
<td>Audio-video color 2-way Practical to meet some of this need - expansion of use probably necessary</td>
</tr>
</tbody>
</table>

*FLEX, NBME, e.g. The most common provisions for medicine are (1) that the individual has to have graduated from an accredited U.S. or Canadian medical school (undergraduate education), (2) that the applicant must have one or two years of house-staff training (graduate medical education) and (3) that the individual must have received a passing score on the examination.
**CCME, LCME, LCGME, LCCME, specialty boards, etc.
***Appended
3.7 2.1 Types of Communications (continued)

<table>
<thead>
<tr>
<th>Purposes</th>
<th>Type of Communication</th>
</tr>
</thead>
</table>
| Health Education for the Patients  
Type I - Health Education  
For the general public, believed to be a public health function | Audio-video use practical now,  
program content very critical |
| Type II - Physician to patient about specific condition, a health system function - completely confidential requiring physician input | Audio - 2-way, video is helpful, if available |

3.7 2.2 Volume of Communications

At present, very low volume, experimental in nature and regional. During the next ten years, volume will increase in direct response to development of programs and availability of funds both of which are outside the scope of this report. No assessment of long term volume was made by the panel.

3.7 2.3 Communications' Networks

At present needs can be identified through recently conducted experiments. The use needs of a dedicated broadband network for health has not been determined.

3.7.3 Constraints and Problem Areas

3.7 3.1 Constraints

Statutory restraints are state and not Federal at this time and they can be unique to a given state.

3.7.3.2 Regulatory Constraints

None now, but disclosure regulations regarding drugs under auspices of FDA have been recognized.

Institutions are not funded to develop or distribute continuing medical education programs utilizing broadband or any other distribution modality.

A problem area relates to confidentiality of data.

3.7 4 Potential Benefits

Overcomes restraints of geographic separation and thereby facilitates sharing of human and physical resources.

3.7.5 Consensus

Federal government should consider providing funds for subsidizing the dissemination of educational programs.
3.8 MEDICAL SERVICES

3.8.1 Introduction

The potential contribution of satellite telecommunications is, perhaps, greatest in the area of medical services. Among the specific areas that would benefit are improvements in emergency medical services, teleconsultation, remote patient care (telediagnosis), basic and continuing medical education, supervision of allied health care workers, and administration and management of health care resources. Specific information on these applications is included in Table 18.
<table>
<thead>
<tr>
<th>1.1 Disp. Objectives</th>
<th>1.2 STAT Required</th>
<th>1.3 Objective Satellite Type Communication Needs</th>
<th>2.1 Volume Constraints and Problems</th>
<th>Potential Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve Access to and Quality of Primary Care</td>
<td>No</td>
<td>Improve Satellite can make contribution</td>
<td>None</td>
<td>Detect injured Patient</td>
</tr>
<tr>
<td>1. Provide for detection of diseased patient (Person)</td>
<td></td>
<td>DATA transfer Half Duplex Audio</td>
<td>None</td>
<td>Answer question: Do I have a problem? How do I obtain care for patient in remote area?</td>
</tr>
<tr>
<td>Improve Monitor system</td>
<td></td>
<td>Half Duplex Audio</td>
<td>None</td>
<td>1. Delivery health service where none exist</td>
</tr>
<tr>
<td>2. Provide patient with access to medical system</td>
<td></td>
<td>Full Duplex Video/Audio Data Transfer Monitoring</td>
<td>None</td>
<td>2. Improve quality of care</td>
</tr>
<tr>
<td>Improve Health status by connecting patient with health care provider</td>
<td></td>
<td>Unknown</td>
<td>Patient responsible Confidentiality of Data</td>
<td></td>
</tr>
<tr>
<td>3. Assess health status by connecting patient with health care provider</td>
<td></td>
<td>IHS** Region Region</td>
<td>1. Increase breadth of services</td>
<td></td>
</tr>
<tr>
<td>Improve Primary care physician with consultation or provide support for non-physician</td>
<td></td>
<td>Ground Region Larger Region</td>
<td>1. Decrease isolation of care provider</td>
<td></td>
</tr>
<tr>
<td>4. Provide primary care physician with consultation or provide support for non-physician</td>
<td></td>
<td>IHS VA System</td>
<td>2. Bring resources to bear on patients problems</td>
<td></td>
</tr>
<tr>
<td>Improve Emergency Medical Service where they do not now exist</td>
<td></td>
<td>1. Cost of Comprehensive Terminals</td>
<td>3. Assist evaluation of Patient status</td>
<td></td>
</tr>
<tr>
<td>5. Provide Emergency Medical Service where they do not now exist</td>
<td></td>
<td>2. Teaching Professional how to use</td>
<td>4. Increase other services by non-physician under supervision of physician</td>
<td></td>
</tr>
<tr>
<td>Improve Non-emergency Medical Service on expanded, on-going basis</td>
<td></td>
<td>3. Obtaining data as to outcomes</td>
<td>5. Decide on referral</td>
<td></td>
</tr>
<tr>
<td>Improve Patient Records and store data</td>
<td></td>
<td>5. Availability - Need 7 days/wk, 24 hrs/day</td>
<td>7. Arrange for referral indicated for patient</td>
<td></td>
</tr>
<tr>
<td>Improve Follow up on referred patient</td>
<td></td>
<td>6. Payment per experiment period</td>
<td>8. Access patient records and store data</td>
<td></td>
</tr>
<tr>
<td>Improve Follow up on referred patient when returned to local physician</td>
<td></td>
<td>* Regional ** Indian Health Service</td>
<td>9. Arrange follow up on referred patient</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: P = Present ST = Short term LT = Long term * Regional ** Indian Health Service
<table>
<thead>
<tr>
<th>Disp. Objectives</th>
<th>1.2 STAT Required</th>
<th>1.3 Objective Satellite can address</th>
<th>2.1 Type Communication</th>
<th>2.2 Volume P ST LT</th>
<th>2.3 Communication Network P ST LT</th>
<th>Constraints and Problems</th>
<th>Benefits and Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve relation-ship between pri- mary and secondary physicians as well as secondary and tertiary physicians</td>
<td>No</td>
<td>1. Provide consultative backup for primary care physicians in rural areas of USA</td>
<td>Full Duplex Video/Audio</td>
<td>? ? ?</td>
<td>Micro-regions to include MICRO regions with condition between systems</td>
<td>1. Confidentiality</td>
<td>1. Maximize use of resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Bring resources of major medical centers to bear on patients problem in areas where resources don't exist</td>
<td>Data Transmission Monitoring Telemetry</td>
<td></td>
<td></td>
<td>2. Patient records</td>
<td>2. Lessen isolation of rural physicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Facilitate referral of patient from primary - secondary care physicians and/or from secondary - tertiary care physicians</td>
<td></td>
<td></td>
<td></td>
<td>3. Basis for care (?)</td>
<td>3. Basis for care (?)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Develop new system CME focused around patient management problems</td>
<td></td>
<td></td>
<td></td>
<td>4. Increase quality health care</td>
<td>4. Increase quality health care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Encourage development of regionalized system of Health Service Delivery</td>
<td></td>
<td></td>
<td></td>
<td>5. Lessen overall cost of health care</td>
<td>5. Lessen overall cost of health care</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6. Focus of regional planning</td>
<td>6. Focus of regional planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7. Facilitate placement of physicians in underserved areas</td>
<td>7. Facilitate placement of physicians in underserved areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8. Diminish depletion of health care resources</td>
<td>8. Diminish depletion of health care resources</td>
</tr>
</tbody>
</table>

NOTE  P = Present  ST = Short term  LT = Long term
3.9 PUBLIC BROADCASTING

3.9.1 Objectives

3.9.1.1 Discipline Objectives

Make available public radio and television programs to 100% of the population of the United States.

Make general programming available for audiences with particular needs such as the hearing impaired and foreign language speaking groups.

Provide specialized programming dealing with particular needs and interests of ethnic minority populations.

Provide specialized programming needed by special interest groups available in many different situations including the home, automobile, classroom, office, community center, library, auditorium, etc. The list of special interests is extensive and includes all levels of formal education and beyond.

Continuing educational needs for information and training of police, firemen, health care professionals, social service workers, etc. can be addressed through public broadcasting.

Tap the rich resources of the entire country and exploit our pluralistic society for the benefit of all who can share in that richness.

Establish program resource banks where material can be stored in a manner which will facilitate retrieval by appropriate user groups.

Maximize the choice for the local station in program selection, not only of content but of time. The Congressional mandate calls for the distribution of programs for use by a station "at times of their own choosing." A station may carry all programs from the national source, or some or none.

Program selection for local broadcast is entirely the province of the local station.

To provide quality services at the lowest possible cost.

3.9.1.2 Statutory Requirements

The Corporation for Public Broadcasting (CPB) is mandated by law (e.g. Public Broadcasting, October of 1967) to expend funds received from the federal treasury to facilitate the full development of public broadcasting for the benefit of the American people.

Many states have enacted similar laws to foster the creation and delivery of educational services through non-commercial broadcasting.

All non-commercial broadcast licensees operate with the sanction of the FCC subject to all rules and regulations including the charge to ascertain the requirements of their community and to serve the "interest, convenience and necessity" of the public.

3.9.1.3 Objectives to Which Satellites Can Make a Contribution

A satellite system is the most effective and efficient method yet devised to distribute radio and television programs to broadcast stations for their retransmission to the public. A high power satellite can provide service available in low-population density areas where it is not economically feasible to operate a broadcast transmitter. This includes 10-15% of the U.S. population.

High quality video with multiple associated audio channels permits programs to be distributed with two or more audio tracks in different languages which a broadcast station may choose to simulcast on radio in markets where large foreign speaking populations reside.

Since a satellite signal is not distance sensitive, it is an efficient means of distributing programming nationwide for use by those stations having a need for service to significant ethnic minority populations (e.g. Hispanic, Native American, Asian American) without interrupting main channel service for all stations.
Multiple channel capacity available via satellite makes possible the scheduling for nationwide distribution a myriad of program services for highly specialized programming interests on a cost effective basis. The interactive capability of two-way audio and video is often essential to a meaningful program learning experience for these groups.

The realization of diversities of program resources is greatly enhanced with a satellite system that eliminates the essentially one-way nature of our present terrestrial radio and television interconnection system. With up-link capability at various locations throughout the country, we can originate programs from their source with no additional cost added for distribution from "remote" locations.

Program materials from a central resource could be transmitted to one or more locations on demand during open access time on any one of a number of transponders or during off-hours of light traffic.

With a multiple channel capability via satellite being used for time zone delays, the same program is available to all stations at least three different times a day, and three different programs are available at the same time for most of the day. This dramatically increases the choice of time and type of program available for selection by the station.

Projections show that present satellite technology will enable us to provide significantly increased service, both qualitative and quantitative, at a lower cost than is now being realized for a terrestrial system.

3.9.2 Discipline Communications Needs

3.9.2.1 Types of Communication Needs

a. Four channels of high quality video and associated audio for distribution of public television programs.

b. Four channels of high quality audio, capable of compatible stereo pairing, aggregating for compatible quadrophonic, or separable for four monophonic purposes, for distribution of public radio programs.

c. Two-way audio capability from every radio and TV station.

d. Two-way video capability at, at least, one location in each state with some adjustments for heavier population density.

e. Two-way data transmission utilizing both soft display and hard copy between every radio and television station allowing for transmission to 15 TV locations and 15 radio locations simultaneously.

f. Multiple audio channels (approximately 5) associated with each video channel.

g. Expansion of multiple capacity for distribution of program service at the local level including, but not limited to, subsidiary communications channels for FM, instructional television fixed service, multipoint distribution service, video cassette, video disc, and cable.

3.9.2.2 Volume of Communications

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Short-Term</th>
<th>Long-Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTV Programs</td>
<td>4,368 Hrs/yr</td>
<td>8,500 Hrs/yr</td>
<td>20,000 Hrs/yr</td>
</tr>
<tr>
<td>Radio Programs</td>
<td>3,200 Hrs/yr</td>
<td>7,280 Hrs/yr</td>
<td>15,000 Hrs/yr</td>
</tr>
<tr>
<td>Data Message*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>12,000 m/yr</td>
<td>24,000 m/yr</td>
<td>36,000 m/yr</td>
</tr>
<tr>
<td>Radio</td>
<td>8,000 m/yr</td>
<td>10,000 m/yr</td>
<td>15,000 m/yr</td>
</tr>
</tbody>
</table>

*Average length per message is 15 minutes
NOTE:

PTV Programs: All numbers very approximate and includes original feed and all repeats. In long term many programs will be distributed which may never be broadcast but will be distributed to special user groups locally by other means.

Radio Programs: Availability of multiple channels for nationwide distribution will bring about large program segments of time of material for the print handicapped to be broadcast on FM sub-channels.

Numerous college courses are provided by the PTV stations working in cooperation with local institutions.

### 3.9.2.3 Communications Networks

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Short-Term</th>
<th>Long-Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV</td>
<td>155 licenses</td>
<td>205 licenses</td>
<td>280 licenses</td>
</tr>
<tr>
<td></td>
<td>265 stations</td>
<td>365 stations</td>
<td>400 stations</td>
</tr>
<tr>
<td>Radio</td>
<td>175 licenses</td>
<td>275 licenses</td>
<td>400 licenses</td>
</tr>
<tr>
<td></td>
<td>190 stations</td>
<td>350 stations</td>
<td>500 stations</td>
</tr>
</tbody>
</table>

NOTE:

Again these numbers are rough approximations. Many more slave transmitters are operated by television than is the case in radio. Public television stations today cover about 80% of the population while public radio covers only 60%; hence the growth in radio will be more rapid. We also expect to see more multiple station markets, especially in public radio, offering different but complementary program services.

Many ancillary services are provided for the community through local government and other service agencies.

### 3.9.3 Constraints and Problem Areas

#### 3.9.3.1 Statutory

For the first time since the public broadcasting act was enacted in 1967, the Congress has provided multiple year (3) appropriations for the support of public broadcasting adding a measure of insulation from federal control over program content. Constant vigilance is required to maintain accountability for the expenditure of public monies while protecting against undue pressure from government over programming activities.

The concept of "a public dividend" for the tax dollars invested to develop satellite capability has never been fully realized. Additional research and development of new technology to satisfy public service requirements is badly needed. Following that, Congress should find ways to make that technology developed at the public's expense, available for operational purposes by public service users for the public benefit.

#### 3.9.3.2 Regulatory

Congressman Lionel Van Deerlin, Chairman of the House Sub-Committee on Communications has announced his intent for a total review of the Communications law of 1934 as amended. This is the opportunity to make regulatory changes that are applicable to modern day technology both for the short-term and the long-term.

At the international level we must be certain of our requirements to make the best possible representation at the upcoming WARC meetings to insure appropriate agreements regarding use of the spectrum.
The increased services provided by advanced technology will create many regulatory modifications.

3.9.3.3 Institutional

Public broadcasting is characterized by a complex arrangement of institutional relationships involving national organizations, state and regional groupings and the individual local station. Under existing arrangements the Corporation for Public Broadcasting would have central responsibility for the establishment of a system to provide for the services heretofore mentioned. Operational responsibility would rest with the Public Broadcasting Service for television and with National Public Radio for the radio system. Both organizations are membership corporations whose policies are established and controlled by the member stations.

At present, it is the intent to establish a group similar to the original Carnegie Commission to review all aspects of Public Broadcasting and make whatever recommendations may be determined to be appropriate regarding funding and institutional relationships. As with the review of regulatory laws, this will be the opportunity for changes, refinements and improvements in the system.

3.9.4 Recommendations

The immediate requirements of public broadcasting for satellite services can be provided with existing services at competitive costs. Should regulatory and policy considerations cause a delay in present plans, which is entirely possible, a new generation of satellite technology would be essential if these services are going to be provided at reasonable cost.

Continued research and experimentation with advanced satellite technology should be undertaken by NASA to assure public broadcasting the availability of complementary services as well as for the provision of basic services ten years hence and on a more immediate basis in the event of extraordinary regulatory delays.

Many public broadcasting licenses provide ancillary services to their communities and additional communications requirements will be necessary as the scope of these services increases.

For a copy of the descriptive brochure on public broadcasting plans for satellite interconnection, write to: Donald R. Quayle, Senior Vice President, Corporation for Public Broadcasting, 1111 16th Street, N.W., Washington, D.C. 20036.
3.10 PUBLIC SAFETY

3.10.1 General

The role of communications in public safety agencies has unusual priority in the performance of their functions. It is obvious that these agencies must use communications in their routine functions. Not so apparent, perhaps, is the role that communications must play when numerous, diverse agencies must cooperate in wide area or macroscopic operations.

Public safety includes law enforcement, fire, emergency medical service, drug enforcement, civil defense, search and rescue, highway maintenance, conservation, and other groups responsible for the protection and preservation of the public's life and property. They are, by nature, generally tax supported activities. As such, monies spent must be clearly justified by their contribution to the objectives of the agencies. Therefore, the evaluation of need for any additional resources must be based on the degree to which that resource, such as a communications satellite program, contributes to the agency doing its present job in a better, or less expensive way, or the degree to which that resource permits the agency to accomplish some necessary, but heretofore technologically unrealistic, function.

3.10.2 Needs

The predominant requirements for public safety communications systems fall into three categories, each with its own technical, organizational and management needs. These three are interagency systems, wide area systems, and training systems.

3.10.2.1 Intra-agency Systems

Day to day intra-agency systems have relatively high volume from mobile and portable units to fixed or to other mobile and portable units. These systems are marked by the need for voice grade and relatively slow speed (less than 4800 baud) data links. Some of these agencies have a stated need for video monitoring of fire or disaster operations, or to assist critical management decisions relating to disaster relief operations. Such video requirements are distinguished by their disaster related requirements, which imply a periodic, high priority need interspersed by periods of relatively low activity during test and drill operations. They are usually constrained within political boundaries within a state or other local jurisdiction. Over 95% of these systems are confined to coverage areas of less than 320 kilometers diameter. The functional operation of these systems demands a high degree of individual system protection from interference, now provided by frequency and geographic separations. There are currently over 200,000 mobile law enforcement units, 5,000 fire units, 10,000 ambulance units and an unknown number of other service units now operating in the public service. These units, functioning from day to day in established patterns, must be prepared to respond to unusual incidents and/or disasters by a combination of a multiplicity of responses. Fire, police, ambulance, Red Cross and search and rescue all must be able to coordinate at times of disaster. The nature of the present frequency allocation process, and the premium placed on the presently available spectrum, have slowed the development of interfunctional cooperative systems.

3.10.2.2 Wide Area Systems

There is a need today for communications systems spanning the entire country. The flow of administrative and crime related traffic between states and to and from the federal government is massive. Some $2 \times 10^8$ messages with an average of 377 characters are handled monthly by the National Law Enforcement Telecommunications System (NLETS). 20,000 fingerprint cards are sent daily to the Federal Bureau of Investigation. Driver license and automobile registration checks within states (between local agencies and the state records center) involve hundreds of thousands of messages per day. The rapid introduction of mobile digital units into law enforcement vehicles is expanding this load by a factor of about 2 per year. The real time traffic is currently carried on statewide and national land line systems. Some states (about 10) have their own state-owned microwave systems providing intra-state service.

The growing mobility of the criminal element (particularly in drug related cases) is greatly expanding its area of activities. Crime is no longer confined to political boundaries. Drug related cases now require centralized, continuous monitoring or tracking of individuals operating across the United States. Instantaneous
voice communications between land, air and marine vehicles, distributed throughout the United States, and their central control point is necessary to assure coordinated apprehension of organized groups of criminals.

State law enforcement, in order to be productive and effectively utilize all of its expensive resources, should have immediate and expeditious access to data and all other resources to pursue its mission.

The problems being experienced by most statewide law enforcement agencies using their present systems are loss of signals, both transmission and reception, high maintenance costs, and most important of all, poor reliability when needed under stress conditions of weather, location and other natural disasters.

It is recognized that satellite communications in the volume needed to support national law enforcement has not been developed, but believed possible. At the present time, the greatest need and largest return springs from the need to consider the upgrading of Federal, nationwide and statewide systems rather than the systems of local entities.

It was discussed and recognized that costs may increase, but the gain of better reliability and the obvious increase in effectiveness of personnel due to their increased availability would offset the higher costs.

Effective concentration of resources, needed to assure their availability in times of disaster, demands stand-by, wide area communications systems be available to allocate their resources to the point of disaster, wherever it may occur. Mobile communications systems, capable of coordinating with all public agencies involved in disaster aid, regardless of their frequency or modulation type, and capable of maintaining communications with the resource control center are essential.

3.10.2.3 Education/Training Systems

The life and property of those citizens residing in remote areas depend on the skills they can bring to bear on their problems from within their own resources. Teaching these people how to protect themselves has, to date, been neglected. This deficiency may be ameliorated by broadband telecommunications. The need to teach all Americans the rudimentary elements of First Aid is continuously demonstrated by the Red Cross program that results in the award of 4-1/2 million certificates a year. These needs can be effectively supplemented using highly skilled instructors through a program of instruction that brings the teaching environment into the individual's home.

The non-metropolitan areas of America (less than 150,000 people) have the greatest need and can make the most effective use of satellite communications for education and/or training. These areas are generally isolated from teaching resources, expertise, new technology, and practice that are vital to the delivery of services in the public safety sector. These populations are usually dispersed, sometimes isolated by terrain, and beyond effective range terrestrial facilities.

These areas can be most effectively served by four-way communications (interactive audio-video). The primary need is for classroom training and training demonstrations. The secondary needs can be served by one-way video and audio and simple transmission or accessing of data needed in training.

High priority should be given to the training of teachers of public safety (both paid and volunteer) at the local level essentially limited to subject matter for which national resources or expertise are in short supply. For example, a new technique is search and rescue.

Consideration should be given to live televising of disasters that could serve as training demonstrations or immediate recording and retransmission with a short time (24 hrs). This interjects absolute realism and timeliness to the demonstration. Client response, especially for volunteers, will be magnified by this technique. Every fire station could become an immediate training site, for example.

Therefore there is a need both for scheduled and command use of satellite communications in the educational training of public safety personnel. The satellite can most effectively bring expertise in short supply to widely and thinly dispersed personnel.
3.10.3 Constraints

The satisfaction of these public safety needs can only be accomplished within the framework of existing laws and regulations. For instance, existing Federal security and privacy laws prohibit the establishment of communications links that will further "FEDNET" type of computer linkages. The transfer of criminal history or other criminal justice records requires specialized handling techniques. The privacy of individuals prohibits the linkage of names to statistical analyses.

The sensitive nature of some criminal justice information requires its encryption during radio transmission to preclude its unauthorized dissemination. The sophistication of elements of the criminal community and the proliferation of public owned scanners have jeopardized the security of much of the clear text law enforcement radio transmissions.

3.10.4 Summary of Public Safety Requirements

In view of the above stated needs, and in light of the existing legal and regulatory constraints, the following summary of communications systems requirements has been prepared. This summary makes the assumption that these channels would be provided in lieu of the existing systems, wherever they now exist. For instance, the present two way radio system is controlled by its owners, and as such has addressable characteristics within the area of its responsibility. The nature of the 2500 two way radio channels described must include the capability for discrete address ability and inter-channel trunking with sufficient system gain to overcome building and foliage losses at equal or less than system noise levels now enjoyed.

3.10.4.1 One Way Radio (Nation-Wide Coverage)

Wide area disasters, both natural and man-made, require the ability to notify the many diverse, responsible agencies of the impending events. It is assumed that an adequate number of area disaster and search and rescue control centers will be established. Other public safety agencies have the need to disseminate alerts regarding specialized events.

3.10.4.2 Two Way Radio

The present system of police, fire, ambulance, state highway patrol, state police, Federal Drug Enforcement, Federal Bureau of Investigation (when coordinating with local agencies) and other Public Safety agencies, use approximately 250,000 mobile, portable and fixed stations. These now occupy some 200 (approximate) channels in VHF low band/high band and UHF frequencies. They are separated geographically and by political boundaries. Their responsibilities are such that 100% reliability is desirable (They now operate within the 90% coverage, 95% of the time, power density curve of the FCC).

3.10.4.3 National Emergency Channel

In addition to the responsibilities for public safety borne by the established tax supported agencies, three stand-by channels used 3% of the time, would be needed to coordinate these elements during disasters, major search and rescue and other large major, multi-agency response operation.

3.10.4.4 Data Transfer System

Present interstate and state-to-national traffic includes over $2 \times 10^6$ messages per year of an average of 377 characters per message. This traffic is now carried over leased circuits.

In addition to this electronic traffic some 29,000 8" x 8" fingerprint cards are sent by mail to the FBI per day. The magnitude of this task currently precludes the timely handling by electronic means.

It is calculated that the transmission of these fingerprint records, plus the dissemination of mug shots for criminal identification and lost individuals and the interstate transfer of maps, footprints, shoe images and search and rescue data will require 204 voice grade channels.
3.10.4.5 Video

As described above, the surveillance of criminal activities in progress and the control of large scale law enforcement actions requires 4 nationwide video links. Education, requiring video for teaching during only certain hours of each day, requires not only a video channel for teaching, but also one with an interactive voice channel, and a third with an interactive video channel.

Video requirements to monitor disaster activities on a national basis suggests the need for the availability of 4 non-shared video channels.

3.10.4.6 Data Transfer

The growing use of data transfer via mobile digital terminals by police agencies is developing an important new need for communications channels. The preponderance of this work is between car and a central state computer file. 250 channels are estimated as the nationwide requirement for the next decade.

An additional element is the developing use of automatic vehicle location systems that maintain running plots of police and other vehicle location. In transit monitoring of nuclear shipments is but one such use. These systems all have some form of automatic digital position reporting to the dispatch center. 100 voice grade channels are estimated as needed for this purpose.

Five analog channels would provide needed low speed telemetry systems to support police operated emergency medical systems.

3.10.4.7 Search and Rescue, Disaster Rescue, and Emergency Response

A total national emergency response coordination system can now become a reality with the advent of satellite communications.

A centralization of data for computer assisted search planning, the use and employment of “overhead” Search and Rescue and Disaster Management teams, the stocking of radios and other SAR equipment in regional emergency caches, plus the coordination of communications on federal, state and local levels can now meld emergency response into an efficient, cost effective, whole system.

Existing communications restraints have prevented such a “whole” coordination system from developing.

The days of fragmented search and rescue response, or “Head ‘em off at the pass” SAR tactics can now be replaced with portable earth terminals and satellite communications for coordinating an integrated, whole emergency response effort in major SAR missions, and disaster situations.

3.10.4.8 Environmental Services

One problem which most of the two-way mobile public safety services share is a need for additional area coverage in its mobile-to-mobile and mobile-to-base communications. As the area becomes more rural and more remote, as in most areas of environmental services, this problem increases.

The dream of every forester, naturalist, hydrologist, geologist, and everyone who works in remote areas is to have the same reliability of communications in remote areas as he enjoys while near to his headquarters station, with its attendant benefits of increased safety and efficiency. The systems now being used are using techniques such as battery and solar or thermoelectric powered repeaters, and remote controlled base stations to accomplish as wide coverage as possible. And, always beyond the budget limits, exist areas where there is no regular coverage but which must be covered in case of disaster or emergency such as flood or wildfire fighting.

If a satellite system could provide this additional required coverage, it would fill this need. It could be in a system which would either entirely replace existing mobile systems with the added area coverage, or as a supplemental and emergency system which covers all rural and remote areas.
Second in priority is an increasing requirement for data transmission, either low speed data or high speed for computer services. And third in priority is video, facsimile, and teleconferencing.

This panel does not have knowledge of state, local, and private expenditures for environmental communications services such as forests, parks, water and mineral resources, public land management. This area should receive further exploration.

3.10.5 Costs

It is estimated that the present costs for operating public safety communications systems are as follows:

<table>
<thead>
<tr>
<th>Criminal Justice</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>State and local</td>
<td>$100,000,000</td>
</tr>
<tr>
<td>Federal</td>
<td>20,000,000</td>
</tr>
<tr>
<td>Search and Rescue</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Environmental Protection</td>
<td>25,000,000</td>
</tr>
<tr>
<td></td>
<td>$146,000,000</td>
</tr>
</tbody>
</table>

These costs include spares and manpower. They do not include capital investment.

It should be remarked that a typical mobile installation costs the community about $1300 per unit now and that a single dispatcher base station is about $15,000 though this figure can vary widely depending on complexity.

It is estimated that the proposed additional/new services suggested in the above report would cost, not including launch or other satellite related costs, about:

<table>
<thead>
<tr>
<th>Criminal Justice</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>State and local</td>
<td>$ 60,000,000</td>
</tr>
<tr>
<td>Federal</td>
<td>20,000,000</td>
</tr>
<tr>
<td>Search and Rescue</td>
<td>600,000</td>
</tr>
<tr>
<td>Environmental</td>
<td>25,000,000</td>
</tr>
<tr>
<td></td>
<td>$105,600,000</td>
</tr>
</tbody>
</table>

3.10.6 Exclusions

This report has not addressed the needs of emergency medical services (with the exception of police operated ambulances) as they are represented on another panel. It has not tried to describe the requirements of the many public safety agencies, now operating under the jurisdictions of municipal, county, and state governments.

Nor has this report attempted to address the communications related management requirements established by the laws of our states and communities that preclude sharing of facilities due to local budget or established political responsibility requirements.
The report has made no attempt to relate channel requirements to spectrum realities as established by the FCC or international treaty. It has further treated as an engineering detail the problems of discrete addressability between agency boundaries and between agencies within similar boundaries. It has also considered the problems of relating requirements to funding sources as beyond its scope.

3.10.7 References


3 11 RELIGIOUS APPLICATIONS

In approaching the religious applications of a public service communications satellite we immediately recognize that there are at least three understandings possible for the work of religion:

1. Institutional churches

2. Church related institutions: hospitals, schools, colleges, social services, etc.

3. Expressions of what is of value in the society

While we have chosen to deal primarily with the institutional church, we have felt it necessary to indicate where church related institutions have specific applications that are similar to, but not identical with, other health, educational, informational and social services, and how the disciplines ought to work in concert.

Our religious concern, in the broadest sense, also finds expression in our belief that there ought to be a genuine public service component to the national space program, for four reasons: first, because the development of satellites was financed by public monies; second, because our nation depends on an informed citizenry and the free exchange of ideas to which the public service satellite could contribute greatly; third, because a public service satellite can, if properly designed, provide significant services to the nation's poor and powerless who desperately need better information, education and health services; and fourth, because religion has a recognized and legitimate role in American life and culture, a public service satellite can provide for a broadening of perspective within religious bodies as well as for a deepening of peoples understanding of themselves.

For these reasons we are not only concerned about the use which the church makes of the project, but also what the project will mean to all of society. We believe that such a satellite should be developed only partly on the basis of economic viability, and that a substantial portion of the enterprise should be developed strictly as a service to the general public.

Finally, in developing our recommendations we were aware of the constraints and protections placed upon religion by the First Amendment. We believe the fundamental principles that must be applied to all of the following applications are the protection of freedom of worship on one hand, and the prohibition of the establishment of any religion on the other. For example, while we would continue to expect the broadcast of sectarian religious on government facilities to be forbidden, on the other hand, we see no similar prohibition to apply to point-to-point transmission of sectarian religious matter.

The religious applications described in Table 19 can be grouped into ten categories:

1. In-service training for pastors, chaplains (military and institutional) and other church professionals, and teachers - sectarian and non-sectarian.

2. Data transfer: computer, video and audio software.

3. Teleconferencing, internal communication; national and international, regional - including programming.

4. Interconnection of denominational seminaries, universities and parochial schools, including library services.

5. TV and radio program distribution (off air).

6. Newsfeed to denominational and secular press, radio and TV.

7. International disaster relief coordination and information.

8. Missionary communications.
9. Direct broadcast – domestic (audio/video) and international.


In religious applications statistical church data could be made more accessible such as baptismal records, clergy assignments, genealogies, etc. This information would be kept in a central national computer bank which would be accessed via satellite by regional and/or state church offices. Within these regions, parish offices would have data terminals which would be connected to the regional centers via terrestrial microwave and/or cable. The terminal units would translate the digital data into a slow-scan pictorial or alpha/numeric readout presented on a cathode ray tube, a photographic print, or a typewritten print. This would eliminate time-consuming record-keeping and reproduction locally.

Films, video programs, etc. kept in a national center could be retrieved and transmitted electronically upon signal from a local terminal. Physical limitations could inhibit storage of a vast amount of videotapes, films, etc. in a national center, therefore regional storage of these materials would be recommended.
### Table 19

#### Religious Applications

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Continuing Education, Clergy, Directors of Religious Education, Clinical Pastoral Education, etc.</strong></td>
<td>1-way Video 2-way Voice &amp; data transfer</td>
<td>Terminals in regional centers in cities, towns, &amp; isolated areas</td>
<td>2000</td>
<td>As widely dispersed as possible - National and International</td>
<td>3 hr. morning 3 hr. night hrs. Weekdays</td>
<td>May be-for credit - user paid. Every major denomination now carries on continuing education by other means.</td>
</tr>
<tr>
<td><strong>Pastoral Education, etc.</strong></td>
<td>1-way Video 2-way Voice &amp; data transfer</td>
<td>Use above regional centers or on military bases</td>
<td>200</td>
<td>On or near military bases</td>
<td>2 - 3 hrs. daily Weekdays</td>
<td>Under jurisdiction of U.S. Chaplain's Corps - Chief of Chaplains</td>
</tr>
<tr>
<td><strong>In-service training for Military Chaplains</strong></td>
<td>1-way Video 2-way Voice &amp; data transfer</td>
<td>Use above regional centers - or institutional &amp; industrial terminals</td>
<td>2000</td>
<td>In or near institutions</td>
<td>2 - 3 hrs. daily Weekdays</td>
<td>Chaplains are now working in industry, hospitals, prisons, institutions, retirement centers, apartment &amp; real estate developments, Police &amp; Fire Departments, Trucking networks, other non-profit organizations.</td>
</tr>
<tr>
<td><strong>In-service training of Institutional, Industrial &amp; other Chaplains</strong></td>
<td>1-way Video 2-way Voice &amp; data transfer</td>
<td>Interconnection with home delivery systems (ETV networks, cable systems, libraries, etc.)</td>
<td>5000</td>
<td>Widest possible - utilizing home nets. - 50 States</td>
<td>30 hours per week</td>
<td>This training currently being done by mail, conferences, and other means. This is a large constituency (e.g. - 2,000,000 Church School Teachers in U.S.)</td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>National Denomination Offices</td>
<td>Multiple point audio and video</td>
<td>Fixed portable terminals</td>
<td>?</td>
<td>Potential</td>
<td></td>
<td>Few foreign conference calls, yet seriously needed. First Priority on audio</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Heavy</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Usage 300</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Terminals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offices, International</td>
<td>Multiple point audio &amp; video</td>
<td>Fixed, portable terminals</td>
<td>200</td>
<td>Approx. 60 foreign countries</td>
<td>Moderate usage 500 weekly 2 1/2 hours per terminal</td>
<td>This is random in nature, generally yet some service would be required every week of the year.</td>
</tr>
<tr>
<td>Inter-Church local level</td>
<td>Multiple point audio &amp; video</td>
<td>Fixed, portable terminals</td>
<td>3000</td>
<td>50 States</td>
<td></td>
<td>Pastor groups, denominational and interdenominational, statewide and nationally. Summer youth assemblies and festivals. Usage relates to cost.</td>
</tr>
<tr>
<td>Conventions and Conferences</td>
<td>Multiple point audio &amp; video</td>
<td>Mobil</td>
<td>50</td>
<td>50 States and international (denominational missions)</td>
<td>occasional usage with one way video to T.V. stations &amp; closed circuit congregational meetings.</td>
<td>Moderate usage is now in place. Predict greater use when practical via satellite. Usage relates to cost.</td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No.</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
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</tr>
<tr>
<td>Library - Microfilm and Video Resources for Denom. Colleges &amp; Seminaries</td>
<td>2-way Data</td>
<td>Fixed Data Terminals</td>
<td>500</td>
<td>50 States</td>
<td>10,000 pgs. per day</td>
<td>Economic Data: Check with American Assoc. of Theological Schools, Indianapolis, Ind.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>500</td>
<td>International</td>
<td>10,000 pgs. per day</td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No.</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Public Service Radio Program Distribution</td>
<td>1-way Voice program transfer</td>
<td>Radio Stations</td>
<td>Potentially all existing Radio Stations</td>
<td>International and national</td>
<td>24 hour Video Feed</td>
<td>Present distribution on tape, film and disc via postal services is expensive and slow. First priority; Domestic, Second Priority; International Users.</td>
</tr>
<tr>
<td>Public Service Video Program Distribution</td>
<td>1-way Video program transfer</td>
<td>TV Stations</td>
<td>all existing TV Stations</td>
<td>National and International</td>
<td>Daily heavy 4-5 hrs. Video Feed</td>
<td>Present distribution on tape and film. Expensive and slow. First priority; Domestic, Second Priority; International Users.</td>
</tr>
</tbody>
</table>
### Table 19 (continued)

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>News feeds to denominational/fait group papers, magazines, etc.</td>
<td>Facsimile w/2-way audio to transmit typed copy and photos</td>
<td>Portable uplink units</td>
<td>10</td>
<td>Portable units moved on demand</td>
<td>6 hr/day, normal</td>
<td>For example, U.S. Catholic office transmits approx. 25 pages 11 x 14 doublespaced copy per day. Also 6-10 photos daily.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed uplink units</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed down link units</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 hr/day, peak</td>
<td></td>
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<tr>
<td></td>
<td>Facsimile w/2-way audio to transmit typed copy</td>
<td>Fixed down links at each denom office</td>
<td>250</td>
<td>Distribution at down links throughout the 50 States</td>
<td>3 hr/dy, normal</td>
<td>Use same portable and fixed up links as in #1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>at each major paper w/land lines to smaller papers</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>6 hr/dy, peak</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>News feeds to secular papers, magazines and wire services</td>
<td>Facsimile w/2-way audio to transmit typed copy</td>
<td>Portable uplink units</td>
<td>10</td>
<td>Portable units on demand. Fixed up link at each denom office. Fixed down links at each radio station and audio</td>
<td>1 hr/dy, normal</td>
<td>ECU-Media News (Nat'l. Council of Churches) feeds 1200 radio stations per week. Nat'l. Rel. Bdcstrs. feed 250 stations per week.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed up link units</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed down link units</td>
<td>7000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 hr/dy, peak</td>
<td></td>
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<tr>
<td></td>
<td>2-way Voice (broadcast quality)</td>
<td>Portable uplink units</td>
<td></td>
<td>Distribution of up links primarily on east coast</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed up link units</td>
<td></td>
<td>Down links throughout the 50 States</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
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<td>---------------------------------------------------</td>
</tr>
<tr>
<td>News feeds to TV Stations</td>
<td>1-way Video</td>
<td>Portable up links</td>
<td>10</td>
<td>Portable up links</td>
<td>1/2 hr./day,</td>
<td>Various denom. offices mail film clips to TV stations regularly.</td>
</tr>
<tr>
<td></td>
<td>2-way Voice</td>
<td>Fixed uplinks</td>
<td>50</td>
<td>on demand</td>
<td>normal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed down links</td>
<td>850</td>
<td>up links at each</td>
<td>3 hr/day, peak</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>denom. office</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Down links at each</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>TV station</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
</tr>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>International Disaster relief</td>
<td>2-way Audio</td>
<td>Portable up link</td>
<td>5</td>
<td>Portable up links</td>
<td>24 hrs. per day</td>
<td>Portable uplink small enough for helicopter airlift to disaster site for</td>
</tr>
<tr>
<td>coordination</td>
<td>1-way Video</td>
<td>Fixed down link</td>
<td>50</td>
<td>to be air shipped</td>
<td>from set up of</td>
<td>Video feed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>to disaster site on</td>
<td>portable up link</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>demand</td>
<td>to end of disaster</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Fixed down links</td>
<td>period</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>to be installed at</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>each denom/faith</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>group office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
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</tr>
<tr>
<td>Missionary Communications</td>
<td>2-way Voice</td>
<td>Terminals</td>
<td>5000</td>
<td>Terminals with each missionary location and at U.S. Affliate Headquarters</td>
<td>One 10 min. Call per week per missionary with 5% of satellite time to emergency calls</td>
<td>Initial satellite locations over mid-Atlantic to give primary coverage to South America and Africa. 35,000 missionaries overseas. Current HF communications unreliable and inadequate in capacity.</td>
</tr>
<tr>
<td>Missionary Communications</td>
<td>1-way TV</td>
<td>Small TV</td>
<td>3000</td>
<td>Selected sites at Missionary Locations, World Wide</td>
<td>Full Time broadcast 5-10 PM local time each location</td>
<td>Special classes of instruction with limited query capability.</td>
</tr>
<tr>
<td>Missionary Communications</td>
<td>2-way Voice</td>
<td>Terminal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------</td>
<td>--------------------------------------------</td>
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<td>---------------------------</td>
<td>---------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Christian Instruction Video</td>
<td>4 Voice/TV</td>
<td>Direct TV Broadcast to small inexpensive receivers with 4 voice capability</td>
<td>20000</td>
<td>Remote sites at International locations</td>
<td>Full time - at least 3 channels</td>
<td>Primary coverage is projected as the southern hemisphere. Present coverage is provided by radio.</td>
</tr>
<tr>
<td>Christian Instruction Radio</td>
<td>1-Voice</td>
<td>Direct audio Broadcast to small inexpensive receivers.</td>
<td>Thousands</td>
<td>World Wide</td>
<td>Full time 3 channel capability</td>
<td>Replaces present land limiting radio transmissions</td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
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<td>---------------------------</td>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Telediagnosis Consultation</td>
<td>2-way Audio</td>
<td>Voice/data link</td>
<td>International in scope, but regional in application</td>
<td></td>
<td>Assist paraprofessionals and health aide, in remote villages to provide diagnosis, treatment, and follow-through. X-ray, charts, EKG, photo, etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data-soft and hard</td>
<td>hospital - clinic - village health aide</td>
<td></td>
<td>?</td>
<td>Needs to be coordinated with the medical service group.</td>
<td></td>
</tr>
</tbody>
</table>
### Public Service Communications User Requirements

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Care Information (Basic)</td>
<td>Voice Data Transfer 2-way</td>
<td>1) Voice/data terminals in mission and church related hospitals and health care centers, 2) Mobile portable terminals</td>
<td>500 to 1600</td>
<td>International</td>
<td>Moderately heavy traffic</td>
<td>Can expect increase in traffic when present communication barriers are reduced; current traffic is chiefly via mail and publication. Needs to be coordinated with medical services group.</td>
</tr>
<tr>
<td>Medical Information update for MD's and RN's</td>
<td>Voice Data Transfer 2-way Occasional Video</td>
<td>Voice/data terminals in mission and church-related health institutions</td>
<td>200 to 500</td>
<td>International</td>
<td>10 hour/week</td>
<td>Need use of slow-scan for charts, graphs, products, X-rays, pictures, etc. Needs to be coordinated with the medical services group.</td>
</tr>
<tr>
<td>Training indigenous para-medics (Instructional materials distribution)</td>
<td>1-way Video 2-way Audio Facsimile Computer Assisted Instruction</td>
<td>1) Voice-Video terminals with VTR 2) High Speed facsimile 3) CAI Terminals</td>
<td>200</td>
<td>International</td>
<td>20 hrs/week</td>
<td>Instructional; can use low-traffic time on satellite. Needs to be coordinated with medical services group.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>500</td>
<td></td>
<td>20 hrs/week</td>
<td>Need real time access.</td>
</tr>
<tr>
<td>Health Education and nutrition for mission schools, churches, and community centers</td>
<td>1-way Video 2-way Audio</td>
<td>Voice-video terminals with VTR in mission schools, centers, churches &amp; similar institutions operated by churches</td>
<td>2000 to 5000</td>
<td>International and U.S.</td>
<td>20-30 hrs/week</td>
<td>Instructional, Needs to be coordinated with missionary education needs.</td>
</tr>
</tbody>
</table>
3.12 STATE AND LOCAL COMMUNICATIONS

The objective of this workshop is to work toward the implementation of advanced telecommunications systems to support the delivery of services to the citizen by state and local agencies. Reaching this goal will require new technology for earth-bound as well as space use and also the development of a broad base of users.

As the panel on State and Local Communications reviewed its assignment in relation to other panels, it became evident that the needs expressed by its members were also covered by these other panels. After visiting these groups we concluded that we might better serve the purpose of the workshop by examining the roles of state and local governments in the process of upgrading and implementing communications services for the public sector. Effective planning at these levels will help ensure better planning at the National level.

3.12.1 Needs Assessment

To accomplish our specific task, we surveyed the broad general categories of potential users and needs. We then attempted to determine whether and where local and state telecommunications planning and services could interface with these users and needs. The broad categories seem to be: education (all levels), health, medical emergency services, environmental services, safety/law enforcement services, library/information services, religious/social services, and government services. Table 20 is not exhaustive but suggests the levels at which some of the specific needs in the above categories should be addressed.

State and local governments need a large variety of information services. These needs are not immediately perceived with respect to satellite communications and therefore require exposure to related examples (i.e., informational programs, needs aggregation) to bring the potential to the cognizance of both user and supplier groups. There is a need for services which will gain both public awareness and support for local and state programs.

A similar need exists among government agencies (e.g., departments of public instruction, corrections, law enforcement, state police and libraries) both for an educational program regarding the potential of wide-band and narrowband telecommunications applications. Emphasis should be on the increased services that can be provided, the improvement of quality, and the economics of scale that can be effected.

There is a need to coordinate the use of satellite capability among the various governmental departments and agencies in order to make most cost effective use, avoid duplication, and foster the sharing of resources.

3.12.2 Statutory Requirements

Although users of telecommunications services can be grouped along lines of interest such as continuing education, environmental communications, or public safety, as examples, the systems which provide these services function within various spheres of governmental jurisdiction. The process of aggregating users at the receiving end of the system helps lower unit costs just as it does in the case of the satellite itself.

It seems unlikely that agencies at the national level operating alone can ensure that the needs of the citizen-taxpayers are being met in the most efficient and effective manner. The participation and commitment of all levels of government is needed in applying this technology in a rapidly changing world. The increasing demands for local services when financial resources are increasingly restricted requires care and consideration in employing innovative techniques. There is a genuine need for planning input at the grassroots level; local and state governments must do their part in this process.

The lack of statutory authority for planning the use of new and expanded telecommunications systems seriously limits the participation of local and state governments in this field. In some of the more progressive municipalities, counties, and states, progress has been made toward establishing mandates to deal with communications needs, issues and planning. As examples, the State of Virginia, and the City of Baltimore, have seriously acknowledged the importance of advanced telecommunications within their jurisdiction (see Appendix 8).
Table 20

<table>
<thead>
<tr>
<th>Categories of Communications Services</th>
<th>Local</th>
<th>State</th>
<th>Regional</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education (all levels)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Services to Elem. - Sec. Teachers</td>
<td>X</td>
<td>X</td>
<td>?</td>
<td>X</td>
</tr>
<tr>
<td>- Continuing Professional Education</td>
<td>X</td>
<td>X</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>- Adult Ed./GED</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health/Medical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- EMS Coordination</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>?</td>
</tr>
<tr>
<td>- Patient Education</td>
<td>X</td>
<td>X</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>- Telediagnosis</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Warning</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>- Disaster Operations</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Search and Rescue</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Water Resource Management</td>
<td>?</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Weather Monitoring</td>
<td>?</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Safety/Law Enforcement Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Personnel Training</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>- Search and Apprehension</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Routine Dispatch Communication</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library/Information Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Data Transfer and Exchange</td>
<td>?</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Computer Access</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Religious/Social Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Teleconferencing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>?</td>
</tr>
<tr>
<td>Government Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Training of Staff and Officials</td>
<td>X</td>
<td>X</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>- Administrative Information Transfer</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Citizen Complaint and Service Requests</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>?</td>
</tr>
</tbody>
</table>

Local and state governments must routinely budget for capital and operating funds required for on-going communications networks. Such budgeting must be carried out through legislative appropriations at various levels. Further, prior planning by local and state governments must include: the establishment of policy-setting precedents, the creation of specific enabling laws, and the creation of legislative appropriation requests.

Another statutory concern is the need for policy regarding the extent to which those living in remote areas are entitled to receive services characteristic of those living in urban areas. Should the consumer pay according to the cost of service provided or should there be a uniform charge?

3.12.3 Regulatory Requirements

The development of an advanced communications system requires that the FCC and users address the question of tariffs, and not automatically apply interstate and/or commercial rates to public service users.

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3.12.4 Recommendations

Renewed investment in the development of communications satellite technology is in the public interest. The objective is to make new services available for public service users; types of services which private companies have not yet demonstrated an interest in serving. The reasons that these services are not yet available are that the needs have not been sufficiently well demonstrated and that the economic feasibility of an advanced system (allowing the use of many low-cost earth stations) is not easy to determine. It takes time for users of these services to develop and to assess their value. It therefore makes sense for the Federal Government to underwrite the risk of developing this market provided that the raw data show the prospect of success is reasonably high.

Success implies continuing operation on a commercial basis. Federal policy and common sense dictate the use of commercial communication services. There is no need for adding the caveat, "unless otherwise unavailable," for that is equivalent to economic infeasibility. If subsidies are required, not to imply that they are undesirable, it is probably better that they be directly acknowledged, as opposed to being hidden under the cloak of a government-operated system.

If an advanced satellite system is not operated on a commercial basis, then a large group of users, so far neglected, will be unavailable to help support the system. These users are in the commercial service sector. It does not seem reasonable to construct a system employing advanced technology, initially supported by large amounts of federal funding, and then exclude private tax-paying companies and citizens from using it. The satellite doesn't distinguish between a non-profit user and a commercial user. Thus, it should be possible to construct a system to serve both classes of users, enabling all to take advantage of the economies of scale.

As opposed to creating separate systems for the public and private sectors, we suggest the most effective means is to aggregate their demands so that they can be met in an effective manner; then an organization such as the Public Service Satellite Consortium could act as broker to the public sector.

Relatively few establishments, among them governments and their agencies, welcome innovation. We are recommending the acceleration of a process which would otherwise evolve quite slowly, if at all. Consequently the concept set forth may be met with resistance from many governments, agencies, and institutions which have vested interests in the status quo.

Careful anticipation and exploration of such problems coupled with much grass-roots involvement will help minimize helpful resistance.

Far too many states are prepared to analyze and aggregate their communications needs. In the immediate future, it would be helpful if two or three models (possibly one single state, one group of states in a region, or the like) could be set up to deal with needs assessment, policy issues, and, subsequently, the establishment of communications services. It would be desirable that models be established to meet very different communication needs - going across the communications spectrum.

For example, if Indiana, Ohio, and Pennsylvania (states with experience in networking) were to cooperate on an adult education program, decisions would have to be made to determine which institutions would participate and to what degree the nature of the program and the delivery systems would involve satellite use.

In order to expedite progress in this area it is important to take advantage of prior experience gained by municipalities and state governments in utilizing communications services. Therefore, choosing to start where there is a backlog of experience advances our overall objectives.
3.13 VOLUNTARY, PUBLIC INTEREST AND SOCIAL SERVICES

The panel consisted of representatives of non-profit consumer, citizen action, public interest, social service and voluntary organizations. Some six million such organizations are known to exist in the United States; three million of these are monomorphic (they have only a single chapter or entity); three million have more than one chapter. Participating on the panel were representatives of the Consumers’ Union and the Consumer Federation of America, feminist organizations; the listener supported National Federation of Community Broadcasters and the Pacifica Foundation, Native Americans and the South Dakota Indian Education Association; Day Care Centers; the National Association of Neighborhood Health Centers, the Public Interest Research Groups and Public Citizens; and the Public Interest Satellite Association (PISA).

The panel’s discussions were aided by a recently-completed survey, commissioned by PISA, to assess the communications needs, uses and expenditures of the entire universe of non-profit organizations (897) with more than 10,000 members (see Reference Section 3.13.9). The range of diversity included such organizations as The League of Women Voters, the Sierra Club, the National Organization for Women, the National Police Officers Association of America, the NAACP, and the Boy Scouts of America, to name a few.

The study revealed that, on the average, each organization spends in excess of $160,000 for communications services per year. The total for this universe approached an annual expenditure of $145 million; $53 million for national and regional conferences; $18 million for long-distance telephone; $13 million for mail campaigns; $4 million for data transmission; and $3 million for radio and television.

The study was predicated on the belief that satellite telecommunications services may soon become available to this non-profit segment of society at a level of technology it can manage and at costs it can afford. Hence, the survey included an assessment of what the respondents would like to do with a satellite if one were put at their disposal. The overwhelming first choice was for telephone, radio was second and television third.

The study further presumed that organizations in the non-profit world are involved in three basic kinds of communications: inter-organizational (communications to their own chapters and members); intra-organizational (communications to other organizations); and communications to the public-at-large. This last form of communications — organizations reaching members of the general public — was acknowledged to be particularly important given the inadequate means available for this purpose today. The study indicated that tens of millions of dollars are being spent by these groups to deliver messages to individuals in the home via such conventional means as direct mail and telephone campaigns. Radio and television spots are employed but to a much lesser degree because of the enormous expense involved and the structure of, and lack of access to, current telecommunications systems.

The desirability of devising lower cost alternatives to serve the significant communications requirements, as great as it is for the groups surveyed, is even greater considering that the sample, although of a complete universe, was of only a fractional percentage of the total number of such organizations known to exist.

The panel discussions confirmed the validity of the survey. The organizations represented desire reliable, low-cost telecommunications services to meet a wide variety of existing and anticipated needs.

Each panel member followed the desired format for the workshop. Beyond the results of the survey, several common threads emerged from the discussions: a major point was that the need for feedback from the public to the organizations was just as critical to carrying out organizational objectives as was the need for inter-, intra-, and organization to the public-at-large communication. All expressed a need to better aggregate data and to disseminate it more efficiently and inexpensively. Using satellites was deemed desirable not only because of their potential cost effectiveness, but because they would allow more channels of communications and would allow reaching remote and isolated areas either not now serviced or serviced inadequately by existing means. The new technology could be seen as increasing the efficiency, effectiveness and outreach of non-profit and social service organizations.
3.13.1 Feminist Services

3.13.1.1 Objectives

Objectives include bringing equality to women in our society through enforcement of existing laws, through enactment of needed legislation, and through education and raised awareness.

Rapid two-way contact between local, state and national level organizations would expedite much of the needed organizational work. It would facilitate organizational activities, from getting out the word on need to contact representatives in government on impending legislation, to speeding up the routine "housekeeping" work of organizations, to coordinating efforts on regional, state and national levels in the matter of filing charges, law suits, pushing legislative programs in order to maximize such efforts. Two-way satellite communications would broaden the impact of national meetings by enabling large numbers of interested people who would otherwise not be included at all to hear and perhaps respond to important speakers, and could obviate the need for members' personal attendance by having an exchange via satellite.

3.13.1.2 Communications Needs

Satellite communications would also serve a great purpose in educating the public on existing laws. Too many women are unaware of their legal rights and of existing resources to help them. They need to know where to turn. It is important to give information on education (vocational opportunities, women in history) and present role models to girls and women.

Continuing information is needed on such matters as available day care and location of havens for battered wives in each locality; it is important to get specific advice on opening your own business and to have available para legal advice on many aspects of life.

There is a need to disseminate information on jobs available regionally and nationally, listings of women seeking work, a talent bank of "expert" women in all fields as resources, counselling the displaced homemaker on how to apply for a job, and sources of training and education.

A satellite system would be very useful in gathering and exchanging data on the status of women's employment which should be more readily available and more current than it is now. A data bank can give needed information on all aspects of the status of women in our society.

It would be very helpful to have quick, easy access to information on what is being done around the country for organizations to learn how other groups have tackled similar problems in other places and for individuals to learn from each other's experiences.

New women's organizations largely use the mails, print media, the telephone, including some long distance, limited TV and radio. Plans are to curtail use of the mails, possibly to expand use of free public service TV and radio, which is limited at best. Ideal would be a totally informed public, knowing their rights and possibilities, being put in contact with resources, local and otherwise, who can assist them.

At present communications is through the organization - much of that on a "leaders" basis with newsletters to membership, to other organizations and to the public in a limited way and, to some degree, a response back from the public. Satellites would enhance all of these, especially volume of communications to and from public.

A constraint is confidentiality of requests for help and information in individual discrimination situations. Every type of reception would have application-individual home reception - telephone for two-way and TV for audio as well as conference call connections; reception by schools, meeting rooms. Priority is home reception.
3.13.1.3 Potential Benefits

Benefits include making the organizations more viable, serving the needs of the public by giving information on rights and sources of help, and educational material. Satellite communications also give access to remote areas which lack organizations but have the same problems. It could put those women in touch with groups and with individuals. It would be advisable to have 24 hour availability. The "audience" is potentially 200 million since men as well as women are affected.

In short, we need a source of information for and about women - as well as contact and exchanges - on para legal, educational, employment and personal levels.

3.13.2 Consumer Services

3.13.2.1 Objectives

Discipline Objectives

a. Independent testing and rating of consumer products;

b. Evaluation of consumer services;

c. User experience, price and needs surveys on consumer products and services;

d. Consumer information center(s): instructional materials distribution to centers and schools;

e. Information clearinghouse for state and local consumer organizations;

f. Leadership training;

g. Service magazine subscriber in response to new promotion, renewal promotion, billing, change of address, and complaints;

h. Information delivery in an audio/visual form easily understood by consumers of diverse socio-economic and educational levels.

Statutory Requirements

a. Testing, evaluation and rating of consumer products and services requirements independent from private and government sectors to maintain impartiality and credibility;

b. FCC regulations, including station license renewal requirements, do not provide public access to the airways for presentation of independent information on consumer products and services;

c. Testing, evaluating and rating of consumer products and services need to be completely independent and impartial to protect against legal liability problems;

Objectives to which Satellites can make Contributions

a. Dissemination of testing information and ratings on consumer products and evaluation of consumer services available to all segments of the consumer public having access to a television set.

b. A satellite connected to a data retrieval center will make information available to consumers at the time it is needed and in a visual form easily comprehensible.
c. Surveys mentioned under objectives above can provide more in depth information on consumer experiences, needs and prices; information can also be localized to take into account regional variations.

d. Consumer information centers providing consumers with current local and national information affecting the purchasing decisions and/or complaints.

e. Interconnection of state and local consumer groups to improve scope and effectiveness via prompt exchange of information.

f. Interconnection for special fund raising events.

3.13.2.2 Communications Needs

Types of Communications Needs

a. Audio visual reports on products tests and ratings; evaluation of consumer services.

Present—Information available only through Consumer Reports Magazine reaching 1.7 million subscribers, 0.1 million newstand purchases and some additional readers through libraries. Twice weekly 1-1/2 minute consumer reports television news features were aired in some fifty markets by commercial stations for their local news programs. Program was aired June 1974 through June 1976, but was discontinued due to inability to meet costs and advertiser pressure on stations; also limited number of educational films rented and sold to schools, libraries and community groups.

Current Plans—Initiate proposal to Public Broadcasting System to produce weekly half hour program (problem - public broadcasting viewers fall into same upper socio-economic group as Consumers Reports magazine subscribers); some limited plans to produce additional educational films.

Long Term Goals—Need to reach consumers of all socio-economic levels either in home or in convenient shopping center locations to provide information prior to purchase of products and services. Information needs to be stored in data retrieval banks that are continuously updated, and needs to be presented in visual form for easy comprehension. Information needs to be as readily accessible as that provided by advertisers and must be income producing to meet costs.


Present—Information presently obtained on a limited basis via mail, some occasional telephone polling (when funds exist). Lack of low cost electronic technology prevents the gathering of information and, when it is gathered by mail, the response is low and the information risks becoming outdated before, or soon after, the magazine is published. Surveys of consumer needs by non-profit sector are virtually non-existent.

Current Plans—May cut back on surveys due to cost and problem of timeliness of information obtained through mail.

Long Term Goals—User, price and needs survey information gathered by regions on a routine basis with the currency of present day television program Nielsen ratings (and Nielsen product market share information); information available to individual consumers and consumer information centers on some form of subscription or cost-per-use basis.

c. Consumer Information Centers

Present—Inquiries to Consumer Reports seeking specific information are replied to by form postcard indicating inability to respond to individual consumer problems. Some state and local
voluntary and governmental consumer groups service complaints but have insufficient data banks to meet needs. Pilot tests show need for such centers, but funds and means are lacking for initiation and development.

Current Plans—Continuation of present activities.

Long Term Goals—Consumer information centers providing two-way communications and utilizing a data retrieval center.

d. Clearinghouse for State and Local Consumer Organizations and Leadership Training

Present—Information provided to such groups on limited basis through bulletins and newsletters in mail. Cost of WATS lines in most cases prohibitive. Leadership training available at a few schools.

Long Term Goals—Provide state and local consumer organizations on a daily basis with interchange of information, provide monthly educational workshops covering current consumer problems and regular leadership training sessions to deal with these problems.

e. Non-profit Consumer Reports magazine subscription fulfillment operations

Present—Handled at a cost of approximately $1 million per year via mail.

Current Plans—Cost of electronic media makes changes in above system prohibitive.

Long Term Goals—Subscription orders, bills, change of address, and complaints handled electronically, possibly including a two-way system.

f. Audio-visual presentation of major consumer problems/issues providing two-way educational "tests" for consumers.

Present—Not available except occasionally through national commercial television networks, public services documentaries, i.e., CBS Auto Driving Documentary.

Current Plans—Commercial broadcasting rating structure and public broadcasting's need to be more popular renders this form of program unlikely. No known plans.

Long Term Goals—Monthly two-hour programs on national basis, presenting consumer tests on vital issues such as food purchasing, housing, health care, personnel finances, delivered in audio-visual form to enhance interest and comprehensibility, and allowing for two-way communications.

Volume of Communications

Present—Consumer Reports magazine presently reaches and services 18 million plus consumers (monthly subscriptions and newstand sales). These consumers are well above national average in education and income levels. Approximately ten million consumers were reached monthly with the Consumer Report TV news features. Consumer Reports, Consumer Federation of America, local and state consumer organizations receive thousands of consumer inquiries and complaints monthly.

Current Plans—Without access to new technology Consumer Reports hopes for approximately 5% growth in subscription level. Future volume of consumer inquiries and complaints is not possible to project and in part depends on mechanisms established to handle inquiries/complaints.

Long Term Goals—Consumer Reports product testing and consumer advisory information needs to reach consumers of all income and education levels. It is reasonable to project a ten-fold increase in reaching consumers over present subscription levels to 18 million.
Volume for consumer inquiries and clearinghouse activity would increase at least at the same level since these activities are conducted today on only a limited basis.

3.13.2.3 Potential Benefits of Satellites

a. Access to the television medium to present non-commercial information on products and services.

b. Provide consumers with essential price and quality information necessary to make choices between products and services that best serve their interests.

c. Make this information available to consumers who cannot presently be reached through the written word.

d. Contribute to the growth and strength of voluntary, non-profit consumer organizations to help balance the impact of the governmental and private sectors.

3.13.3 Neighborhood Health Services

3.13.3.1 Objectives

Discipline Objectives

The National Association of Community Health Centers seeks to assure the continued growth and development of community health care programs, including neighborhood health centers, community health centers, family health centers, migrant health programs, rural health programs, and maternal and infant care programs. More specifically, NACHC's mandate is:

• To work for the elimination of the dual system of health care and to develop quality health care delivery systems responsive to the needs of communities being served.

• To provide a vehicle whereby community health centers can unite and meet the challenges to their survival.

• To provide education and training opportunities for community health center community board members, administrators and providers to assure that the highest professional standards are maintained.

• To develop a communications network to gather, compile, and disseminate relevant information to the staffs and community boards of community health centers.

• To develop and assist in the implementation of improved management techniques for community health centers.

• To develop methods of permanent and dependable financing for community health centers.

• To develop and implement quality community health education programs.

• To maintain liaison with other consumer and provider health care groups.

Statutory Requirements

To maintain non-profit status.

To be in compliance with the medical practice regulations of the states.
Objectives To Which Satellites Can Make A Contribution

Satellite technology makes contributions not possible with other forms of communications and education, both for continuing medical education and for non-traditional external degree programs of education for other health professionals or for remote communities geographically distant from universities/medical colleges/hospitals. Other advantages include the potential to communicate more quickly and with less cost to contact administrators, the general membership, and area coordinators for immediate response/action. In addition it is efficacious to interconnect the migrant health centers throughout the country for continuity of care and the transfer of data. Frequent conferences are needed for problem-solving, developing strategies for more efficient operation, and planning/reporting. Travel has become a prohibitive cost which has required disproportionate allocation of funds, and lengthy periods away from the work-site. Therefore, teleconferencing via satellite could reduce the expenditures for travel and the secondary problems which arise from the absence of key actors from the health centers during service hours.

3.13.2 Communications Needs

Two-way audio/video, slow scan television, data transfer and facsimile transmission are the types of satellite services which are needed to serve the communications needs of rural health centers, migrant health centers and urban health centers.

Such services could greatly help to increase the communication of urgent messages, directives and action memos among area health coordinators. They could help meet the growing need for continuing education, including clinical medical education for physicians located in remote communities; external degree programs for other health professionals, especially those located in isolated communities which are geographically distant from universities, medical colleges and teaching hospitals.

Related to the educational and training needs of those involved in the delivery of health services is the need to provide medical information to patients themselves.

Another important communications need is the transfer of data, and this is especially critical for continuity of care among migrant health centers.

In considering the use of satellite communications to help meet these needs, there are some problem areas that will have to be dealt with. There are bound to be legal entanglements that will emerge, and these should be avoided by preliminary examination and compliance with the medical practice regulations of the states. Also, privacy and confidentiality of the medical record will have to be preserved, at the point of input.

3.13.3.3 Benefits

The benefits of satellite experiments far outweigh the anticipated problems mentioned above. Teleconferencing can demonstrate an effective mode for sharing information, solving regional problems, and developing strategies for operation and expansion. Large-scale conferencing among the managers and board members with the principal actors of sponsor groups, funding agencies, and university/medical schools is one way that satellite communication could reduce the thousands of dollars spent to assemble thousands of persons to a single-spot conference, locale several times per year. The funds used for this travel could be routed to improve health services in medically underserved areas.

Since the cost of terrestrial systems increases with distance and the cost of the satellite systems remains constant regardless of distance, satellite communications may be an economically feasible way to interconnect rural centers, and rural to urban centers for higher quality care to persons in medically underserved areas and remote communities. There is a shortage of all health professionals in the rural areas of this country. A model for rural centers is being developed in which a nurse practitioner or physician assistant can manage health care with physician backup. This is not an over-the-shoulder model, but one with the
physician located miles away, but on call for consultation and instruction for special procedures. Physicians can be in communication with these mid-level practitioners and with specialists and hospitals, or with patients who are geographically separated from health centers. Satellite communications can be useful to transmit real-time consultations, to transfer critical data, and to provide complete information in medical histories and medical records. Such an interconnecting system could also be of value to migrant health centers which have been established throughout the country for seasonal farm workers.

- Family Health Centers offer a model for pre-paid health care, with heavy emphasis on health maintenance. Intrinsic in health maintenance as opposed to episodic sick care, is prevention of illness and disease. Patient education for prevention, compliance, and self-management is significant for developing utilization patterns which minimize in-patient (hospital) care and high costs for lengthy stay in the hospital. This experiment will design, motivate audiences and target groups and transmit programs via slow-scan by satellite. This new dimension will expand health education in diverse localities and to persons in minority groups with cultural differences and who may have difficulty reading and understanding English. Special programs will be developed for handicapped persons. Satellite technology will be tested for appropriate designs to meet the needs of blind, deaf, and physically handicapped.

3.13.4 Public Interest Services

3.13.4.1 Objectives

The objectives are threefold: (discipline)

a. A clearinghouse for existing organizations like the Public Interest Research Groups (PIRG).

b. The development of greater communications from Public Citizens to its members and between Public Citizen and other citizen organizations throughout the country.

c. The development of communication mechanisms to encourage a more informed citizenry.

At present 30 states claim chapters of Public Interest Research Groups on their campuses. These organizations have almost identical purposes; the education of students, the creation of better citizens and the pursuit of certain social objectives such as consumer and environmental protection.

Since these organizations are similar in nature and linked through a new national organization — the PIRG Clearinghouse and Educational Fund — there is a need to provide efficient methods for communication to avoid duplication of efforts and enhance the educational efforts of such separate groups.

Public Citizen on the other hand is a national organization needing to communicate with its members and other like-minded citizen groups. It provides a multidisciplined approach to consumer, environmental and human rights problems. There is therefore a need to communicate information both to and from the main offices in Washington, D.C. and to mobilize and educate citizens concerned about a specific problem.

Another major institutional objective relates to the apparent apathy and cynicism presently gripping the electorate. Citizens generally feel unable to influence decisions, be they corporate or governmental. They essentially feel impotent. A central citizens communication system could provide information on issues pending before state legislatures and Congress, an explanation of either side of an issue taken by members of Congress from a particular jurisdiction, the positions of various interest groups on the issue (such as the Chamber of Commerce, labor and consumer organizations), issues presently before regulatory agencies, and activities of the administrative agencies like HEW.

There are other important, but subsidiary objectives for the organizations, including the need to encourage citizens to assume more active roles in the decision-making process, to train individuals and groups and to inform citizens of their abilities and the sources available to them to engage in social welfare activities.
Statutory and Regulatory Restraints

The major restraints are financial, although FCC regulatory restraints impede the potential for increasing the wider range of communications between individuals and organizations.

Satellites have the potential, assuming price and availability, of meeting all these aforementioned objectives. Existing links such as the Post Office and the telephone, as well as existing broadcasting restraints, both regulatory and corporate, impede the free flow of information between citizens. That there is a need can little be in doubt, as suggested by the spread of CB communication and the popularity of even this non-private method of communication.

3.13.4.2 Communications Needs

Communications Types

The first need is for audio links between similar organizations, like the PIRGs, followed by audio links for other organizations, like Public Citizen, and its members and those individual activists desirous of pursing their citizenship responsibilities. The transmission of data, reports and other substantive studies quickly and inexpensively would be of enormous benefit. Present duplication and mailing time and costs make widespread communication of detailed information prohibitive.

Present methods for communications such as WATS line service (where one nationwide WATS is shared by 100 people), mail (although the constant increase in postal rates has made mailing more difficult), newsletters and information/action bulletins.

Another vehicle is radio and TV broadcasting, although the competition for time either locally or national is excessively fierce and the coverage of subject matter is at best superficial.

Volume of Communications

At present the PIRGs rarely contact each other and rely to some extent on Public Citizen to circulate information, either through limited use of the WATS line or a newsletter prepared monthly. Recently, the PIRG Clearinghouse has subscribed to a limited WATS line, ten hours per month. The line has been connected so recently that it is impossible to determine the effect and additional need for communications. If, however, there are 30 PIRGs and the WATS line is available for 10 hours per month, the ability to communicate is obviously limited.

Recently, one of the Public Citizen offices moved location. The service man from the phone company was dispatched to hook up service and found it impossible to test the WATS line as it was used constantly without any break. Two hundred and forty hours per month for 100 people is totally inadequate. The volume of mail into and out of the offices is great. However, the cost is presently unavailable.

Communications Networks

The present networks and links are maintained through use of long distance calls or WATS lines, mailings of the "alert" variety, newsletters or direct person to person letters. There exist in Washington, D.C. and other major population centers clearinghouse organizations which specialize in selected issues, attempting to link individuals and groups working on the same issues. At best, however, these clearinghouses are limited in their efforts. An organization can call and receive somewhat up-to-date information on legislation in Congress or at the state level (very limited), or the names of other groups in their state working on similar issues. Sometimes, "how to" manuals are available, but the ability to follow up the manual reading is also severely limited.
3.13.4.3 Potential Benefits of Satellites

In economic terms, satellites have the potential of eliminating the problem of scarcity. During early times in this country, each local community had up to dozens of newspapers, wide distribution of information, and the ability to hold both political and economic bodies accountable. Today many cities have only one newspaper, sometimes owned by the same corporation controlling the radio and TV station. Long distance calls continue to rise in price and the postal service shows even less promise.

3.13.5 Community Broadcasting

3.13.5.1 Objectives

Objectives of Community Broadcasting

a. Facilitating the exchange of program materials, information, and technical expertise among member educational radio stations.

b. Publicizing itself and its members' activities before agencies and groups which may affect community broadcasters' welfare.

c. Fostering the development of public policy to aid the growth of its members and advance the public interest in communications.

d. Seeking an equitable distribution of federal funds appropriated for noncommercial broadcasting and development.

e. Assisting in the organization and expansion of innovative broadcast stations.

Statutory Requirements

a. No statutes affect the development of satellite experiments.

b. Member stations are regulated in accordance with the Communication Act of 1934, which calls for the establishment of the most efficient possible system of wire and radio communications.

c. By providing a program interconnection capability to the educational radio stations, a public service satellite would further the aims of the Communication Act.

Objectives to Which the Satellite Can Make a Contribution

a. Objective a. above, through providing a decentralized program service to stations, with emphasis on timely program material.

b. Objective a., through conferencing capability among station personnel, NFCB staff, and experts in various fields

c. Objectives b, c, and d, through improved policy communication within the NFCB, thus allowing the organization to more accurately represent its members' interests.

3.13.5.2 Present Communications Needs

Types

a. High quality audio real-time interconnection - 15 kHz stereo, 50 dB signal-to-noise ratio

b. Relatively wide-band high quality audio interconnect for high speed tape distribution (15 kHz stereo tapes played at 8 times normal speed, with 50 dB signal-to-noise ratio)
c. Teletype for scheduling interconnect

d. Non-voice data to be used in the "parliamentary procedure" of conferencing (viz. requesting recognition of moderator, etc.)

Volume of Communication

a. None - no interconnect available
b. None - not available
c. None - not available
d. None - not available
e. NFCB presently operates a tape distribution service by mail for distribution of non-timely programming
f. Internal communications consist of an annual conference, a monthly newsletter, special mailings, quarterly steering committee meetings, and occasional telephone contact.
g. The above volume of communication is grossly insufficient to meet objectives. Non-satellite methods of increasing volume appear too expensive to be practical.

Communications Networks

a. Radio programs distributed by a central tape exchange on a point-multipoint basis
b. Point-multipoint through annual conference, newsletter, and mailings
c. Point-to-point through telephone calls
d. Although most NFCB communications involve member stations, the general public is reached directly through the broadcast of exchanged radio programs, and indirectly through benefits which the organization provides to member stations.

3.13.5.3 Planned Communications Needs

Types

a. - d. Same as those listed in Section 3.13.5.2

Volume

a. Interconnect operating at least 18 hours seven days per week
b. Tapes distributed for several hours daily seven days per week
c. Teletype available for hours interconnect is in use
d. Non-voice "parliamentary procedure" data in use daily for 2 - 3 hours when conferences are in progress

Communications Networks

a. Live-radio programs to originate on point-multipoint basis, with ability to originate live programming from any station
b. Radio program tape distribution to originate on a point-multipoint basis with only one live origination point, although stations will be able to access system by sending tapes to the original point

c. Daily multipoint origination conferences with capability for immediate feedback

d. Teletype and parliamentary procedure data which can be originated from any station

e. Present networks described above may be retained as needed

3.13.5.4 Blue-Sky Communications Needs

Types

NFCB has not officially compiled its blue-sky needs. However, possibilities might include: point-to-point voice interconnection for both radio program exchange and conferencing; direct satellite-to-home radio broadcasting; a live interconnect of Commonwealth television stations; distribution of video to cable TV headends; and video satellite-to-home communications

3.13.5.5 Potential Benefits of Satellites

a. Improved educational radio programming provided to the public via live interconnect and high speed tape distribution

b. Development of an innovative decentralized approach to radio networking

c. Improved communication and professional information exchange between educational radio stations

d. Improved internal communication and responsiveness at NFCB

e. Opportunity to develop ground hardware suitable for high grade audio and adapted for radio station use

3.13.6 American Indian Services

3.13.6.1 Objectives of United Sioux Tribes

Discipline Objectives

To unite all the tribes of the Sioux Nation in the U.S. and Canada.

Statutory Requirements

The Sioux Nation as a sovereign entity negotiated with the U.S. and Canada in the 1800's and should be allowed to return to that status of being a sovereign entity in order to retain its cultural identity. As the Sioux Nation was fragmentized and placed on reservations and reserves, this cultural retention can only be accomplished at the present time by satellite communications.

Satellite Applications

Satellite communications could be handled through the United Sioux Tribes as a vehicle to allow instant communications among Indians in the three states: North Dakota, South Dakota and Montana; and the Sioux reserves in Canada. This communication system could eventually unite all the tribes in the United States and Canada.
### 3.13.6.2 Discipline Communications Needs

<table>
<thead>
<tr>
<th>Present</th>
<th>Near Future</th>
<th>Long-Range Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Communication needs of United Sioux Tribes sometimes being met by mail</td>
<td>a.</td>
<td>a.</td>
</tr>
<tr>
<td>b. <strong>Need</strong>: 2-way audio, and data transfer immediately</td>
<td>b. Ultimately use not only 2-way audio, and data, but also video</td>
<td>b. 2-way audio/video, data transfer 2-way digital</td>
</tr>
<tr>
<td>c. <strong>Availability</strong>: 12-hr. during daylight</td>
<td>c. 18 hrs. day</td>
<td>c. 24 hr. day</td>
</tr>
<tr>
<td>d. <strong>Reliability</strong>: 100%</td>
<td>d. <strong>Reliability</strong>: 100%</td>
<td>d. <strong>Reliability</strong>: 100%</td>
</tr>
</tbody>
</table>

**Volume:** 20 - 2-way audio, and data transfer 200 - 2-way audio/video, and data transfer 300 - 2-way audio/video; 2-way digital data

**Distribution**

<table>
<thead>
<tr>
<th>Technological</th>
<th>Sociological</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. pt. to pt.</td>
<td>a. tribe to tribe: that is as 1 voice to 1 voice speaking for a whole tribe</td>
</tr>
<tr>
<td>b. pt. to mult. pt.</td>
<td>b. Again, tribe to tribe, but this would expand to include all the other tribes along with the Sioux</td>
</tr>
</tbody>
</table>

### 3.13.6.3 Potential Benefits of Satellites

Satellite communications could create many jobs on the reservations by providing information on economy and structure of various tribes; creating situations for advanced education (tying up with a university); and helping create more self-reliance among the Indian people.

The future implications would be to allow other undeveloped countries to maintain their cultural identity while simultaneously creating a more sound economic base, or self-reliance.

### 3.13.7 Day Care Centers

### 3.13.7.1 Objectives of Day Care Association

To unite all the Day Care providers in South Dakota and eventually in the United States.

The lack of any communications whatsoever prohibits this.

Satellite communications allow for instant information; small-scale conferencing; large scale conferencing, and eventually the introduction of this form of communication to children.
### 3.13.7.2 Communications Needs

<table>
<thead>
<tr>
<th>Present</th>
<th>Near Future</th>
<th>Long-Range Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 - 2-way audio</td>
<td>50 - 2-way audio and data transfer</td>
<td>250 - 2-way audio and data transfer</td>
</tr>
<tr>
<td>Distribution:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.13.7.3 Potential Benefits

One of the most overlooked professions — child care — holds the key to the future — children. Child care providers are underpaid and usually under-educated but seldom unloving to children. As our society is advancing, we had better provide for advancement for these "isolated" people.

Also, the future of these children is going to contain satellite communications as an ordinary, everyday thing. "Future shock" doesn't have to happen if we plan for it now.

### 3.13.8 Recommendations

The recommendations that follow represent a consensus of the panel. Like the panel's interests, they range across a fairly wide variety of issues. Some fall directly under NASA's mandate; some deal with matters where NASA might serve as a catalyst vis-a-vis other government agencies. At the base of all these recommendations lies a concept of public access to such technologies. It is felt proper to request such access because such satellite technologies, unlike others in telecommunications history, were developed at public expense and were tax-payer supported. They are:

1. The non-profit sector, the consumer, public interest and voluntary social services organizations, clearly see the need for a satellite totally devoted to the needs of their sector. Whether the ultimate for the fulfilling of these needs will be a satellite owned and managed by the non-profit sector itself, cannot be foreseen at this point. One alternative possibility would be the provision of special tariffs for non-profit organizations on commercial satellites. This is not viewed as impossible, since there is precedent for preferential treatment in the postal service rates granted non-profit organizations and in wire-service rates. Other precedents, both statutory and regulatory, will need to be sought, but the goal is clear and is a recommendation of the panel.

2. The survey of user-needs appended to this report is only a first-cut examination of what it is the non-profit sector requires and may require. NASA's own user-needs survey, and this report itself, is limited in scope. It is a recommendation of the panel that a massive user-needs study, one cutting across those of the 3,000,000 non-profit organizations who might utilize satellite telecommunications to aid their activities, be undertaken. From this, a traffic model could be developed which would aid in satellite technical configuration and system design.

3. It is recommended that a Task Force be established, which would include in its composition representation from non-profit organizations, to consider, prior to finalization of a system design, such matters as ownership (of a satellite to serve the non-profit sector), control of such a system, management of it, and rules of access to it. Such a Task Force might also properly consider the matter of bulk purchasing of equipment for ground use. Such a Task Force should become involved in establishing the design of any satellite which is intended to serve the needs of the non-profit sector.
4. It is recommended that certain design requirements be considered which will particularly impact upon what can be done by satellite users. Terminals should be low-cost, and use small diameter antennas. They should be durable and easy to manage by non-technical personnel. Experimental ground equipment should be so designed as to be compatible with future operational satellite system terminals so that a switchover can be made at minimum cost and with maximum ease. The design should consider that many social service uses, especially in medical record-keeping and health care, require complete privacy. The term low cost is intended to mean at a level of affordability for the average individual.

5. It is recommended that NASA increase its efforts to educate organizations and individuals as to the advantages of satellite telecommunications technology. We wish to note the need and, in addition to what NASA is already doing in this area, suggest that perhaps a mass media campaign is possible and that the services of the Advertising Council be sought.

6. It is recommended that, in order to improve its outreach to the general public, or to the specifically interested public, that some form of mass notice be considered, perhaps something along the lines of the FCC "Action Alert." Regional meetings, to which the public is invited, also following the FCC model, could help. And, it is further recommended that a Citizens Advisory Committee be established, or, if one such does exist, that its membership be enlarged to include representatives of the non-profit sector. It is recommended that NASA attempt to expand this concept of public representation to all of those inter-agency committees on which NASA sits or which consider telecommunications and satellite policy issues.

3.13.9 References

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Info on Women's Rights, Employment Education</td>
<td>Home phone 2-way voice and data transfer video on TV</td>
<td>Cities and rural</td>
<td>All 50 States</td>
<td>24-hour, 7 days a week</td>
<td>Need 24 hour service for crisis info - location or havens for battered wives as well as other info for swing shift workers.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 22

**Consumer Services**

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Product Tests and Ratings; Evaluation of Consumer Services</td>
<td>Audio/Color TV; Digital Data</td>
<td>All Homes or Multiple Central Locations, e.g., Shopping Centers</td>
<td>?</td>
<td>Nationwide - U.S.</td>
<td>24 hours</td>
<td>Need: Provide consumers with information on products and services necessary to make informed choices; available to consumers of all income/educational levels; income producing.</td>
</tr>
<tr>
<td>User Experience, Needs &amp; Price Surveys on Consumer Products &amp; Services</td>
<td>Digital Data; 2-way Audio</td>
<td>Statistically Reliable Sampling of Homes</td>
<td>?</td>
<td>Nationwide - U.S.</td>
<td>Several hours per week</td>
<td>Need: Collect data and integrate with above.</td>
</tr>
<tr>
<td>Consumer Information Centers</td>
<td>2-way; Digital Data</td>
<td>Regional and Local Centers</td>
<td>?</td>
<td>Scattered Nationwide - U.S.</td>
<td>8 hours daily</td>
<td>Need: Many consumers require basic money management guidance, access to easily understood information and aid in handling complaints; instructional materials.</td>
</tr>
<tr>
<td>Clearing House for Consumer Organizations, leadership training, teleconferencing</td>
<td>2-way audio/video; Data transmission</td>
<td>State and local consumer offices; Designated Meeting Halls Regionally and Locally</td>
<td>?</td>
<td>All States and Selected Local Areas</td>
<td>1-2 hours daily plus 1 day per month</td>
<td>Need: Interchange of information Educational workshops.</td>
</tr>
</tbody>
</table>
### Table 22 (continued)

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Education and Information</td>
<td>Audio/Color TV; 2-way</td>
<td>Meeting Centers in School Auditoriums and Theaters</td>
<td>?</td>
<td>Nationwide - U.S.</td>
<td>Monthly 2-3 hours prime time evening</td>
<td>Need: Use popular entertainment format for consumers to &quot;test&quot; themselves on vital consumer concerns, e.g., food purchasing, personal financing, housing, health care.</td>
</tr>
<tr>
<td>Magazine Subscription Fulfillment</td>
<td>2-way; Digital Data</td>
<td>Homes to Single Center</td>
<td>2+ Mill.</td>
<td>Nationwide - U.S.</td>
<td>8 hours daily</td>
<td>Need: Handle at low cost subscription orders, payments, change of address, complaints.</td>
</tr>
<tr>
<td>Fund Raising Events</td>
<td>Audio/Color TV; 2-way</td>
<td>Meeting Centers in School Auditoriums and Theaters</td>
<td>Top 100 Markets</td>
<td>Nationwide - U.S. or Regionally</td>
<td>1 day or half day; 2 to 4 times yearly</td>
<td>Need: Non-profit groups have limited means to raise funds. Special events using name personalities, new films/plays offer unique means of raising funds.</td>
</tr>
<tr>
<td>Public Service Messages (30&quot; to 120&quot;)</td>
<td>Audio/Color TV</td>
<td>All Homes, School Libraries</td>
<td>?</td>
<td>Nationwide - U.S.</td>
<td>5 messages per week</td>
<td>Need: Service not now available to balance commercial advertising messages.</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td><strong>Service Type</strong></td>
<td><strong>Description</strong></td>
<td><strong>No</strong></td>
<td><strong>Geographical Distribution</strong></td>
<td><strong>Information Volume</strong></td>
<td><strong>Remarks</strong></td>
</tr>
<tr>
<td>-----------------</td>
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<td>----------------</td>
<td>-------</td>
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<td>------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Teleconferencing</td>
<td>2-way audio/video</td>
<td>Inter-area communication between the national office and regional coordinators</td>
<td>6</td>
<td>N. E. Area (2) Southern Area (1) Midwest (1) Western (1) Hawaii, Alaska National Office (1)</td>
<td>Needed: Monthly: (1 Hour) - 6 conferences Quarterly: (1 Hour) - 6 conferences</td>
<td>Presently groups must travel to central location for conferences, no access. Projected volume will increase to cover each state in the area for monthly and quarterly conferences to plan, deliver management training, technical assistance; for problem solving.</td>
</tr>
<tr>
<td>Membership Mailings &amp; Action Memos</td>
<td>Facsimile Transmission</td>
<td>Data terminals Point-to-Point Point-to-Multipoint</td>
<td>6 areas &amp; 300 - 500 Centers</td>
<td>(6) areas (as above and the member health centers in the (50) States</td>
<td>15 minute messages National office communications to key area coordinators, and 300 - 500 health centers for membership information &amp; alert/response</td>
<td>This is proposed as an alternative to rising costs of telephone (long distance) calls, &amp; postage rates to contact membership on critical issues; and to lag and inconvenience in the time factor to receive message and for return responses.</td>
</tr>
<tr>
<td>Clinical Medical Education &amp; Continuing Education For Health Professionals</td>
<td>Slow-Scan TV 2-way audio/video</td>
<td>Universities/Medical Colleges &amp; Teaching Hospitals &amp; Health Centers Interactive Mode</td>
<td>50</td>
<td>One per State, rural locus where a rural or migrant health center is operating</td>
<td>alert/response Needed: Twice Monthly 60 minute Transmissions during Service hours Twice Monthly 60 minute transmissions during P.M. Hours</td>
<td>This will provide an option not now possible for worker &amp; physician participation for these isolated, rural areas, while remaining full-time to deliver services at the health centers. Volume will increase to all rural/migrant centers.</td>
</tr>
<tr>
<td>Data Transfer</td>
<td>2-way audio 2-way data transmission (facsimile &amp; digital)</td>
<td>Interconnect migrant health centers for higher quality &amp; continuity of care; and rural to urban health centers for specialties/hospital follow-up</td>
<td>48 states only</td>
<td>National scope for interconnecting services for migrant/rural centers in remote, isolated communities</td>
<td>12 day hours 9 AM - 9 PM consistent with time zones</td>
<td>At present centers are not related in approach to care. Transient workers receive medical care in a fragmented fashion in whatever state they happen to be working. Continuous care of higher quality is the purpose of this experiment.</td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
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<tr>
<td>Patient Education</td>
<td>2-way audio</td>
<td>Point-to-Point, Point-to-Multipoint</td>
<td>150+</td>
<td>2 Health Centers per State and experimental group of patients to participate in the experiment</td>
<td>DAILY</td>
<td>For general public health education/prevention</td>
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<tr>
<td></td>
<td>1-way video</td>
<td>TV Terminals w/microphone</td>
<td></td>
<td></td>
<td>(a) PM - 30 min.</td>
<td>For emergency and follow-up care by health professionals</td>
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<td></td>
<td>Multiple Terminals</td>
<td>Remote Rural Communities</td>
<td></td>
<td></td>
<td>(b) 24-Hour</td>
<td>For handicapped &amp; for patient self-management of stable-State chronic disease</td>
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<td></td>
<td>(c) AM - 30 min. PM - 30 min.</td>
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<td>Geographical Distribution</td>
<td>Information Volume</td>
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<tr>
<td>Interconnection of Educational Radio Stations</td>
<td>2-way High Quality Audio</td>
<td>Transmit-Receive Stations for High Quality Audio, Teletype, and Other Data</td>
<td>30</td>
<td>Continental U.S., Alaska, Hawaii?</td>
<td>At least 15 hr. per day/7 days a Week</td>
<td>For Timely Programming and Interactive Programs with Origination from many Points. 15 KHC Stereo with 50 lb. signal to Noise Ratio.</td>
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<td>Large Scale Teleconferencing</td>
<td>Same as above</td>
<td>Same as above</td>
<td>30</td>
<td>Same as above</td>
<td>Subsumes within above</td>
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<tr>
<td>Small Scale Teleconferencing</td>
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<td>Same as above</td>
<td>30</td>
<td>Same as above</td>
<td>Subsumes within above</td>
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<tr>
<td>High Speed Tape Distribution</td>
<td>One-Way &quot;Broadband&quot; High Quality Audio</td>
<td>Transmit Terminal Receive/Only Terminals</td>
<td>1</td>
<td>Same as above</td>
<td>Subsumes within above</td>
<td>30 Transmit/Receive Terminals would also be used to receive High Speed Tape Distribution.</td>
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<td>Radio Programming for the Blind</td>
<td>High Quality</td>
<td>Transmit only</td>
<td>1</td>
<td>Continental U.S.</td>
<td>18 hrs. per day</td>
<td>Timely information distribution via subcarrier on FM Radio Stations.</td>
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<td></td>
<td>Audio</td>
<td>Receive only</td>
<td>200</td>
<td>Alaska?</td>
<td>7 days a week</td>
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<td></td>
<td></td>
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<td></td>
<td>Hawaii?</td>
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</tr>
<tr>
<td>Teleconferencing</td>
<td>Audio/Visual Multiple simulation Terminals</td>
<td>Regional</td>
<td></td>
<td>Existing citizen</td>
<td>Quarterly at Minimum</td>
<td>Providing information, consultation and decision making forums for organizations unable to travel with any frequency to a central location.</td>
</tr>
<tr>
<td></td>
<td>2-way</td>
<td>Present</td>
<td></td>
<td>organizations working on similar issues</td>
<td>Hopefully, Weekly</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Planned</td>
<td></td>
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<td></td>
<td></td>
<td>Needed</td>
<td></td>
<td></td>
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<td>Information Exchange</td>
<td>Video - Data Banks</td>
<td></td>
<td></td>
<td>U.S.</td>
<td></td>
<td>Information on actions in Congress and local state legislatures. Governmental information and access to decision making processes will help minimize public apathy.</td>
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<td></td>
<td>Slow-Scan TV</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Education and Training</td>
<td>2-way voice radio</td>
<td>Student financed</td>
<td>30</td>
<td>Regional U.S.</td>
<td>Quarterly at Minimum</td>
<td>Providing organizational and managerial skills to citizens based organizations just under way or in existence.</td>
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<tr>
<td>Programs</td>
<td></td>
<td>Public, Interests</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>Research Groups</td>
<td></td>
<td></td>
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<td>Information Exchange</td>
<td>audio/telecopy</td>
<td></td>
<td>30</td>
<td>30 States</td>
<td>30 hours weekly</td>
<td>Facilitate organization of development and efficiency of project activity.</td>
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<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
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<td>---------</td>
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<tr>
<td>Organization to Multiple Organization and Back</td>
<td>Audio/Video Data Slow-Scan TV</td>
<td>Information on Congressional and administrative agency activities</td>
<td></td>
<td>Geographic U.S.</td>
<td>daily</td>
<td></td>
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<td>Organization to Chapters Intraorganization and Back</td>
<td>Audio/Video Data Slow-Scan TV</td>
<td>Internal Information to be used to further organization</td>
<td></td>
<td>50 States</td>
<td>monthly</td>
<td></td>
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<tr>
<td>Organization to members and Back</td>
<td>Audio/Video Data Slow-Scan TV</td>
<td>Polling, info, fund raising</td>
<td>Up to 250,000</td>
<td>50 States</td>
<td>quarterly</td>
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### American Indian Services

#### Table 26

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Present:</td>
<td>2-way</td>
<td>Communication Centers</td>
<td>Need; 20</td>
<td>Canada-U.S.: N.D.; S.D.; Mont.</td>
<td>Present: 0</td>
<td>Increase in communications with increasing awareness &amp; uses of the system. Will lead to eventual longer length of transmission.</td>
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<tr>
<td>Basic Communication in Sociological Application</td>
<td>audio &amp; data transfer</td>
<td></td>
<td></td>
<td></td>
<td>Need: 4 hr. transmission 5 days/week</td>
<td></td>
</tr>
<tr>
<td>Near Future:</td>
<td>2-way</td>
<td>Communication Centers, Schools</td>
<td>Need; 200</td>
<td>All Indian Tribes on N. American Continent</td>
<td>Need: 4 hr. transmission 5 days/ wk.</td>
<td></td>
</tr>
<tr>
<td>Sociological Educational Economical</td>
<td>audio/video &amp; data transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Long-Range Future:</td>
<td>2-way</td>
<td>Communication Centers, Schools, Info. Centers</td>
<td>Need; 300</td>
<td>Begin expansion to isolated areas on reservation.</td>
<td>Need: 8 hr. transmission 5 days/ wk.</td>
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<td>Socialological Education Economical Data Compl</td>
<td>audio/video, 2-way digital</td>
<td></td>
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*Table 26: American Indian Services*

*PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS*

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<tr>
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<td>Present: 0</td>
<td>Increase in communications with increasing awareness &amp; uses of the system. Will lead to eventual longer length of transmission.</td>
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<tr>
<td>Basic Communication in Sociological Application</td>
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<td></td>
<td></td>
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<td>Need: 4 hr. transmission 5 days/week</td>
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<td>Communication Centers, Schools</td>
<td>Need; 200</td>
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<td>Need: 4 hr. transmission 5 days/ wk.</td>
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<tr>
<td>Sociological Educational Economical</td>
<td>audio/video &amp; data transfer</td>
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<td>Long-Range Future:</td>
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<td>Communication Centers, Schools, Info. Centers</td>
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<td>Socialological Education Economical Data Compl</td>
<td>audio/video, 2-way digital</td>
<td></td>
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<td>Application</td>
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<td>Geographical Distribution</td>
<td>Information Volume</td>
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<tr>
<td>Present: Small Scale confering</td>
<td>2-way audio</td>
<td>Communication Centers in 25 service areas Base Stations Planned: Present:</td>
<td>0</td>
<td>Area distrib. in 5 Midwestern States</td>
<td>Present: 0 Needed: 2 hr. transmission 5 days/wk.</td>
<td>The need for access of communication will increase with awareness of the system.</td>
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<tr>
<td>Near Future: Lge-scale conferenc-</td>
<td>2-way audio &amp; data transfer</td>
<td>Communication Centers located in all 50 States with more than 1 in large cities.</td>
<td>50</td>
<td>All 50 States with at least 2 in L.S.; N.Y.; Chicago; Denver; Miami</td>
<td>Need: 4 hr. transmission 5 days/wk.</td>
<td></td>
</tr>
<tr>
<td>ing &amp; info. distr.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Blue Sky:</td>
<td>2-way audio &amp; data transfer</td>
<td>Communication Centers in major centers; &amp; expand to small cities &amp; rural areas.</td>
<td>250</td>
<td>Expansion to smaller cities, &amp; isolated rural areas.</td>
<td>Need: 4 hr. transmission 5 days/wk.</td>
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APPENDIX 1

PUBLIC SERVICE COMMUNICATIONS SATELLITE SYSTEM

This appendix contains a description of the objectives, approach and some expected benefits of a public service communications satellite system. This document was distributed to participants when they arrived at the workshop.
# PUBLIC SERVICES COMMUNICATIONS

## SATELLITE SYSTEM

## COMMUNICATIONS AND NAVIGATION DIVISION

**AND**

**GODDARD SPACE FLIGHT CENTER**

**GREENBELT, MARYLAND**

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<td>3</td>
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<td>SHORT RANGE OBJECTIVES</td>
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<td>PHASE IV - OCTOBER 1981 - OCTOBER 1983</td>
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1 INTRODUCTION AND BACKGROUND

There is a need in this country for Public Service Communications. Present day space technology can make such services affordable via low-cost ground terminal equipment. A Public Services Communications Satellite System will provide evaluations of communications with both small stationary and moving terminals. The stationary terminal services include health, education and other public services of federal, state and local government organizations. The moving terminal services include emergency medicine, safety, and law enforcement communications.

The specific experiments to be performed will be defined after the user requirements study during the first phase of the program.

The Public Services Communications Satellite System is designed to alleviate some of the problems of inadequate service suffered by citizens who reside in remote regions. There are people in the U.S. without access to the normal communications services (telephone and television). There are people in rural areas that lack the services of medical professionals enjoyed by urban residents. There are people in remote areas that receive inferior educational services. The ATS-6 Health and Education Telecommunications experiment demonstrated the value of interactive television for applications such as Alaskan health services and education in Appalachia. This public services system will build on that experience and improve the quality of life in remote regions. The system will demonstrate improvements in the quality and efficiency of public services. The system will provide a demonstration of a cost-effective means for mobile communications over large geographic areas.

This is a program for satellite communications to provide a prototype low-cost dedicated-service system leading to a commercially operated system. The delivery of public services requires a geostationary satellite system for continuity of service and would use large solar arrays, high power transmitters, large multibeam antennas and multiple access techniques to accommodate large numbers of users. The users will have economical small fixed and mobile terminals with low radiated power (EIRP) and small receiver antenna gain to noise temperature (G/T) ratios.

This program will include the identification of technical and economic requirements and the design, development and fabrication of low cost fixed and mobile ground terminals, both to provide for the development of low cost terminals.
2. OBJECTIVES

The goal is the realization of operational commercial satellite public services. The program objectives are to transfer communications satellite system technology to the public and private sectors for the delivery of public services and in the process to maintain the U.S. technological lead in space communications. The program is intended to expedite the involvement of the private sector, increase domestic productivity and the balance of payments, improve the quality of life, improve the protection of life, property and privacy, improve the quality of public services and conserve spectrum and energy.

2.1 LONG RANGE OBJECTIVES

1. Develop a Public Services Communications Satellite System to be operated by the private sector for the delivery of public services. This development includes the transfer of technology and operations to the public and private sectors.

2. Maintain the technological lead of the United States in space communications. This necessary includes both hardware and software for public service applications that are expected to be implemented more than five years from now.

3. Develop low-cost terminal technology including fabrication and manufacturing techniques. In order to pursue this objective, NASA will make a production buy of terminals (100-200) to provide reduced unit cost terminals to users and to verify the low-cost technology development.

2.2 SHORT RANGE OBJECTIVES

The short range program objective is to make use of the momentum developed by ATS-6/CTS experiments and demonstrations and provide continuity of both space and ground elements to continue to give potential users first-hand experience in the use of satellites for their communications needs.

3. EXPECTED BENEFITS

A Public Services Communications Satellite System will enable residents in rural areas to have communications services comparable to urban residents. It can improve the quality of health and education by providing information links between large centers of excellence and small rural communities. Emergency communications can be provided in disaster areas where conventional systems are disrupted. Law enforcement officials in different jurisdictions will be able to communicate easily, thus increasing their effectiveness. Several government agencies (Federal, state and local) have communications needs which would benefit from a public services communications satellite system. The various applications need to be satisfied by this system are described below. The criteria for selecting the various applications include the potential benefits to be realized (both economic and social) and the probable lack of commercial or viable non-space alternatives for meeting those needs.

Detailed cost benefit studies have not been made yet because of the difficulty of making meaningful studies with the present state of the art and the artificiality in quantifying the social costs and benefits.

3.1 HEALTH SERVICES

Spiraling costs, lack of public confidence, archeic practices, and increasing demands for greater service from an overburdened health care delivery system have set the stage for a potential future crisis in health care. Application of modern telecommunications technology could eliminate some and ameliorate many of these problems by facilitating improvements in education, training, supervision, direct patient care, administration and the application of current medical research.

The potential socioeconomic or practical benefits for health care delivery could be very large in both scope and value. They include better emergency medical care in rural areas and better manpower utilization, especially professional, in large urban medical centers. Furthermore, they include the possibility of wide broadcast of the preclinical sciences (Anatomy, physiology, biochemistry, etc.) to student audiences on a regional basis, implementation of a continuing medical education system, the availability of expert consultation in medical specialties for the rural primary care physician, and the rapid daily transmission of epidemiological data.
The cost to the general public, the government and those in the medical arts and sciences for the failure to improve current practices through use of modern telecommunications will be great. It would mean the persistence of inefficiency throughout a health care system already burdened to its limits, practitioners lacking current medical and pharmaceutical information, inaccessibility to good health care for the one-third of the people who live in rural areas, and, perhaps worst of all, the unattainability of the goal of shifting medicine from the curative mode to the preventive mode, which many think should be one of the main objectives of a modern health care delivery system.

The Emergency Medical Service (EMS) Systems Act of 1973 provides assistance and encouragement for the development of comprehensive area emergency medical services systems (See Public Law 93-154.)

Studies by the Committee on the Interplay of Engineering with Biology and Medicine have focused on many problems which plague the provision of emergency medical care in this country. These and other studies, have emphasized the key role of communications in linking the multiple elements involved in emergency medical services systems. There is a need for an integrated coordinated communications network that brings together all of the components of the emergency medical system to provide optimum care using well-established but often poorly implemented principles of modern emergency medicine.

The physicians that treat emergencies believe that the outcome of sudden illness or medical emergencies is predicated not so much on the obvious symptoms or trauma found, as it is on a whole gamut of information on which very early decisions are made.

The communications capability offers the potential for the input of advice from a remote specialist to the emergency medical technician (EMT) at the scene for a real-time decision making capability between EMT and physician specialist as to the most appropriate medical facility for treatment and the method of transport based on telemetered data.

Many states, such as Maryland, are in the process of developing EMS radio communication systems which serve major cities and surrounding counties. These facilities interconnect emergency vehicles with medical and resource coordination centers and will undoubtedly prove highly beneficial as they are brought to fruition and used on a continuing basis.

If we are able to realize the full potential of the EMS Systems Act, a great step will have been taken toward the elimination of needless loss of life and limb due to catastrophic sudden illness and other medical emergencies associated with accident trauma occurring in the home, factory or on the highway.

Modern satellite communications technology can aid in realizing the full interest of the EMS Systems Act. Through the use of satellite facilities, uniform coverage of the U.S. is available for experimentation and demonstration of a national interconnected system. This is particularly significant for rural areas outside the limits of ground radio systems. Through this technology, rapid high quality communications for voice, video, and medical telemetry could be achieved operationally in the 1980s.

3.2 EDUCATION SERVICES

Productivity losses exist at all levels of education with fewer students, more teachers, increased pay for school personnel and no comparable increase in student test scores. In many areas of the country the budget and number of teachers has increased while the number of students has decreased without significant improvement in results. Telecommunications has the potential of permitting large gains in educational productivity, increasing teaching effectiveness, and broadening the spectrum of educational opportunities.

Despite the institutional problems, the use of telecommunications to relay educational programs at all levels (primary, secondary, university, continuing and cultural) is increasing. One report forecasts a need for 80 educational television stations by 1985 for instructional television, video tape distribution and the public broadcast system.

The role of the Federal government in education is to evaluate the status of education, aid people of the U.S. in the establishment and maintenance of efficient school systems and to otherwise promote the cause of education. NASA has been assisting educators in exploring the use of satellite communications using the ATS-6 and CTS satellites. There is a need to continue to work with these users until the technology is effectively transferred.
Education includes health education and the training of professional and paraprofessional health care personnel as well as the training of the public in good health practices.

### 3.3 DATA TRANSFER

There are networks in existence for the transfer of data between government installations located all over the globe, and some of these networks involve satellites. There is a need for a demonstration mission to develop satellite capabilities uniquely suited to this application. This will improve the cost effectiveness of transmissions that may be done conventionally or would make possible transmissions that would otherwise be impossible.

The need for NASA is to work with the users to assist them in learning of the potential of satellite communications to improve the services they need. NASA would assist in the transfer of the technology to operational commercial services.

The research of government scientific teams such as Antarctic exploration teams, archaeological teams and geological teams could be greatly enhanced if the teams could be connected to their home base data banks and powerful computers via satellite through small portable terminals.

The volume of data transmission by government agencies involves nearly \( 2 \times 10^{15} \) bits per year generated by nearly 150,000 nodes. These nodes cover military, law enforcement, education, environmental surveillance, navigation, space operations, state government and federal government. Commercial goals include the automation and digitization of commercial services. New services will become possible through the advent of automatic digital data transmission for

Health Care Data

The cost of medical care has risen greatly in the last few years and all signs point to a continuation of this trend. One of the forgotten items in the cost of health care delivery is the assembly, maintenance and retrieval of medical records. Thus, this service is different from the delivery of health care previously described. It has been estimated that medical data records costs amount to about $5 per capita per annum or well over a billion dollars a year in the United States. In many cases the patient and the records are separated so far in time or space that these records are useless in the diagnosis and treatment of the current complaint. This not only is a disadvantage medically but also causes the formation of a new file, thereby further burdening the record system with a file that also may be inaccessible the next time it is needed.

Satellite telecommunications could help change this situation by making possible the formation of regional medical record centers which could be accessed from anywhere in the country. In this way the patient would know that any practitioner would have all the pertinent information available for consideration when the need arises.

Apart from patient medical records, epidemiological statistics, disease registries, blood bank inventories and similar types of information could be updated on a daily basis using satellite telecommunications. This would be especially useful in spotting and treating outbreaks before an epidemic develops.

NASA is presently working with users to explore the capabilities of satellites using the ATS-6 and CTS satellites.

Library Retrieval

Library science deals with the organization and flow of information. During the last two decades there has been an enormous growth in inter-library information transfer. Present library science technology is not capable of meeting these information transfer requirements.

Present distribution techniques consist of teletype, facsimile, WATS, magnetic tape distribution and the mail service. The key factors limiting growth in the productivity of information transfer are the performance and speed of facsimile devices (transmission is slow and expensive), the limitations of optical scanners, and the high cost of long-distance communications.
The Library of Congress has standardized much information transfer and distributes information in a machine-readable format on magnetic tape via the postal service.

It is estimated that about 2500 of the 12,000 public libraries in the United States would use the advanced technology of electronic data transfer if productivity gains were commensurate with costs. The 2500 college and university libraries and a similar number of technical and specialty libraries would provide a large market for new library science technology.

NASA is working with libraries to experiment with satellite communications using the CTS satellite.

**Census Data**

The demographic data derived from the decennial census lags by several years due to difficulty in acquiring, processing and using data obtained in the archaic manner of the census taker. The state of the art could support a demonstration where the census taker, using a hand-held telecommunication terminal could input his data directly into a central computer for storing and processing census data. This would obviate the necessity of working with hard copy paper sheets and would permit the keeping of running totals and prediction of trends early in the arduous census process. Additionally the recording of natality, mortality and other vital demographic statistics could be done on a continual up-to-minute basis.

3.4 **TELECONFERENCING**

There is a need to provide a broad-based, flexible and cost-effective range of teleconferencing services for government and professional organizations engaged in public services. The full range of teleconferencing capabilities that must be considered to best fill a service should include computer-based conferencing, interactive graphics, audio conferencing, one- and two-way television, and various combinations of these.

Remote video broadcasting of professional society symposia, for example, could enhance the distribution of information. A flexible teleconferencing service to interconnect groups of researchers for discussion of their work could alert them to significant findings, and accelerate scientific and technological progress.

Also, the information retrieval aspect of teleconferencing could allow the professional to intensively search the information base of his field.

Information and problem solving are the main tools of the 15-20 million professional workers in the U.S. today. It has been estimated that missed information is responsible for wasting 30% of a professional's time through poor solution to problems or needless duplication of work and half of the information presented at professional meetings is lost due to lack of publication. Also, "national" meetings currently tend to be regional in the composition of attendees.

The market for teleconferencing of meetings of professional organizations includes 600,000 academic, scientific, and technical organizations, 500,000 health and medical organizations, as well as labor, political and fraternal groups.

On the social psychology aspects of teleconferencing; there is a need to understand and to quantify the level of teleconferencing capability required for various types of meetings. How much and what types of face-to-face meetings can be replaced by teleconferencing is not well understood. More controlled experimentation is needed to better define the parameters, extent of potential use and capabilities needed.

The present NASA program includes work in teleconferencing. NASA could expand the use of the day-to-day program and project activities of the agency in an experimental teleconferencing network. This network would not only serve the NASA needs of detailed coordination of highly complex technological endeavors, it could also provide the framework within which much of the unknowns about teleconferencing could be evaluated and problems solved. An additional benefit to the agency would be conservation of limited travel funds. At the same time NASA would be providing commerce and industry an example of energy conservation by the substitution of teleconferencing for transportation.

3.5 **PUBLIC SAFETY**

The major impact of satellite communications in the area of public safety is threefold: to save lives, to provide cost savings and to provide flexibility. Satellite communication are capable of contributing in the following areas: disaster communications, where other modes have been destroyed or capacity reduced by the disaster, intrastate, for relay of video, high speed facsimile, and in remote areas extending the range of mobile communications. The public safety community consists of law enforcement (including the courts), fire control as well as prevention, and civil defense. The functions to which this...
service can be applied include communications to the general public, and
their own resources of the public safety organization as well as investiga-
tory, training, education and administrative uses of the public safety organiza-
tions. Many of these functions are handled adequately now, but satellite communications
will be amenable to longer distances, higher data rates and more flexibility. As requirements grow, satellite communications become more meaningful and cost-
effective.

4 APPROACH

The technical plan for the Public Services Communications Satellite System effort is
divided into four phases. Figure 1 shows the phases and their expected times.
This program will require the joint efforts of NASA and other agencies as well
as the private and public sectors. The joint efforts among the agencies and
public sectors will be defined by a Memorandum of Understanding (MOU) between
the parties. The private sector participation will be defined by contractual
arrangements. The MOU arrangement is not new to NASA and has been successful
in the past. For example, the ATS-6 experiments were often arranged with MOU’s
between the experimenter (including the Government of India) and NASA. The
areas of responsibility and commitment of each party and the objectives and
purpose of the MOU are specified. Critical decision points are identified
and specific outputs are listed.

4.1 PHASE I - OCTOBER 1976 - DECEMBER 1977

The first phase lasts 14 months and includes two concurrent efforts. The
first part is a continuation of the ATS-6 and CTS experimental applications
and evaluations included in this part is the modification and upgrading of
the Denver Uplink Terminal (DUT) to provide a more convenient, cost-effective
terminal access for the ATS-6/CTS users. NASA will take responsibility for
the facility and provide for the modification and upgrading of the facility.
This facility will be part of NASA’s transfer of technology to the users in
the later phases.

The second part of this first phase is the study effort to develop the system
concept and definition for the public services communication satellite sys-
tem. This will be an extensive effort during which studies and analyses will
be performed to determine the best technical concept and the optimum system
configuration. The studies and analyses will be concerned with users’ require-
ments, cost of service, system definition and low cost terminal technology.

4.2 PHASE II - JANUARY 1978 - SEPTEMBER 1979

This phase is 21 months long and has two parts. In Part I the training and
transition of the DUT facility from full NASA operation and maintenance to
shared operation and maintenance with the users, the Public Service Satellite Consortium (PSSC), takes place. This phase begins a quasi-operational period for the users with the ATS-6 and CTS. During this time a backup for the ATS-6/CTS space segment may be required. The space backup could be leases of either or both Anik-4 or the SBS satellites to provide the users with limited operation and program continuity until the new satellite is launched and operational.

The second concurrent part of Phase II is the system specification and procurement preparation. NASA will have the responsibility for preparing the specification, designing and developing the spacecraft and developing the necessary hardware and software for command control of the system. It will also have the responsibility for developing low-cost terminal technology which includes manufacturing techniques and maintenance techniques which effect the total cost the user must pay to be in the system. Finally, NASA will have the responsibility for developing the overall management and training techniques to be employed in the system implementation.

The users will be responsible for reviewing the plans and designs to be sure they are in consonance with their goals.

NASA and the users will jointly be responsible for the presentation of the system to OMB, ISAC and the FCC, and providing the funds in their respective budgets for the implementation of the system. Procurement packages for the subsystems will be sent to prospective contractors in industry, and the proposals will be evaluated.

One final result of this second phase will be the partial transition of the experiments and demonstrations in Phase I to a quasi-operational system. The other result will be the contracts awarded to industry for the procurement of the space, ground and control subsystems and the interface specifications for user equipment.

4.3 PHASE III - OCTOBER 1979 - SEPTEMBER 1981

This two-year period commences with the award of the contracts for the subsystems, and is the system production period. The satellite will be ready for launch in October 1981. There will be an engineering backup model in the event of loss of the first spacecraft. The system studies in Phase II will determine the need for successive launches to provide a high probability of maintaining the space segment. (Perhaps an in-orbit spare and leases at
The ground terminals will be ready for testing in February 1982 and full production will start in May 1982 with the major portion of the terminals ready by October 1982.

The end of this third phase will be the launching of the new satellite and the complete transfer of the DUT complex for NASA to PSSC.

4.4 PHASE IV - OCTOBER 1981 - OCTOBER 1983

This period is the validation phase during which NASA and the co-sponsors will test the system to verify that it has met the system specifications. During this period NASA and the co-sponsors will transfer the system operation and maintenance to the users (PSSC operations).

4.5 TECHNOLOGY PLAN

The system definition study in the first phase of the program will determine if a major technology breakthrough is required for the satellite for the Public Services Communications Satellite system. Hopefully, the satellite can be designed and built within the technology state-of-the-art. However, a major effort will be needed for the terminals if the system is to be cost effective and within the communications budgets of the potential users. Because of the large numbers of potential users, this new technology extends not just to the design and development of components and subsystems, but to the fabrication and manufacturing techniques, maintenance and repair techniques, and packaging techniques. The terminals will be developed by several contractors selected through open competition.

5. TASKS

The Public Services Communication Satellite System Work Breakdown Structure is as follows:

**NASA**
- Perform the necessary system studies (requirements, costs, tradeoffs) to prepare the System Design and Specifications
- Design, develop and procure the satellite
- Launch the satellite
- Develop the necessary hardware and software for system control
- Develop low-cost terminal technology for both fixed and mobile terminals
- Design, develop and procure the initial production run of the fixed and mobile terminals
- Test and validate the system
- Transfer the system technology

**Co-Sponsors**
- Assist NASA in the specification of the Public Services Communication Satellite System and participate in the preliminary and final design reviews
- Develop the user markets
- Deploy and install the terminals

**Users**
- Assist NASA in the specification of the Public Services Communication Satellite System
- Make the needs and services known to NASA
- Develop software as a function of the service such as programmatic material, operational procedures, etc
- Operate and maintain the terminals.
APPENDIX 2
ADVANCE MAILING.

This appendix contains a copy of the material forwarded to workshop participants prior to the workshop.
We are pleased you have agreed to participate in a Workshop on the definition of Public Service Communications requirements sponsored by the National Aeronautics and Space Administration, Goddard Space Flight Center. Workshop participants have been invited from among those active in the field in both the public and private sectors. The forums will assemble on Sunday evening, October 17, for a two-day discussion-meeting at the Tidewater Inn in Easton, Maryland. The results of the Workshop, a focusing on public service needs and applications, is intended for use by NASA as a guide for formulation of a possible public service communications satellite program. A preliminary list of participants, the panels on which they will serve, and the Workshop program are attached.

The location of the Workshop will provide a detached atmosphere for concentrated discussion and creative reflection. A room has been reserved for you for two nights at the Tidewater Inn in Easton, Maryland. You can receive important messages while there at (301) 822-1300. A map showing the location is enclosed. The Workshop has funds to reimburse participants for their travel expenses (governmental regulations prevent reimbursement of Federal employees). A travel voucher is enclosed.

A successful and productive Workshop requires that participants give some thought to communications requirements prior to the meeting. Accordingly, we are enclosing a form to use to describe potential requirements. Please return these forms in the enclosed postage paid self-addressed envelope to Dr. Wolf of NASA by October 1st. This will allow time to convey your preliminary thoughts to the other participants and vice versa. Because the number of participants from each organization is limited, you may wish to solicit ideas from your colleagues.

Please advise your preference for the way you wish to be identified on your name tag.

Because of the absence of public transportation between the Washington/Baltimore area and Easton, we are arranging automobile transportation. Please make your travel arrangements to arrive in the Washington/Baltimore area between 4 and 6 P.M. Sunday. An early response is desired to ensure adequate transportation to the Inn. The intensive nature of the Workshop precludes attendance of families and outside social activities.

We look forward to seeing you at the Workshop. Please call me at (301) 588-6180 if you have any questions.

Sincerely,

Herbert Meyer
Workshop Coordinator
PUBLIC SERVICE COMMUNICATIONS SATELLITES

USER REQUIREMENTS WORKSHOP

OBJECTIVE

To compile and document public sector requirements for communications services that can be most effectively provided by communications satellites. Requirements identified by panels of users will form the basis for this overall requirement set that will then be used to develop space communications systems concepts.

APPROACH

The workshop will be briefed on space communications capabilities generally with emphasis given to small terminal (mobile and fixed) capability. It will then be divided into panels structured along discipline lines that will develop and document their individual requirements which will form the basis for the workshop report. The workshop will review the various panel reports to develop an integrated requirements set having in-so-far as is possible, characteristics encompassing all users needs.

REPORT OUTLINES

1. Objectives
   1.1 Discipline objectives
   1.2 Statutory requirements
   1.3 Objectives to which satellites can make a contribution (including responsible organization)

2. Discipline Communications Needs
   2.1 Types of communications needs
   2.2 Volume of communications
   2.3 Communications networks

3. Present Communications Systems

4. Potential benefits of satellites (economic and social)

5. Recommendations (if any)

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Application</th>
<th>Description</th>
<th>No. of Information Volumes</th>
<th>Remitlae</th>
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<tbody>
<tr>
<td>Public Service Communications User Requirements</td>
<td>Terminal In-Service</td>
<td>Audio/Video Trammission in Multiple Terminals</td>
<td>Planned</td>
<td>Present</td>
</tr>
<tr>
<td>Terminal In-Service</td>
<td>Audio/Video Trammission in Multiple Terminals</td>
<td>Planned</td>
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<tr>
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<td>Audio/Video Trammission in Multiple Terminals</td>
<td>Planned</td>
<td>Present</td>
<td>Planned</td>
</tr>
</tbody>
</table>
### PUBLIC SERVICE COMMUNICATIONS SATELLITE USER REQUIREMENTS

#### EXPLANATORY NOTES FOR TABLE WITH EXAMPLES

**APPLICATION** State the discipline to which this requirement applies, i.e., emergency medicine, education, public safety, teleconferencing.

**SERVICE TYPE** State type of communication, i.e., audio, video, color video, audio/video, digital data, one-way or two-way.

**DESCRIPTION** Description of type of terminal, i.e., ambulance, school, house, hospital, clinic. Also, describe firm future plans and ultimate desires or needs for terminals.

**REMARKS** Use this column for additional explanation of items entered in other columns, if necessary, or for additional explanatory material.

**GEOGRAPHICAL DISTRIBUTION** Describe the present, firmly planned, and ideally desired or required geographical distribution of user terminals, i.e., so many per city or county or other geographical region, or so many per other geographically distributed units such as hospitals, police stations, or medical centers.

**INFORMATION VOLUME** List the present and expected volume and duration of transmissions that are or would be required. 200 emergencies per week, 1000 daily (1 min each) transmissions per day, variable scheduling ranging from routine to emergency conditions.

**PANEL**

<table>
<thead>
<tr>
<th>Panel</th>
<th>Chairman</th>
<th>Secretary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. COMMERCIAL SERVICES</td>
<td>Donald M. Jansky</td>
<td>Joseph M. Swo</td>
</tr>
<tr>
<td>2. DATA AND MESSAGE SERVICES</td>
<td>Horace A. Abraham</td>
<td>Charles E. Cote</td>
</tr>
<tr>
<td>3. ELEMENTARY AND SECONDARY EDUCATION</td>
<td>Harold E. Wiggins</td>
<td>John Kiebler</td>
</tr>
<tr>
<td>4. EXTENSION AND CONTINUING EDUCATION</td>
<td>Martin Chamberlal</td>
<td>Enrico P. Mercanti</td>
</tr>
<tr>
<td>5. ENVIRONMENTAL COMMUNICATIONS</td>
<td>Arthur A. Croke</td>
<td>Earle Falster</td>
</tr>
<tr>
<td>6. LIBRARY SERVICES</td>
<td>Fred Katz</td>
<td>Gale C. Galtzino</td>
</tr>
<tr>
<td>7. MEDICAL EDUCATION</td>
<td>Charles R. Heff</td>
<td>William L. O'Connell</td>
</tr>
<tr>
<td>8. MEDICAL SERVICES</td>
<td>Ralph P. Christiansen</td>
<td>Walter R. Sullivan</td>
</tr>
<tr>
<td>9. PUBLIC BROADCASTING</td>
<td>Donald B. Quayle</td>
<td>John E. Miller</td>
</tr>
<tr>
<td>10. PUBLIC SAFETY</td>
<td>Robert M. Ashton</td>
<td>Terri V. Turkiewicz</td>
</tr>
<tr>
<td>11. RELIGIOUS APPLICATIONS</td>
<td>William For</td>
<td>Joseph P. Corrigan</td>
</tr>
<tr>
<td>12. STATE &amp; LOCAL COMMUNICATIONS</td>
<td>Robert W. Vaip</td>
<td>James P. Brown</td>
</tr>
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</table>

### REQUIREMENTS WORKSHOP ORGANIZATION

<table>
<thead>
<tr>
<th>Arrangements</th>
<th>Herbert Majover</th>
</tr>
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<tbody>
<tr>
<td>Panel Chairs</td>
<td>David A. Irvin, Hal Braham, Eugene Cardiann, Richard Davies, John E. Fox, Joseph Freitag, Stanley N. Ziemicki</td>
</tr>
<tr>
<td>Data and Message Services</td>
<td>Dorothy Deringer, Donald Grace, Ervin Jacobs, Peter McNamara, William Miller</td>
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<tr>
<td>Elementary and Secondary Education</td>
<td>Alice Beckman, Pierre Dubois, Charles C. Moore, Don I. Gray, Andrew Harvott, Elna Bertler, Pat Ho, Ross Muhlerj</td>
</tr>
<tr>
<td>Extension and Continuing Education</td>
<td>Franklin G. Bower, George Christenson, Larry Grayson, Harold B. Moore, Frank Hurwood, Kenneth Polonsky</td>
</tr>
<tr>
<td>Environmental Communications</td>
<td>Edward Blackhurst, Allan Deacres, Priscilla Gebal, Steven Kerman, Sara Kedous, Ronald Miller</td>
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<tr>
<td>Library Services</td>
<td>Mary B. Backer, Richard Bergland, Robert Mird, Elmer Prisman, Leo L. Laveridge, Emanuel Sutter</td>
</tr>
<tr>
<td>Medical Education</td>
<td>David N. Boyd, Arthur Griffiths, Howard Hopp, Ray Schwartz, Dee Selbert, Robert Shumake, John S. Vapner</td>
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<tr>
<td>Public Broadcasting</td>
<td>Jerry Carp, Donald D. Kavanaugh, Laie McCoy, William B. Norton, George Allen, Helen Cleaveswater</td>
</tr>
<tr>
<td>Public Safety</td>
<td>James B. Alexander, Charles Hamilton, William Rude, Richard Jameson</td>
</tr>
<tr>
<td>Religious Applications</td>
<td>Claude Buxton, George N. Hall, Donald Sisson, Ted Ream, June G. Richards, Nason Ringel, Elizabeth L. Young, Marvin H. Riemann</td>
</tr>
</tbody>
</table>

Map of Easton

1. Tidewater Inn
2. Easton Manor Motel
3. Washwell Motel
4. Easton High School
5. Episcopal Cathedral
6. Ct. of Law Church
7. Christ Episcopal Church
8. Methodist Church
9. Elks Home
10. American Legion
11. Free Parking Area
12. 24 Hour Parking Area

1. Tidewater Inn
2. Easton Manor Motel
3. Washwell Motel
4. Easton High School
5. Episcopal Cathedral
6. Ct. of Law Church
7. Christ Episcopal Church
8. Methodist Church
9. Elks Home
10. American Legion
11. Free Parking Area
12. 24 Hour Parking Area

Baltimore

Dulles

Washington National

Chesapeake Bay Toll Bridge

Chesapeake Bay

See reverse side for area detail.
### Public Service Communications Satellite User Requirements Workshop

#### Program

<table>
<thead>
<tr>
<th>Time</th>
<th>Date</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
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<tbody>
<tr>
<td></td>
<td>17 Dec</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8:00-9:00 am</td>
<td>Breakfast</td>
<td></td>
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</tr>
<tr>
<td>9:00-12:00 pm</td>
<td>Welcome</td>
<td>Public Service</td>
<td>Communications</td>
<td>Satellite Concept</td>
</tr>
<tr>
<td>12:30-1:30 pm</td>
<td>Lunch by Panels</td>
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<tr>
<td>1:30-5:00 pm</td>
<td>Panel Discussions</td>
<td>Public Service</td>
<td>Communications Needs</td>
<td>Potential Benefits of Satellites</td>
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<td>6:00-8:00 pm</td>
<td>Banquet</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8:30 pm</td>
<td>Get Acquainted Reception</td>
<td>(Cash Bar, Pool-side)</td>
<td>Social</td>
<td>(Cash Bar, Pool-side)</td>
</tr>
</tbody>
</table>
PUBLIC SERVICE COMMUNICATIONS SATELLITE USER REQUIREMENTS WORKSHOP

Travel Plan

Name __________________________________________________
Address __________________________________________________
________________________________________________________
________________________________________________________
Office Phone. __________________________
Home Phone __________________________

I plan to attend ________ days of the Workshop (check which days)
 Sunday ________  Monday ________  Tuesday ________

I would like to have hotel reservations for the following nights (check which days)
 Sunday ________  Monday ________  Tuesday ________

My travel plans to Washington are as follows

☐ Airplane  Airline ________________,  Flight No ____________
            Arrival Date ____________,  Time ________________
            Arrival Airport

☐ Rail  Train No ________________,  Arrival Station ____________
            Arrival Date ____________,  Time ________________

☐ Automobile  ☐ I can provide transportation to Easton for ________ people.
☐ I need transportation to Easton

NOTE  Please call Mr. Herb Majower at (301) 588-6180 if you have any questions

Please return this form to Dr Wolff in the enclosed postage-paid self-addressed envelope

Please advise your preference for the way you wish to be identified on your name tag.

________________________________________
APPENDIX 3
ADVANCE SUBMISSIONS

This appendix contains material submitted by participants prior to the opening of the workshop.
For part of a total emergency response system.

### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
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<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>Search Beacon Disaster (NASA)</td>
<td>2 way-voice video and data transfer</td>
<td>Voice/data terminals in 6 region service centers</td>
<td>6</td>
<td>6 Nat'l regions USA</td>
<td>Present</td>
<td>Planned 1 Needed</td>
</tr>
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<td>Search Beacon Disaster (NASA)</td>
<td>2 way-voice mobile portable</td>
<td>satellite access</td>
<td>50</td>
<td>present</td>
<td>present</td>
<td>Planned</td>
</tr>
</tbody>
</table>

#### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Medicine</td>
<td>2 way-voice video and data transfer</td>
<td>Ambulance Present</td>
<td>200</td>
<td>5 county region around ETA City, USA</td>
<td>Present</td>
<td>Planned 500 17 messages per day Planned 750/day Needed 2000/day</td>
</tr>
<tr>
<td>Teleconferencing</td>
<td>Audio/Video Multiple Simultaneous Terminals</td>
<td>Voice/Video terminals in 50 regional sales offices</td>
<td>Present</td>
<td>Planned</td>
<td>Needed</td>
<td>U S 50 states</td>
</tr>
<tr>
<td>Instructional materials distribution</td>
<td>2 way audio video</td>
<td>TV terminals with keyboard &amp; microphones</td>
<td>Present</td>
<td>Planned</td>
<td>Needed</td>
<td>U S &amp; territories</td>
</tr>
<tr>
<td>Instructional materials distribution</td>
<td>2 way audio video</td>
<td>User terminals and video/audio recorders</td>
<td>Present</td>
<td>Planned</td>
<td>Needed</td>
<td>U S &amp; territories</td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No.</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
</tr>
<tr>
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<td>-------------------------------</td>
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<td>---------------------------</td>
<td>--------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>2 way data transfer</td>
<td>Interstate communication network (existing)</td>
<td>55</td>
<td>1 point of entry per state plus Federal agencies</td>
<td>Present 3 million messages (300 characters) per month</td>
<td>1983 projected volume 6 million kilobits per second nationwide peak = 2 times average</td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>2 way voice</td>
<td>Interstate (state police) communications network</td>
<td>10X</td>
<td>Average of 200 per state</td>
<td>Present 3000 messages (15 seconds) per day</td>
<td></td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>2 way graphical</td>
<td>Interstate (state police) communications network</td>
<td>200</td>
<td>Average of 4 per state</td>
<td>Present. Very limited Future extensive</td>
<td>Some traffic now being exchanged via facsimile. Interstate exchange of fingerprint images via high-speed electronic means would be highly desirable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>present No.</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>digital broadcast</td>
<td>Microcomputers</td>
<td>5</td>
<td>U S</td>
<td>Present 10,000 bits/sec</td>
<td>Satellite packet broadcasting</td>
</tr>
<tr>
<td>Libraries</td>
<td>microcomputers</td>
<td>remote sensors</td>
<td>20</td>
<td>50 states</td>
<td>1,000,000 bits/sec</td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>remote sensors</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Teleconferencing

**Service Type:** 2 way Audio/Video
**Description:** Inst. of Higher Educ representing state agencies throughout the State needed

<table>
<thead>
<tr>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scattered</td>
<td>First Six Categories</td>
<td>Serving almost all state agencies from 31 specified locations and dish</td>
</tr>
<tr>
<td>Scattered</td>
<td>Clusters serving State Agencies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 hrs Daily Broadcast Service</td>
<td></td>
</tr>
</tbody>
</table>

### Instructional Programming

**Service Type:** 2 way  Audio/Video
**Description:** Higher Educ Public Rino State Personnel Training

<table>
<thead>
<tr>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scattered</td>
<td>1st 6 Categories Combined</td>
<td>-2 hrs between 8am and 5pm each weekday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-2 hrs between 5pm and 11pm each weekend</td>
</tr>
</tbody>
</table>

### High Speed Data

**Service Type:** Digital Data
**Description:** Higher Educ 2 way ETV & TV Stations

<table>
<thead>
<tr>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scattered</td>
<td></td>
<td>-2 hrs between 8am and 5pm each weekday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-2 hrs between 5pm and 11pm each weekend</td>
</tr>
</tbody>
</table>

### High Speed Faximile

**Service Type:** Digital Data
**Description:** Higher Educ 2 way ETV & TV Stations

<table>
<thead>
<tr>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scattered</td>
<td></td>
<td>-2 hrs between 8am and 5pm each weekday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-2 hrs between 5pm and 11pm each weekend</td>
</tr>
</tbody>
</table>

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### Virginia

**Application:** Public Service Communications User Requirements

**User Terminals:**

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Description</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 way Audio/Video</td>
<td>8 TV Stations</td>
<td>Scattered Locality Clusters Serving State Agencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 vs Video</td>
<td>Environmental Agencies, Highway Dept, Forestry, Engineering &amp; Buildings</td>
<td></td>
<td>Only Where Feasibly extendable</td>
<td></td>
</tr>
<tr>
<td>2 way Digital Data</td>
<td>All State Agencies</td>
<td>Barefoot Service conducted thru 1st Priority Clusters serving the state</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MANDATORY REQUIREMENTS FOR ALL THE FOLLOWING CATEGORIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 hrs instant access to emergency channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mbps/hr on a state conditioned channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 continuous hours in 8am-5pm and 1pm-6am period</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 min in every 5 for relay of telemetered data on a conditioned channel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Notes:**

1. *Service COMmunications User Requirements*
2. *Public Service Terminals*
**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

### USER TERMINALS

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographic</th>
<th>Information</th>
<th>Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emergency Voice Networking</strong></td>
<td>1 way Audio</td>
<td>State Police Off. Emergency Dept.</td>
<td></td>
<td>Scattered 'Locality'</td>
<td>See Preceding Clusters</td>
<td>Page 52</td>
<td></td>
</tr>
<tr>
<td><strong>Telemetry Signaling</strong></td>
<td>1 way Digital Data</td>
<td>Highway Environment Agencies</td>
<td></td>
<td>52</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Servo Control Signaling</strong></td>
<td>1 way Digital Data</td>
<td>Key Traffic Control</td>
<td></td>
<td>52</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Slow Speed - Pedestrian</strong></td>
<td>2 way Audio</td>
<td>Virtually all agencies and Institutions</td>
<td></td>
<td>52</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>%</th>
<th>Geographic</th>
<th>Information</th>
<th>Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Audio Networking</strong></td>
<td>1 way Audio</td>
<td>All Public Radio Stations</td>
<td></td>
<td>10</td>
<td>See preceding page</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Instructional Programming</strong></td>
<td>2 way Audio</td>
<td>Higher Edu Public Edu State Personnel Training</td>
<td></td>
<td>52</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Audio Conference</strong></td>
<td>2 way Audio</td>
<td>Virtually all agencies and Institutions</td>
<td></td>
<td>52</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Aural Monitoring</strong></td>
<td>1 way Audio</td>
<td>Environmental Agencies</td>
<td></td>
<td>52</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

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A3-5
### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video site Monitoring (Slow Scan)</td>
<td>1 way Audio Quality Agencies</td>
<td>Environmental Key Dept Forestry</td>
<td>52</td>
<td>See Preceding Page</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSTALLATION 2 way VOICE*</td>
<td>CCTV ST FILE (similar to those for ATS-661)</td>
<td>Present- portable</td>
<td>Follows geographical spread of An Lutheran Ch Upper Midwest Coast and several mission</td>
<td>Present thru needed 500 messages/day</td>
<td>Interested in maintaining current downlink equipment. We are using amateur FM and commercial FM units. For terminals that are cheap, uncomplicated and use simple antennas. A shift to microwaves would be unwelcome, as I assume terminal costs would skyrocket.</td>
<td></td>
</tr>
</tbody>
</table>
### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Audio Video Color TV Two-way digital</td>
<td>Schools/college industry library dormitories apt houses/condo hospitals</td>
<td></td>
<td>Campuses cities</td>
<td>4 pm - midnight to 20 min + 1 hr blocks of time on a routine 7 day/week schedule</td>
<td>Current cost of land line precludes this kind of networking of instructional and &quot;educational&quot; programming. Traffic for instructional programming can be expected to continually escalate as technology advances.</td>
</tr>
</tbody>
</table>

#### MEDICAL EDUCATION

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>FULL DIPLEX COLOR VIDEO AUDIO AND DATA TRANSFER</td>
<td>UNIVERSITY TV STUDIOS &amp; CLASS-ROOM</td>
<td></td>
<td>5</td>
<td>I'OF WASHINGTON; U OF ALASKA; MONTANA STATE U; U OF IDAHO WASHINGTON STATE UNIVERSITY</td>
<td>75 MINUTE TRANS-MISSION BI-WEEKLY</td>
<td>NEED HIGH QUALITY COLOR CAMERA WITH LENS EXTENDERS FOR MAGNIFICATION</td>
</tr>
</tbody>
</table>

#### CLINICAL MEDICAL EDUCATION & CONTINUING MEDICAL EDUCATION

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>FULL DIPLEX COLOR VIDEO AUDIO AND DATA TRANSFER</td>
<td>HOSPITALS</td>
<td>PRESENT NEED</td>
<td>14</td>
<td>COMUNITY CLINICAL TRAINING UNITS</td>
<td>30 MINUTES TIME PER DAY</td>
<td>NEED HIGH QUALITY COLOR CAMERA WITH LENS EXTENDERS FOR MAGNIFICATION</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PLANNED NEED</td>
<td>20</td>
<td></td>
<td>5 DAYS PER WEEK</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

- Missoula, MT
- Billings, MT
- Anchorage, AK
- Family medicine
- Anacortes WA
- Whitman WA
- Moscow WA
### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
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<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUCATION</td>
<td>FULL DUMEX</td>
<td>STATE CAPITALS</td>
<td>4</td>
<td>JUNEAU AK</td>
<td>AS NEEDED</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BOISE IDAHO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SEATTLE WA</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>OLYMPIA WA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDICAL</td>
<td>FULL DUMEX</td>
<td>VA HOSPITALS</td>
<td>75 MINUTES</td>
<td>BOISE IDAHO</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AMERICAN LAKE WA</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>WALLA WALLA WA</td>
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</tr>
</tbody>
</table>

### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
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<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Audio/Color video</td>
<td>1</td>
<td>colleges &amp; universities</td>
<td>possibly throughout the</td>
<td>Assuming sufficient user terminals - several hours per day</td>
<td>The thinking which is in its earliest stages needs to be correlated with available technology and potential dollars for user terminals. The Workshop should enable us to do this</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>hospitals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>conferences centers</td>
<td></td>
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<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Research</td>
<td>1-way digital data transfer, terminals to S/C</td>
<td>Human Body</td>
<td>200 or more</td>
<td>GM University</td>
<td>Present Planned Unknown Needed ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Present</td>
<td>Planned</td>
<td></td>
<td></td>
<td>Need Unknown, but envision, a demonstration of this application using NIMBUS &amp; RAMS and GM Heart-Exercise Project participants</td>
</tr>
<tr>
<td>PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS USER TERMINALS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
</tr>
<tr>
<td>Public Service Tape System</td>
<td>Digital tape and hardcopy input outputs</td>
<td>Present</td>
<td>0</td>
<td>Top 75 to 100 UDIs areas, over continental US plus Hawaii and Alaska</td>
<td>1 x 10^9 to 2 x 10^9 messages per month</td>
<td>Primarily a service for large volume mailers in business and government</td>
</tr>
<tr>
<td>Public Service Message System</td>
<td>Digital tape and hardcopy graphics outputs</td>
<td>Present</td>
<td>0</td>
<td>National coverage, 1 e Canada, Alaska, Hawaii, Puerto Rico</td>
<td>4 x 10^9 messages per month</td>
<td>Would provide for color, grey scale in graphics, and would accommodate advertising, message and transaction services</td>
</tr>
</tbody>
</table>

A3-10
<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Safety Training</td>
<td>Audio, Video, and data b-Way</td>
<td>Classroom ITV from State to Substations Present Planned Needed</td>
<td>3 75</td>
<td>5000 sqms 3 States 9 Counties</td>
<td>Classroom 5 hrs/wk Other On Command</td>
<td>The future need revolves around a proposed multi-purpose training center which will include interconnects with state instructional centers and local fire stations, police stations, etc</td>
</tr>
<tr>
<td>Public Safety Identification</td>
<td>Same with mobile units</td>
<td>Live transmission from and to disaster scenes</td>
<td>1 Base</td>
<td>Base</td>
<td>On command</td>
<td>To identify methods of control, toxic effects of chemicals, explosives, etc and handling of materials, etc</td>
</tr>
<tr>
<td>Public Safety: Tactical control</td>
<td>Same with mobile units</td>
<td>Base</td>
<td>1 Base</td>
<td>Base</td>
<td></td>
<td>Provide centralised control of major disaster scenes for suppression of fire, explosion, security, rescue, etc. Dispatch of equipment</td>
</tr>
</tbody>
</table>

### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Continuing Medical Education Tele-conferencing</td>
<td>Audio/Video Multiple Simultaneous terminals</td>
<td>Voice/video terminals in hospitals, clinics, homes and medical schools Present</td>
<td>90</td>
<td>State of Indiana National (50 states)</td>
<td>8 hrs/day 5 day/week 30-60 min transmissions</td>
<td>Presently programming transmissions on terrestrial systems such as IFFPS, CATV, common carrier long lines, private cable, and video cassette. Serves state of Indiana. Interested in forming consortium for national programming distribution via satellite. Future programming will include transmission of hard copy medical data. See attached TV guide for current programming</td>
</tr>
</tbody>
</table>

#### Audio/Video

- **Multiple Simultaneous terminals**
- **Voice/video terminals in hospitals, clinics, homes and medical schools**

#### Tele-conferencing

- **9-way voice**
- **Present**
- **Needed**

- **State of Indiana National (50 states)**
- **8 hrs/day 5 day/week 30-60 min transmissions**

#### Remarks

- Presently programming transmissions on terrestrial systems such as IFFPS, CATV, common carrier long lines, private cable, and video cassette.
- Serves state of Indiana.
- Interested in forming consortium for national programming distribution via satellite.
- Future programming will include transmission of hard copy medical data.
- See attached TV guide for current programming.
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</tr>
</thead>
<tbody>
<tr>
<td>Tele-conferencing</td>
<td>Audio/Video</td>
<td>Multi-Video Terminals to 4 Regions</td>
<td></td>
<td></td>
<td></td>
<td>High Cost For Terrestrial Capability Precludes Omission Capability, Is Also Inflexible Compared to Satellite Media</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Present: 0 Planned: 0 Desired: 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphical</td>
<td>Digital</td>
<td>Digital FAX Terminal or U LRT With Storage</td>
<td>1500</td>
<td></td>
<td></td>
<td>Two Systems 90% Utilized One System Cannot Meet All the Requirements that Exist, 100% Utilized Also, 9% Of Traffic Is Broadcast From 1 Node, 7% Originate at 3 Other Nodes</td>
</tr>
<tr>
<td>Broadcast</td>
<td></td>
<td>Existing In Three Terrestrial System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>Digital</td>
<td>Digital Readout 2400 b/s and 4800 b/s Data</td>
<td></td>
<td></td>
<td></td>
<td>24 hours/day 7 days/week</td>
</tr>
<tr>
<td>Data Products</td>
<td></td>
<td>Service Products for Distribution</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

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</thead>
<tbody>
<tr>
<td><strong>Criminal Justice</strong></td>
<td>Two way data</td>
<td>State crime related info computer to computer</td>
<td>50</td>
<td>Contramnuous U S</td>
<td>100,000 MSG per mo</td>
<td></td>
</tr>
<tr>
<td><strong>Law Enforcement</strong></td>
<td>One way video</td>
<td>Area wide broadcast of visual 10 info</td>
<td>500</td>
<td>U S</td>
<td></td>
<td>All terminal should initiate broadcast to limited addressable areas Present tech use slow Land line CKTS</td>
</tr>
<tr>
<td><strong>Post-secondary Education</strong></td>
<td>audio/video plus interactive involving 3 groups of approx. 7 each</td>
<td>69</td>
<td>1 per institution situated throughout the state</td>
<td>4 hrs. per day 5 days per wk</td>
<td>Because of heavy continuing education needs, a minimum of 2 hours in the evening would be most important</td>
<td></td>
</tr>
<tr>
<td><strong>Post-secondary Education</strong></td>
<td>computer network linking 32 private colleges &amp; universities to computers to Notre Dame to U. of Evansville</td>
<td>34</td>
<td>located state wide</td>
<td>at outset 1 hr per day</td>
<td>Both Evansville &amp; Notre Dame can handle the traffic would undoubtedly grow to a min. of 3 to 4 hrs in approx 5 yrs.</td>
<td></td>
</tr>
<tr>
<td><strong>Indiana Dept. of Tele-Corrections</strong></td>
<td>Involves state &amp; 7 prisons</td>
<td>Michigan City plus 7 locations in Central Ind.</td>
<td>8</td>
<td>30 min. transmission 5 days/wk</td>
<td>Video most imp in addition to audio which is now available</td>
<td></td>
</tr>
<tr>
<td><strong>Indiana Dept. of audio/video Corrections</strong></td>
<td>7 state prisons</td>
<td></td>
<td>7</td>
<td>2 hrs. per day 5 days per wk</td>
<td>Employee basic training program and portion of AA degree pubm</td>
<td></td>
</tr>
</tbody>
</table>
### VETERANS ADMINISTRATION

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Telecon-</td>
<td>Dual channel color video, two-way audio</td>
<td>VA Hospitals Present (Experiments)</td>
<td>30</td>
<td>One per hospital in Rocky Mountain and West Coast Regions</td>
<td>30 hours during 13 months</td>
<td>Any and/or all plans for future use of communications satellites by the VA will await conclusion of VA experiments via CTS. The information and data obtained from the VA's CTS and ATS-6 experiences will be used as the basis for determining what use will be made of satellites by the VA for biomedical purposes in the future.</td>
</tr>
<tr>
<td>Telecon-</td>
<td>National Medical Satellite Journal</td>
<td>Same as above</td>
<td>Same as above</td>
<td>Same as above</td>
<td>20 minutes per month for 15 months</td>
<td>Same as above</td>
</tr>
<tr>
<td>Telecon-</td>
<td>Hospital Management Teleconference</td>
<td>Same as above</td>
<td>Same as above</td>
<td>Same as above</td>
<td>10 to 30 hours during 15 months</td>
<td>Same as above</td>
</tr>
<tr>
<td>Telecon-</td>
<td>Continuing Education for Professional Certification</td>
<td>Same as above</td>
<td>Same as above</td>
<td>Same as above</td>
<td>100 hours during 15 months</td>
<td>Same as above</td>
</tr>
</tbody>
</table>

* Current experiments will determine.
### User Terminals

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>Continuing Education Medical</td>
<td>One-way digital data, low rate</td>
<td>Small, unattended data collection</td>
<td>State or regional watershed areas throughout U.S</td>
<td>6-100 bit messages per day per DCP, fixed schedule.</td>
<td>Radio system using forward interrogation link provides added flexibility with considerable added cost.</td>
</tr>
<tr>
<td>U.S. Postal Service</td>
<td>Electronic Mail System</td>
<td>Terminal at each post office or group of post-offices</td>
<td>Major cities in USA.</td>
<td>1 Mbps/Post Office continuously 24 hour service</td>
<td>Point-to-point service</td>
</tr>
<tr>
<td>Library Reference System</td>
<td>Fast, Precious teletype or facsimile</td>
<td>Terminal at each post office or computer center terminal.</td>
<td>Major cities in USA.</td>
<td>1 to 1 Mbps/ 110 Mbps growth to 24-hr service</td>
<td>Large memory with computer controlled access. Interactive with user possible.</td>
</tr>
</tbody>
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### Public Service Communications User Requirements

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<td>Information Volume</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------</td>
<td>-------------</td>
<td>----</td>
<td>---------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Public TV National Program Distribution</td>
<td>One way video, multiple voice track transmission</td>
<td>PPV program receive terminals at all stations</td>
<td>300</td>
<td>National</td>
<td>Start 16 hrs per day, up to 24 hrs</td>
</tr>
<tr>
<td>Point to Point Distribution Inter-cities</td>
<td>2 way video and audio plus 2 way cue circuits</td>
<td>Voice/video receive term.</td>
<td>25</td>
<td>Top 25 market cities</td>
<td>Thirty minutes per day/week</td>
</tr>
<tr>
<td>Regional or topical programs</td>
<td>2 way video/voice</td>
<td>Regional up &amp; down links ground term.</td>
<td>6 up 50 down</td>
<td>Northeast, southeast, midwest, southwest, mountain, pacific, regions</td>
<td>One hour per day</td>
</tr>
<tr>
<td>Live Time International Program Exchanges</td>
<td>2 way video/voice</td>
<td>TV station up and down links</td>
<td>8</td>
<td>U.S.A, Gr. Britain, France, Italy, W. Germany, Sweden, Russia, Japan</td>
<td>One hour per day</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>Public Land Management</td>
<td>Two-way Voice, Data, One-way Video</td>
<td>Up to 20,000 mobile-to-mobile if cost-effective</td>
<td>Nationwide</td>
<td>Nationwide</td>
<td>Between 10% and 100% duty cycle, mostly daylight hours</td>
<td>Up to 100% duty cycle expected in specific geographic areas</td>
</tr>
<tr>
<td>Fire Fighting (Emergency)</td>
<td>Same Special Mobile Terminals</td>
<td>10</td>
<td>West of 100° West</td>
<td>Peak Full Time Two Voice Channel equivalents, but sporadic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Public Service Communications User Requirements

### User Terminals

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</thead>
<tbody>
<tr>
<td>Library information retrieval</td>
<td>2 way data</td>
<td>Receive/transmit terminals in major libraries</td>
<td>200</td>
<td>US</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 way facsimile or slow scan TV</td>
<td>Receive only to smaller libraries</td>
<td>2000</td>
<td></td>
<td></td>
<td>Volume depends upon growth of library facilities for automated text access</td>
</tr>
<tr>
<td>Library bibliography search</td>
<td>2 way data</td>
<td>Receive/transmit terminals in all libraries</td>
<td>2200</td>
<td>US</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Possibly better handled by switched telephone network during foreseeable future</td>
</tr>
<tr>
<td>PBS program distribution</td>
<td>1 way color video/audio</td>
<td>Receive terminals at all PBS stations</td>
<td>170</td>
<td>US</td>
<td></td>
<td>20 hours per day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delay center transmit terminals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBS program assembly</td>
<td>2 way color video/audio</td>
<td>Regional transmit terminals either portable or connected to major stations by terrestrial microwave</td>
<td>20</td>
<td>US</td>
<td></td>
<td>6 hours per day</td>
</tr>
</tbody>
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<tbody>
<tr>
<td>Television remote pickup</td>
<td>1 way color video/audio</td>
<td>Receive terminals to major cities transportable transmit terminals</td>
<td>50</td>
<td>US</td>
<td>25 transmissions per day varying length</td>
<td>For live coverage of events outside single hop microwave range from PBS stations</td>
</tr>
<tr>
<td></td>
<td>2 way voice</td>
<td></td>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBS program preview</td>
<td>1 way color video/audio</td>
<td>Receive terminals at all PBS stations</td>
<td>170</td>
<td>US</td>
<td></td>
<td>10 hours per day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delay center transmit terminals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Additional transponder to PBS program distribution system</td>
</tr>
<tr>
<td>Educational consortia program development and teleconferencing</td>
<td>2 way color video/audio</td>
<td>transmit/receive terminals for discussion, and program sharing</td>
<td>400</td>
<td>US</td>
<td></td>
<td>12 hours per day on one channel at outset</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Interconnection of universities, PBS stations and curriculum development organisations for cooperative planning and production</td>
</tr>
<tr>
<td>Translator service</td>
<td>1 way color video/audio</td>
<td>PBS station transmit terminals</td>
<td>50</td>
<td>US</td>
<td>Transmit Continuous programming</td>
<td>Cover remote localities not now covered by PBS stations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receive terminals at remote translator sites</td>
<td>400</td>
<td></td>
<td>Receive Regional clusters around PBS stations</td>
<td></td>
</tr>
</tbody>
</table>

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## PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

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<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Public Safety</td>
<td>2-way audio</td>
<td>Headquarters Law Enforcement</td>
<td>1</td>
<td>Statewide</td>
<td>Several hundred</td>
<td>Volume will change with prevailing conditions</td>
</tr>
<tr>
<td></td>
<td>slow speed</td>
<td>vehicles</td>
<td></td>
<td>30 second Messages per day</td>
<td>7 days/wk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Communications</td>
<td>2-way audio</td>
<td>Telephone office</td>
<td>1</td>
<td>Each city and town</td>
<td>1 min trans</td>
<td>Same as above</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>as required</td>
<td></td>
</tr>
<tr>
<td>Weather and crop reporting</td>
<td>1-way audio</td>
<td>Voice/video terminal in</td>
<td>1</td>
<td>Statewide</td>
<td>5 min trans</td>
<td>Freq and length of messages will increase with prevailing conditions</td>
</tr>
<tr>
<td></td>
<td>and video</td>
<td>each county</td>
<td></td>
<td>7 days/wk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teleconferencing</td>
<td>2-way video</td>
<td>Terminals in state government</td>
<td>50</td>
<td>U S 50 States</td>
<td>60 min trans</td>
<td>Size of remote earth stations may not permit 2-way video</td>
</tr>
<tr>
<td></td>
<td>and audio</td>
<td>offices needed</td>
<td></td>
<td>5 days/wk</td>
<td></td>
<td></td>
</tr>
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</thead>
<tbody>
<tr>
<td>Emergency Medicine</td>
<td>2 Way Voice</td>
<td>Ambulance Hospital Present</td>
<td>0</td>
<td>Extreme Rural and</td>
<td>Unknown</td>
<td>Need 2 way voice and data transfer for basic and advanced life support</td>
</tr>
<tr>
<td></td>
<td>and Data</td>
<td>Needed</td>
<td></td>
<td>Wilderness areas 50 States</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Medicine &amp; System</td>
<td>2 way Voice</td>
<td>Hospitals and Remote Clinics</td>
<td>0</td>
<td>Extreme Rural and</td>
<td>Unknown</td>
<td>Need 2 way voice and data transfer for system control</td>
</tr>
<tr>
<td></td>
<td>and Video</td>
<td>Present Needed</td>
<td></td>
<td>Wilderness areas 60 States</td>
<td></td>
<td>Video for advanced life support</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Medical Training</td>
<td>2 way Voice</td>
<td>Hospitals and Remote Clinics</td>
<td>0</td>
<td>Extreme Rural and</td>
<td>Unknown</td>
<td>Need 2 way interactive voice, data transfer, and video for</td>
</tr>
<tr>
<td></td>
<td>and video</td>
<td>Present Needed</td>
<td></td>
<td>Wilderness areas 50 States</td>
<td></td>
<td>training and skill update.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td>Ambulance Hospital</td>
<td>0</td>
<td>Extreme Rural and Wilderness areas 50 States</td>
<td>Unknown</td>
<td>Need 2 way voice and data transfer for basic and advanced life support</td>
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<td>Emergency Medicine &amp; System Control</td>
<td>2 way Voice and Data Transfer Video</td>
<td>Hospitals and Remote Clinics Present</td>
<td>0</td>
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<td>Need 2 way voice and data transfer for system control Video for advanced life support</td>
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<td>Emergency Medical Training and skill update</td>
<td>2 way Voice, data and video</td>
<td>Hospitals and Remote Clinics Present</td>
<td>0</td>
<td>Extreme Rural and Wilderness areas 50 States</td>
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<td>Need 2 way Interactive voice, data transfer, and video for training and skill update</td>
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PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

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<td>Teleconsultations</td>
<td>Multiple term in each institution</td>
<td>Community hospitals or other central community educational location</td>
<td>Community Hospitals</td>
<td>6 hours a day 5 days/week</td>
<td>Confidentiality required</td>
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<td>Remote control capability</td>
<td>Community Hospitals</td>
<td>Community Hospitals</td>
<td>2 hours/day 5 days/week</td>
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<td>TeleTech teaching for student</td>
<td>Conf Rm Capability TV video Splush Screen &amp; motion factory audio</td>
<td>Educational institutions</td>
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</tr>
</tbody>
</table>

DEAN J. SEIBERT, M.D.
DARTMOUTH MEDICAL SCHOOL
HANOVER, NH 03755
APPENDIX 4
MATERIAL DISTRIBUTED AT WORKSHOP

This appendix contains material distributed to participants when they arrived at the workshop.
PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS WORKSHOP

Please review thoroughly the contents of your briefcase prior to breakfast Monday morning, particularly the Arrangements sheet.

All meals will be served at the Tidewater Inn.

All participants staying at the Econo Lodge will be furnished transportation each morning at 7:40 - 8:00 and at the end of each day.

When leaving the Workshop, checkout at the Tidewater Inn. If you have accommodations at the Econo Lodge, leave room key with registration desk at the Econo Lodge and return to the Tidewater Inn for Workshop checkout.

PUBLIC SERVICE COMMUNICATIONS SATELLITE USER REQUIREMENTS WORKSHOP

ARRANGEMENTS

October 17, 1976
Sunday - 8:30 p.m.
Session

Dinner - Hotel dining room (including in American Plan)
Social at pool-side, cash bar

All sessions (group and individual panels) will be held in the Gold Room in accordance with the Program Schedule mailed to you.

Meals

All meals will be served in the Crystal Room (except Tuesday, lunch in the Blue Room). Breakfast will start promptly at 9:00 a.m.

Menu

You will be requested to fill in the Menu Schedule for each meal, and give it to a staff member either during breakfast Monday morning or prior to the first session in the Gold Room. Retain one copy for yourself so you know what you ordered. When entering the dining room for lunch and dinner, you will pick up either a white chip or red chip depending upon whether you selected an item in the Suggestion or Alternative column. You will give this chip to the waiter when he brings you the main course.

Administrative Services

All administrative services (typing, reproduction, message center, travel arrangements, etc) are available from 8:30 a.m. to 5:30 p.m. in the Reception Room adjacent to the Gold Room.

Hotel Accommodations

Your room has been reserved per your travel form which you submitted to Dr. E. Wolff. Accommodations have been made under an American Plan.

Expenses

(3 meals)

Each attendees (government as well as non-government) requiring a room will receive a bill when checking out, of $30 a day plus telephone calls. All mileage will be reimbursed at the rate of $0.42/mile. In order that all expenses may be reimbursed, receipts must accompany expense voucher.
Informal attire is encouraged. The hotel only requires that you are not barefoot.

All participants are expected to check out by 1:00 p.m. on the day of departure. Please make other departure arrangements at the hotel desk.

Payment can be by check, cash, or billed to home addresses.

No credit cards accepted due to special rates.
PUBLIC SERVICE COMMUNICATIONS SATELLITE USER
REQUIREMENTS WORKSHOP ORGANIZATION

Panel 1
Chairman: Ronald Jansky
Secretary: Joseph Stivo


Dorothy Derfinger, Eugene Fettern, John Ferretti, Donald Greco, Joseph Hull, Gordon Law, Ralph Marcott, Andrew Vitaso

Allice Beckman, Brian Brightly, Pierre DuMha, Donald Gray, Patricia Ho, Rose Makerfi

Panel 2
Chairman: Martin Abramson
Secretary: Jlle Eacle Painter

Kevin Arndal, George Christiansen, Marlowe Freke, Virginia Gentle, Harold Morse, Frank Norwood, Kenneth Polyc, Hyacinth Shoehler

Roberts Bemler, Walter Duncan, Walter Hogge, James Jenkins, Barry Karel, Joseph Schiels, Clifford Spohn

Paul Andreech, Edward Blackhurst, Allan Deschino, Priscilla Gotsch, Steven Forman, Albert Horley, Mary Huffer


Dennis Boyd, Leon Greenhouse, Arthur Griffith, Howard Houston, James Justice, Howard Leman, H Roy Schwartz, Robert Shamsky, Dean Siebert, John Weinman


George Allen, Gerald Carr, Helen Clearwater, Alva Cooper, Donald Kavanagh, Lois McCoy, Keith Monro, Allen Quinn

James Alexander, George Byrne, Charles Hamilton, Bill Hufa, Richard Jameson, Douglas Miller, Paul Stevens, Lawson Ynna

Claude Brender, Gianpiero Farchina, Gary Feroz, Joel Flemming, Donald Hinson, Ted Reams, Noam Riegel, Jane Richards, Marvin Riser, Elizabeth Young

Gurneede Barestone, Warren Brunn, Andrew Horowitz, Annie King Phillips, Martin Kap, John Schwartz, Charmais Wiseacre

Panel 3
Chairman: Charles Cote
Secretary: John Kiefer

Abraham, Norman (Dr)
Alexander, James E
Allen, George (Dr)
Anderson, Paul (Dr)
Arndal, Kevin
Ashon, S S
Baerns, Gertrude
Becznick, Mary B (MO)
Beckman, Alice
Berglund, Richard (MO)
Bermier, Robert
Bird, Robert M (MO)
Blackhurst, Edward (Dr)
Boning, John
Boy, Donald R (MO)
Braham, Hal
Bream, Warren
Breig, Charles
Brightly, Brian
Brown, James P
Buster, Claudia
Byrne, George (Fr)
Ceccavalli, Eugene
Cary, Gerald
Chamberlain, Martin (Dr)
Christensen, George (Dr)
Christenson, Ralph P (MO)
Clearwater, Helen
Cohn, Jone
Cooke, Arthur R
Conant, William W
Cooper, Alva S
Corrigan, Joseph P
Cote, Charles E
Cowen, Burt
Davies, Richard S
Deering, Dorothy (Dr)
Deshache, Allay (Dr)
Douglas, Frank
Dressler, Robert (Dr)
DuMha, Pierre (MOs)
Duncan Water W
Dunali, Sajid
Farchina, Gianpiero
Fehnberg, Eugene J
Ferino, Gary
Ferretti, John
Flemming, Joel B
Fordyce, Samuel N
Foss, William (Dr)
Freiburg, Jerome

Affiliations

ALMA Institute
United Methodist Board Disciplines
Regional Educational Services Agency
U S Office of Education
National Institute of Education
LEAP
Member of the Board, KIPTF
Self
Appalachian Educational Satellite Project
Merging Medical Center
COMSAT General Corporation
National Library of Medicine
Appalachian Educational Satellite Project
RCA American
Division of Emergency Medical, New General Electric
Consumers Union
Federal Communication Commission
Corporation for Public Broadcasting
GSFG/NASA
Rural Electrification Administration
U S Catholic Conference
American Satellite Corporation
DEA
University of California, San Diego
Iowa State University
Self
American Red Cross
Northern Inc.
NOAA
GSFG/NASA
Department of California Highway Patrol
GSFG/NASA
GSFG/NASA
AID - Consultant
Aeronautical Ford
National Science Foundation
Library of Congress
Operations Research, Inc.
GSFG/NASA
Architects of San Francisco
Office of Chief Engineers
GSFG/NASA
COMSAT General Corporation
Operations Research, Inc.
Operations Research, Inc.
Miami - Dade Community College
Virginia Public Telecommunications Council
NASA Headquarters
National Council of Churches of Christ
NASA Headquarters
Freitag, Joseph
Friman, Elmar
Froehle, Karlheinz
Gentle, Virginia
Gotsick, Priscilla
Graca, Donald J (Dr)
Gray, Donald L
Greenberg, Joel S
Greenhouse, Leon
Griffith, Arthur
Hamilton, Charles
Hartley, William G
Hew, Charles V (MO)
Hutter, Roger
Haman, Steven
Hess, Gary (Dr)
Hillard, Robert
Hinson, Donald
Ho, Patricia
Hogge, Walter
Harley, Albert L
Horowitz, Andrew
Huffer, Mary (Dr)
Hulett, Bill
Hull, Joseph A
Huppe, Howard
Jameison, Richard
Jensky, Donald M
Jones, James R
Jones, Dick
Justice, James V (MO)
Katz, Ruth (Dr)
Kavanaugh, Donald D
Kenne, Barry
Kleiber, John W
Kurland, Jeffrey R
Law, Gordon
Laffoon, Howard
Laveridge, Leo L (MO)
Law, Mary L
Lauer, Bernard J (Dr)
Lebow, Herbert
Mercotte, Ralph P
McCabe, Ronald W
McCoy, Lois
Mercanti, Enrica
Michaelis, James
Miller, Douglas (Rev)
Miller, Bernard P
Miller, John E
Monroe, Keith L
Morris, P. Lee
Morris, Harold E (Dr)
Morton, William B
Mukerji, Rose (Dr)
Nehlsen, Edward
Norwood, Frank W
Oldham, Richard C
Painter, J Earle
Phillips, Antje King
Pike, Neal
Polycron, Kenneth A (Dr)
Potter, James G
Quylo, Donald R
Reams, Elwood H
Redlich, William N (Dr)
Richards, Jane G (Dr)
Riegel, Mason D
Rifman, Marvin H (Dr)
Rogal, Martin
Ruminski, Stanley E
Schlesel, Joseph W
Schlaerth, John
Schwarz, M. Roy (MD)
Sebert, Dean (MD)
Selz, George
Shemaskin, Robert
Shoemaker, Nathan
Silva, Joseph N
Skidmore, Clifford A (Dr)
Stevens, Paul M (Dr)
Sutter, Emmanuel (MO)
Tishler, Sidney
Turkiewicz, Jan W
Vantress, Harry (Dr)
Vitorti, Andrew (Dr)
Vonborn, Friedrich (Dr)
Welp, Robert M.
Weimperis, Jon D (MO)
Wipfen, Harold E (Dr)
Wilson, Ronald L
Wisecarver, Charmane

Miller, John E
Monroe, Keith L
Morris, P. Lee
Morris, Harold E (Dr)
Morton, William B
Mukerji, Rose (Dr)
Nehlsen, Edward
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Wipfen, Harold E (Dr)
Wilson, Ronald L
Wisecarver, Charmane

ECON Incorporated
GSFC/NASA
International Association of Chiefs of Police
Mississippi Authority for ETV
Appalachian Regional Commission
Agricultural Research Service
Self
NETRE Corporation
JET
KCTS-TV - University of Washington
GSFC/NASA
National Association of Neighborhood Health Centers
FCC
FRC, Information Sciences Company
PSFC
Corporation for Public Broadcasting
Office of Emergency Service
GSFC/NASA
Indiana Higher Education Telecommunications System
Department of General Services
Mayor's Office of Telecommunications - Operations Center
National PIRG
ATT - Long Line Department
National Weather Service
National Federation of Community Broadcasters
University of Washington School of Medicine
Baltimore Medical School
Operations Research, Inc.
Veterans Administration - Department of Medicine and Surgery
Rutgers University
Lewis Research Center/NASA
National Environment Satellite Service
Southern Baptist Radio - TV Commission
GSFC/NASA
Association of American Medical Colleges
Maryland Center for Public Broadcasting
GSFC/NASA
COMSAT Corporation
Line
GSFC/NASA
Office of Telecommunications - State of Alaska
Lake View Clinic
National Education Association
EDEG
South Dakota Indian Education Association
ALASKA ATS-6
HEALTH/EDUCATION TELECOMMUNICATIONS
EXPERIMENT

ALASKA EDUCATION EXPERIMENT
FINAL REPORT
EXECUTIVE SUMMARY

September 30, 1975
INTRODUCTION

Alaska is a state of extremes. Fewer than 350,000 people live in 265 communities scattered throughout Alaska's 586,400 square miles. Most of these communities are small and rural. Forty percent have populations of less than 1,000. Most of the smaller villages in Alaska are also remote, two-thirds are not on any connecting highway system. In these isolated areas transportation is limited to air or water travel. In the 65 villages without airstrips transportation is even more limited; when fall freezeup and spring breakup prevent either float or ski-planes from landing on rivers.

Alaska has the most extreme climate of any state in the United States, ranging from southeastern rain forest to desolate Arctic tundra. One-third of the state is north of the Arctic Circle, and winter temperatures can be quite extreme.

Adding to the isolation of the state's rural areas is Alaska's poor communications system. HF radio provides the only communications link in many villages but changing atmospheric conditions make this network unreliable. Telephone service is provided to some rural communities, with much variation in both type, cost and quality of service. Circuits are typically overcrowded, especially in smaller villages having only one telephone for all to share.

AM and FM radio exist primarily in Alaska's larger cities. The six public broadcasting facilities in the state serve 16% of the population. The commercial public military and cable television distribution systems provide service to Alaska's urban areas. Virtually all programming on all systems is video-taped or filmed and played back on a one-week or more delayed basis.

The cultural diversity in Alaska is also extreme. Eskimos, Aleuts and Indians (Athabaskan, Tlingit, Haida and Tsimshian) together comprise 17% of the total state population. Three-fourths of these Native Alaskans live in approximately 175 small rural villages with 25 or more residents. Numerous traditional languages are still spoken in many villages and those who speak one language or dialect cannot always readily understand those who speak another.

Life in Alaska's villages can be hard. Year-round jobs are scarce, incomes are very low and the cost of living is high. Many still rely on food-gathering for subsistence. It is in these small isolated communities that the most serious problems of education and health persist.

Health care is a major problem in Alaska's rural areas. Medical service in most villages is limited to local health aids, working under the direction of a physician from a regional hospital often quite distant from the individual village.

Educational problems in remote areas of Alaska are also severe. Primarily non-Native, English-speaking teachers provide schooling through the sixth grade in most villages. To continue their education village students are required to attend regional boarding schools or move to a larger, more urban community. Many students have almost no frame of reference outside of village life, and find it difficult at best to adjust to more complex urban living.

A wide variety of recent studies have agreed in concluding that a satellite communications system could ideally apply to the complex problems of rural Alaska's isolation. The State of Alaska has seen the ATS-6 satellite experiment as a prime opportunity to explore increased health and educational communications. This experiment
provided the state with its first opportunity for utilizing a prototype operational satellite communications system for the transmission of television and multiple voice channels to low-cost earth stations in rural Alaska.

The sites selected as earth terminals provided the HET experiment with a cross-section of characteristically rural Alaskan problems. Only five are on any existing highway system. Travel to the remaining thirteen is primarily by air or water, weather permitting.

Five of the 10 Athabaskan languages were represented in the satellite footprint as well as Central Yupik Eskimo. Five communities in the footprint have substantial Thlinget-speaking populations. Some English is spoken with varying degrees of proficiency in all the villages included. Fourteen of the 18 experiment communities could be classed as rural villages with an average population of less than 250.

Clearly, the challenge of the ATS-6 HET experiment was a unique one. This demonstration served as a model for services which might be made available on an economically feasible basis in the future and explored the use of advanced communication systems to lessen the negative aspects of living in isolated rural villages of Alaska.

II. OBJECTIVES

The ATS-6 HET experiment provided a unique opportunity for the State of Alaska to achieve its objective of gaining from experience the knowledge necessary to make precedent-setting planning decisions on the development, operation and programming of a future statewide operational satellite system.

The State of Alaska's specific objectives for the ATS-6 HET Alaska Education (ALED) experiment were:

1. To install and operate an experimental satellite system to give the state technical experience from which to plan future statewide satellite communications systems.
2. To provide educators in the state with experience in the development and production of program materials designed to meet the educational needs of rural Alaska.
3. To involve users in all phases of relevant program content selection and development.

The state's objective was not to determine if a satellite could be useful, but how to most effectively use it. Although it was technically possible prior to this experiment to design satellite-based systems to improve communications in Alaska, a better understanding of likely utilization, acceptance and operation requirements was needed before making any statewide investment of the magnitude required.

This experiment allowed the state to gain specific technical experience with the operation and maintenance of earth terminals as well as technical satellite interface. The satellite footprint in Alaska provided an identifiable rural target population for innovative programming experimentation based on identifiable educational needs.
The selection, scheduling, and production of programming provided experience in the process of specified educational program development and the data necessary for determining program requirements and costs.

Alaska's primary interest was not in precisely measuring the instructional efficiency of various programming and dissemination techniques. Rather, the state was exploring effective ways of utilizing the technological resource at hand.

An effective telecommunications system must allow users to generate service requirements and users must have experience with a system before they can accurately define how it can best meet their needs. A consistent objective of this experiment was to provide users with experience in use of a satellite system as well as with the means to express their own priorities among the variety of applications to be made of a telecommunications satellite system for rural Alaska.

By directly involving users as active participants in this experiment development, interactive, real-time communications led to exploration of techniques valuable in reducing the isolation of remote Alaskan communities. The ALED experiment provided Alaska with an opportunity to test these user-suggested techniques on an experimental basis. This allowed modification of programming for improved effectiveness, which in turn stimulated acceptance by involved users and helped determine the suitability of various operational techniques, potential user demand, and operating costs.

XI RECOMMENDATIONS

SYSTEM DESIGN

Based on the state's experience with the ATS-6 satellite system, it is recommended that the Alaska Governor's Office of Telecommunications be represented during the system specification phase of any future satellite operational system design.

The GOT, based on its experimental use of ATS-6, recommends that increased usefulness would be provided if future satellite systems included at least the following technical capabilities:

1. Two video channels with four high-quality phase-related audio channels, each with uplink frequencies usable in Alaska.
2. As many single channel per carrier voice channels as possible, to work between low-cost earth terminals. At least one of the audio channels should be designated solely for system control and coordination.
3. Ability to work with low-cost (10-foot) earth terminals capable of receiving either or both of two television channels and of transmitting and receiving voice on either one of two or more channels.
4. A footprint giving full coverage of the state.
5. Full-time satellite availability for service, including eclipse protection.

SYSTEM OPERATION

For future satellite communications systems, the satellite technical control center, particularly if located outside Alaska, should have a direct means of communication with a network control center located in Alaska. In addition, the Alaska network...
control center should be provided with equipment and personnel necessary to carry out technical and operational monitoring of the system.

SITE SELECTION

Future site selection should include Native regional corporation recommendations and should directly allow all potential sites to make their own decision of whether they wish to participate or not. Since the potential impact of such a system on village life could be quite substantial, all state planning should incorporate a means of villages to consciously and clearly choose to participate.

INSTALLATION

1. Site surveys should be conducted at all terminal locations well ahead of actual installation and final site selection to assess the best possible antenna and receive equipment locations.
2. Equipment procurement for future systems should be performed with maximum lead time possible to allow efficient on-schedule installation accomplishment.
3. Close coordination with both local school authorities and village councils is vital to insure the most practical and useful placement of viewing monitors. It is recommended that a minimum of two monitors be placed in each village, one in the community hall and one in an appropriate school classroom. Maximum use of educational programming could be made with placement of monitors in every classroom.
4. Installation planning must flexibly accommodate to the variable weather conditions in Alaska as well as the accessibility of each individual location.
5. Future communications networks in the state should plan to provide a minimum of 10% additional complete electronics components as replacement spares.

6. In future state networks, the satellite should be available for system testing as each terminal is installed with satellite ground support fully operational as well.

UTILIZATION AND USER INVOLVEMENT

1. For future state satellite programming efforts, the G.O.T. strongly recommends continued utilization of the consumer committee concept to directly involve village users in program design and planning. The committees should remain active throughout the production phase of any future project.
2. Paid trained and supervised utilization aides at each terminal location should be a continuing component of all future communication networks in the state.
3. Two-way audio interaction should remain an option of future systems.
4. Village participant selection should be coordinated through village councils or Native regional corporations.
5. In coordinating with Native regional corporations, it is recommended that requests be made for counselors or trainers, people that work at the "grass roots" level, to act as corporation representatives.
6. Maximum use of all fixed-time educational broadcasts could be made by rural teachers if VTR equipment was available at all sites for recording programs.
7. Program scheduling should allow repeat program broadcasts if more than one hour difference in time zones exists among receiving sites.
8. With well-trained and informed utilization aides and teachers in each receiving site, the utilization of a future satellite network could provide a cost-effective means for providing a wide variety of state agency training programs directly to Alaskan rural residents.
RECOMMENDATIONS

PROGRAMMING

1. To acquire needed expertise in instructional media presentation, it is recommended that educational program design for future broadcast systems be performed by an experienced educational planning agency under contract to project management.

2. Design of educational programming should also involve close and consistent coordination with the rural educators who will be receiving the programs.

3. Prior to program broadcast start, a clearly outlined plan of field testing viewer reactions to all programs should be implemented.

4. Programming that offers simultaneous Native translations during broadcast should be utilized in future systems, providing translations of all program material not only segments.

5. Future program planning should be approached imaginatively and not be limited to the standard concepts of television program presentation.

PROJECT MANAGEMENT

1. GOM strongly recommends that future satellite program funding be finalized for all programs a minimum of six months prior to broadcast start and that all commitments with funding agencies be made in writing at all times.

2. Management of future program development should include frequent coordination meetings between program designers, scriptwriters, and producers, particularly during development and initial production phases.

3. To facilitate program development, producers should be funded for coordination input with designers at the start of program design. For adequate preparation time prior to production, the production contract should be finalized a minimum of

nine months (preferably 12) prior to scheduled broadcast start.

4. Production of programs for future systems should include technical training for Alaska Natives.

5. Coordination of the utilization of educational programming should be established between future project management and a central state education agency (such as the Alaska DOE or ASOSS).

6. An active and consistent public information effort is essential to encourage user participation in any future satellite communications network.

7. Management for future satellite programming systems throughout Alaska should include a communications advisory board consisting of Native leaders, educators from DOE, ASOSS, and BIA.

8. Evaluation efforts for subsequent projects should approach with care the selection of personnel involved in village visits and evaluation of village reactions.
XII SUMMARY

The ATS-6 ALED project was a unique experiment—a first opportunity for the State of Alaska to gain the experience of operating a satellite programming network. The experiment provided a first-hand demonstration of the practicality of media technology in meeting the communications needs imposed by Alaska's rugged terrain, harsh climate and sparse population.

The experiment was a model for gauging the appropriateness of using satellite communications for instructional purposes and for developing programming content specifically designed to be relevant to the needs of rural Alaskan residents—both student and adult. It further demonstrated the potential importance of satellite television programming in supplementing and supporting the instructional resources of Alaska's rural classroom teachers.

As a result of this experiment, GOT gained experience in a wide variety of areas directly relevant to the planning of a future statewide operational satellite network.

Earth terminal equipment was installed by GOT in 19 widely scattered communities throughout the state. Over 1,000 miles separates the northernmost experiment site, Allakaket, with Craig, the southernmost community in the ALED footprint. The problems encountered in installation due to the isolation of site communities, limited transportation and variable weather conditions provided valuable input for future communication systems installation planning. None of the 25 S-band antennas in use failed during the project despite weather conditions and none were damaged. Temperatures to -60 degrees F did not impair receive terminal operation and only one equipment failure was directly attributable to colder weather. Antenna installation in several communities required special preparation due to ground conditions and winter snow accumulation.

Fourteen terminal sites were rural Alaskan villages with an average population of less than 250. Alaska's ATS-6 ALED footprint included villages with substantial populations speaking in addition to English, Central Yupik, Eskimo, Thlinget and five Athabaskan dialects. The experiment presented GOT with the challenge of coordinating input from the culturally diverse footprint population in designing and producing culturally relevant programming. All community participants were selected by their own communities or one of the four Native regional corporations represented within the footprint. Utilization of ALED programming was further coordinated with local schools and village councils as well as through the 15 aides hired and trained in the operation of all site terminal equipment.

This experiment also involved GOT in coordinated working relationships with other state agencies in developing programs for distribution over ATS-6. Instructional programming subject areas were based on the Alaska Department of Education's priority of needs for Alaska rural children and the Department of Education provided continuing input throughout the project. Experiments of Opportunity program development directly involved the Alaska Department of Community and Regional Affairs, the Alaska State Library and the Alaska Department of Fish and Game.

Instructional Programming design was accomplished for GOT by a contracted professional educational design agency with continuing guidance from two 10-member committees of Alaskan program consumers. All programs were produced for GOT by an Alaskan professional television production facility.

In less than one full year of planning, 100 hours of original television programs...
were designed and production and broadcast began. Instructional programs were available to 1200 rural school children (K-5th grade) and 150 rural Alaskan educators. Viewer-Defined Programming was accessible to 9000 Alaskan village residents young and old, as well as to the 50,000 urban residents of Fairbanks.

The ALED project gave GOL a first-time experience in the operation of an interactive satellite communication system, providing an innovative and direct means of viewer feedback. Another unique feature of the project was the experimentation with simultaneous broadcasts in English and two Alaskan Native languages.

The technical interface required with NASA and NCC provided GOL with useful experience in the day-to-day coordination and scheduling of real-time satellite broadcasting. The operation of the system resulted in specific technical recommendations for future system equipment design and capabilities.

The ATS-6 ALED experiment was a model learning experience for the state. Both the successes and the mistakes of this experiment were valuable to the continued sophistication of Alaska's development of the most practical, useful and effective future operational satellite system for the state.

A full external evaluation of this project is being prepared for NIE by Practical Concepts Inc. with assistance from the Center for Northern Educational Research. In GOL's view, one of the most important aspects of this experiment has been the consumer input and reaction during all phases of development. In spite of difficulties encountered and the short time span of this project, site participants have expressed the hope that the project could continue and expand.

In behalf of the school board, we would like another ATS-6 project to continue next year. The school children really enjoy the program and they also like to communicate on the satellite.

---School Board Chairman Nikolai

I'm going out to get some signatures on a petition that we keep ATS-6 in McGrath next year.

---Utilization Aide McGrath

The satellite TV reaches many in a way that radio and regular TV could not. And we of Valdez are glad that we are part of the whole program.

---Utilization Aide Valdez

We sure would like to have another ATS-6 project next year. The school children have more interest in school now. They look forward to watching TV. They really enjoy it and it's very educational.

---Village council President Nikolai

It has been very rewarding to see the very positive and beneficial results (of the Health Education series). If extended and expanded, the ATS-6 project could change the educational face of Alaska and broaden the educational concepts of the entire nation. I feel confident this concern is shared by the teachers and students of rural Alaska as well.

---Chairman Health Education consumer committee

The potentials for satellite communications in Alaska are beginning to be discovered by planners and users alike.
EXECUTIVE SUMMARY

This document summarizes the final report of the evaluation of the Applications Technology Satellite-Six (ATS-6) Biomedical Demonstration in Alaska, one of several Health-Education-Telecommunications (HET) demonstrations on that satellite sponsored by the US Department of Health, Education, and Welfare. The biomedical demonstration in Alaska was jointly sponsored by the Indian Health Service and the Lister Hill National Center for Biomedical Communication. The evaluation was conducted by the Institute for Communication Research at Stanford University, under contract to the Lister Hill Center.

The primary purpose of the demonstration project was to explore the potential of satellite video consultation to improve the quality of rural health care in Alaska. As part of the project, a centralized, computer-based, problem-oriented medical record system was introduced. The demonstration was conducted in the Tanana Service Unit of the Alaska Area Native Health Service.

Satellite ground stations permitting both transmission and reception of black and white television were installed at four locations in the Tanana Service Unit — Fairbanks, Fort Yukon, Galena, and Tanana. Receive-only television capability was installed at the Alaska Native Medical Center in Anchorage. All five sites had two-way audio capability. The Fairbanks Native Clinic did not participate in the demonstration because of staff shortages at the clinic and because specialist consultants were available in Fairbanks, making teleconsultation capability less relevant to the needs of Fairbanks patients.

Two of the locations were in communities without a resident physician — Fort Yukon and Galena. In most of the consultation, patients at these two remote sites were seen by physicians at the Service Unit Hospital at Tanana or by medical specialists at

...
Anchorage. In some consultations, patients at the Tanana Hospital were seen by specialists in Anchorage. Simultaneous two-way video capability was not available, although the one-way video could be switched to permit transmission from any site except Anchorage. Transmission from the hospital to the remote clinic was used primarily for educational programs.

The results of this evaluation should be interpreted in context. The demonstration was an exploratory field trial, not a rigorous experiment. A relatively small patient population was served and the communities involved are not completely typical of other settings, even in Alaska. The availability of the satellite limited the demonstration to a fixed schedule of three hours per week for a period of nine months. There were concurrent changes in the health care system and the social environment that might distort or obscure the effects of the video consultation service. These constraints complicated the conduct of the demonstration and its evaluation, they should also guide interpretation of the results. Despite the limitations, much valuable information about the difficulties and advantages of video teleconsultation and its possible implementation in Alaska was gained. Introduction of the tele-medicine service into the realistic setting of an on-going health care delivery system in Alaska permitted valuable experience to be gained that would not have been possible in a more tightly controlled experiment in a different setting.

CONCLUSIONS

1. Satellite communication using small ground stations for audio and black and white television transmission can reliably provide signals of sufficient quality to be useful in the health care delivery system in rural Alaska.

The quality of signal obtained in this demonstration was suitable for the great majority of medical cases encountered. The basic satellite equipment, while complex, is not too sensitive for operational use by non-technicians even under demanding environmental conditions, provided that adequate arrangements are made for technical maintenance and repair. Equipment down-time in this demonstration was primarily due to the length of time taken to diagnose and repair equipment problems rather than to persistent malfunctions in an operational setting the larger scale, greater experience, and unambiguous locus of responsibility for maintenance would avoid some of the equipment problems that occurred in this limited-duration small-scale first-time demonstration.

2. Useful consultations for practically any medical problem can be conducted using satellite video channels.

During 104 scheduled transmission days, approximately 125 video consultations were conducted. The range of diagnoses was very wide and included "sensitive" health problems such as gynecologic problems that one might expect to be omitted from video consultations. The patients came from every age bracket and practically every community in the Tanana Service Unit. More than 75% of the cases occurred in five categories: follow-up visits, accidents, musculoskeletal problems, skin problems, and infectious or parasitic diseases. The system was also used for transmission of X-rays and EKGs from remote sites and for transmission of educational material from the Tanana Hospital. Most of the consultations were for evaluation of minor problems, but 13% were judged "moderately severe" by the physicians. Relatively few critical or emergency cases were involved, probably because emergencies cannot wait for scheduled transmission times. A system with 24-hour-a-day, seven-day-a-week capability would be likely to have a different pattern of use.

3. Satellite video consultation can be successfully carried out by health care providers at all levels of training.
Village health aides from Galena, Huslia, Nulato, and Venetie were able to present their patients without difficulty over ATS-6 from Fort Yukon and Galena. A nurse and nurse also used the system for successful consultations with primary care physicians in Tanana and medical specialists in Anchorage. Physicians in Tanana made use of the system to present patients to Anchorage for specialist consultation

4 The unique capabilities of the video transmission may play a critical role in five to ten percent of the cases selected for video presentation. Otherwise, there was little measurable difference between the effect of video and audio consultation.

Cases selected for television were slightly more complex or severe than those discussed over audio channels. The kinds of cases that are difficult to handle over video are also difficult to handle with audio-only consults. Video consultations took longer (12 to 15 minutes) than audio consultations (3 to 6 minutes). The initial diagnosis is changed by the consulting physician after the video consultation more often than following audio consult, but this difference appears to result solely from fewer "routine" cases being presented for video consultation. The level of change in management plan is the same for video as for audio consultations.

The consultant physicians recorded their best judgment of the probable effect that each consultation would have on the medical outcome for the patient. These ratings indicate that about half of all the consultations via any medium should have a more than symptomatic effect on the medical outcome for the patient. However, these ratings show no difference between telephone, satellite audio, and satellite video consultations on the patient's expected eventual health status. A physician observer judged that the visual information may play a critical role in about five percent to ten percent of the cases selected for video consultation

5 The health care providers involved in the demonstration generally felt that the video consultations improved the capabilities of the health care system, but questioned whether the improvement was worth the additional cost or inconvenience. They placed much stronger emphasis on implementation of reliable operational audio-only channels which they consider absolutely essential to delivery of health care in rural Alaska.

The health care providers felt that the benefits of reliable voice communication compared to the previous absence of any reliable communication were so great that the additional benefits of video appeared small by comparison. Most communities in the Tanana Service Unit have neither roads nor telephones, their only reliable means of communication is the experimental ATS-1 satellite, which is long past its life expectancy and is without a back-up in the event of failure. Termination of that capability through technical failure or administrative decision would be a major set-back for health care delivery in the Tanana region. (At the outset of the demonstration, some of the native leaders were reluctant to have their communities involved in a nine-month demonstration that provided little possibility of continued service. They agreed to support the ATS-6 demonstration in part because it would continue to focus attention on the need for reliable voice communication.)

6 The Health Information System (HIS) was judged by all participants in the demonstration to be a valuable addition to the health care delivery system that should be continued in the Tanana Service Unit and extended to other parts of the State.

The computerized problem-oriented medical record system with revised medical forms and paper and microfiche output was universally judged to be a significant improvement in the quality of health care delivery in the Tanana Service Unit.

The providers saw the format and structure provided by the input forms, the organization of the patient summaries, and the
availability of records from other locations as major advantages of the new system. They felt that bi-weekly updates of their copies of patient summaries were sufficiently frequent for most outpatient care.

**RECOMMENDATIONS**

The full report concludes with a chapter titled, "Implications for Operational Service and Future Research." It reports technical possibilities and cost estimates for possible future operational systems, so that policy makers can review for themselves both the potential benefits and the probable costs of possible next steps.

The most promising areas for future research are also discussed in the light of these technical, cost, and research considerations. Nine major and fourteen minor recommendations are made in that chapter.

The nine major recommendations are:

**Recommendation 1** The Indian Health Service should continue to assign top priority to implementing reliable operational voice communication reaching all communities in Alaska.

**Recommendation 2** The Health Information System (HIS) should be maintained on a permanent basis in the Tanana Service Unit and should be expanded as rapidly as possible to the rest of Alaska.

**Recommendation 3** The Indian Health Service should begin field tests of slow-scan video, medical telemetry, facsimile, and data transmission techniques using voice grade (narrow-band) channels.

**Recommendation 4** Because operational two-way motion video services throughout Alaska are currently neither technically nor economically feasible, such services should not be considered by the Indian Health Service at this time. Information useful for planning possible future services could be obtained from an experimental video linkage permitting medical specialists at Anchorage to view patients at Bethel.

**Recommendation 5** The Indian Health Service should work closely with other agencies and organizations sharing common interests and objectives in planning satellite communication systems for health service delivery, including the Public Service Satellite Consortium. This activity should include the preparation of technical plans and cost projections associated with different possible uses of video ranging from limited experimentation to full-scale statewide implementation of one-way video transmission (for education programs) and two-way video linking most Alaska locations for operational video telemedicine services.

**Recommendation 6** Health care planners outside Alaska should seriously consider health care delivery systems in which the primary provider is both geographically and culturally close to the client population, using communication technology to obtain consultation from physicians. The favorable results in Alaska deserve to be copied elsewhere.

**Recommendation 7** The Lister Hill National Center for Biomedical Communication and the Indian Health Service should encourage or support research and development activities leading to improved-capability and reduced-cost terminals for multi-function and time-shared use of audio channels.

**Recommendation 8** The Lister Hill National Center for Biomedical Communication and the Indian Health Service should encourage or support research and development leading toward time-sharing and bandwidth-sharing techniques for more efficient use of audio and video channel capacity.

**Recommendation 9** Technical research and development activities intended to improve the quality of health care should, like this AT6-6 project, have close contact with the physical, social, and human environments in which any resulting innovations are intended to be located.
The Veterans Administration Experiment With the Applications Technology Satellite-6: Final Report

Submitted by The Foundation for Applied Communications Technology.
The Veterans Administration Experiments in Health Communications on the Applications Technology Satellite (ATS-6)

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Abstract

The Veterans Administrations Experiments in Health Communications with the Applications Technology Satellite-6

Many of the hospitals in the Veterans Administration system are located great distances from medical teaching facilities. To reach these hospitals with participatory educational programs and consultation acces by traditional communications methodology such as terrestrial facsimile or by traveling specialists is costly and difficult. High powered communications satellites can potentially overcome these goals via communicating wide and narrow bandwidth signals to low cost receivers.

The Veterans Administration elected to become an experimental user of NASA's non-commercial Applications Technology Satellite if field test the use of a commercial satellite system directed to diagnostic therapeutic and educational purposes. The hospitals selected to participate in the experiment were located in the Appalachian Region were of three regions selected for experimentation on ATS-6 due to geographic isolation. The hospitals participated were comprised of physicians nurses and other health professionals.

The four events tested were video seminaries, teleconferences, grand rounds, and patient clinics program directed to patients and computers mediated events. Video seminars which included preproduced software were the most well received in the events in terms of audience view and usability according to questionnaires returned by participants. However, all four events met to some extent the objectives of presenting in an easily clear and audible two way communication by satellite providing useful information in an interesting format which might result in better patient care in the receiving hospitals. The Stanford based evaluation conducted for the experiments indicated that the satellite broadcasts had altered the attitudes of the ten hospitals so that the professionals practicing there were more receptive to new information.

Communications by satellite are likely to be of great usefulness to the Veterans Administration in overcoming the educational and clinical isolation of many hospitals within the vast ASP facility system. To be of lasting value however, the satellite would have to be high powered (to be received at low-cost antennas) with longer life expectancy (seven years or more) and available continuously at a relatively low hourly cost.
Section I: The Problem

The Veterans Administration operates the largest health care delivery system in the western world. It includes some 171 hospitals and 212 out-patient clinics, many of which are located in geographically isolated areas of the United States. Space and geography have created complexity and isolation as the two greatest challenges confronting VA. Moreover, constraints on patient care in its own facilities have led to a reliance on telecommunication systems for information exchange with non-VA medical centers.

In 1969, the Department of Defense (DOD) established the joint military telecommunication system (JMTS), a national wide communication system. The VA, which has its own telecommunications network, was interested in participating in JMTS.

During the same period, the VA had established its own telecommunication network, which was used to support all VA facilities. The VA's network was based on public switched telephone network (PSTN) technology and was used for voice and data communication.

The VA also operated its own satellite communication system, which was used for emergency communications. However, the VA was interested in a satellite-based communication system that could support telemedicine applications.

The VA's interest in telemedicine was driven by the need to improve access to medical care for veterans in remote areas. The VA was interested in developing a telemedicine system that could be used to provide medical care to veterans in remote areas, as well as to improve access to medical care for veterans in urban areas.

The VA's interest in telemedicine was driven by the need to improve access to medical care for veterans in remote areas. The VA was interested in developing a telemedicine system that could be used to provide medical care to veterans in remote areas, as well as to improve access to medical care for veterans in urban areas.
Appalachian region on the basis that it was needed for national security. Experimenters had chosen the situation of building new receivers and the frequency range 4.6 to 4.74 to match the signals sent from Atlanta that would be received somewhere in Canada but not in the southern portion of Appalachia. As the signals comprised large earth stations that have their own frequencies, the satellite was equipped to receive the experiments in Appalachia chosen the latter alternative.

A. Selection of earth station

The experiments with stations were located in Durham, North Carolina, Denver, Colorado and the Houston, Texas. The main parameter considered when choosing a location was the difference in propagation delay to the satellite. The soil and type of communication equipment would be used to be on the ground as well as the Houston earth station. This test appeared to be an efficient way to make the satellite. When it was decided that the equipment was working properly, they were as high as that by comparison it was less expensive to acquire programming and all the important satellite facilities was the availability of the VA experiments might also work in conjunction with the satellite's facilities, where the experiments would then be transmitted to the earth station and then to the wire.

B. Simulation of two-way interaction

The important aspect of the new experiment was which the satellite was supposed to have. We knew that the experiments were supposed to be considered with awakened frequencies. The two-way aspect was considered important even though it wasn't actually carried by the satellite because it was not thought that future satellites will have the capability of transmitting two-way information and other signals. A capability that will appear to be of particular importance in the future, Administration National telephone lines could send very small signals on a continuous basis. Because of the one-way line, the satellite was intended to have only one way to access to the same. The five telephones were placed geographically into two roughly similar groups and then the test.

The plan was to ask the five hospitals each to call to each other in turn and try to make conversations during the broadcast period.

The radio phone to the telephone was thought of as of great importance during two-way communication between physicians to nurse and patients. It was considered important that the other signals were not immediately used to these conversations. Some method had to be devised for sending visual signals from the hospitals to the studio where visual transmissions would be based. It was decided to use new voice transmission, capability of sending visual information over a line by voice transmission to a telephone receiver.

C. Simulation of hospital broadcasts

Another important potential use of this experiment was to allow hospital personnel to communicate as opposed to usual broadcasts. Potentially satellites will make hospitals to send in house programming, as well as individual messages to

hospitals and medical teaching centers. To simulate the aspect of satellite technology, the receiver was made to incorporate the mobile unit originally planned to be on location instead of sending signals via the satellite. It was not possible to equip the satellite and the mobile unit would be engaged to make messages which could be sent to the hospital facility in time for broadcast and with a view such as the situation for sending visual information the day of broadcast.

2. Experimental Control

As in the case of most adult educational programs, it was decided to update the program and the contents that would allow knowledge gain so that one could assess the effects of the program. In certain cases, broadcast over different periods during the broadcast period there were other terms of an equal, educational, and on set training in each hospital. Staff members in participating hospitals were transported to other VA or civilian hospitals where incumbent were in during the experimental period. In further experimental on multisite techniques on the program as a sound installation on halts of VA hospitals and radio stations for the experiments.

Furthermore, the hospital's selected to be experimental for the project were not selected on a random basis. For practical and technical reasons, they were selected on the following basis.

A. There were more than 5,000 images that could be transmitted from the satellite.

B. They were relatively remote from a major radio area in many respects.

C. They had large hospital bed general of general and medical surgical patients such that one solution. Solutions for the early multicommunity centers which led to participation in order to extend the scope of the program's impact on the patients.

D. They had participated in experimental treatment of radio telephone, satellite, and other equipment.

E. They had participated in experimental treatment of radio telephone, satellite, and other equipment.

The section of this report will discuss the experiments designed for the VA's program from how they were a comprehensive look at the experience.
Section II: The Experiment

The communications satellites created during NASA's Applications Technology Satellite program were much like the telephone or television in that the technology appeared before most people realized they had a need for it. In the case of the Veterans Administration, however, since the capabilities of the ATS-6 became known a number of units for the satellite became obvious. It seemed advantageous to test the satellite for these uses in a limited number of hospitals for potential use throughout the VA health system.

The experimental events subsequently designed for the VA validation of the satellite had been tried in other forms and in traditional contexts with varying success. Although there would be subtle changes from the VA/ATS-6 experiment such as an emphasis on high quality production of programs, the most significant variable to be tested was the satellite itself. Designers and manufacturers of the ATS-6 claimed that it would deliver television pictures more clearly than could be received on home sets and a signal that would not be affected by weather or terrain. The claims were potential however until someone attempted to broadcast or test the VA system.

Testing and validating the ATS-6 was an important conclusion to NASA's Applications Technology Satellite program. The program had resulted in technology that inevitably could provide many kinds of communications, including television directly to schools, hospitals and other institutions—eventually to homes—through existing coverage. However, the technology had yet to reach potential applications and NASA was offering experiments in opportunity for those interested in those applications. Then if the satellite was all it was purported to be and if transmitting many types of communications signals as commercial value would result in future manufacture of these communications satellites, but they would be underwritten by private enterprise rather than by the Federal Government.

COMMUNICATIONS BY SATELLITE

Important to the VA is its decision to become an experimental partner with the ATS-6 were the results of past experience of others with previously launched satellites in NASA's ATS series.

Background of ATS Program

The first Applications Technology Satellite launched was ATS-6 in December 1966. A number of special television programs were rebroadcast by ATS-6, including ten hours of Canada's Type B2 to Australia. Most relevant to the VA however was the medical communications. A Alaska ATS-6 provided a two way radio channel between native health aids in remote Alaska villages and a Public Health Service doctor at the Alaska Native Medical Center in Anchorage. Traditional communications in this area to high frequency radio has been unreliable and the system by satellite provided a service heavily relied upon by the Alaskan patients.

ATS-2 was launched in 1967. A failure in the fuel supply system of the ATS-2 rocket caused the launch attempt to occur in an elliptical orbit. The ATS-2 jettisoned and reentered the earth's atmosphere on September 2, 1967 and was destroyed.

ATS-3 was launched in 1967. It was significant because it was the first space to space-telecommunication satellite using the Attacom. A demonstration of which took place on November 21, 1967. It also transmitted the first color television signal of the earth from space and was used for high-to-low communications for the management of shipping lanes.

ATS-4 launched in 1968 by a Centaur missile was a 100 by 400 mile orbit. It was the Centaur's second mission and the weapon did not occur. ATS-4 re-launched the earth satellite in 1972.

ATS-5 launched in 1969 was used for range tests specifically the earth's horizon to determine lines of position of ships. ATS-5 has also been used for telegraph transmission and communication propagation tests, and other tests involving aircraft.

ATS-6 Potential

ATS-6 was the most complex and powerful communications satellite ever launched. The more powerful the satellite the less expensive the ground receive can be and the goal was to provide high powered signals in a small number of small retransmission stations located over large areas of the earth.

Such satellites could be highly useful in a system as widespread and complex as the Veterans Administration. Once the satellite had been designed and launched communications between two-way satellite to transmission of people could be cost effective as compared to traditional communications. To be an example an ATS-6 would test the feasibility of such a satellite communications system for the VA and to test the feasibility of such a satellite communications system for the VA and to demonstrate the potential.

THE VA/ATS-6 EXPERIMENTAL EVENTS

The Veterans Administration experiments on ATS-6 were to be based upon two general communications requirements:

A. The need for access to special programs, and
B. The need for continuing education that incorporates learner participation.

A two-way linkage was implicit in both of these requirements. Practical experience with the Medical Media Network supplying visualized programs to VA hospitals had produced evidence of the efficiency of two-way linkages needed. In a study undertaken to identify informational needs of the Appalachian medical community needs that might be met using the ATS-5 Singh and Morgan state that:

One of the major problems with physicians, para professionals and patients in the Appalachian region remains the difficulty in maintaining contact with professional developments. There are also problems related to the skill training of para professionals which the physician cannot afford to send a receipt away for informational purposes. However, physicians in the region are not sure if the program can be of real help in the region.

The report goes on to suggest tele-laboratories computer assisted instruction and tele-conferencing as methodologies for solving these problems.

Active participation during the presentation of continuing education programs is an important ingredient of most specialties in the field of medical education. It has shown that only a few select principles, in answering questions resulting from a video-taped program lead to a decreased attendance. The tele-conference is of special interest and therefore the learning interchanges between learner participants and the program is of major interest.

Based upon the VA's communication requirements, there is one experience and the research evidence the principal of the Foundations for Applied Communications Technology (FACT) designed in low experiment for training on ATS-6.
The use of the Москва experiment could be considered as a tool for measuring the effectiveness of the program. In both experiments, the number of participants was small, and the results are not generalizable. However, the Moscow study could be replicated with a larger sample size to provide more robust results.

The Moscow study also suggested that the use of video seminars as an educational tool could be beneficial. Video seminars allow for the delivery of content in a more interactive and engaging format, which may lead to better retention and understanding of the material. The Moscow study found that participants who watched video seminars had a higher retention rate of knowledge compared to those who did not.

In conclusion, while the Moscow study is limited in scope and sample size, it provides valuable insights into the potential benefits of using video seminars as an educational tool. Further research with a larger sample size and more rigorous methodology is needed to confirm these findings and explore the potential applications of video seminars in various educational contexts.
unable to detect and transmit small changes in image density in the whole area of the prostate. All lesions could be interpreted directly but could not be transmitted without artifact. Also, the television screen was limited to black and white or color fields. This limited the use of color television systems.

The telemedical system was used to provide diagnostic services to patients in the participating hospital. The system allowed for the transmission of images and audio. In addition, the system could be used for educational purposes. The system was designed to be flexible and could be adapted to different situations.

5. COMPUTERIZED EVENTS

The computer-assisted instruction was sent via facsimile to the requesting doctor. The doctors could review the images and audio files at their leisure. This allowed them to make informed decisions without having to be physically present at the hospital. The system was also used to provide education to medical professionals. The system was designed to be user-friendly and could be accessed by medical professionals at any time.

VIACOMputerized Patient Self-Assessment

The computerized patient self-assessment program was used to evaluate the patient's status. The program was designed to be simple and easy to use. The patient was asked questions about their symptoms and the program would provide feedback. The program was also designed to be confidential and would not be shared with the doctors unless the patient requested it. The program was used to improve the accuracy of diagnosis and treatment.

VIACOMputerized Clinical Decision Making

The computerized clinical decision making system was used to assist doctors in making decisions. The system was designed to be flexible and could be adapted to different situations. The system was also used to provide education to medical professionals. The system was designed to be user-friendly and could be accessed by medical professionals at any time. The system was also used to improve the accuracy of diagnosis and treatment.

VIACOMputerized Audio Visual Presentations

The computerized audio visual presentations were used to provide educational material to the doctors. The presentations were designed to be simple and easy to use. The doctors could access the presentations at any time and could review the material at their leisure. The presentations were also designed to be confidential and would not be shared with the doctors unless the patient requested it. The presentations were used to improve the accuracy of diagnosis and treatment.
SUMMARY

In planning these five experimental events, the designers realized that the human factor would be just as vital as the technology. The ways in which different individuals influenced the experiment from institution of equipment through production and their response to changes in events could not have been predicted. What actually took place from the design stage of the experimental events through 44 two-hour broadcasts of programs will be described in the next section. The Procedure.
Section III:
The Procedure

The principal goal of the VA project on ATS-6 was to conduct an experiment to test the feasibility of using the Affordable Remote Care (ARC) system to deliver health care services to remote areas. The project was designed to evaluate the effectiveness of the system in reducing the number of unnecessary hospitalizations and improving the quality of care provided to patients.

STAGE I: ORGANIZATION AND NEEDS ASSESSMENT

The first stage of the project was focused on organizing the research effort and assessing the needs of the target population. This stage was divided into two phases:

1. The National Aeronautics and Space Administration (NASA)
   - The project was initiated by NASA, which provided the necessary funding and technical support.
   - The agency worked closely with VA hospitals to identify the need for the experiment.

2. National Medical Auditory Center (NMAC)
   - The NMAC provided the necessary technical expertise and support for the experiment.
   - The center worked closely with VA hospitals to identify the need for the experiment.

STAGE II: PREPRODUCTION

The second stage of the project was focused on preproduction activities, including the development of the experiment design and the selection of participants.

1. The Federation of Rocky Mountain States (FRMS)
   - The FRMS provided the necessary technical expertise and support for the experiment.
   - The center worked closely with VA hospitals to identify the need for the experiment.

2. Applied Communications Research (ACR)
   - A group of communications researchers provided the necessary technical expertise and support for the experiment.
   - The center worked closely with VA hospitals to identify the need for the experiment.

3. Appalachian Regional Commission (ARC)
   - The project was funded by the Appalachian Regional Commission, which provided the necessary funding and technical support.
   - The agency worked closely with VA hospitals to identify the need for the experiment.

4. Board of Directors Foundation for Applied Telecommunications (FAC)
   - The project was funded by the Foundation for Applied Telecommunications, which provided the necessary funding and technical support.
   - The agency worked closely with VA hospitals to identify the need for the experiment.

5. Experiment Coordination Committee (ECC)
   - The project was coordinated by the Experiment Coordination Committee, which provided the necessary funding and technical support.
   - The agency worked closely with VA hospitals to identify the need for the experiment.
and those were unknown quantities. The equipment was reviewed at the University of Colorado Medical Center and a physician-monitor was discovered who had all of the necessary attributes. An Associate Professor of Medicine and a hematologist he was asked to become the community host/moderator of settings arrangements with the University of Colorado which were eventually agreed upon as specifications for all parties. A nurse monitor moderator also was recruited. One nurse who had background working on a VA coronary care unit as well as other specialized training was asked to make a videotape test along with other candidates. She was retained as a nurse moderator based upon an agreement with the Veterans Hospital in Denver where she was an employee. Another key professional the production assistant was hired prior to the first broadcast but was replaced soon after the broadcast began.

An engineer was hired to travel with the mobile unit that would be used to videotape or film the preproduction material. This arrangement did not work well and the engineer left the project. A second contractor was contracted to work with the mobile unit during the teleconference events.

To find an individual with the necessary skills and resources to take on this responsibility required nearly a year. The project coordinator selected an evaluation plan development and the new design was a videophone, one of the subjects assigned to the video seminar was never again used. The selection of the experiment was selected in January 1974 on the basis of the resulting videotapes. The project director had been retained a second time for program evaluation a physician and a nurse could begin to learn what the potential modalities in instructional settings were after reviewing at the University of Colorado Medical Center and a physician-monitor was discovered who had all of the necessary attributes. An Associate Professor of Medicine and a hematologist he was asked to become the community host/moderator of settings arrangements with the University of Colorado which were eventually agreed upon as specifications for all parties. A nurse monitor moderator also was recruited. One nurse who had background working on a VA coronary care unit as well as other specialized training was asked to make a videotape test along with other candidates. She was retained as a nurse moderator based upon an agreement with the Veterans Hospital in Denver where she was an employee. Another key professional the production assistant was hired prior to the first broadcast but was replaced soon after the broadcast began.

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The hospital coordinators with their various assignments from engineering and data collection public information had the responsibility to continue the work of the study. A period of time (presumably that the interviewers were scattered from 68 individuals) was evaluated for the telephone interviews. The telephone modalities had been used with the assistance of key staff members. The recruitment and hiring of these individuals was not an easy task and the project was gearing up for the production phases.

The director of experimental design was the first professional staff member to be recruited. She participated in the early planning and provided input on the selection and assessment and working with the project coordinator in designing the experiment. The project coordinator and the media event maters were responsible for the evaluation of the program.

The production director who would have the responsibility of coordinating the elements of each study phase to include the preproduction personnel, live lectures and two-way exchanges with the hospitals and then directing and coordinating all of the technical aspects of the experiment. To be both important background for the producer-director who was to be an amazingly important role in making a list of objectives interesting informative television were presented in most cases in the front stage guides which were experimental for this experimental event.

Objectives for the residents were limited to the acquisition of knowledge and whatever subjective responses the evaluation group would be solicited by the project coordinator and the evaluation team would be able to gather following the teleconference events. The objectives for this section of the experiment were limited to the acquisition of knowledge and whatever subjective responses the evaluators were able to gather following the teleconference events. The objectives for the teleconference included evaluation and engineering objectives including whether or not the slow scan transmissions were technically clear and whatever subjective responses the evaluators were able to gather following the teleconference events. The computer and VIDAC would be evaluated for technical results whether or not signals were transmitted clearly via satellite and for factors inherent to the material transmitted.
Videocassette recorders are being used in various hospitals to provide instant access to visual information. These devices are being used to provide a permanent record of inpatient care, to facilitate education for both patients and staff, and to provide a means of communication between hospital and home. The advantages of this system include its ability to store large amounts of information, its flexibility in terms of access, and its potential for use in both medical and non-medical settings. The disadvantages include the cost of the equipment, the need for training staff in its use, and the potential for misuse of the information stored.
TABLE I
VA/AT5-6 SATELLITE EXPERIMENT
PROGRAMS BROADCAST 7/10/74 through 5/20/75

<table>
<thead>
<tr>
<th>Date</th>
<th>Program Title</th>
<th>Participants</th>
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<tr>
<td>7/16</td>
<td>40,000 Country Men</td>
<td>David E. Caldwell</td>
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<tr>
<td></td>
<td>Open Discussion</td>
<td>Peggy Mathis</td>
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<tr>
<td></td>
<td></td>
<td>Roger Hamura</td>
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<tr>
<td></td>
<td></td>
<td>John DeHaan M.D</td>
</tr>
<tr>
<td>7/10</td>
<td>Anemia</td>
<td>Roger Hamura</td>
</tr>
<tr>
<td></td>
<td>Video Seminar—M D</td>
<td>Stephen Walker M.D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peggy Mathis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Robert B. Stannickson</td>
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<tr>
<td>7/17</td>
<td>Problem-Oriented Medical Record</td>
<td>Roger Hamura</td>
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<tr>
<td></td>
<td>Video Seminar—All disciplines</td>
<td>James Crumpler M.D</td>
</tr>
<tr>
<td></td>
<td>Two-Hour Program</td>
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<tr>
<td>7/24</td>
<td>Acute Upper G I Bleeding—M D</td>
<td>Roger Hamura</td>
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<tr>
<td></td>
<td>Grand Rounds—M D</td>
<td>Edward Berk M.D</td>
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<tr>
<td></td>
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<td>Benjamin H. Smith M.D</td>
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<tr>
<td></td>
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<td>Fred Kern M.D</td>
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<td>Daniel Hermann M.D</td>
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<td>Samuel Caruthers M.D</td>
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<tr>
<td></td>
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<td>Rose Marie Hale R N</td>
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<td>Janet Velozquez R N</td>
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<td>Judy Goodman R N</td>
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<td>Grand Rounds—R N</td>
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<tr>
<td>7/31</td>
<td>Changing Role of the Nurse</td>
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<td>Video Seminar—R N</td>
<td>Nancy Hymson R N</td>
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<td>Robert Bradley M D</td>
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<tr>
<td>7/31</td>
<td>Acute and Chronic Renal Failure</td>
<td>Roger Hamura</td>
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<td>Grand Rounds—M D</td>
<td>Marla Klein M D</td>
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<td>John Conner M D</td>
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<td>8/7</td>
<td>The Management of Commonly Occurring Acute Problems</td>
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<td>Video Seminar—R N</td>
<td>Wanda Avery R N</td>
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<td>Alcoholism Rehabilitation</td>
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<td>Carrie Moody</td>
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<td>Joseph Drench M.D</td>
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<td>8/21</td>
<td>The Problem Drummer</td>
<td>Peggy Mathis</td>
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<td>Outpatient Clinic—Patients/Families</td>
<td>John Mogen M.D</td>
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<td></td>
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<td>Marilyn Fitch MSW</td>
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<td>8/28</td>
<td>Changing Role of the Nurse</td>
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<td>Part III</td>
<td>Loh Morgan M.D</td>
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<td>8/28</td>
<td>Family Therapy</td>
<td>Roger Hamura</td>
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<td>Ann Triggler R N</td>
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<td>8/28</td>
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<td>Leo Ager M D</td>
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<td>PSYCH SW</td>
<td>Kin Lutherfer Pke D</td>
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<td>9/4</td>
<td>Death, Dying and Grief</td>
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<td>Video Seminar—R N</td>
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<tr>
<td></td>
<td>SW PSYCH</td>
<td>Lewis Ficher Ph.D</td>
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<tr>
<td>9/11</td>
<td>Pulmonary Embolism</td>
<td>Roger Hamura</td>
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<tr>
<td></td>
<td>Video Seminar—M D R N</td>
<td>Peggy Mathis</td>
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<tr>
<td></td>
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<td>Arthur Sasafras M.D</td>
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<tr>
<td>9/11</td>
<td>Changing Role of the Nurse</td>
<td>Roger Hamura</td>
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<td></td>
<td>Part IV</td>
<td>John Elmendorf R N</td>
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<tr>
<td>9/18</td>
<td>The Diabetic Patient</td>
<td>Peggy Mathis</td>
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<td>Outpatient Clinic—Patients/Families</td>
<td>L. Marquardt R N</td>
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<td>9/18</td>
<td>Surgical Treatment of Pituitary Ulcers</td>
<td>Roger Hamura</td>
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<tr>
<td></td>
<td>Grand Rounds—M D R N</td>
<td>Robert S. Brittan M.D</td>
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<td>Allan R. Kreitz M.D</td>
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<td></td>
<td></td>
<td>Peter H. Baker M D</td>
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<tr>
<td>9/25</td>
<td>Behavioral Modification Techniques</td>
<td>Roger Hamura</td>
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<td></td>
<td>Grand Rounds—R N</td>
<td>Peggy Mathis</td>
</tr>
<tr>
<td></td>
<td>PSYCH SW</td>
<td>Ogden E. Lindsay Ph.D</td>
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Program Title: Two-Hour Program

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<tr>
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<tr>
<td>Death, Dying and Grief</td>
<td>Roger Hamura</td>
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<td>Video Seminar—R N</td>
<td>Peggy Mathis</td>
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<tr>
<td>SW PSYCH</td>
<td>Lewis Ficher Ph.D</td>
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<tr>
<td>John DeHaan M.D</td>
<td>Carol Alexander R N, M S</td>
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<tr>
<td>Pulmonary Embolism</td>
<td>Roger Hamura</td>
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<td>Video Seminar—M D R N</td>
<td>Arthur Sasafras M.D</td>
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<td>John Elmendorf R N</td>
<td>John Elmendorf R N</td>
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<td>Changing Role of the Nurse Part IV</td>
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<td>Video Seminar—R N</td>
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<td>L. Marquardt R N</td>
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<td>Behavioral Modification Techniques</td>
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<td>Grand Rounds—R N</td>
<td>Peggy Mathis</td>
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<td>PSYCH SW</td>
<td>Ogden E. Lindsay Ph.D</td>
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<tr>
<td>Ray Beck</td>
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<td>Sandy Dorken, M.A.</td>
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<tr>
<td>Claudine Paris B.A.</td>
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<tr>
<td>Virginia Longene, BSN M.A.</td>
<td>Peggy Mathis</td>
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<td>Roger Hamura</td>
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<td>Virginia Longene, BSN M.A.</td>
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<td>Ann Triggler R N</td>
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<td>Richard Massenghi, M.D</td>
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<td>Shirley Miller R N</td>
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<td>Roger Hamura</td>
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<td>Virginia Longene, BSN M.A.</td>
<td>Peggy Mathis</td>
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<td>Barbara Eckert R N</td>
<td>Ethel Hicks R N</td>
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<td>Nancy Hymon R N</td>
<td>Ann Triggler R N</td>
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<td>Richard Massenghi, M.D</td>
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<td>Shirley Miller R N</td>
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<td>Roger Hamura</td>
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<td>Virginia Longene, BSN M.A.</td>
<td>Peggy Mathis</td>
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<td>Barbara Eckert R N</td>
<td>Ethel Hicks R N</td>
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<td>Ann Triggler R N</td>
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<td>Archer Gordon M.D Ph D</td>
<td>A. James Lewis M.D</td>
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<tr>
<td>Kevin M. McIntyre M.D J D</td>
<td>Leonard Schenkel M.D</td>
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<td>Richard Fester Ph.D</td>
<td>Peggy Mathis</td>
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<tr>
<td>Carrie Cheeck R N</td>
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<td>Roger Hamura</td>
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<tr>
<td>Marc Lafore M.D</td>
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<td>John Adair R N. S.S.</td>
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<td>Roger Hamura</td>
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<tr>
<td>Richard Fester Ph.D</td>
<td>Peggy Mathis</td>
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<tr>
<td>location with Shirley Hoffman B.S.</td>
<td>Roger Hamura</td>
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<td>Roger Hamura—In studio with</td>
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<td>Rebecca Batsch M.D</td>
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<tr>
<td>Paula Huels B.S N</td>
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<tr>
<td>Sydney Smith B M D</td>
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<tr>
<td>1/6</td>
<td>Cardiac Rehabilitation Video Seminar: MD RN LVN NA</td>
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<td>Cardiac Rehabilitation Outpatient Clinic: Parents / Family</td>
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<td>1/7</td>
<td>Hypertension Video Seminar: All Disciplines Two Hour Program</td>
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<td></td>
<td>Wilkes Barre PA Teleconsultation Scanzan MD Two Hour Program</td>
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<td>1/27</td>
<td>Albonna PA Teleconsultation Nephrology M.D. Two Hour Program</td>
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<td>Clerksburg WV Teleconsultation Cardiovascular Surgery MD Two Hour Program</td>
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<td>Beckley WV Teleconsultation Radiology M.D. Two Hour Program</td>
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<td></td>
<td>Salem VA Teleconsultation Problems in Access to Circulation in Duluth MD RN</td>
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<tr>
<td></td>
<td>Christmas and New Year's Holidays LVN NA</td>
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<tr>
<td>1/6</td>
<td>Ms Home Tele Consultation Cardiac Anesthesias MD RN Two Hour Program</td>
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<tr>
<td>1/6</td>
<td>Asheville NC Teleconsultation Problems of the Geriatric Patient - MD RN</td>
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<thead>
<tr>
<th>Date</th>
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<th>Participants</th>
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<tbody>
<tr>
<td>1/27</td>
<td>Salisbury NC Teleconsultation Nursing Care in Long Term Illness - MD RN</td>
<td>Roger Hammaris, Ruby Mellor, R.N., Curtis Cump, M.D., Lee Bonner</td>
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<tr>
<td></td>
<td>and continuation of the Asheville Teleconsultation Two Hour Program</td>
<td>Jean Hayter, B.S.N., M.A. and William A. Boes, M.D., L. Steiner, R.N.</td>
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<tr>
<td>1/29</td>
<td>Fayetteville NC Teleconsultation Preventive MD RN</td>
<td>Roger Hammaris, George G. Cameron, Jr., M.D., John D. Hale, M.D.</td>
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<tr>
<td></td>
<td>Two Hour Program</td>
<td>Samuel Caruthers, M.D., Lawrence Norton, M.D., John W. Schaeffer, M.D.</td>
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<td>1/11</td>
<td>Salisbur Geo Teleconsultation Pulmonary Medicine and Cardiac MD RN</td>
<td>Roger Hammaris, D. Beall Bratton, M.D., E. Dent, M.D.</td>
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<td>Blood Causes Video Seminar: MD RN</td>
<td>Peggy Mathis, Sharon A. Palmer, R.N., Katherine Williams, M.D., MD</td>
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<td>2/19</td>
<td>Neurological Diagnoses Grand Rounds - MD RN</td>
<td>Roger Hammaris, Michael Chergnott, M.D., James A. Lewis, M.D., John C. Stein, M.D.</td>
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<td>2/26</td>
<td>Oral Cancer Detection Grand Rounds DDS RN LVN</td>
<td>Roger Hammaris, John L. Hicks, M.D., Richard D. DeSantis, M.S.</td>
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<td>Ambulatory in Uninary Tract Infection Video Seminar: MD RN</td>
<td>Roger Hammaris, R. Russell Martin, M.D., Gladys Chelsey, R.N., M.S.</td>
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<td>3/5</td>
<td>Psychotherapeutic Drugs Grand Rounds: MD RN PSYCH SW</td>
<td>Roger Hammaris, Lee E. Hall, M.D., Thomas L. Crowley, M.D., Wallace Leblow, M.D.</td>
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</table>
5. COMPUTERIZED EVENTS

Once two programs had been selected to be computer events on the satellite the major activity of establishing interconnections between computer satellites and hospital was accomplished by the two coordinators for these events the Hopkins Department of the University of Utah had expressed an interest in participating in the two coordination for these events the Hopkins Department of the University of Utah College of Medicine located at the Latter Day Saints Hospital and the Psychiatric Service of the veterans Administration Hospital Both of these facilities are located in Salt Lake City Utah.

Selection of Participants

The two Appalachian VA hospitals selected to participate in the clinical decision making program at the Hopkins Department of the University of Utah had expressed an interest in having their nurses participate in the computer assisted training project. They were selected to test the program using traditional telephone lines 24 hours a day for the program was administered during the test period for two and a half hours on Wednesdays during the test period on April 6. All these were selected to participate via satellite linkage.

Sainbury was selected to participate in the patient-identifiable assessment program at the Salt Lake City VA Psychiatric Service because the request for a computer-managed program came from that hospital. The doctor who requested the program was asked to coordinate the event at the receiving end.

Engineering

The computerized events were primarily engineering experiments to compare satellite linkages with traditional telephone connections between computer and CBT. The interface with the satellites presented the most difficulties in conducting these events.

Implementation of Computerized Events

The implementation of both computer events was delayed by a federal regulation then pending and about to become law. The legislation was intended to protect individual privacy and the time required for the events to be protected during the exchange between Salt Lake
and Salisbury delayed the beginning of all computer experiments for two weeks.

On December 16 the base was at the Electric Spume Flight Control Center in New York City, as was ATS-1 and 6. The cameras were unable to detect that any signals were being transmitted through the satellite. On December 26 it was confirmed by satellite engineers that the satellite was functioning properly.

The fire that occurred on January 12 was the result of a malfunction in the electrical system of the satellite. The fire was caused by a short circuit in the power supply to the satellite. It was quickly extinguished and the satellite was returned to service without any damage.

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As predicted, the problem with the satellite and Salisbury was caused by the incorrect wiring of the power supply to the satellite. Salisbury was therefore returned to service.

**TABLE II**

| Date (1975) | Communication Log
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<td>Communications from ATS-5, ATS-6, and ATS-5 were confirmed to be functioning properly.</td>
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<td>Communications from ATS-5, ATS-6, and ATS-5 were confirmed to be functioning properly.</td>
</tr>
<tr>
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</tr>
<tr>
<td>March 5</td>
<td>Communications from ATS-5, ATS-6, and ATS-5 were confirmed to be functioning properly.</td>
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**TABLE III**

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<tbody>
<tr>
<td>January 23</td>
<td>Communications from ATS-5, ATS-6, and ATS-5 were confirmed to be functioning properly.</td>
</tr>
<tr>
<td>January 26</td>
<td>Communications from ATS-5, ATS-6, and ATS-5 were confirmed to be functioning properly.</td>
</tr>
<tr>
<td>February 5</td>
<td>Communications from ATS-5, ATS-6, and ATS-5 were confirmed to be functioning properly.</td>
</tr>
<tr>
<td>February 12</td>
<td>Communications from ATS-5, ATS-6, and ATS-5 were confirmed to be functioning properly.</td>
</tr>
<tr>
<td>March 5</td>
<td>Communications from ATS-5, ATS-6, and ATS-5 were confirmed to be functioning properly.</td>
</tr>
</tbody>
</table>
Section IV: Observations

General Observations

Hospital Participants

The most frequent and consistent observers of the VA programs were nurses, including registered nurses, licensed practical nurses, and nursing assistants. There were of course far more nurses than physicians in any other type of health professionals practicing in VA hospitals, and nurses have also traditionally been more involved in continuing education programs than have physicians.

In developing the program for VA hospitals, the planners hoped that with a large percentage of nurses, the results would be better than those obtained in VA hospitals. There were of course far more nurses in VA hospitals than physicians, and there were even fewer physician participants in any other type of health profession. The planners felt that nurses would be more likely to participate and that nurses were more likely to participate in continuing education programs than were physicians.

The Attitude of the Coordinator

Each hospital within the VA system is a separate entity with its own unique culture. Therefore, different hospitals may have different attitudes towards the program. The key to determining whether a hospital is interested in the program is the hospital director. For this reason, the attitude of the director of the hospital in which the coordinator was working was considered important in determining whether the hospital would participate in the program. The program was not successful on its own, and the coordinator was able to influence the attitude of the director to some extent.

The Physical Setting

Another important variable in determining acceptability of the program was the environment in which it was held. In one case in which the program was offered to large university hospitals, the physical setup was considered a key factor in determining success.


december 1980
34
...
4. TELECONSULTATIONS

The goal of these events was to provide an opportunity for physicians (and in some instances nurses) to consult with specialists about problems they were having in diagnosing or treating actual patients. The intent was to bring hospital physicians together with the consultants, and to enable those who could not be present at the actual clinic, to participate in the consultations. Participants were able to communicate directly with each other via satellite broadcast in real time.

The primary problem in achieving this goal was that the teleconsultations were not private one-to-one events. Like the other satellite broadcasts, they had an audience both in the originating and observing hospitals. All satellite broadcasts were monitored and in other places. There was therefore no feeling of a need to showmanship on the part of each hospital preparing a teleconsultation. Physicians were reluctant to show off their work to others, and felt that the patients might be dissatisfied with the fact that they were not being seen by the consultant.

Fortunately there were enough exceptions to this perception so that the teleconsultations were successful, and it was clear that patients could be better cared for. The teleconsultations conceptually has great potential and the satellite could be extremely valuable in overcoming problems of time and distance.

Two-way television is not a necessary ingredient for accomplishing this. The VA/ATS-6 experiment utilized slow scan TV for sending pictorial information to the consultant. Although apprehension was expressed prior to the experiment about this technology especially when it was to be used for transmitting X-rays and histopathology slides, there were few if any instances during the teleconsultations when the visual transmitted was less than adequate for diagnostic purposes.

In fact, it was found that the slow scan process took a long time to display a visual image of the tissue, and that the visual was not always adequate for the consultant. The consultant should be able to display images more quickly, and the visual should be adequate for the consultant.

5. COMPUTER MEDIATED EVENTS

For both computer mediated events of the VA/ATS-6 experiment the software proved to be well accepted in the hospitals. The difficulties in providing the computer hardware to the satellite were technical and primarily due to the decreasing transmit power of the ATS-3 satellite used to return the signals from the hospital to the satellite. If computer mediated events were to be used in the future satellite communications, the two-way linkages should be available with enough bandwidth to carry computer information in a timely manner.

The computer mediated events were most successful in terms of how well received they were at the VA in Jacksonville and the technical problems were solved. The problems were solved by having the computer hardware available and the computer on the satellite at the hospital located in Jacksonville.

programs when they were requested on one of the four channels of the hospital's television viewing system. If a program was allowed to run continuously (one of the limitations evaluated in the experiment) then the channel could be tuned for any of the hospital's internal or external television programs.

The evaluation coordinator said that the programs received via satellite were frequently unwatched because they were unviewable. The Westinghouse group stated that one occurrence of the satellite being tuned was "malfunction" due to its being dropped off the system. At another time they were unable to transmit the VIDAC programs for a week due to a technical malfunction at the Denver studio. The evaluation coordinator reported that due to the technical difficulties there were a number of technical problems and the satellite equipment still needed to be improved in order to make the system available nationally.

The main complaint of the VA was that the equipment was not well functioning and the consultants were not able to provide adequate service. The VA's main complaint was that the consultants were not able to provide adequate service. The VA's main complaint was that the consultants were not able to provide adequate service.

6. VIDAC

During the ten week VIDAC program, 204 frame pictures transmitted at high speed) were available at the four VA hospitals. Individual viewers selected programs and complex evaluation forms. This program was 20 percent of the possible target population and included primarily nurses in charge of laboratory personnel. A survey was conducted to assess the usefulness of the system.

The system was found to be useful and felt that it would be worth the cost to find out if the VIDAC system was used by nurses in charge of laboratory personnel.

In the report of the VIDAC experiment on ATS-6 which included data from the evaluation forms collected by the VIDAC evaluation coordinator from the Florida State University evaluation, the Westinghouse group stated that the VIDAC program was a success in that it could be used to transmit future consultations. However, the settings and circumstances should probably be different from what they were for the VA experimental on ATS-6.

The communication between consulting physician and specialist should be different. Evenness of the method might eliminate some non participating observers but other methods too should be employed to improve in-person education.

In the future, the communication between consulting physician and specialist should be different. Evenness of the method might eliminate some non participating observers but other methods too should be employed to improve in-person education.

The VIDAC programs were not designed for this purpose. The VIDAC program was designed for a scientific purpose. The VIDAC program was designed for a scientific purpose. The VIDAC program was designed for a scientific purpose.
Satellite Will Connect 10 VA Hospitals

Satellite Television Used in Experiment

VA Hospital to Use Satellite Wednesday
Section V: Data and Evaluation
(by Applied Communications Research, Palo Alto, California)

INTRODUCTION
The experiments impacted the ten experimental hospitals on several levels. Nearly all individual events provided information which was used by some segment of the hospital staff. Many such as the presentation on G.1. infections had a significant impact on hospital procedures in nearly every hospital. The six experimental events had varying success. Video seminars seemed to have the greatest impact and were the most popular. The other end of the scale was represented by the CAT events which were plagued by technical problems. The most profound effect, however, was that of the experiment as a whole on the hospital staffs.

1. Methodology
The VA/ATS-6 system can be divided into two groups - those designed for delivery to group (video seminars, grand rounds, outpatient clinics and teleconsultations) and those designed for delivery to individuals (CAT and computer mediated patient management). The teleconsultation event should perhaps be classified as an individual delivery event, however the form in which they were used was more that of a hospital-originated panel round than a one-to-one consultation.

The evaluation of these events was based on a variety of data collection techniques. The group events were evaluated using a combination of data gathered from observational interviews and audience reactions collected both via an evaluation form completed immediately after each broadcast and via retrospective questionnaires administered two-three months after broadcast. Because of changes in questionnaires and time problems, questionnaire data collection was not uniform across the experiment. The following table shows what types of questionnaires (and how many) were completed for each of the last group-oriented events. The program evaluation questionnaires were those completed by the audience immediately after each broadcast. The post-retrospective questionnaire referred to in the table was the initial prototype questionnaire which covered the last 1% events broadcast. This questionnaire was substantially revised into a much more powerful instrument (the full retrospective questionnaire) which is the foundation for much of the evaluation of the project to assess the impact of the entire VA/ATS-6 experience.

The video seminar, a field demonstration of CAT traveled throughout Appalachia during the ten months of the project visiting the experimental hospitals and interviewing staff members to obtain their reactions both to the project as a whole and to individual programs in addition where possible be observed broadcasts in the hospitals. After the experiment ended, Dr. Roger Hattwick, the physician moderator also visited four of the experimental hospitals to analyze the impact of the experiment on medical care provided by the hospitals. Consultant evaluation forms - forms distributed to consultants who participated in the ten teleconsultation events to collect their impressions of the teleconsultation experience. Participant evaluation forms - forms distributed to experimental hospital staff members who made presentations in the teleconsultation events to obtain their reactions to the teleconsultations. The following table shows how many data were collected by each of these measures and how many of the 50 events (including introductions and debriefings) were covered by each technique.

### Summary of Evaluation Methods

<table>
<thead>
<tr>
<th>Instrument</th>
<th>N of Programs Covered</th>
<th>Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VR</td>
<td>6</td>
<td>1,034</td>
</tr>
<tr>
<td>Evaluation</td>
<td>67</td>
<td>12,533</td>
</tr>
<tr>
<td>Retrospective</td>
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<td>1,270</td>
</tr>
<tr>
<td>Post Test</td>
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<td>307</td>
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<tr>
<td>Survey</td>
<td>4</td>
<td>44</td>
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<tr>
<td>Consultant</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>Participant</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

2. VIDEO SEMINAR
The video seminars were the most frequent type of program (35%). There were also the most popular type of program and were very well attended. Averaee attendance based on program evaluation forms for 31 programs was 1997 with a standard deviation of 6113. The figure is, however, a considerable undercount. By comparing program evaluation forms with available audience logs, we predict that the actual attendance averaged about 420 per program. The most heavily attended program was the initial video seminar on problem oriented medical research, which included 412 program evaluation forms.

In addition to being the most well attended of the experimental programs, the video seminars were also the most highly regarded. The mean rating of the 28 events covered by the retrospective questionnaires was 4.87 on a scale of 1 (very good) to 5 (very poor). This mean was based on 1,034 individual program responses. In addition the highest rated of the 42 events covered by the full retrospective questionnaires was a video seminar on "Etiology and Management of Pulmonary Embolism" which had a mean rating of 4.87 (based on 61 responses).

In general, responses to the video seminars were very positive. There were, of course, minor complaints about technical or presentation techniques with most of the programs. One relatively frequent complaint for example was that the events were "very rapid" and lacked "quantitative information." One very frequent complaint was that the time provided for discussion was far too short. After a number of these comments had been received, an alternate delivery technique was employed for one program (Pulmonary Embolism). The program, it was hoped would be more effective, and it was hoped that the time for discussion would be increased so that it could be viewed prior to attendance. The second type of program was sent to the hospitals in advance so that it could be viewed prior to time and the entire hour could be spent on discussion. Response to this action was mixed. The prevailing reason for creating scheduling problems was that for non-VA physicians who wished to attend. Comments from four hospital evaluation coordinators are summarized below.
Approximately 30 people viewed the film prior to broadcast. 15 viewed the broadcast. The audience felt that the old way was better. However, 13 people said they would use the newer system next time. The group was large, 37 people attended. 24 were nurses and doctors, 12 were nurses, and 1 was a trainee. The group was asked to provide their comments on the questions presented at the beginning of the program. The group was asked to provide their comments on the questions presented at the beginning of the program. The group was asked to provide their comments on the questions presented at the beginning of the program. The group was asked to provide their comments on the questions presented at the beginning of the program. The group was asked to provide their comments on the questions presented at the beginning of the program.

The impact of the video seminar appears to have been quite high. All those who reported seeing video seminars (376 viewers, 128 experienced 1 viewer/experience per viewing) reported that this was the best method they had used to obtain the information. Some 35% wanted to use the method again. 44% reported that they would use the method again. 39% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the method was suitable for them. 29% reported that the 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In addition we did not obtain the computer printout describing the participants progress from the organizing CAI center finally due to technical problems encountered in running the experiments the field representatives had only very limited opportunity to observe the event in progress.

What information we do have is based primarily on interviews conducted with nurses who did planned to participate in the experiment.

The following are excerpts from these report describing interviews conducted with nurses about the CAI experiment.

FAYETTEVILLE: Reactions at Fayetteville towards the CAI program were quite positive although several of the nurses interviewed indicated they had only limited contact with the CAI events because of scheduling problems. Most nurses interviewed expressed frustration that the program was available only two hours per week (after the initial period in which the program was available 24 hours a day).

One nurse in hospital admission said she had only been able to use the equipment once because, she said, she had to use it. She said the CAI program was the most effective training tool she had ever seen and was a great deal more valuable to her than the rest of the ATS-6 events. She found the equipment easy to use and felt it would be very useful to her to have the program available all the time. She indicated that the reason the CAI program was more valuable to her than the rest of the ATS-6 events was that most of the other events were geared more towards physicians therefore although she enjoyed training from these programs much of the material was over her head. The CAI on the other hand seemed tailored especially for her.

A ward nurse indicated she felt the CAI program served as a constant reminder of medical knowledge. She also felt it had great potential for keeping her abreast of new techniques within her own specialty and for broadening her knowledge in other areas.

An RN in the psychiatry ward stated that while she had not been able to use the program herself, she felt it was a supplement that nurses who had used it found it was an extremely valuable learning experience. She also stated that the full impact of the program had not been felt.

ALTOONA: Technical problems with the Altoona program may have greatly affected the impact of the CAI program. Many of the problems seem to have been caused by equipment malfunctions at Altoona although some program malfunctions were experienced as well. (For example the program frequently failed to record completed exercises.)

In addition technical problems there apparently were some local problems in understanding how the equipment worked. This problem was aggravated by the low of the nurse coordinator part way through the experiment.

The following comments were written in response to a question on the post test asking what the ATS-6 exercises were the respondents would like to see repeated would another satellite become available.

We were impressed with the potential of the computer program that we were unable to take full advantage, in this experiment, of the full potential of the CAI program. A greater number of areas of current care respiratory intensive care etc.

It is important to make any assessment of the CAI event based on the data available. The FAYETTEVILLE on line experience appeared to be quite positive however technical problems made it impossible to make any assessment of the satellite mediated links.

In addition to the lack of information available to evaluate the CAI experiment technical advances in the computer field notably, the growth of the value added computer industry (which provide computer communication resources over long lines) strongly suggest that alternative delivery means for CAI may be possible relatively to invoke. These rapid advances in the computer industry particularly in the area of microcomputers may have a significant impact on CAI within the next two years.

7. Computer-Mediated Patient Management

The second computer event performed in the VASTS-6 events was to assess the value of a computer managed program for diagnostic and treatment of patients. The program was provided to the Salisbury N.C. hospital only.

The nature of the program made it very amenable to traditional evaluation measure. As a result evaluation of the event consisted of site visits by the field representatives.

Some initial technical problems were encountered and in the first two weeks of operation (February 19 to April 2) only three full sessions involving two patients were conducted. The potential for this type of program at Salisbury as high as traditional diagnosis involves administration of the MMPI battery which must be sent to Minnesota for diagnosis this request five days. The CAI program has the potential for providing more rapid diagnosis although this had not been the case as of April 4.

Physicians reported that the two patients seemed to enjoy using the CAI equipment. One of the two patients had refused to take the MMPI, but did not object to the CAI exercise. None of the two patients experienced any problems with the computer. Hospital officials indicated they felt only about 20 percent of their patients would be able to use this equipment upon admission. But after some initial treatment the figure would rise to approximately 75 percent. Some patients because of combined physical and mental problems would probably never be able to use the CAI program. However this group was considered virtually un relevant.

This particular program seems to offer high potential although our data is extremely limited. The data on technical problems is insufficient to make any judgment concerning in view of the above limitations. However it was the use of the CAI programs in the computer capacity may make other forms of transmission in house possible a more viable means of access.

8. Comparing the Group-Oriented Experiments

It is instructive to examine the four group-oriented events to see how successful each was in comparison with the others.

These comparisons are based on data from the retrospective questionnaires. The two comparison uses the ratings given each program in the final retrospective questionnaires. This form was used to evaluate 10 video seminars 11 grand rounds 10 teleconferences and 2 outpatient clinics.

9. General Observations

The following comments were not directed towards any specific experiment (but rather towards the VASTS-6 program as a whole) but the data collected such as pre and post test sites with any significant impact on the potential for a satellite mediated biomedical communication system.

It has been found that there were marked differences in the cooperation and participation of the ten experiment hospitals. These differences were caused by a number of factors including size relative remoteness staff load and the personalities of the hospitals.

In some hospitals for example administrative support for the experiment was less than enthusiastic. This manifested itself in a number of ways—physical facilities used for showing the programs publically both inside the hospital and for the surrounding medical community morale of the staff etc.

In one hospital for example a site visitor encountered a similar nurse who had been on appraiser for more than ten years yet was not aware of the VASTS-6 program.

The following chart shows the mean attendance by hospital across all programs.
Ch.4: Role at POMR on other programs

Sheila was one of many nurses who were unable to be present for the original broadcast. Some hospitals kept a complete list of programs. Others for economic reasons retained only the most popular programs, targeting others to have the tapes for reuse.

Although it was impossible to obtain accurate figures retaining the use of these videocassettes the data we do have indicate that the viewing of events was at least doubled through the use of the videotapes. Often videotapes were used not only within the experimental hospitals but were also exchanged with other area hospitals.

The following table is a partial listing of showings of program videotapes at Altona, one of the hospitals that seemed to make great use of these videotapes. This listing is incomplete but it does give some idea of the frequency of use of the tapes and the number of staff members who were present for showings.

The program most cited in the post-experimental questionnaire was Death and Dying. It is obviously a great impression on the nurses who viewed it and it was the program most frequently mentioned by them when they were asked to cite examples of how the experimental events had affected them in the performance of their tasks.

9.4 Videotapes

One unexpected result of the VA/ATS-6 events was the high use of videotapes made of the programs. Most of the hospitals videotaped the events for loan use by staff members who were unable to be present for the original broadcast. Some hospitals kept a complete list of programs. Others for economic reasons retained only the most popular programs, targeting others to have the tapes for reuse.

Although it was impossible to obtain accurate figures retaining the use of these videocassettes the data we do have indicate that the viewing of events was at least doubled through the use of the videotapes. Often videotapes were used not only within the experimental hospitals but were also exchanged with other area hospitals.

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9.5 Impact

The post-experimental questionnaire contained a number of questions regarding the impact of the VA/ATS-6 experiment as a whole. Although the sample is not too large (32) the responses to these questions provide significant insight into both the viability of a satellite-mediated communication system for the VA and its possible impact.

To summarize responses to these questions we have compiled them against the roles of the respondents to show the differences in responses by role. Each role is represented by a row in the table and by reading across the row it is possible to see how respondents from a particular role answered a question. Response categories for the questions are based across the top of the table and are shown condensed.

To interpret the table first read the very last column. This column gives the number of respondents from each role type and what percent of the total sample this group represents. In table 1, for example, there are 89 M, 53 F and they represent 29.5 percent of the sample. Now read the bottom 2 rows. They give the number of respondents who selected each answer to the question. For example in the first role 45 people or 15 percent of all respondents answered D very much to the question How much look at all of the cells-row 3, column 5. It shows that 13 nurses answered the question with a strongly response. These 13 nurses are 21 percent of all the nurses who responded. They represent 43.3 percent of all people who responded, strongly to this question and are 10 percent of the total sample. Note that the number in the lower right corner (922) represents the total number of people responding to the question and is the sum of the farthest right column and also the sum of the bottom row.

The last table deals with the success of the ATS-6 events in providing information to help solve existing problems. Across all roles 60 percent indicated they felt the events had at least somewhat eased their problems. Nurses tended to be slightly more positive towards the experiment than were physicians.
The second table describes responses to a question probing the potential for satellite-mediated communications. In general, the respondents, were quite positive about the potential (81.3 percent indicated they felt there was some potential and only 1.3 percent felt there was no potential) Again, nurses tended to be more positive than physicians.

Q: To what extent do you feel satellite communication (including the actual ATN4 programs you have seen) has the potential to solve or ease these problems?

### Table 1: Potential for Satellite Communication

<table>
<thead>
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<th>Count</th>
<th>No Reply Very Much</th>
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<th>Slightly</th>
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<tr>
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<td>0</td>
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<td>0</td>
</tr>
</tbody>
</table>

| Column | 6 | 4 | 1 | 2 | 1 | 5 |
| Total | 12 | 8 | 3 | 5 | 4 | 25 |

A surprising number (15.1 percent) of the respondents indicated they asked one or more questions in the events they attended. Physicians tended to ask more questions than did nurses.

### Table 2: Questions Asked During Broadcasts

<table>
<thead>
<tr>
<th>Count</th>
<th>No Reply Very Much</th>
<th>Somewhat</th>
<th>Slightly</th>
<th>Not At All</th>
<th>Row</th>
</tr>
</thead>
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<tr>
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</tr>
<tr>
<td>Tot. Pct.</td>
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<td>1</td>
<td>2</td>
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<td>4</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>M: D</td>
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<td>7</td>
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<td>0</td>
</tr>
</tbody>
</table>

| Column | 6 | 4 | 1 | 2 | 1 | 5 |
| Total | 12 | 8 | 3 | 5 | 4 | 25 |

When questioned concerning the value of the real time interaction offered by satellite communication, slightly more than 50 percent felt it had some value approximately 25 percent declined to respond. The value of the real time interactions!

### Table 3: Value of Real Time Interaction

<table>
<thead>
<tr>
<th>Count</th>
<th>No Reply Very Much</th>
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<th>Slightly</th>
<th>Not At All</th>
<th>Row</th>
</tr>
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<tr>
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</tr>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

| Column | 6 | 4 | 1 | 2 | 1 | 5 |
| Total | 12 | 8 | 3 | 5 | 4 | 25 |
When questioned concerning the degree to which they felt they had access to specialists and consultants in Denver via the satellite, the respondents were more negative. Only 46 percent felt they had some access while among 39 percent felt they had little or no access. This may in part be a reflection of the frustration expressed throughout the experiment over the lack of discussion time.

### Table 14

<table>
<thead>
<tr>
<th>Event</th>
<th>No Reply</th>
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<th>Somewhat</th>
<th>Slightly</th>
<th>Not At All</th>
<th>Total</th>
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</thead>
<tbody>
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<td>10</td>
</tr>
<tr>
<td>M.D.</td>
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<td>18.2</td>
<td>25.1</td>
<td>23.6</td>
<td>14.6</td>
<td>29.5</td>
</tr>
<tr>
<td>Nurse</td>
<td>13.6</td>
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<td>48.7</td>
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</tr>
<tr>
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<td>18.5</td>
<td>7.7</td>
<td>9.9</td>
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<tr>
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<td>24.9</td>
<td>11.6</td>
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</table>

The next question probed the degree to which the satellite events had been able to create a sense of face to face interaction between the respondents and the Denver consultants. Nearly 53 percent of the respondents indicated they felt there was some success in creating this interaction. Nurses were more prone to feel such contact than physicians.

### Table 15

<table>
<thead>
<tr>
<th>Event</th>
<th>No Reply</th>
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<th>Somewhat</th>
<th>Slightly</th>
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<th>Total</th>
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<td>3.4</td>
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</tr>
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<td>43.5</td>
<td>42.9</td>
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<tr>
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<td>8.5</td>
<td>3.4</td>
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<tr>
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<td>47.5</td>
<td>32.2</td>
<td>8.5</td>
<td>3.4</td>
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</tr>
</tbody>
</table>

In general, the respondents felt that viewing the VA/ATS-6 events was a good use of their time. Nurses were far more positive than physicians.

**Question:** To what extent do you feel that pertinent information was transmitted via ATS-6?

**Table 16**

<table>
<thead>
<tr>
<th>Event</th>
<th>No Reply</th>
<th>Very Much</th>
<th>Somewhat</th>
<th>Slightly</th>
<th>Not At All</th>
<th>Total</th>
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<tbody>
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<td>0</td>
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<td>0</td>
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</tr>
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<td>30.3</td>
<td>10.1</td>
<td>3.4</td>
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<tr>
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<td>43.5</td>
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<td>0.0</td>
<td>48.7</td>
</tr>
<tr>
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<td>5.0</td>
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<tr>
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<td>47.5</td>
<td>32.2</td>
<td>8.5</td>
<td>3.4</td>
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</tbody>
</table>

**Question:** To what extent do you feel that viewing programs (ATS-6 programs) was a good use of your time?

**Table 17**

<table>
<thead>
<tr>
<th>Event</th>
<th>No Reply</th>
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<th>Somewhat</th>
<th>Slightly</th>
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<th>Total</th>
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<td>43.5</td>
<td>42.9</td>
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<td>0.0</td>
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<tr>
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<td>4.0</td>
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<tr>
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<td>32.2</td>
<td>8.5</td>
<td>3.4</td>
<td>19.3</td>
</tr>
<tr>
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<td>47.5</td>
<td>32.2</td>
<td>8.5</td>
<td>3.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>
When asked whether or not they felt the viewing of the experimental event increased their competence, nearly 80 percent of the respondents indicated that it had at least somewhat increased their competence. Only 7.5 percent felt that viewing had not increased their competence at all. Again, nurses (99 percent) tended to be much more positive than physicians (49.4 percent).

The last two questions concern the technical quality of the individual events and the quality of the instructional material presented. When asked if they felt the events were technically adequate, 81 percent of the respondents felt they were at least somewhat adequate and only 1.3 percent felt they were not technically adequate.

When asked if they felt that the tapes were covered comprehensively, nearly 80 percent of the respondents indicated that they felt they were covered at least somewhat comprehensively.

<table>
<thead>
<tr>
<th>Column</th>
<th>Count</th>
<th>No Reply</th>
<th>Very Much</th>
<th>Somewhat</th>
<th>Slightly</th>
<th>Not at All</th>
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<table>
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<th>Somewhat</th>
<th>Slightly</th>
<th>Not at All</th>
<th>Row</th>
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<td>3</td>
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<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
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</table>
9.2 Scheduling Problems

There were some scheduling problems caused primarily by some cancellations and production problems. Measured in some of the programs. This meant that the original ten month schedule, had to be corrected with monthly updates which were sent out around the middle of the preceding month. Although the provided the hospitals with two-three week warning of schedule changes it did cause the hospitals some stress—particularly in their community relations programs which encouraged area physicians to attend the broadcasts. Although this may seem a minor problem most of the hospitals did have some community interests in the experimental town and frequently had large numbers of non VA attendees.

The actual broadcast schedule created problems as well in several hospitals it conflicted with long established meetings which could not be rescheduled. Also many staff members who wished to present for the broadcast could not because they were on duty and could not leave. Obviously no single time would be best for all viewers however it seems obvious that future experiments or events should have some arrangement for multiple scheduling.

9.4 Printed Material

One problem which was mentioned briefly in the discussion of grand rounds was the frequency of absence of printed material to accompany the programs. sketching sometimes caused problems in getting printed material to the hospitals in time for the video seminars. Comments from the hospitals indicated that they prefered to get the printed material in advance so staff members could prepare for the programs and as a result the material often was not available until the day of the program sometimes. Another complaint against the printed material was that there were not enough copies of the printed material.

Although no printed printed materials were prepared for the teleconferences or grand rounds there were frequent complaints about the lack of a printed copy of the events that took place. This was caused by the lack of staff time for watching the television programs. They were very busy and interested in the programs but found it very difficult to understand some sort of preparatory material. Readers have significantly increased the impact on the events at 77 percent.

Again we must note that no study is implied here. The data does not allow us to determine if the adoption of new information was based on some need which existed prior to the program or whether it was a case of some usually new information was presented and the group responded.

9.5 Technical Problems

Technical problems were present throughout the project. Concerning 15 or 20 problems complained about poor audio and, for the most part, lack of video signals. Some stations also indicated frequent audio problems. However it appears from the pattern of these reports that the problems did not appear in all hospitals at the same time suggesting that the technical problems were not the result of the broadcast. Also, many of the hospital viewing rooms had very poor acoustic conditions which further contributed to the problem both when receiving the events and when asking questions.

9.6 Confirwid Evaluations

These respondents were obviously self selected as well (all respondents) and we are in general very pro-1450. Regardless of the self selection bias however it appears that there is at least a hard core of very and used of the experimental programs. To get some feeling for their impressions of the programs the following comments have been selected from the questionnaires.

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Respondents</th>
<th>Mean Program</th>
<th># Viewing</th>
<th>Mean Times</th>
</tr>
</thead>
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<td>7.37</td>
</tr>
</tbody>
</table>


I think that none of these ideas which we can recall reflect the nature of some of our patients such that little or any change in their attitude with them of value. The majority of our patients would have been satisfied and interested in receiving these programs. The majority remaining are long term (chronic) and alcoholic which in treatment of the alcoholic have been unreceptive —none [many programs]

I consider the question somewhat open to evaluation some cases rather than making homes —physician (2 programs)

I have no change at all [none programs]

I did not use them much but I found them [none programs]

I found them of great help and used them in the capacity of a physician —(2 programs)

I think that the way you present your job differs only because of an Atari 1450 broadcast.

I thought it was a better way to present the programs to the public but it was not of great value.

I found them very helpful to my group of patients with the problem at hand [none programs]

I found them very helpful to my patients with the problem at hand [none programs]

I think that these programs were mainly of value for the patients I dealt with them [none programs]

I found them not of great help [none programs]

I think that these programs were mainly of value for the patients I dealt with them [none programs]

I think that these programs were mainly of value for the patients I dealt with them [none programs]

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"All hospitals are different. If we may not be able to learn from the procedures and their implications, they are not identical. The differences between hospitals are marked by the presence of different types of patients, the different nature of the services they provide, and the different cultures that exist within them."

Q. How much time should be spent in communication between different levels and types of personnel in order to ensure effective communication? (This question was asked to the physician and the nurse.)

A. "The time spent in communication between different levels and types of personnel is crucial. Effective communication is essential for the smooth functioning of the hospital. It is also important for the well-being of the patients."

Q. How much does the hospital staff rely on computer systems and other technological tools? (This question was asked to the physician and the nurse.)

A. "The hospital staff relies heavily on computer systems and other technological tools. These systems help in managing the patient's medical records, scheduling appointments, and tracking medication. They also facilitate the sharing of information among different departments."

Q. What is the role of the hospital staff in the decision-making process for patients? (This question was asked to the physician and the nurse.)

A. "The hospital staff plays a crucial role in the decision-making process for patients. They provide information and guidance to help patients make informed decisions about their care. They also work with patients to develop a personalized care plan that meets their unique needs."

Q. How much do patients rely on hospital staff for information and guidance? (This question was asked to the physician and the nurse.)

A. "Patients rely heavily on hospital staff for information and guidance. They are often unsure about their diagnosis and treatment options. Hospital staff can help patients understand their condition and the available treatment options, and guide them through the decision-making process."

Q. How much do hospital staff rely on the patient's input in the decision-making process? (This question was asked to the physician and the nurse.)

A. "Hospital staff rely heavily on the patient's input in the decision-making process. They work closely with patients to understand their preferences and values, and incorporate this information into their care plans. Patients' input is crucial in ensuring that their care is aligned with their goals and values."
Sometimes, however, unexpected changes are observed in a patient's condition that are not related to the current treatment regimen. These changes may not be apparent at the time of admission, but they may become significant later on. For example, a patient's blood pressure may fluctuate during a procedure, indicating a potential problem with the equipment or the patient's condition.

In evaluating the impact of these changes, we need to consider the possibility that the observed changes may be due to factors other than the current treatment. One way to approach this is to compare the patient's baseline data with the data collected during the procedure. This can help identify any discrepancies that may indicate a problem.

Another approach is to use statistical methods to analyze the data. For example, we can use a t-test to compare the mean blood pressure during the procedure with the baseline data. If the difference is statistically significant, we can conclude that the observed changes are not due to chance.

In conclusion, unexpected changes in a patient's condition can have significant implications for their care. By carefully evaluating these changes and considering all possible factors, we can ensure that patients receive the best possible care.

1. **Summary**

1. The case study provided evidence of unexpected changes in a patient's blood pressure during a procedure.
2. An unexpected change in the patient's blood pressure was observed during the procedure.
3. The change was statistically significant, indicating that it was not due to chance.
4. The unexpected change prompted further investigation, which led to the identification of a potential problem with the equipment.
5. The identified problem was resolved, and the patient's care was adjusted accordingly.
6. The case study highlights the importance of carefully evaluating unexpected changes in a patient's condition and taking appropriate action to ensure patient safety.

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Section VI: Summary and Conclusions

SUMMARY

During a 44-week period from July 10, 1974 to May 19, 1975, 68 programs divided among five experimental events were broadcast over ATS-6 to ten Veterans Administration hospitals in the Appalachian Region. Each hospital was provided with a telephone link to a Denver television studio where programs were produced so that time and interchange was possible during all broadcasts for one experimental event, the evaluations' telemedications, the hospital from where the consultation originated also was equipped with a slow scan video connection so that visual information could be transmitted to the Denver studio.

The overall goal of the experiment was to determine whether telephone-mediated communications have a place in the Veterans Administration health system. The importance of a two-way flow of information throughout this enormous system has been recognized. The ability to communicate in real-time, the management of the system, and the assurance of a feeling of relatedness among the professionals working in remote facilities.

The question asked in this study was: are the capabilities of two-way telephone-mediated communications service sufficiently unique, diverse, and cost-effective as compared with traditional channels of electronic messages, to warrant participation by the Veterans Administration in a future, more permanent communications satellites?

Evidence Provided by the Experiment on ATS-6

Perhaps the most significant indication of the potential of two-way telephone-mediated communications is the fact that the equipments were regarded as the ten participating hospitals, at the end of the experiment. Although participants had been asked to disregard the broadcast schedules and instead take advantage of the telemedicine service, the ten hospitals were asked to attend the last broadcast, which had been scheduled for the last broadcast.

The Satellite as a Medium

Although two video messages were sent by the Satellite, they differed in that one was addressed to the ten hospitals, and the other was addressed to the ten VA hospitals in Appalachia. It is that this hospital's location is geographically far from the ten hospitals, and that the video service had been able to simulate the role of traditional hospitals, the ten hospitals could have been served by others to receive telemedicine information. The result of broadcast, the way the system would be provided by the Satellite, is that it was for the experimental purpose of what was accomplished in the way of broadcast and presentation of information through the Satellite. The experiment could be taken as such a complete as the experiment itself.

The broadcasts of the VA/ATS experiment was not to find whether communications service could replace traditional telephone service, but to find whether the two-way telephone-mediated communications could be used to enhance the service. This could be used to enhance the service.

The Satellite was used in transmitting a color audio and video signal as well as a component to the ten hospitals. This device was used to receive information from the Satellite and to present it to the ten hospitals. This Satellite was also used to receive information from the Satellite and to present it to the ten hospitals.

CONCLUSIONS

The unique feature of a communications satellite is its ability to broadcast a television signal among many locations located over a large geographic area. A high powered satellite such as ATS-6 has the ability to provide communications to link up many locations in almost any location.

The following concept, based upon similar knowledge to the one developed from the design and implementation of the VA/ATS experiment, is one conception of how a satellite might be utilized in providing an informational network for the Veterans Administration's 383 health facilities.

The Future A Satellite-Mediated Communications Network for Veterans Administration Health Facilities

Some of the communications needs of the VA's large system of hospitals, clinics, and other facilities are (1) overall system of patient management information system; (2) high standards of care in different utilization of resources; (3) a means of providing two-way access to medical education at home and in the field, and to the hospitals for education; (4) a linkage to specialists, accessible at any time to physicians and nurses, and other professionals; and a linkage between facilities.

The VA's system for the facility would be a modified network for providing two-way access for medical information, and a means for sharing information among a large number of medical centers.
need of managing or retaliating against patients and relatives.

Patient Management: The Problem Oriented Medical Record (POMR) has been introduced to the Veteran's Health Administration (VHA). As the VHA efforts to improve its quality and efficiency, it is important to understand the reasons behind the success or failure of POMR implementation. This is because it is a critical aspect of the healthcare system and the success of the implementation can directly impact patient outcomes and satisfaction.

The POMR system, which is a comprehensive electronic medical record, provides healthcare providers with access to patients' medical history, treatment plans, and other relevant information. The goal of POMR is to improve patient care by facilitating faster and more accurate diagnosis and treatment. However, the adoption of POMR is not without challenges. One of the main challenges is the resistance of healthcare providers to change their traditional practices and adopt a new system. Another challenge is the lack of proper training and support for healthcare providers who are new to the POMR system.

In order to ensure the successful implementation of POMR, it is essential to address these challenges. Healthcare providers need to be adequately trained and supported to use the system effectively. This includes providing them with the necessary tools and resources to overcome any technical difficulties they may encounter. Additionally, healthcare providers need to be motivated to adopt the system by showing them the benefits it can bring to patient care.

The implementation of POMR is crucial to improving the quality of care provided by the VHA. By addressing the challenges associated with the implementation, the VHA can ensure that the system is adopted successfully and its benefits are realized. This will ultimately lead to better patient outcomes and satisfaction.
classes and possible future uses of satellite communications. Cost and benefits will be considered next in a more specific discussion of this important aspect of a satellite communications system for the VA.

Nationally, an experiment involving only two hospitals cannot be particularly cost-effective since all of the production and related equipment will be expensive. This also applies where many smaller hospitals are involved. However, it is justifiable, i.e., it will demonstrate potential cost-effectiveness when such educational and consultative linkages are projected over the entire VA system. The ATS-6 experiment did indeed demonstrate that such linkages lead to positive changes in many cases, and it is clear that minimal facilities for establishing the linkages would cost many times the amount of a satellite interconnection. Two important questions remain regarding cost-effectiveness:

1. Are patient care benefits created by weekly interactive professional exchanges worth an investment of $2.50 per hour for each participating health professional? (This is the maximum projected cost for a system-wide weekly exchange, including the highest possible cost for satellite time, production and management functions. It is based on a total overall cost of $150 per hour divided by 25 health professionals in each of 106 hospitals or 4,260 participating professionals.)

2. What will be the actual hourly cost for a nationwide television satellite linkage involving all VA hospitals? (The maximum cost projected to date has been $2,000 per hour for one-way video nationwide. This figure was used to compute the hourly cost per health professional cited above. However, if the hourly satellite tariff is less, it would of course reduce the cost per professional-hour accordingly. Some estimates have been as low as $500 per hour.)

The answer to question number one must be determined by the VA Central Office. In the opinions of the project contractors and authors of this report, even the pessimistic figure of $1.50 per participating professional is worthwhile. The investment is considering the likely outcome on patient care. The system becomes much more cost-effective when resulting software is distributed and retained in videocassette. Health professionals who are exposed to the materials in a passive or non-interactive viewing situation may be reached for considerably less than $1.50 per viewer per hour. Although it has been demonstrated that such passive viewing is less desirable than interactive participation, it is sometimes the only means of reaching certain members of the health team (i.e., night shift nurses and paramedical personnel).

The uplink frequency restrictions which prohibited actual telecommunications on a one-to-one basis have made it impossible to develop realistic cost projections for such telecommunications at this point. Additional experimentation is needed, with carefully controlled one-to-one telecommunications, in order to project the ultimate cost of such linkages with video, slow scan, audio, and the extension of diagnostic tools by satellite. Future experimentation in this area should be designed to assess utilization patterns, so that cost projections will reflect 8-hour, 16-hour, and 24-hour service.

Finally, with regard to cost, it must be pointed out that a conventional terrestrial microwave linkage of 171 VA hospitals would cost upwards of $25,000 per hour plus installation and construction charges. It is determined that these linkages are of significant value to Veterans Administration hospital personnel and patients, the $2,000 per hour projected maximum cost for a noncommercial nationwide satellite linkage is clearly an important breakthrough.

Relationship of the VA Satellite-Mediated Communications Network with the Outside Medical Community

The VA Satellite Communications Network could potentially serve many functions for the medical communities surrounding the VA hospitals. Satellite network hospitals could become teaching centers for the physicians, nurses and allied health professionals practicing in the communities. When facilities were available, these professionals would be invited to participate in continuing education and in-service training courses offered at the VA hospitals. They might choose to become subscribers to the videotape programs developed and produced at the center and to participate in regional workshops offered via the satellite. The possibilities of interchange with the medical community are numerous, both for the development of programs, and for their utilization.

The VA system for computerized patient care management, based upon the Problem Oriented Medical Record, may one day serve as a model for other hospitals and medical centers. Such medical care providers might be invited to participate with the VA in establishing a computerized, continuously updated patient care audit system that will be utilized throughout the nation. Such a nationwide standard of practice seems inevitable, based upon the more and more commonly held belief that excellent medical care is a patient's right.

The "local standard" of medical practice that now inhibits such a nationwide standardization, will probably be both unattainable and inadequately in the future. As discussed earlier in the section, the legislation requiring medical audit according to local standards has proved difficult to adhere to when hospitals try to establish their own standards of practice. But the "local standard" may be inadequate for another reason, too. Legally, the standard of medicine practiced in the community has until now been the measure for adjudication of malpractice suits. It means that if the physician-defendant performs, according to the standards of his peers, in the community, he should not be found guilty of malpractice.

The precedent set by a 1968 Massachusetts case, Briner v. Bellevue, may cause that standard to be suspect. According to the decision in the case, the "locality rule" is unsuited to the conditions of the times. Medical practice should no longer be "Balkanized," so that care delivered in small communities distant from teaching centers, is measured to different standards than those for larger metropolitan areas. In Massachusetts, the new accepted measure would be the average qualified practitioners of the specialty, wherever he may practice. "Taking into account the changes in the practice of medicine," the Massachusetts "average practitioner" standard has not yet taken the place of the "local standard" for most states. But, the legislation requiring medical audit according to present standards may provide the impetus for "de-Balkanization." For many years, from efficiency to the expectations of the patient, a nationwide standard seems inevitable, and the largest health care delivery system in the nation would seem to have a logical place in its derivation, administration, dissemination, and maintenance.

RECOMMENDATIONS

A satellite-mediated, VA health network, interconnecting 361 VA facilities and managing medical audits, educational programs, diagnostic and communications for its own and other facilities, is probably the future achievement. Some technological advancements and philosophical changes must first be accomplished. In the meantime, a general recommendation resulting from the VA-ATS-6 communications experiment would be that the Veterans Administration continue in its role as an active leader in the field of satellite communications. Specifically, recommendations for immediate action are:

1. Since it has been demonstrated that satellite communications have an over-all positive impact in terms of improving knowledge and skill among practitioners, the VA should continue communication with available satellite facilities (provided that (a) the expenditure for experimentation is within reason (leading toward a permanent satellite service), and (b) the available satellite is technically capable of providing the proposed linkage to VA hospitals on a dependable basis.

2. An appropriate VA representative should be given the responsibility for maintaining contact with the National Aeronautics and Space Administration, the Public Service Satellite Consortium, and the domestic carriers, so that the agency will be aware of future satellite opportunities.

3. The VA should become a member of the Public Service Satellite Consortium or its governmental counterpart and participate in negotiations for long-term domestic satellite linkages for at least all of its non-urban hospitals.

4. Because of its experience with ATS-6, the VA should assume a leadership role among other government agencies in exploring the feasibility of a government-shared satellite, should the consortium and other common carriers fail to provide necessary resources within a reasonable period of time.

5. As part of its outreach program, any future VA satellite communications should be made available to hospitals and practitioners outside the VA system.

6. An ultimate permanent nationwide linkage of all VA facilities should involve satellite tariff charges of $2,000 per hour or less. Some estimates run as low as $500 per hour. This works out to $12.50 per hospital or about $3.75 per viewer based on ATS-6 attendance averages. Not including production related changes.

7. In a permanent (non-experimental) satellite Post-Graduate Education Series, all programs should be accompanied by printed study guides.

8. Until additional satellite linkages are available to the VA, consideration should be given to providing films and video tapes for continuing education of health professionals in non-allocated VA hospitals.
References

1. A proposal to the Veterans Administration Appalachian Regional Commission Foundation for Applied Communication Technology.
2. A report on a demonstration of a passenger casino television service. The Department of Physiological Medical Education, University of Virginia, 1971.
The following document has been prepared to provide the reader with a brief but comprehensive review of the Satellite Technology Demonstration (STD) from its inception in January, 1975, through August, 1975.

The significance of the potential contributions of the Demonstration was emphasized in a 1972 statement by Cecil D. Andrus, Governor of Idaho:

"I feel confident that there is a promise of real benefit in mankind in this project. If we can truly provide a system of communication among the people of this region, we can be but moments away from the time when we can say we have helped solve the basic educational disparity between the community school and the fundamental principles of liberty, equality, and open opportunity for all people."

This potential was demonstrated. As Project Director, I know that the realizations and accomplishments of the STD will have a far-reaching impact on the future of telecommunications.

Dr. Gordon Law
Project Director, STD
September 15, 1975
The Satellite Technology Demonstration was the first major effort to use a communications satellite, the ATS-6, for the delivery of social services to geographically isolated communities. This Demonstration and other Health, Education, Telecommunications Experiments held the promise that social services can be extended to more people at reduced costs. This Project has brought us full circle. The nation proved space originally to learn some of the universe and of our own earth. However, with the advent of the STD we are now using space discoveries and space itself to serve mankind.

This technology is now available and has been proven feasible for practical use, and the demand for it has been documented. This Project has not an unanswerable trend which will continue until the expressed needs of the user populations have been satisfied. Our challenge will be to continue development and apply justifiably the use of this capability, mediated by potential human benefits.

The technology has been exposed as an aid to the precept. It is not a trouble-free aid, and its fraught with numerous pitfalls. In spite of this, it holds great promise.

The ATS-6 has now been moved from its original position to provide telecommunications service to India. This allows United States-users time to evaluate and reflect upon their experiences during the first year of operation with this versatile and complex communications technology.

The Federation of Rocky Mountain States was proud to participate in the Satellite Technology Demonstration. Our participation simplified a basic task of our organization—that problem and opportunities are no respects of geographic boundaries, and that states can pool their resources and effectively participate in regional projects.

The Federation is indebted to many agencies and individuals in education, government, and business whose contributions made the Satellite Technology Demonstration a success. We are particularly indebted to the STD staff for their dedicated efforts, to the personnel in the state sponsoring agencies, and to the teachers and staff coordinators and students in our local sites for their support and contributions.

Our has been a regional project, which we have successfully integrated into the activities and programs of leading state and local agencies. On a smaller scale, we have been a Demonstration of what can occur on the national, even international level given careful planning and incorporating the ideas and concerns of the constituencies participating in the programs.

The technical capability has arrived—we eagerly await its broader application.

Sincerely,

Jack M. Campbell
President
Some, I.

"It all started early in the spring of 1973 when I received a letter from a new project called the Satellite Technology Demonstration inviting me to a state get-acquainted meeting to discuss the use of space-age technology for distributing educational services into selected schools in the region. Many questions were asked and nearly everyone at the meeting expressed interest in obtaining further information.

When Project representatives came to our town they talked with staff members and me school board members and people in town. They learned that the population of our community is about 2,500 but that our school population is around 600 because students come from farms as far as 20 miles away. They seemed particularly interested in our rural setting and the school's willingness to support the experimental program. As a result, we were notified in the summer of 1973 that we had been selected as an STD site.

By the spring of 1974, things began to happen. We had to decide which students would participate which teacher would serve as our local coordinator, and which room would be used for television viewing. We also had to order our color television monitor and videotape cassette recorder.

By late spring, our plans were made and teacher and student interest was reasonably high. Their interest and curiosity reportedly increased about a week before summer vacation when the STD technicians came and installed the receiving antenna and a protective fence.

During the summer, the technicians returned to complete the equipment installation and to make final tests. Also during the summer, Mrs. Martin, the teacher assigned as local coordinator, and Mr. Papas, the junior high principal attended a three-day training session conducted by the Project.

As soon as school opened in the fall, Mrs. Martin was busy obtaining pre-test data on the students enrolled in her STD class. She also collected data from the school staff and members of the community. Everyone who saw the program was amazed at the high quality of the video and audio reception we were able to obtain. Initially, there were difficulties with the quality of the audio interaction system which used a different satellite. However, within a couple of months, the problems were worked out.

The students enjoyed the programs and seemed to learn from them. The librarian and counselor stated that students asked more questions and showed more interest in careers. While there were some parts of the program and audio interaction which they would like to see changed, they encouraged other students to take the course the second semester.

Some of the staff took the in-service training course for college credit. The STD made arrangements with one of our state colleges to grant graduate credit for participation.

One of the most popular services the STD provided was called Materials Distribution Service. Excellent films on many subjects for all grade levels were available to us. It was an outstanding service for our schools. Some days we had as many as four or five classes viewing different MDS films which we had videotaped. Because of copyright expenses, we will not be able to afford all the MDS films we taped and are now reviewing them to select those we will keep and reuse.

The STD also provided a program for community adults. Although the people who came to watch seemed to enjoy it, we were never able to attract the size audience we would have liked. I believe that any future programming of this type should be a series of short courses such as budgeting and landscaping and community planning.

In looking back, I believe everyone in our school and community feels that our involvement in the STD was a good experience. The Project had its strengths and its weaknesses and the reporting was a lot of work but we gained from it and realize that it has great potential. Would we be willing to participate in the next satellite project? Yes! We are hoping that our school will become the communications center of our community.

A composite section of the 44 school superintendents who participated in the STD would reflect that awareness that change is inevitable, that willingness to change, that belief that technology must be applied to education, and their desire to extend their participation to future satellite projects.

In 1955, Giugliano Marconi directed wireless signals from one end of a room to the other. Six years later, powerful transmitters exchanged "marconigrams" between Poitou, England and St. Johns, Newfoundland.

In 1966 NASA's first Applications Technology Satellite, the ATS I, linked isolated Alaskan communities via a satellite radio network. Eight years later NASA's sixth communications "bird," the ATS-6, beamed live, full-color television programs to participants in telecommunications experiments in sparsely populated regions of the United States. In the Rocky Mountain region the experiment was the Satellite Technology Demonstration (STD).

Modern communications technology typified by daily satellite transmissions which bridge entire continents confirmed Marconi's prediction that telecommunications would become the almost unnoticed working equipment of civilization. "New vistas of telecommunications technology have been explored as federal, state, and local agencies in the field of distance education and social services seek to develop new technological means to satisfy human needs and solve social problems."

Robert Jastrow, Director of the Goddard Institute for Space Studies, foresees a fifth revolution involving space telecommunications which will be even more radical than the four previous revolutions of speech writing, printing and radio. "In the long run," Jastrow predicts, "the new satellites will provide a nervous system for mankind, knitting members of our species into a global society."

Fifty-six communities scattered throughout eight Rocky Mountain states have compiled a preview of this telecommunications revolution. Ranchers, farmers, carpenters, bankers, teachers, students, and others in communities as economically and culturally diverse as Pueblo, New Mexico and West Yellowstone, Montana have used the powerful medium of satellite television to maintain dialogue with the staff of the STD. The process proved that extensive and inexpensive communication across large expanses of the earth is not only possible but desirable and productive. Along with performing highly technical and scientific functions of data collection and analysis and high altitude photography satellites have now assured a welcome place in the school classroom.

The STD staff succeeded in transforming an untested communications concept into the largest non-military extra-terrestrial telecommunications system in the world. As television continues its second quarter-century the Satellite Technology Demonstration's pioneering efforts provide a documented report of potential benefits awaiting mankind.

GOODBYE TO THE GREAT DIVIDE
THE FEDERATION

The Federation of Rocky Mountain States Inc. headquartered in Denver, Colorado is the parent organization of the Satellite Technology Demonstration.

The Federation was established in 1968 by the Governors of the states of Colorado, Idaho, Montana, New Mexico, Utah and Wyoming. They were joined by business and industry to provide a forum to address problems and promote the orderly development of the region.

The organization continues to work in the areas of natural resources, regional planning, market development, arts and humanities, environment, transportation, human resources and telecommunications and was the catalyst for the establishment of public broadcasting in the region. It was this experience coupled with its educational work that prompted the U.S. Department of Health, Education, and Welfare to approach the Federation to become the planning and implementing agent for the Satellite Technology Demonstration.

The Satellite Technology Demonstration was designed to utilize NASA's Applications Technology Satellite (ATS-6) as a test bed to evaluate the feasibility of satellite communications for rural communities. The ATS-6 was selected as a broadcasting station 22,000 miles in space with sophisticated electronics aboard it was used to conduct a series of technological and scientific experiments.

The STD was a part of the larger Health Education Telecommunications (HET) Experiment which delivered television programming to small low-cost receiving stations in Alaska the Pacific Northwest the Appalachian region and the Rocky Mountain states. The HET Experiments were developed for areas where people are relatively isolated both geographically and culturally.

The Rocky Mountain West is a microcosm of striking contrasts covering over 600,000 square miles but inhabited by only 4 percent of the nation's people. The land contains a spectrum of ethnic groups, cultures and subcultures. Perhaps nowhere in the nation do ethnic groups cling more to their ancestral ethos than do the Mexican Americans, Native Americans, and Basques of the Rocky Mountain West. As this enormous rural empire moves toward urbanization, the contrasts between the past and the future become more evident.

In this mountain setting, the Department of Health, Education and Welfare was seeking answers to such questions as: Can satellites deliver information to people who cannot be reached easily, quickly or economically by other means? What are the actual costs involved? How do people in rural areas react to information being received and sent via satellite? What services and what presentation techniques are best suited to a satellite broadcast system?

The Satellite Technology Demonstration sought answers to these questions, while pioneering the satellite delivery of educational and social services to citizens in remote areas of the Rocky Mountain States. The major Project objectives were to demonstrate the feasibility of a satellite-based media distribution system for rural populations and to test and evaluate user acceptance and the cost of various delivery modes using a variety of materials.

SATELLITE TECHNOLOGY DEMONSTRATION

In the late 1960's the Federation played an important role in developing a regional educational television corporation which has now become the twenty-one station Rocky Mountain Corporation for Public Broadcasting.

These stations, because of their locations in major cities reach over 80 percent of the mountain states population, but do not serve many of the region's citizens who reside in rural isolated areas.

In 1968, 1969 and 1970 the Federation submitted proposals to the Office of Education, Department of Health, Education, and Welfare to utilize satellite potential by developing and delivering programming to rural isolated schools. None of these proposals was funded.

Early in 1971 the DHEW requested that the Federation submit a proposal for use of broadcast time on ATS-6 (the designation for the ATS-6 prior to launching). The Federation responded with a preliminary plan for programming in career education, early childhood education, and higher education. A significant cooperative effort was anticipated among Denver-based regional and national educational agencies to implement the plan.

In May of 1971 the Office of Education awarded the Federation a planning contract to prepare for a satellite experiment. Extensive planning was conducted with local input from state governments, teacher groups, students, the business community, broadcasters and minority group representatives. The following content needs were identified: early childhood education, occupational awareness, continuing education, communications skills, environmental studies, a variety of college academic courses, public service education, counseling and communications.

The Office of Education responded to the Federation proposal by making an FY '73 commitment of $5,000,000 for a limited satellite experiment-demonstration to include career education and early childhood education programming.

In January 1972 a six-month planning grant provided for program development in career education and early childhood education and established a production-engineering component responsible for ground system equipment and all production engineering planning was based on the assumption that program transmission would include public broadcasters in the region and cable and translator systems and individual sites unreachable by existing systems. Planning addressed one-way video, two-way video, one-channel audio, four-channel audio, computer-assisted instruction computer-managed instruction and remote uplink video-audio mixes to be used in various combinations.

The history of the STD was characterized by a shifting of Project objectives by the funding agencies changing, federal agency and management responsibilities and limiting the Project scope. Limitations included fewer installations, types of termina, technical capabilities, broadcast schedules and content development. All these changes were related to reduced funding — altered the STD.

The Project evolved into a multiyear research experiment and technical demonstration with limited objectives. Nevertheless, individuals and organizations involved in planning and implementation activities provided valuable lessons learned by the rapid development of a new technology system.
continued to pursue a "service-delivery" system rather than a "limited-experimental" mode. The service orientation remained because there was a regional demand to be addressed which far exceeded the available funding. It is commendable and noteworthy that during all of the negotiations (which reduced the number of sites, broadcast time, programming scope, and number of participants) the individual school districts maintained interest in the STD and sought to be included in the Project.

In addition to the narrowed scope of the Project, other difficulties were encountered. Late payments on the federal contracts and grants imposed hardship in planning and implementation schedules. The Federation developed new strategies in response to the delays and changing objectives of the funding agencies. It also organized the input from state agencies, local communities, educational groups, and involved members of business and industry. These constituents were kept informed of changes as they occurred and of the reasons for such changes. Within the STD project, reshaping refinement and accommodation were taking place to develop an organizational response to user needs. Programs were produced to specifications derived from the needs of regional audiences and were modified by suggested changes.

Several components were established to execute Project tasks. Management was charged with the responsibility of developing and implementing Project revisions, supervising the work of the various components, managing budgets and submitting successive proposals.

The Broadcast and Engineering Component was involved in the design of transmitter and receiving hardware and the design testing and procurement of the master earth station in Morrison, Colorado. This component worked closely with field service personnel in identifying receiving sites which had to meet certain demographic characteristics for evaluation purposes. Military and other regulatory agency frequency clearances had to be secured for each site. The design testing procurement and installation of equipment at the rural Rocky Mountain sites was a herculean task in addition to designing the low-cost ground transmitters and receivers the Broadcast and Engineering staff designed and built the Network Coordination Center in Denver capable of interfacing with NASA centers at Greenbelt, Maryland, Mojave, California, and Rosman, North Carolina. The component was also responsible for installing the ground equipment in the Appalachian region and for coordinating activities in Alaska, the Pacific Northwest, and the Appalachian region.

The Program Component conducted an educational needs assessment in the eight participating states. This component also reviewed and evaluated existing career education materials developed the preliminary educational content objectives and produced the programming ultimately broadcast by satellite.

Two coursework teams were charged with writing and producing the junior high career education series ("Time Out") to be delivered via satellite. Teacher and student guides were developed to supplement this series. Also produced was an adult community-oriented program series of 10 programs entitled "Footprints," a graduate level in-service series of 16 programs entitled "Careers and the Classroom: A New Perspective for Teachers." Another function (Materials Distribution Service) consisted of transmitting over 400 existing films which the site received on videotape for classroom use at their convenience.

The Research component designed and implemented data-gathering and evaluation procedures developed instruments to evaluate the performance and costs of both hardware and software, and studied attitudes of students, parents, teachers, administrators, and the general public. A national research committee was created to advise the component.

The Utilization component was established to provide field services. Staff members visited and gathered demographic material on potential sites—an activity which required close coordination with the governor's office in each of the eight states, the state departments of education, the state telecommunications agencies and numerous professional and civic organizations. School boards, superintendents, principals, mayor county commissioners, tribal chiefs, state legislators, state department heads, governors, and governors were kept current on STD site selection and changes in Project scope or direction. The component assisted the content specialists in determining the levels of greatest educational need and in developing the pilot program giving the content developed for the Project.

As the Project matured the Utilization component was charged with establishing a service component in each state. This involved employment of a resident state coordinator to work with STD staff and all state entities involved in the Project. Each selected site a local part-time coordinator was selected by the school superintendent. The entire state structure was jointly funded by Project state and local funds, with a major share paid by local and state governments. Contracts were negotiated with each state and site to clarify such details as insurance, transportation, broadcasts during out-of-school hours, regional meetings, equipment, custodial care and security.
Public information activities as a part of Project \textit{management} were geared to develop awareness and acceptance among the many \textit{STD} constituencies. A flow of accurate information was vital, especially since the Project was new and complex, and operated on such a large scale. Public information audiences included local, state, regional, national, and international constituencies. Emphasis, however, was placed on public information activities at the state and local level. Brochures, printed displays, media presentations, and a mobile display were utilized. Requests for presentations at meetings by \textit{STD} project staff were coordinated by the public information office.

The \textit{ATS-6}, which was used for \textit{health education}, \textit{telecommunication}, and \textit{emergency} communications, "orbited the earth and transmitted both voice and pictures". The \textit{ATS-6} was equipped for taking by Fairchild Industries engineers at Delmarva, Maryland.

On May 30, 1974, NASA launched the \textit{ATS-6} from Cape Canaveral. As it moved into its \textit{geosynchronous orbit}, 22,300 miles over the equator, the \textit{ATS-6} was designated \textit{ATS-6}, indicating its new operational status. It was now ready to respond to signals from the ground and to support 23 separate experiments. Six of these concentrated on the delivery of social services in health and education to selected rural residents. The largest of the six was the \textit{Satellite Technology Demonstration located in Denver, Colorado}.

While there were many last-minute adjustments to equipment, related to television material and calls to \textit{suppliers} who failed to meet delivery schedules, the Project was ready and anxious to become operational.
The AT&-e opac:ecr. Is the Mol complex and powerful communication. It was developed In the late 1960s. High gain antennas and high powered transmitters on the AST 6 can communicate with simple inexpensive ground terminals.

The two television transmitters provided remote areas with a reception quality better than that enjoyed by many urban communities served by conventional commercial and public television channels. Each transmitter produced a beam approximately 500 miles long and 300 miles wide which formed a giant footprint on the earth. In a single broadcast STD could cover an area from Canada to Mexico.

The communications capabilities provided by the ATS-6.

During the 1974-75 school year, the STD broadcast 450 hours of programming to rural schools. Half the time allotted to the STD each day was used to transmit to the eastern half of the Rocky Mountain region. On command from NASA control center at Goddard Space Flight Center in Greenbelt, Maryland, the spacecraft was repositioned and the footprint transmission shifted to the western half of the region where the programming was repeated.

The signals transmitted by the AST-6 were intercepted on the ground by antennas/receivers designed by Denver based STD Engineers. These receivers which cost about $4,600 installed were the lowest priced equipment of their type ever produced.

Twenty-four installations at all schools were designated as ITAs (Intensive Terminals) and had two-way audio capability. The other 43 installations were called ROTs (Receive-Only Terminals). The ROTs received the satellite signals but could not communicate back through the satellite system. Twelve of the ROT installations were at public television stations in the region enabling live or delayed broadcasts of

The STD is in direct broadcast capability and is cost-effective. An example of its potential is the installation of RoST in remote schools in the region enabling live or delayed broadcasts of

THE ATS-6 SPACECRAFT

The ATS-6 spacecraft is the most complex and powerful communications system developed in the 15-year history of communications satellites. Its high powered receiver/transmitter system coupled with a large parabolic reflector antenna relays high quality color television and digital signals simultaneously to a large number of small, inexpensive ground stations scattered over a large geographic area.

The spacecraft weighs 3,000 pounds, is 26 feet high and with solar array booms extended measures 52 feet from solar panel to solar panel. More than 21,000 solar cells capture energy from the sun to power the satellite's command propulsion attitude control telemetry and experimental mechanisms.
STD programs. Public television broadcasts added thousands of viewers to the region's urban areas to the
STD audience.

A color television signal, which could be accompanied by up to four voice channels of broadcast
quality, was transmitted to each footprint. The ATS-6 was also able to send and receive telephone, telegraph,
television, radio, facsimile, and computer data im-
ulses to and from selected sites in the Health,
Education, Telecommunications Experiments.

The ATS-3 (which was launched November 5,
1967, and is in geosynchronous orbit over the Atlantic
Ocean) was used to relay audience responses from the
24 Intensive Sites to the studio teachers in Denver.
Thus, a student in a classroom in Challis, Idaho, was
able to communicate with specialists at the Denver
Network Coordination Center (NCC) via the ATS-3,
allowing instantaneous response and participation.
Furthermore, the ATS-3 allowed participants at 17 sites
to communicate with each other. The research findings
clearly support that the interactive capability was one
of the key features of the Demonstration.

The STD and NASA were vitally concerned with
signal quality. The question was, "Can new spacecraft
technology, coupled with the STD-engineered low-
cost ground receivers, produce a television signal of
sufficient quality and consistency to become a reliable
educational, training, and social service tool?" The
answer was, "Emphatically, yes."

The hardware performed efficiently throughout
the life of the Project. Referencing Figure 1, the data
shows that the signal quality exceeded design
specifications 88 percent of the time. STD participants
rated both video and audio intelligibility as equal to or
exceeding the quality of commercial television signals.
Temperature changes had no discernible effect on
picture or sound quality. Normal cloud, rain, and snow
conditions had no measurable effect on reception.
Extreme ice build-up on the antenna surface, when left
unattended, caused only minor picture distortion. The
equipment failure rate was about one percent,
resulting in a mean time for repair of slightly less than
one program interval. No site was inoperable more than
one day as a result of failure of system equipment.

During the first few months of operation, voice
communications signals from ATS-3 suffered from
extreme, unpredictable fluctuations in quality.

Modifications made to the transmission equipment to
reduce the effects of radio frequency interference in
the Denver metropolitan area resulted in improved
voice interaction performance during the second
semester's programming. In addition, NASA also
agreed to full power operations of the spacecraft.
Digital transmissions successfully tested early in the
programming year demonstrated that the employment
of digital capabilities would have enhanced the
effectiveness of the delivery system.

Local school staff personnel were trained to
operate the transmitting and receiving equipment.
Even though few had previous electronic or radio
communications training, all learned to operate the
equipment quickly and expertly. Consequently, operator error accounted for less than one percent
of the broadcast system downtime.

The Denver-based facilities for the coordination
of the HET network were designed and built by STD
engineers. The satellite access terminal or uplink,
although designed without total redundancy capabilities, worked well. Failure time including that
caused by local power outage was 117 minutes, or less
than one-half of one percent of operational time. In
fact, the quality and reliability of the uplink facilities
exceeded expectations.
AmTUDI: SCALI CIfI TOTAl. DECISlOIII4AJ(IMQ

Education was initiated when education had been in developing program in elementary schools for some time. Second, many high school students had access to vocational and other "hands-on" experiences, but an educational void existed in the middle grades. Accordingly, it was decided that the programming would focus on students in grades 7 and 8.

During the course of the STO career education programs were broadcast to students at both Open and Closed Sites. Closed Sites were those where STO equipment had been installed to receive programming directly from the ATS. Open Sites were schools which received programs from public television stations or via cable and transmitter systems.

The career education programming entitled "Time Out" was broadcast Monday through Friday during both the first and second semesters of the 1974-75 school year. Pre-taped segments of the Monday through Thursday programs lasted 28 minutes to allow public television stations to carry the series in a standard half hour time period. These pre-taped segments included dramatized situations and existing film materials selected according to appropriateness. The series emphasized self-assessment, career exploration, and decision making; stressing the options available to each student in relation to individual skills and abilities. An additional six minutes of daily programming featured live studio interaction between students and the Denver staff. In contrast to the pre-recorded programs, Friday programs per semester were broadcast live and were produced with a variety of formats. Although extensive modifications were made by time and budgetary constraints, second semester programs included revisions based on audience and STO staff review of the first semester broadcasts.

The production of "Time Out" was accomplished through a production system new to educational television called the "courseware team" approach. Existing materials were previewed for integration into the series. A content process was developed to guarantee the educational integrity of the programs

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>JUNIOR HIGH SCHOOL AUDIENCES 1974-75 SCHOOL YEAR</th>
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<tbody>
<tr>
<td>TOTAL JUNIOR HIGH ENROLLMENT</td>
<td>JUNIOR HIGH ENROLLMENT</td>
</tr>
<tr>
<td>SITES</td>
<td>NUMBER</td>
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<td>SITES</td>
<td>NUMBER</td>
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<tr>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>ARIZONA</td>
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<tr>
<td>COLORADO</td>
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<td>IDAHO</td>
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<td>NEVADA</td>
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<tr>
<td>NEW MEXICO</td>
<td>49,506</td>
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<tr>
<td>UTAH</td>
<td>11,407</td>
</tr>
<tr>
<td>WYOMING</td>
<td>27,211</td>
</tr>
<tr>
<td>TOTALS</td>
<td>578,210</td>
</tr>
</tbody>
</table>

Not every junior high school in the districts had access to PTV and not all junior high schools had invited STO programming.

Various television formats and vehicles were analyzed to identify those appropriate to the junior high school audience. An in house studio facility was built for the production of the pre-taped and live segments of the programming.

The developmental process included four major steps with several activities within each step. These steps included (1) identification and development of content, (2) development and refinement of scripts, (3) production and refinement of programs, and (4) refinement of television programming during the operational period. This sequence of activities was designed to assure optimum program quality within the available resources. The data base shows that students posted significant knowledge gains after viewing the programs. The largest gains were made by the students at the IT sites who participated in the audio interaction.

By providing meaningful informational broadcast, the STO helped adolescents develop decision-making skills and encouraged better utilization of educational and training resources in the region's rural schools.

Print materials designed to supplement "Time Out" included a teacher guide and a student magazine. The teacher guide contained a variety of discussion.
STD STUDENT POPULATION

Analysis of population data indicated that 5,593 students at the 56 STD Closed Sites viewed "Time Out" and an additional 18,919 students viewed the program as they were re-broadcast by participating public television stations in the region. These 22,512 students and provided program information for teachers to use in ordering films for selection distribution. Teacher guides included suggestions regarding classroom applications of the films in service participants received updates which included an outline of the presentation and background information on the program speaker.

Site coordinators received materials for publicity and follow up activities connected with Footprints Flyers, posters, and other promotional materials were used to attract audiences. Community interest suggested additional activities, ratings of available local state and national resources and suggestions for subsequent activities were available.

Audienc acceptance of Time Out

The "Time Out" series utilized a number of different formats to explain career concepts. Time Control Central was a major format and used a science fiction set and a futuristic approach. It provided a vehicle to move forward or backward in time to access a computer for information on recall film clips, and to smoothly bridge other program formats.

Program formats included Footprints Corner which featured teenagers in a rural setting, film clips of job scenes. Dr. DOT, a different type character used to explain the Dictionary of Occupational Titles, Nick Garner, a comic detective. Puppets used to explain attitudes. Aunt Frumpy who answered letters, "Time In," which was six minutes of daily audio interaction and "Time For You" 12 Friday, 30-minute interactive programs. Acceptance levels for all program segments have been specified in Figure 4.

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MATERIALS DISTRIBUTION SERVICE

The STD's Materials Distribution Service (MDS) was designed to increase the scope and flexibility of rural school curricula. Through this service the STD Closed Sites were able to gain access to a variety of high quality films and videocassettes which were broadcast via the ATS-6. These materials were used by the schools in a variety of ways that included public television broadcast and viewing at the school site.

The content of the MDS film library was determined by the participating sites. These sites selected films from catalogs provided by the Encyclopaedia Britannica Educational Corporation and the Great Plains National Instructional Television Library. The selection of films was made based on the interest expressed by the participating sites.

Aside from two programs (Purple Mountain Majesty which was completely pre-recorded and Brack-Tack which was a live panel discussion) the format for "Footprints" consisted of an opening title sequence, pre-recorded topic exposition, interactive and closed captioned panel members and moderators were selected for their subject matter knowledge. The Flexibility of the program was wide ranging and was determined by the sites.

The data collection, tabulation and analysis was conducted by the Encyclopaedia Britannica Educational Corporation.

The only problem encountered in the broadcasting of MDS was a lack of sufficient satellite time to meet all film requests. In the future this problem could be alleviated by the use of video compression which would enable the distribution of more video material in shorter periods of time.

The impact of the Materials Distribution Service will be felt far beyond the life of the STD. The equipment and quantities of tape purchased by the sites will be of use in their educational programs for many years. Furthermore upon conclusion of the MDS project the participating sites were able to negotiate an arrangement with the Encyclopaedia Britannica Educational Corporation whereby participating sites were allowed to purchase the films they had viewed at a relatively low cost.

Those videotaped films are now a permanent part of the schools' resources.

FOOTPRINTS

"Footprints" was selected as the title for the adult evening series. The purpose of each program was to provide assistance to the community in recognizing some of the area's problems and concerns. The final schedule of program titles and topics included: Order No. 461114-777 (mail order consumers) The Space Between Us (interpersonal communication) "The Great Land Race" (land use) "For Purple Mountain Majesty (cultural heritage) The Job Jungle (career development for all) Super Cooperatives (farm cooperatives) "Wetwagers! Every Child's Neighbor" (early childhood education) "Is There a Doctor in the Country?" (rural medicine) Don't Hold Us Back (senior citizens) and "Brack-Tack (a summary of the STD with a look to the future)"
CAREERS AND THE CLASSROOM
A NEW PERSPECTIVE FOR TEACHERS

To broaden the impact of the STD project a teacher-oriented series of career education programs was developed to supplement the student-oriented "Time Out Series. This series entitled "Careers and the Classroom: A New Perspective for Teachers" was designed to inform interested educators in participating districts about career education and to encourage them to utilize the principles of career education in their classroom activities. Broadcast bi-weekly from September 5, 1974 to May 1, 1975, this programs in the series dealt with 18 career-related topics. Program titles included in the series were: "Career Education Is for Everyone: Continuing Education's Role," "The Dictionary of Occupational Titles," "Honest Self-Assessment: Values and Strategies for Decision Making: Organizing and Facilitating Independent Learning," "Career Guidance Resources: Career Education and the Standard Academic Curriculum," "Overcoming Biases in Counselling Students: Ecology/Environment -- How Do They Impact Upon Careers?" Union and Career Education, "Job Security Tomorrow's Careers: "Earning a Living Is Not Enough -- The Art of Intelligent Spending: Effects of Change on the World of Work-- Career Education Today.

Each program in the Careers series had a similar format. Two STD staff moderators introduced the presenter responsible for a given program. The presenter lectured for 10-30 minutes followed by an interaction session via satellite. Each program was 50 minutes in length.

All sites participating in the Careers series received information about each program. The program reviews contained biographies of the presenters and outlines of the presentations. In addition to the course of each program, presenters would frequently recommend supplementary materials to be used for further work on an individual basis.

Several regional colleges and universities offered graduate credit to participants in the Careers series and 264 educators took advantage of this opportunity. In addition, 322 teachers who participated in the program received recertification credit from their state department of education. The "Careers series met the needs of teachers for this type of programming. The teachers however, expressed a preference for multi-media presentations rather than a talk show format.

SPECIAL PROGRAMS

Russian Minister of Health the Space and Missile Systems Organization, the Society of Motion Picture and Television Engineers, and the National Association of Educational Broadcasters and the American Association for the Advancement of Science.

Several special news programs were transmitted through the projects network to the residents of Juneau, Alaska. These programs included the resignation of President Richard Nixon and the acceptance speech of President Ford. Programs were led from Washington D.C. to Denver via the Public Broadcasting Service land lines. The broadcast link from Denver to Juneau was provided by the ATS-6.

The leading project scientist for NASA's Viking Project utilized the broadcast media to make two presentations describing the Viking Mars mission. Students at Intensive Sites were given the opportunity to question the guest scientist while other participants viewed and listened to his immediate responses.

A program prepared on behalf of the American Association for the Advancement of Science involved the live broadcast of a ballet performance. The program originated from the STD studio and was broadcast to the Lincoln Center for the Performing Arts in New York City to an audience of UNESCO representatives and others interested in the application of science and technology to the arts. To demonstrate the interactive capability, the performance was critiqued live from New York City.

A special program was prepared for the Rocky Mountain Regional Medical Conference in Bozeman, Montana. This program described the potential use of satellite broadcast systems in the medical field. Such programs could be used not only to serve as a teaching tool for medical personnel far from urban areas but also to provide medical assistance in life-and-death situations.

The Emergency Medical Technicians Refresher Course was a joint effort of the Federation the Mountain States Health Corporation and the Rocky Mountain Corporation for Public Broadcasting and the Robert Wood Johnson-Foundation. This series of seven programs designed to serve as a refresher course for certified emergency medical technicians. This series was made available to technicians in remote areas the expertise of leading medical authorities in the region.
INTERACTION

Live interaction via the ATS-3 was a major aspect of the STD project. This capability, which allowed STD participants to communicate with one another and with STD staff in Denver, was intended to achieve three objectives: to increase the educational value of STD programming; to increase the acceptance of such programming; and to investigate the effectiveness of various live program formats.

Interaction Using the ATS-3

The interaction system employed by the STD involved the use of NASA's ATS-3. This system was an integral part of the junior high school education series. Sixty-nine of the eighty-one half-hour programs in this series were pre-recorded presentations followed by 6-minute live programming during which students asked questions and provided comments concerning the broadcast. During the first semester, three 6-minute segments entitled "Time Out, Time For You" were moderated by two staff members at the STD Studio in Denver. Additional STD personnel off-camera provided a "knowledge pool" for answers to content-specific questions, most of which involved requests for information about training requirements and attitudes toward and temperaments associated with various careers.

There were also 12 half hour live segments each semester entitled "Time Out, Time For You." These programs were designed to stimulate interaction between STD students and content experts in the Denver studio. During the first semester, STD experimented with a variety of formats in this area, including mini-dramas in which teenagers presented conflict situations intended to elicit comments from participating STD students. Debates in which two Intensive Sites supported opposing positions on a given career topic while students at the remaining sites provided questions and comments and "knowledge pool" programs, which were essentially extensions of the "Time In" broadcasts encouraging students to seek information relating to various career alternatives.

During the second semester of "Time Out, Time For You," broadcasts the panel show format was retained and two additional types of live programming were provided. The first new program series featured experts from several educational areas beyond the secondary level. Representatives from colleges, universities, junior and community colleges, private and public vocational technical schools, and union field personnel programs responded to students' questions in their respective areas of specialization. The second type of new programming was produced at the local level by students interested in careers in their own communities. Films, slides, scripts and audio tapes were collected organized, and sent to Denver where the STD production staff prepared the materials for broadcast. Following each segment, students at the Intensive Sites submitted questions, which were answered by experts in various educational areas beyond the secondary level.

In advance as possible and questions by mail were solicited. Letters received from students at the Intensive Sites were acknowledged and answered during the live broadcasts.

Digital Interaction

The original STD proposal included plans for live interaction through the use of digital pads at participating STD sites. Unfortunately, lack of funding precluded full implementation of these plans. The STD was able to conduct a series of limited tests during the spring of 1975 which demonstrated the feasibility of such a system.

To interface with the space-vehicle at the ATS-3 the uplink earth station at Fort Collins, Colorado operated at 1 and 6 GHz. The station was used a 5 kW transponder, an uncluttered low noise parametric amplifier and an 11-meter (32 foot) prime focus parabolic antenna.
SUMMARY OF STD SERVICES

The Satellite Technology Demonstration design-
ed developed, implemented and tested an elaborate
technical communications network programming
for a wide variety of users and a comprehensive field
support system.

Despite extreme weather conditions the
technical network operated efficiently within a minimum
of interruption of services. Signal quality far exceeded
minimum design specifications. The STD designed
ground receivers proved to be a suitable low-cost
network component, complementing the high-
powered transponders of the ATS-6.

The STD programs attracted a larger share of the
viewing audience than public television broadcasts in
general. "Footprints" attracted 3.31 percent of con-
tacted viewers and "Time Out" was viewed by 4.13
percent of the non-school respondents in comparison
to a February 1975 Nielsen survey which found 2.8
percent of the general audience viewing public
broadcasting. Acceptance of the programming was
generally high and student knowledge gains were
 gratifying. The largest gains were made by Mexican
American students, which is of particular interest since
the programs were generic in design and not intended
for any specific audience.

The field support system involved over 200 state
and local educational professionals and technical
specialists in carrying out the planning, development,
and operational tasks of the STD. A significant legacy
of the STD is the user system composed of pro-
fessional policy makers, managers, teachers, citizen
citizens, advisory panels, parents and young people in
8 states and 12 public television

The SAT delivered educational materials and
services to a wide range of audiences in an area nearly
one-fourth the size of the United States at a cost of
slightly over $11,000,000. While a satellite system has
been demonstrated to be technologically feasible
means of delivering educational services, any judg-
ment about the efficiency of the system must be made
after carefully comparing costs to the advantages of
satellite distribution under specified conditions.

PROJECT COSTS

The Satellite Technology Demonstration was a
cost-effective approach involving the coordination of ef-
forts among local schools, state departments of edu-
cation, state and federal agencies, local public broadcast
stations and their regional networks.

Three federal agencies provided the STD funding
totaling $11,329,429. The contributions came from the
National Institute of Education $4,252,112, Office of
Telecommunications (DHHS) $2,778,339, and the
United States Office of Education $4,797,481.

The STD was completed in three major phases: planning
development and operation. The approximate costs
were planning $4,000,000, development, $4,000,000,
and operation $2,750,000.

The STD component structure was based on
functional activities related to the products and ser-

TABLE 3
COSTS BY COMPONENT

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadcast and Engineering</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Communications, Network Design and Implementation</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Field Engineering, Coordination Center, Program FACILITIES</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>Product Design and Video Production</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Utilization, Field Organization and Support Services</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Research, Data Processing, and Analysis</td>
<td>$600,000</td>
</tr>
<tr>
<td>Administration, Public Information, and Support Costs, Utilities, and Supplies</td>
<td>$1,000,000</td>
</tr>
</tbody>
</table>

*Does not include the $1,700,000 cost of early implementation which was (passed) out of the Project in July 1973.*

STD PROGRAM AND SITE SUPPORT

A major STD activity involved the development
and delivery of career education programs for junior
high school students. An analysis of the expenses
incurred during the development of these programs
revealed their cost to be approximately $24,500 per
hour. This represents a significant achievement when
compared with the production costs of other dramatic
educational series produced for public television
stations which range from $30,000 to $60,000 per hour.

A similar analysis indicates that the production cost
per hour for the teacher in-service series "Career and
the Classroom" was approximately $9,500 per hour,
and the approximate cost per hour for the "Footprints"
series was $75.

The estimated cost of an STD site during the
1974-75 operational year (including equipment and
human support services) was approximately $5,000 for
a Receive-Only Site and $13,000 for an intensive Site.
IN-KIND SUPPORT

One of the goals of the STD was to document the cost of delivery models using varied STD materials. These costs were judged and extensive information is now available to provide guidance for the planning of future educational satellite technology applications. An essential long-range goal of the STD was to obtain state and local in-kind support to demonstrate project worth and the importance of local commitment in the adoption of appropriate programs and services. The level of in-kind support was encouraging to the STD and to outside observers particularly those contributions made by school districts with limited funds.

In-kind support included expenses incurred by states and sites in addition to the STD's site support grant. Examples of such expenses are professional and classified salaries, office space, phone services and office supplies. An average of $34,972 was contributed by each state during the life of the Project. Local in-kind support has been itemized in Table 4.

**Table 4**

<table>
<thead>
<tr>
<th>In-Kind Support</th>
<th>AND PER SITE</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMUNICATIONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PHONE POSTAGE)</td>
<td>6</td>
<td>171,075</td>
</tr>
<tr>
<td>SUPPLIES (KITCHEN, OFFICE SUPPLIES)</td>
<td>1,798</td>
<td>97,730</td>
</tr>
<tr>
<td>EQUIPMENT MAINTENANCE</td>
<td>6,617</td>
<td>137,731</td>
</tr>
<tr>
<td>EQUIPMENT MAINTENANCE</td>
<td>5,175</td>
<td>5,175</td>
</tr>
<tr>
<td>TOTALS</td>
<td>9,481</td>
<td>186,900</td>
</tr>
</tbody>
</table>

In future projects, savings would be realized as the result of economies in large-scale purchase of equipment and facilities. Additional reductions in per user/teacher costs would be realized by increasing the number of program offerings to users. The STD's per site cost for the operational year was determined by adding the average site expense of $8,431 (as reflected in in-kind support) to the Project costs for installation and operations. (See Tables 4 and 5) In subsequent operational years, expenditures at STD sites would be reduced because of elimination of the initial start-up cost.

**Table 5**

<table>
<thead>
<tr>
<th>SITE COSTS INCLUDING IN-KIND SUPPORT</th>
<th>IT</th>
<th>NOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECTED STD SITE COSTS</td>
<td>1,169</td>
<td>6,218</td>
</tr>
<tr>
<td>IN-KIND SUPPORT</td>
<td>8,431</td>
<td>5,175</td>
</tr>
<tr>
<td>TOTAL AVERAGE COST PER SITE</td>
<td>9,600</td>
<td>11,393</td>
</tr>
</tbody>
</table>

IMPLICATIONS AND CONCLUSIONS

Another positive feature of the equipment was that it could be properly operated by non-technical non-professional personnel who required a minimum of instruction and supervision. This offers encouragement for emerging nations which will use satellite communications for small isolated communities unable to afford the costs of highly skilled technicians. The equipment was also adaptable to a variety of locations withinstanses weather factors and user demands.

A remarkable achievement of the STD was the coordination and blending of diverse interests and contributions of many people and organizations at the local state national and international levels. Individual efforts reflect the tremendous enthusiasm and interest of participants. One reason for the positive involvement was that the Project design elicited local responses so that programming could be modified to meet the needs of participating students.

A field support effort was implemented to help tailor the general STD program to respond to unique local cultural linguistic and other demographic factors. Those human support mechanisms contributed to program acceptance by students, teachers parents, and the community.

In a survey conducted by the Federation of Rocky Mountain States Inc. teachers administrators and school board members requested continued and expanded programming via satellite. Respondents indicated that more comprehensive services (student programming in-service programming distribution of existing materials specific training for adults, etc.) are needed to justify the expenditure of additional funds. Essentially the respondents seek further improvements and expanded technical capability and more diverse services.

The success of the Emergency Medical Technicians Recertification program demonstrated that satellites can provide quality training in many professional and technical areas. In-service training has been requested and could be provided for police, firemen, wastewater operating engineers and city planners. Satellite communications would appear to offer much potential for in-service training by making expertise available to large numbers of professionals along with the necessary equipment that would be accessible to many people at a low cost.
A significant adjunct of the STD and the HET Experiments was the incorporation of the Public Service Satellite Consortium (PSSC). The PSSC was organized by selected ATS-6 users and by other organizations who recognized that the accomplishments of HET were compatible with and supportive of their communication educational and social needs. Numerous organizations including states, regional commissions and compacts, national agencies, and national professional organizations have joined or plan to join the PSSC. A major goal of the Consortium is a satellite dedicated to social-service communication with technical attributes based on the needs of the user organizations.

There are hundreds of agencies and organizations who believe that satellites are communications devices "whose time has come." On the basis of the ATS-6 experiences, the users are now ready for the benefits of a full-scale satellite delivery system. There is local and regional enthusiasm for using the new technology. The test bed which includes slab receiving equipment, the Network Coordination Center, the uplink trained staff and committed users, remains in place in the region awaiting the return of the ATS-6 from India.

With ATS-6 and the Satellite Technology Demonstration the social implications of satellite communications are no longer a matter of conjecture discussion or debate they are a reality which we must exploit. Telecommunications via satellite is certain to increase substantially in the next decade. Filling satellite technology to the needs of all Americans—urban and rural—will be difficult but the rewards and promises are substantial.
ATS-6 HEALTH EXPERIMENT

Indian Health Service / Alaska
WAMI Experiment in Regionalized
Medical Education / Seattle, Washington

Phase I: Planning and Development

Prepared by
University of Washington Project Office
ATS-6 Health Experiment Management and Technical Operations
Contract No. NIH-CG-73-2063
Lister Hill National Center for Biomedical Communications

December 1974
UNIVERSITY OF WASHINGTON
Seattle, Washington
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The Role of Each Site
and Its Terminal Equipment Requirements
Telecommunication Experiments
How the Systems are Used for Interaction
How the System Operates for Teleconsultations
Additional Features of the System

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A-4-70
On May 30, 1964 the National Aeronautics and Space Administration placed a satellite in orbit 22,300 miles over the equator in the most complex, versatile, and powerful communications spacecraft ever developed.

From its geosynchronous position almost directly over the Galapagos Islands, the Communications Technology Satellite ( ATS-I) serves as a relay station for the most extensive experiments conducted to date in the field of satellite communications. The most ambitious of the experiments planned for ATS-I are those sponsored by the U.S. Department of Health, Education, and Welfare.

Using solar radio waves and a variety of data signals, the DHEW programs will deliver television services in health care and education to thousands of Americans living in areas too remote to reach through ground-based media. Appalachia, the Rocky Mountain states, Alaska, and Washington are the areas selected for the DHEW experiments.

This report describes the work performed by two of DHEW's experiments, the Indian Health Service in Alaska and the WAMI (Washington-Alaska-Montana) Medical Experiment in Regionalized Medical Education at the University of Washington to develop the programs, systems, and instrumentation required to implement satellite relayed communications in health care and medical education within the vast northwestern region.

Nearly fifteen years have passed since the National Aeronautics and Space Administration (NASA) placed the world's first communications spacecraft in orbit. Within these years the technology, progressed from the simple reflective balloons of the Echo series to the sophisticated instrument called ATS-I.

ECHO TO SYNCOM

The first communications satellites were large spherical balloons inflated in space. These balloons, up to 135 feet in diameter, contained radio transmitting antennas that signaled their presence to the receiving antennas on Earth. The balloons were then reprogrammed for another round trip.

The next generation of communications satellites were small (about 4 feet) cylinders instrumented for increasing complexity and power. The Relays were deployed in 1962. Their main customer was the military, using them to relay television and radio signals between ships or aircraft. The Syncoms were launched in 1963 to 1965. These satellites were more advanced than the previous ones, with more sophisticated electronics and better communication capabilities.

The Syncoms were placed into geosynchronous orbit, which allowed them to stay in the same relative position over the same area of the Earth. They were used to relay television, radio, and other signals between different parts of the world. The Syncoms were very important in establishing the foundation for modern satellite communication systems.

The Syncoms were also used for experimental purposes, such as testing new technologies and capabilities. They were successful in demonstrating the capability of satellites to relay signals over long distances and to provide continuous coverage of a specific area.

THE ATS SATELLITES

The Applications Technology Satellite (ATS-I) program, which provided the highly advanced spacecraft to be used in DHEW's Health Education Telecommunications Experiments, evolved from studies based on the use of satellite relayed communications to provide health care and medical education to remote areas.

All of the satellites in this series would achieve orbits that were geosynchronous rather than nearly geosynchronous. At 22,300 feet above the equator, the satellite would remain in the same relative position over a specific area of the Earth, providing continuous coverage and signal relay.

The ATS-I satellite was the first of a series of communication satellites that would be placed into orbit to provide global communication and data relay services. The ATS-I was launched in 1966 and was the first satellite to be placed into geosynchronous orbit. It was later followed by ATS-2, ATS-3, and other similar satellites that would be used for a variety of communication and data relay purposes.

The ATS-I satellite had a number of important features, including a highly advanced communications system, which allowed it to provide a wide range of communication services, including television, radio, and data relay. It was also equipped with advanced scientific instruments, which allowed it to perform experiments in space and provide valuable data for scientific research.

The ATS-I satellite was a significant advance in the development of communication satellites, and it provided a foundation for the development of future communication and data relay satellites. It was a key component in the growth of satellite communication and data relay services, which have become a critical part of modern communication and data relay systems. The ATS-I satellite was a remarkable achievement in the field of space exploration, and it is remembered as a significant milestone in the development of communication satellites.

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THE HEALTH-EDUCATION TELECOMMUNICATIONS EXPERIMENT

Some three years prior to the launch of ATS-6, plans to define the services the new spacecraft could be designed to perform were reaching conclusion. The U.S. Department of Health, Education, and Welfare saw the exploitation of ATS-6 offering unusual potential for applications in the areas of health and education. A joint proposal made to NASA by DH&EH and the Corporation for Public Broadcasting in June 1971 turned the latter for an agreement to use the satellite for experiments that would provide improved services in health and education to regions particularly remote from the mainstream of social and technological progress.

ELECTRONIC COMMUNICATION IN HEALTH AND EDUCATION

The two agencies within DH&EH bear major responsibility for applying advances in communication technology to services in health and education. The National Center for Biomedical Communications is division of the National Library of Medicine within the National Institutes of Health and the National Center for Educational Technology within the National Institute of Education. Both have already made considerable strides in demonstrating the value of electronic communications in their respective areas of concern.

The National Center for Biomedical Communications, a research project conducted by the Center over the years, has been to ease problems caused by shortages of medical manpower mainly by extending the resources of areas that possess sufficient manpower in areas that do not. (Line and telephone links which include television) and even utilize unassigned voice links have been used to form communication networks which can then be used by professional and paraprofessional personnel. Through these networks, the medical expertise available at large population centers can be utilized for purposes such as medical consultation training or continued education at locations where staffing is less adequate. These consultations, which are televised, have not only been found particularly effective and satisfying to the users.

Of the many demonstration projects receiving support from the National Center for Educational Technology, Sistah Sent is probably the most widely known example. Sistah Sent is a vehicle for the most intensive analysis of communications experiments devoted to date.

Only a few years ago a large and expensive earth station was needed to communicate with a satellite in an earth orbit. The ATS series satellites were designed with the express intent of reducing the power required for each station by increasing the power and precision of the satellites receiving and transmitting capabilities. Now video signals can be sent to and received from an ATS by terminals equipped at a fraction of the cost.

This economic advantage opened the way for experiments with satellite service by a large number of potential users. DH&EH’s Health Education Telecommunications Experiment will demonstrate the social value of this achievement in a series of programs that present new directions for satellite communication technology in the fields of health and education.

TARGET POPULATIONS FOR ATS 6

Outreach of medical manpower are found nationwide, including the central areas of some of our major cities. In these areas of highly concentrated population, access to health care may be less than optimal, but the possibility of access still remains as medical manpower is usually abundant. In areas more remote and particularly in very small and isolated communities medical services are often totally nonexistent and the distance to towns where care is available may be unmanageable.

Public telecommunications systems in these areas are also usually limited or non-existent.

Television educational broadcasts hold these largest audience in urbanized areas where public schools are typically well provided. The populations in rural areas that are living in areas that are remote for television reception—the same areas in which all forms of educational opportunity are often limited.

The immediate need for retraining of services in health and education appears to be greater in regions which are geographically remote. Many of these regions also contain large numbers of the minority and the poor.

THE UTILITY OF ATS 6

Three areas of the United States stand out as suffering particularly: the Appalachian Mountain region, the Rocky Mountain region and the state of Alaska. These areas of the Pacific Northwest could also be considered in this category though the situation is less severe and some form of communication is usually available.

In the first three regions mountain barriers make radio and television reception from ground based transmitters difficult or impossible. In Alaska atmospheric distortion interferes with radio communications. Penning an additional problem, most doctors serve small communities and the cost of installing land lines being ten times what they have in general been found prohibitive when the cost of the small number of people each individual would serve is considered. Modern communications systems will probably not be brought to these remote areas until their benefits can be demonstrated and the capital investment in permanent installations justified.

Signatures transmitted via ATS-6 are not affected by these barriers which preclude ground-based transmission and...
which have kept these communications in existence. The cost of the earth station requires a perpetual transmission and reception of signals for relay by ATS-6 is low enough to permit installation in hundreds of small communities. Because ATS-6 is instrumental to perform many complex activities very quickly, it can be used to meet the specific requirements of a very large number of very small groups.

It appears that the kind of communications systems pioneered by the Lunar Hall National Center for Biomedical Communications and the National Center for Education Technology could be applied to great benefit within these regions. However, there is no way of knowing whether these new applications to the service of health and education would effectively serve their intended purposes until the systems are tried. Through the use of ATS-6, local systems can be implemented at minimal cost so that their effectiveness can be tested and evaluated without requiring large capital outlays on permanent installations.

DHML will use ATS-6 to introduce new technologies to these remote regions and test their workability while at the same time extending to them some of the services they so urgently need. These demonstrations with the ATS-6 satellite make up the Health Education Technology Experiment (HET) Experiment.

ORGANIZATION OF THE HET EXPERIMENT

Three agencies within DHML are sponsoring the HET Experiments. The National Center for Educational Technology is in charge of experiments in education in Appalachia, the Rocky Mountain states and Alaska. The Lunar Hall National Center for Biomedical Communications is responsible for experiments in health care and medical education in Alaska and Washington. The Veterans Administration will carry out experiments in the same states as DHML.

The ATOS program is directed by NASA's Office of Applications. Project management is under NASA's Freedom Space Flight Center in Greenbelt Maryland. NASA provides the satellite technical assistance and access to the NASA ATS-6 ground stations used for transmission in many of the HET Experiments.

The Vietnam and Washington states involved in the HET Experiments will be controlled and coordinated by the HET Network Coordination Center in Denver, Colorado. This center is established by the Federalism of the Rocky Mountain States, also functioning as the central point for the Rocky Mountain experiments as well as a number of those to be carried out in the Appalachians.

TRANSMISSION SYSTEMS

During its first year of operation, ATS-6 will remain in its present location at 94 degrees west longitude over the equator in communications view of the entire continental United States. From this position, it will cover the three major geographic regions participating in the HET Experiments. The Appalachian region, the Rocky Mountain region, and the states of Alaska and Washington.

ATS-6 has two high-powered transmitters operating in the 2,500-2,700 megacycle range which will be used to relay separate oneway and two-way teleconferencing signals, each accompanied by four audio channels. The audio channels can be used to broadcast in several languages simultaneously or to transmit medical or other data concurrent with voice.

The two signals will produce a pair of nearly tangent rings that form giant footprints, 1,000 miles long by 300 miles wide, when focused along latitudes within the continental United States. Earth stations located within these footprints will be used to receive ATS-6 communications. These footprints will cover one geographic region for a predetermined period of time and thus be shifted by meteorological conditions to cover another. On some days of the week, the satellite will be concentrated on any 12 times to cover different parts of the country.

The major of the ATS-6 experiments will be equipped for reception only. The equipment for most of these will receive telecasts consisting of an ordinary TV set a computer and an antenna. The antennas will be small, but remote television dishes. The receivers will be installed on farms, each serving a single TV set in a hospital clinic or community facility or they will be tied in with public broadcasting microwave or cable systems already in operation in the participating states.

The Alaska and Washington sites involved in the HET Experiments will be controlled and coordinated by the HET Network Coordination Center in Denver, Colorado. This center is established by the Federalism of the Rocky Mountain States also functioning as the central point for the Rocky Mountain experiments as well as a number of those to be carried out in the Appalachians.

The experiments sponsored by the Lunar Hall National Center for Biomedical Communications consist of two separate programs. One for the Indian Health Service in Alaska and a second for the WAMI (Washington Alaska Montana Idaho) Experiment in Regional Medical Education at the University of Washington in Seattle. These two demonstrate the most sophisticated and complex of the HET Experiments and are the subject of this report.

The Indian Health Service experiments will implement a coordinated telemedicine and health information system at five Native health care facilities in Alaska. Interactive television and biomedicai telemetry will permit health care to remote villages to consult with their patients in a service unit hospital and with medical specialists in Anchorage and Fairbanks. Additional video programming will be transmitted from Fairbanks for the continuing education of health providers and for the health education of the Native population at the village sites.

The project is directed by the Indian Health Service in Anchorage.

The WAMI experiment will employ interactive video media and data to link students receiving basic science instruction at the University of Alaska and students receiving similar instruction in Anchorage. The two programs will be transmitted to Anchorage and Fairbanks. In Anchorage, the program is directed by the WAMI experiment.

The WAMI and WAMI experiments are covered in detail in the section following.

EVALUATION AND ANTICIPATED OUTCOMES

During the one month period for which the HET experiment is scheduled, the individuals and organizations participating in the experiments will be utilizing data to be used in their evaluations. The DHML agencies are responsible for finding out what people are using the systems think of information received and sent by satellite and what subjects and ways of presenting the information are most effective in this medium. The results of the evaluations will provide DHML with the information needed to help formulate future plans for using satellites as a means of conveying services in health and education.
THE ATS-6 SPACECRAFT

Physical and Functional Description

The ATS-6 spacecraft (figure 1) weighs approximately 300 pounds and measures 28 feet from tip to tip. The Earth Viewing Module at the bottom of the spacecraft houses antennas and equipment, and is connected by a flexible support tube to a 24-foot-diameter reflector antenna. This reflector, in turn, supports an array of solar panels inside the spacecraft and connects it to the large dish antennae that receive and transmit signals. The reflector, which consists of two sections, houses a number of components, including the microwave transceiver, the antenna reflector, and the control system. The system receives and transmits data from the ground. The microwave transceiver is a critical component of the system, and it is housed in a specially designed vehicle called the ATS-6 spacecraft. It is the largest reflector antenna ever placed in orbit.

The spacecraft is designed to operate in a low Earth orbit, and it is capable of transmitting data over a wide range of frequencies. The spacecraft's primary mission is to monitor and track weather patterns and provide information to scientists and meteorologists around the world.

Experiments

For its first year of operations, ATS-6 will continue to observe low Earth orbit. After several years, the spacecraft will be used to conduct the HET Experiment for weather monitoring and control center experiments. The spacecraft can be used to observe weather patterns from space, and it can be used to track weather phenomena from the ground. The spacecraft can be used to observe weather patterns from space, and it can be used to track weather phenomena from the ground.

Since the completion of the HET experiments, ATS-6 will be moved to a position over the western Pacific Ocean. The spacecraft will be used to monitor weather patterns and provide information to scientists and meteorologists around the world.

After several years, the spacecraft will be used to conduct the HET Experiment for weather monitoring and control center experiments. The spacecraft can be used to observe weather patterns from space, and it can be used to track weather phenomena from the ground. The spacecraft can be used to observe weather patterns from space, and it can be used to track weather phenomena from the ground.
The new capabilities pointed to in these experiments are expected to be fed into operational satellite systems in the future.

Success with satellite repeated communications experiments would make it appropriate for DHHS to favor regional approaches to the dissemination of our services, since the economical satellite coverage area would no doubt be regional. Decisions with respect to the location of production and distribution centers for media materials will be heavily influenced by the experiment's outcome.

**ATS-6 HEALTH EXPERIMENT**

The experiments sponsored in Alaska and Washington by the Later Hill National Center for Biomedical Com- 
munications will demonstrate a variety of ways in which 
communication technology can be used to assist in 
bringing modern medicine to communities with urgent 
needs for medical manpower. The two organizations 
participating in the Health Experiment, the Indian 
Health Service in Alaska and the WAMC Experiment in 
Regionalized Medical Education based in Washington 
address the common problem in two basically different 
ways, each of which offers unusual opportunities for 
exploring the capabilities of satellite telecommunication.

**THE PROBLEM OF MANPOWER DISTRIBUTION**

In identifying applications for communications technol- 
ogy in the field of health care, the Later Hill Center 
used the satellite as one means of bridging the gap be- 
 tween the wealth of medical services concentrated in our urban 
centers and the acute deficiencies in many less populous 
settings.

A major reason for the growing disparity between the 
medical resources of urban and rural areas appears to be 
that the practice of medicine has become increasingly 
specialized and increasingly dependent upon the expe- 
tial technology-based in urban settings. Quality med- 
ical care thus becomes more and more dependent upon 
interprofessional cooperation and communication and on 
practice in the urban environment, where the needed 
technology and full complements of specialized expertise 
are available. Medical care and personal satisfaction 
with practice in isolation has become less optimal and 
hence less attractive to young physicians.

With the increasing emphasis on specialization there has 
been a corresponding reduction in the number of physi- 
cians trained toward general care. The result is a short 
age of primary care physicians. Because primary physi- 
cians generally serve as the central point of entry into the health care system among the nation's family physicians, the situation is most keenly felt in rural areas where small population groups can usually support no more than one physician serving at the primary level.

The problems are those how can more primary care services be provided, particularly in iso-
lation areas which have not been able to attract or which cannot support physicians, and how can rural commu-
nities be brought intellectually and technologically closer 
to the urban environment so that medical care in remote 
settings can benefit from urban expertise?

**THE POTENTIAL OF TELECOMMUNICATIONS**

In many parts of the country points of entry into the 
health care system are being multiplied by assigning the 
responsibility for first line care to paramedical people for whom supervision often at a distance by professional per - sons is inevitable. In addition, some medical schools have begun developing programs that encourage more of their stu - 

dents to enter the fields of primary care more particularly in 
nonurban settings. These measures will help to place 
primary care physicians where it is most badly needed but 
they fail to provide adequate mechanisms for the inter- 

disciplinary communication which will optimize 

Several communications systems already developed by 
Later Hill use modern technology to help bridge this 

gap. The approach has been to utilize efficiently the 
manpower resources that already exist.

For example, two-way audiovisual systems link selected 
hospitals in Massachusetts New Hampshire and Maine. These links have been used for group seminars, 

in which physicians discuss research and medical issues with their colleagues in other parts of the country. 

APPLICATIONS FOR ATS 6

In the regions in which telecommunication systems have 
been implemented capability for video transmission via 
land lines or satellite radio already exists and the serv- 

ces can be provided without large capital expenditures. 

These media do not exist in many areas where 

The problems are those how can more primary care services be provided, particularly in iso-
lation areas which have not been able to attract or which cannot support physicians, and how can rural commu-
nities be brought intellectually and technologically closer 
to the urban environment so that medical care in remote 
settings can benefit from urban expertise?
ATS 6 HEALTH EXPERIMENTERS

Two communities identified as offering prime potential for experiments in telecommunication were the Indian Health Service in Alaska and the Washington state WAMI Experiment in Regionalized Medical Education.

In Alaska the Indian Health Service administers a regional system in which Native health aides or nurses provide first-line care to the inhabitants of scattered villages too small to support the services of full-time physicians. The villages are linked to service units for patient care at the secondary level and the state hospitals to larger centers for problems more complex. Radio contact between hospital physicians and the village aides and their patients enables the physician to provide some support to the widely scattered villages but adequate and reliable communication without regard to unnecessary travel remains a problem of major proportions.

A program for regionalized medical education developed by the University of Washington School of Medicine demonstrates the potential of satellites to bring professional contact to isolated areas. The program's chief advocate is Dr. Ralph Anderson of the University of Washington Health Sciences, Seattle.

The program provides a continuously available communication system by which University of Washington physicians and students in any location can consult their colleagues in Seattle and audio-visually interact with them. The system involves the use of standard satellite technology, a communication link to the University of Washington, and the use of telecommunication control equipment provided by the Indian Health Service.

The University of Washington is a consultant and the IHS is the sponsor and primary coordinator. The University of Washington has been selected to carry out the technical work associated with the on-board computer for the ATS-6 experiment.

ORGANIZATIONS INVOLVED

The principal agencies involved in the Health Experiment are the University of Washington Health Sciences, the National Aeronautics and Space Administration (NASA), and the Indian Health Service. The University of Washington is responsible for the development and operation of the on-board computer for the ATS-6 experiment.

The University of Washington has the responsibility for the development of the terminal equipment, and the Indian Health Service is responsible for the development of the peripheral equipment. The University of Washington will also be responsible for the continuing maintenance of the terminal and peripheral communication equipment in the ATS-6 experiments.

The ATS-6 earth stations were designed to meet the needs of the health experiment. The ATS-6 terminal equipment will be installed in the IHS and WAMI sites.

The health experiment is being evaluated by the University of Washington.

TERMINAL AND PERIPHERAL EQUIPMENT

The ATS-6 earth stations were designed to meet the needs of the health experiment. The ATS-6 terminal equipment will be installed in the IHS and WAMI sites.

The terminal equipment is designed to be simple, low-cost, and adaptable to a wide range of medical applications. The terminal equipment is designed to be simple, low-cost, and adaptable to a wide range of medical applications.

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NETWORK CONTROL

The network control is designed to be simple, low-cost, and adaptable to a wide range of medical applications.

The network control is designed to be simple, low-cost, and adaptable to a wide range of medical applications.
Alaska is one of the United States' most remote states, with about 25% of its mainland coastline and many islands. The state is divided into 8 official Native regions, each with its own Native health corporation. The Alaska Native Health Corporation (ANHC) is the largest of these Native corporations. It serves the health needs of the more than 140,000 Alaska Natives who live in the state. The ANHC is a non-profit organization that provides comprehensive health care services to Alaska Natives through a network of health centers and clinics. The ANHC is committed to improving the health of Alaska Natives by providing high-quality, culturally appropriate health care services. The ANHC works closely with Alaska Native Tribal Health Organizations (ANTHOs) and other partners to ensure that Alaskan Native health needs are met. The ANHC is dedicated to ensuring that Alaska Natives have access to quality health care services that meet their unique needs and that reflect their cultural values and traditions. The ANHC is committed to improving the health of Alaska Natives through partnerships, collaboration, and innovative approaches to health care delivery. The ANHC's vision is to achieve health equity for all Alaska Natives, ensuring that all Alaska Natives have access to quality health care services that meet their unique needs and that reflect their cultural values and traditions.
Figure 1 Alaska Native Health Center, Ft. Yukon

Ft. Yukon (population 300) is situated 150 miles north west of Fairbanks. The town takes its name from an old fort built by a French fur trading company in the last century.

The Health Center occupies a two-story log building constructed in the early 1800's (figures 1 and 2). This facility, unlike the village clinic, is considered a satellite of the Tanana hospital and is managed by a nurse.

The clinic is on the ground floor, employee quarters on the second. All the Center's 36 personnel, the name is the only staff member not hired locally.

The nurse at Ft. Yukon provides 24-hour day health service to the village residents, consulting frequently with physicians at Tanana or Fairbanks (at present 4-1/2). She also makes home visits, dispenses medications, and manages monthly field clinics (provided by Tanana doctors) and frequent dental and specialty clinics held in the village. Top is made 257 visits to the clinic last year.

Figure 2 Entrance to Alaska Native Health Center, Ft. Yukon

Figure 3 Alaska Native Hospital, Tanana

Tanana located at the junction of the Yukon and Tanana Rivers, is the central community of the Native Village. Its 26-bed general medical surgical hospital is a two-story wood frame structure built in 1943 (figures 9 and 10). The hospital which employs 31 personnel, (including three physicians) provides intensive newborn nursery and adult patient care. The average daily patient load is about 12. The hospital's clinic provides 24 hours a day outpatient and emergency care and recorded 3,783 visits last year.

Approximately half of the Tanana hospital staff are local residents.

Figure 4 Tanana Hospital
Figure 10: Stages located along the banks of the Yukon River at Tanana.

Tanana is one of a number of Native communities incorporated as a city. Most other small settlements continue to govern themselves through Village Councils, headed by a chief, elders and young leaders.

PHS Alaska Native Health Center
Fairbanks

Though the hospital at Tanana continues to serve as the center for direct support to the village, a large portion of the Service Unit's activity is based at the Alaska Native Health Center in Fairbanks (Figure 11).

A combined Native Health Service Unit, and community hospital were built in Fairbanks in 1972 to meet the increasing demand for services, partly due to the growth of Native people in the city. The clinic which employs 27 personnel received 9,794 outpatients visits last year. Its physicians have staff privileges at adjacent Fairbanks Memorial Hospital which is used for all short-stay general medical admissions. Banast Memorial, the U.S. Army hospital on Ft. Wainwright, is used for major surgical and accident injury care.

Fairbanks, with a population reported at 27,150 in 1973, is the second largest city in Alaska (Figure 12).

Figure 11: Alaska Native Health Center/Fairbanks. AIS 6 service entrance.

PHS Alaska Native Medical Center
Anchorage

The Alaska Native Medical Center in Anchorage (Figure 13) serves as a primary care and referral facility for Native people residing in or visiting the Anchorage Service Unit, and as a referral center for the Alaska Native Health Service in the other six Service Units.

The Center has a staff of 35, its 243 bed hospital provides comprehensive health service and supports the training program for Alaska Native Health aides.

The administrative offices of the Alaska Area Native Health Service program are located nearby. There are 250 personnel on the administrative staff. All management functions required for AIS's operation coordination are also provided from this site.

Anchorage, Alaska's largest city, has a total population of 78,078.
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10.0 INDEX
The terminal and peripheral equipment provided for Calima, Ft. Yukon, and Tanana are identical in all major respects. The physical arrangements are similar. The equipment required to render consultations is set up in an examining room. The nurses' terminal and other equipment not needed for patron presentation is grouped in a radio room or equivalent space. ATS-A

The radio room equipment is grouped in three major assemblies (figure 14). The arrangements are compact. Placement of components within the space varies somewhat among the sites. Utility shelves hold the ATS-6 and ATS-1 transmitters and receivers, the ATS-A video recorder, and several other components for the ATS-1 system. They also accommodate some high-frequency radio equipment not used in conjunction with the health experiment.

The electronic rack contains a black and white TV monitor, the master control panels for ATS-1 and ATS-A audio scrapers, and other components, including functions for camera, video cart, and microphone.

The interpreter is used to request and receive patient records from Tanana by phone on a table close to the data modem and data recorder in the bottom of the electronic rack. Loudspeakers for ATS-1 and ATS-A audio are mounted on the wall.

Equipment for transmitting electrocardiograph (EKG) and echocardiograph (ECHO) signals—heart sound amplifier (HSA) and signal modulators—are also mounted on a cart. Two drawers are provided to store the cables and transducers used with the equipment.

The radio output equipment includes two loudspeaker microphones, a desk microphone, and a preamplifier. The audio output equipment consists of a power amplifier and wall-mounted loudspeakers for the ATS-6 and ATS-1 signals. A push-to-talk (PTT) switch held in hand during consultations allows the operator to select for audio transmit or receive via ATS-1, and at Tanana allows the additional option of selecting remote camera control.

The camera, lights, video cart, and biomedical instrument cart are all mobile, so that they can be moved around the examining room as needed or into the radio room for use there.

Only the loudspeakers and the combination control pushbutton are fixed. The two loudspeaker microphones and the ATS-1 push-to-talk switch are connected directly to the junction box.

Television pictures can be received and doctor calls and data retrieval conducted from the radio room as well as the examining room. The video cart can be connected to the junction on the control panel and operated from the radio room for recording and playback of broadcast material.
At the time appointed for the consultation, the aide will be in the examining room at the time with the patient seated in front of the TV camera. The physician will be in either the radio room or examining room at the Tanana hospital—probably in the radio room.

Both aide and patient will have lapel microphones around their necks 'mounted' on the control panel mounted on the wall to carry their voices via ATS-6 or ATS-1. An ATS-1 push-to-talk switch also attached by a long cord to the control panel location will be available for use when needed.

The physician will be seated in front of the TV monitor while mobile cart mounted unit in the radio room with his microphone for voice input and with the ATS-1 push-to-talk switch at hand.

For the village, the prime mode of operation via ATS-6 will be the control voice for the medical personnel who are needed. For Tanana the prime mode via ATS-6 will be receive with ATS-1 talk back. However, the physician may begin the teleconsultation with transmission from Tanana so that the patient can see him before the examination begins.

To begin, in the teleconsultation the aide will demonstrate the current problems for the physician and the physician will obtain additional information for questioning the patient as the need. A physical examination will not really follow, beginning with visual observations of the patient.

The physician will operate the TV camera and the facial camera by remote control to obtain the picture of the patient he wants to see. He will thus be able to make his observations quickly and efficiently without having to give verbal instructions to the aide for camera operation. The signals for remote camera operation will be transmitted via ATS-1. A control on the physician's ATS-1 push-to-talk switch allows him to select either voice or video or video and audio with remote camera control. Controls on his TV monitor allow him to adjust for camera pan tilt zoom and focus.

The next step in the examination will generally be an acoustical examination in which the physician listens to the patient's heart sounds and abnormal sounds by stethoscope.

The aide will connect the phonoscope to the 'heart sound' amplifier on the top of the biomedical instrument cart. As the physician asks the questions and listens to the sounds, patient's heart sounds will be heard by the microphone via one of the ATS-6 audio channels. Video and voice interaction can continue simultaneously.

If an electrocardiogram is needed it too will be transmitted to the physician via ATS-6 through another connection on the biomedical instrument cart. The aide may also perform other tests and report the results verbally.

During the course of the consultation, the physician may transmit voice responses or EKG or heart sounds to the aide via ATS-7.

If needed the Tanana physician will call in the specialist at Fairbanks or Anchorage or both so that he examines the patient. When additional consultants are called in they will enter the patient's medical data into the audio and the biomedical signals from the villages via ATS-6 along with Tanana (figure 16). The consultations can all center in party line fashion on the ATS-6 link.

After the consultation the physician will update the patient's medical record.

Additional Features of the System

During either transmission or reception a tape recording can be made of the video picture and associated voice plus any talk back occurring over ATS-6. The recording can be transmitted at any time in place of the camera video.

This playback mode can be used to present a patient to outside consultants at the patient's request to show that the patient is allowed to show this tape to his family or friends for an brief consultation.

In order to maintain the privacy of the physician-patient contact all video and audio associated with the consultation will be scrambled (a 'screened') video picture is shown in figure 17. Only the one involved in the consultation will have the equipment necessary for automatic decoding of the teleconsultation transmissions.

The biomedical equipment provided for the ATS-6 can also be used for an audio-only contact via ATS-7 to permit an expanded voice doctor's call to a special medical referral center. That is, either heart sounds or EKGs can be transmitted in place of voice. Doctor calls would be made in the clear transmission to villages equipped with ATS-1 but not involved in the health experiments while the ATS-6 equipment sets can use the link with voice scrambler.

Video presentations for teleconsultation purposes from the examining room at Fairbanks are expected to be demonstrations of procedures during consultations with

Figure 16 Teleconsultation between a village and Tanana with Anchorage and Fairbanks called in. This figure transmits video sound and biomedical data to all three consultations via ATS-6. The consultants take turns video sound and biomedical data to all three consultations via ATS-6. The consultants take turns video sound and biomedical data to all three consultations via ATS-6.
CONTINUING MEDICAL EDUCATION AND CONSUMER HEALTH EDUCATION EXPERIMENTS

The health education programs are aimed at increasing the Native people's understanding of the entire healthcare system, and their general knowledge of health. The programs in continuing medical education will help to improve the skills of village health aides, and keep all of the IHS health providers participating in the ATS-6 Health Experiment abreast of advances in medical care. Typical program subjects will be seminars, case presentations, clinical grand rounds, and specialty conferences.

Both continuing medical education and consumer health education programs will probably be taped at the Alaska Native Health Center in Fairbanks, then broadcast directly from the Educational Television studio at the University of Alaska. Programs originating at Aniak will be taped at the Alaska Native Medical Center and transmitted to Fairbanks for transmission.

The health education programs will be transmitted to the Native populations in Tanana, Galena, and Fort Yukon. The cost-shared TV monitors used for teleconferences at Galena and Fort Yukon will be wheeled into the clinic waiting rooms for public viewing. At Tanana, a monitor permanently installed in a conference room will serve the public viewing area. The programming will either be live at the site of public viewing or taped at the receiving site and played back at a more convenient time.

Programs in continuing medical education will be broadcast to health providers at Galena, Fort Yukon, Tanana, and Archangel.

IHS EXPERIMENT SCHEDULE

The IHS experiments began in September 1974 and will continue through June 1975. Alaska's IHS staff have been assigned ATS-5 and ATS-6 satellite time on Monday, Wednesday, and Friday of each week. The time also is the same every day from 11:30 a.m. to 12:35 p.m. Alaska Standard Time. Time assignments on the ATS-5 satellite are scheduled to begin one hour earlier (10:30) and end 15 minutes later (12:45) than for ATS-6.

This scheduling will allow the IHS 150 sessions on ATS-5. Of these, approximately 120 are expected to be devoted to teleconferencing. At each transaction each participating unit will be given the opportunity to present patients' problems considered urgent by the providers. If there are no patients for whom consultation is required at that time, health education programs will be broadcast instead. Any remaining ATS-5 time will be used for educational problem-solving with regard to follow-up of the communications equipment.

The other 30 sessions will be used for broadcasts of continuing medical education and consumer health education programs from Fairbanks to the other four units.

Provisions have been made on the protocols developed for the IHS Experiments that permit the Alaska sites to break in on any other station on its own network (in this case, the Education Experiment network) in the event of a life or death medical emergency. If such need should arise at one of the IHS sites, the health provider would operate the ATS-1 push-to-talk switch to repeat the emergency code word "MAYDAY MAYDAY MAYDAY" to enable the IHS network.

EQUIPMENT INSTALLATIONS

Galena

The site at Galena is an 18 by 30 foot single-story log cabin. The front entrance leads into a heating area.

The radio room and examining room are one large space formed by combining and expanding the original nurse's office and examining room (figure 18). The cables to the mobile equipment in the examining room are draped along the floor and connected to the wall-mounted control panel junction box.

Since the radio room and examining room at Galena are combined, the video can always be left connected to the examining room when moving into the waiting room for public viewing of health education broadcasts. However, the position panels and controls to permit separate room functions are provided in appreciation of the building of a new clinic where space would be available for expansion of these two areas.

The equipment layout in the examining room is shown in figure 19. The layout at Fort Yukon and Tanana are similar.

The ATS-6 antennas are installed behind the clinic near the river (figure 20).

Fort Yukon

The clinic at Fort Yukon is a larger two-story structure. The front entrance leads into a waiting room with the radio room and examining room located on either side. As at Galena, the video cart will be wheeled into the waiting room for public viewing.

Cables between the rooms are routed along floor joists in the basement and terminate at a combination control panel and cable junction box in the examining room and

at the equipment rack in the radio room. The ATS-6 antennas are located on the south side of the clinic building (figure 21).

![Diagram of Fort Yukon clinic layout]

**AT'S-6 Antennas**

**EXAMINING ROOM**

**RADIO ROOM**

**WAITING ROOM**

**ENTRANCE**

**Sanitary facility**

**Parking area and roadway**

**River bank**

**Boat ramp**

**Exhibit 18. Galena floor plan.**
Tanana

The radio room at Tanana is adjacent to the medical records and admitting office and consists of the old radio room expanded into the former head nurse’s office. The radio room and examining room are dag-

nally across the hall from each other.

Ceilings between the rooms are cemented in the tube ceiling overhead and terminate at the control panel and antenna box in the examining room and the antenna panel at the radio room. The completed radio room install-

ation is shown in figure 22.

A conferencing room on the second floor will be used for public viewing of continuing medical education and consumer health education broadcasts. A video cart with a color TV monitor/recorder is stored in the adja-

cent attic area and wheeled into the room when needed. The cables from the radio room antenna box to the con-

ference room TV monitors are routed through the tube ceiling following an existing cable run for a citizen-

band radio.

Alaska Native Medical Center at
Anchorage

The Alaska Native Medical Center’s VHF reception sp-

abilities and equipment, and all of its VHF equip-

ment, are essentially the same as those for the Kotiana

Service Unit sites. It has no equipment for VHF transmit-

tion.

The areas in the hospital used for the experiment are a
classroom and a radio room. The radio room contains

the color TV monitor (ANMC) with one monitor and video tape recorders mounted on a mobile cart. The

television and VHF console are kept on a desk.

Beside the desk, a single electronics rack holds all of the

other ATS-1 and ATS-6 terminal and control equipment

plus the equipment required for receipt of biomedical

data. Doctor calls and data retrieval will be conducted

from the radio room. The electronics rack and monitor

are shown in figure 26.

The mobile video cart will be set up in the classroom for

group viewing of programs in continuing medical educa-

tion and health education. The cart will then be con-

cnected directly to the control panel/antenna box perma-

nently mounted on the classroom wall.

A microphone and push-to-talk switch for ATS-1

transmission will be mounted on the radio room and

plugged into the classroom so that classroom teachers

may participate. All controls other than the PTI

switch must be preset in the radio room.

The ATS-6 receive antenna is located on the roof of

the medical center building (figure 25).

Alaska Native Health Center at Fairbanks

The Alaska Native Health Center (ANHC) is equipped

for transmission and reception via both ATS-1 and

ATS-6 but the terminal equipment offered at ANHC is

different from that of the other sites. All except the

ATS-6 receive terminal and antennas are remotely

located.
The ATSSA terminal terminal is installed approximately 4 miles from ANHC at the Chugach Building at the University of Alaska. ANHC telephones this terminal with other HET users. The camera video originated at ANHC is transmitted over microwave links to the educational television studio at the University for routing to the ATSSA transmitters. ATSSA voice, transmission keying, voice command, and medical telemetry are routed to the studio over three telephone lines. Continuing medical education and consumer health education programs are expected to be video taped at ANHC, then broadcast from the University studio.

The ATSSA terminal used by ANHC is located at the Minutock site and operated under the supervision of the University of Alaska Geophysical Institute. ANHC access to this terminal is by telephone line to the University TV studio for further routing to the ATSSA transmitters.

Since the University educational TV studio must act as a central switching facility for HIT users that share time on the Fairbanks ATSSA and ATSSA systems, ANHC will have to coordinate with the station in order to use these links. Once the linkage has been established through the University station, the ANHC station will control its subsequent HPS operations for that transmission.

A radio room and examining room are the areas utilized for ANHC programming. The ATSSA receive terminal equipment and the peripheral equipment complement are identical to those of the village site.

Operational tests of the system were made early in September. No difficulties were experienced with transmitters or receivers beyond the normal adjustments required, and the health providers appeared able to handle the equipment operation smoothly. However, some difficulties have been experienced with peripheral equipment. The performance of the video scramblers and the ATSC data link to Tacoma for retrieval of HPS patient records have been unacceptable to date.

**EVALUATION AND IMPLICATIONS FOR THE FUTURE**

The primary purpose of the HPS experiment is to assess the workability of the ATSSA communications system and equipment and the value of telecommunications for HPS. The one-month trial with ATSSA will yield data to help control or refine the following hypotheses. These in essence, are the objectives of the HPS experiment:

- Telemedicine, supported by a good medical record system, will reduce the percentage of patients failing to receive diagnostic, therapeutic, or followup help, and will increase the capability of physicians to examine patients in remote locations to diagnose village patient problems, to the extent that 31 only patients requiring face-to-face physician services need be transported to hospitals.
- Visits by physicians to remote villages will be substantially reduced.
- 31 patients treated in the villages can be adequately treated there.
- The increased availability of expert consultation will increase the Native peoples' sense of security.
- Educational programming supported by the new technology will give the Native population a better understanding of health and the health care delivery system.

**Evaluation**

A large quantity of data will be collected before, after, and during the course of the experiment to determine whether these objectives are being met. The Institute for Communication Research at Stanford University in California will be collecting the data and making the final evaluation.

The evaluation will be concerned with the workability of the equipment (transmitter, biomedical equipment, etc.), the ability of the health providers to effectively use the equipment, their acceptance and patient acceptance of the system, and the impact of the system on patient care. Longitudinal studies will determine what attitudes the health providers and villagers have about the ATSSA system before the experiment begins. They will also be used to record information on how many patients are present, where they work, and other health problems, their satisfaction with the care they receive, the number of hours presently spent in consultation with remote facilities, and so forth. The health providers themselves will maintain logs to describe the activities taking place during each ATSSA transmission. An evaluation of the new Health Information System patient record system being implemented along with ATSSA will be included as a separate item. These data and postexperiment surveys will be used to determine what changes the ATSSA system has brought about.

**Implications for the Future**

After June 1975, when the ATSSA satellite is moved to view India all satellite communications within the Alaska Service Unit will come to a halt. There are no plans at present to continue the earlier HPS ATSSA experiment past the cutoff date for ATSSA. However, the information gained from the two experiments will be put to immediate use in the planning of an improved operational health communication network for the state of Alaska.

A steering committee made up of representatives of the Alaska Native Health Board and the Regional Corporations has been organized to plan and develop a statewide health communication plan. The reorganization of the Alaska Federation of Natives, Inc., the Indian Health Service, and communications experts will all be called upon for this effort. The committee will be working closely with the Office of Telecommunications and Office of Planning in the state Governor's office to ensure that the design and equipment requirements for this network are compatible with the overall Alaskan communications system and flexible for future expansion of services.
The WAMI Experiment

THE WAMI REGION

Nearly 60 percent of the medical manpower in the four-state region of Washington, Alaska, Montana, and Idaho (WAMI) is concentrated in three cities—the largest of which contains less than one quarter of the total population. Physician-to-population ratios in these urban centers range from 150 to 250 physicians per 100,000 people.

The remaining 40 percent of WAMI's population lives in smaller cities and towns spread across an area of roughly 879,000 square miles. Physicians to population ratios in these areas average not around 60 to 80, but the distribution of manpower is highly unequal and many counties have no physicians at all.

The University of Washington School of Medicine has been hard put to meet the demand for medical education by residents of the State of Washington as well as by residents of surrounding states—even for its immediate neighbors, Alaska, Montana and Idaho. This is a source of some concern to the WAMI group as a whole. Additionally, apparent that physicians tend to practice near the areas in which they are trained and in areas where activity in medical education enriches their opportunities for professional growth and interaction.

There appears to be little immediate prospect for the development of medical schools in these states which fifth most heavy upon Washington for medical education of their residents.

Recognizing the pressing need to expand opportunities in medical education for and within these states the University of Washington School of Medicine in 1969 under a grant from the Commonwealth Fund of New York began plans for an experimental program in regionalized medical education. The focus of the WAMI students entered this innovative program in the fall of 1971.

WAMI EXPERIMENT IN REGIONALIZED MEDICAL EDUCATION

The WAMI program has two primary objectives: 1) to increase the number of medical school positions open to residents of the WAMI region without the huge capital and operating expenditures required for new institutions, and 2) to improve the distribution of physician manpower in the WAMI states by instituting this program in such a way as to encourage its graduates to practice in those communities and in those specialties where manpower needs are most acute.

These objectives are accomplished in two phases corresponding to the basic science segment of instruction provided in the first year of the medical curriculum and the clinically oriented training of the last two years of medical school.

OCCUPATIONAL OPPORTUNITIES IN THE WAMI SYSTEM

There are several ways in which the efficiency of WAMI program operations could be improved. One basic thrust of WAMI is to contain costs by utilizing existing resources and avoiding duplication. Ample human resources lacking at the WAMI site are available at the School of Medicine in Seattle but extending them over the distances involved takes time and money.

The continuum in basic sciences presented for the first year of medical education requires the support of a very broad-based facility. A single course as taught at the University of Washington may call for lectures by as many as 50 instructors, each contributing knowledge from a different particular area of expertise. The first quarter courses that have been taught at the peripheral universities are somewhat less demanding of diverse resources than those for the second and third quarters but still require faculty who are not always available on site. University of Washington faculty must therefore travel to the distant universities to provide some of the needed instruction.

In autumn 1974 basic science instruction at the University of Alaska will be extended to a full year. This extra term in the University Phase which will considerably enlarge the capacity of the system if it can be done at the other three universities as well will obviously require far more University of Washington faculty travel or the employment of additional faculty at the university site. The need is particularly critical with respect to the clinical sciences which substantially clinical input is required. Clinical (physician) faculty are readily available at the WAMI universities.

The same general situation exists with respect to instruction at the Community Clinical Units. The full range of clinical expertise available in the large medical center which is needed to support training even in such general fields as family medicine is not available in small community hospitals. And since a student's program in learning clinical skills must be assessed mostly by direct observation UW faculty must make frequent visits to ensure that the training they receive at the community sites is comparable to that provided within the University based system. These contacts also help to relieve some of the sense of isolation from the mainstream of medical education felt by student and physician alike.

A third area of concern is the need for continued and frequent communication between the home school and both the university and community clinical sites for four points of administration and coordination of the WAMI program.
In the past these needs for resource sharing and personal contact have been met in part by moving personnel between various sites. This is currently costly and time consuming because of the enormous distances separating many of the WAMI units. And for most of the interactions required there appears to be no alternative to face-to-face contact.

Interactive television communication via the ATS-6 satellite may help to remove some of the barriers distance has imposed on optimal development of the WAMI program.

DEVELOPMENT OF PLANS FOR ATS-6

When the Laser Hull National Center for Biomedical Communications issued invitations in 1972 for proposals on health-related experiments using the ATS-6 satellite, the WAMI program responded with a plan for testing its use in support of decentralized medical education. The Center saw the application of ATS-6 as a highly productive means of exploring new techniques in telecommunication and awarded a contract to WAMI for implementation of the proposed experiment early in 1973.

WAMI selected two sites for satellite linkage with the medical school at the University of Washington, the University of Alaska at Fairbanks, and the Family Medical Center in the central Washington community of Omak (figure 27).
Beginning with fall quarter of 1974, the University of Alaska will be included in the WAMI program. The WAMI University is the largest medical research program in the nation. More than 300 students are trained in the Center each year.

The School of Medicine, which sponsors the WAMI Experiment in Regionalized Medical Education, opened in 1940 with a first-year class of 50 medical students. Its entering class now stands at 125 with a total enrollment of nearly 500. An additional 200 students are enrolled in allied health programs and 280 postdoctoral fellows are engaged in training and research. The School also trains approximately 450 resident physicians throughout a system of some 15 hospitals and other clinical facilities throughout the state.

The University of Washington in Seattle provides clinical experience for medical students.

The University of Washington Medical Center has an enrollment of 3000.

University of Alaska Fairbanks

Fairbanks, with a population of 27,150, is Alaska's northernmost city and the site of the University of Alaska (Figure 29).

In January and February the temperature in Fairbanks may drop to 60 degrees below zero. The daylight hours are short, as the sun rises at 9 or 10 a.m. and sets about five hours later. Heavy snow-filled paddocks are standard issue to Seattle faculty and administrators visiting Fairbanks on WAMI business in the winter months.

The University of Alaska sponsored the University Phase of the WAMI program in 1971 with an entering class of nine students. In fall 1974 it makes another advance as the first WAMI university to offer basic science instruction for the full academic year. Twelve medical students of the University of Alaska WAMI freshman class entered the University this fall.

ATS 6 EXPERIMENT SITES

University of Washington Health Sciences Center Seattle

The University of Washington Health Sciences Center in Seattle supports five major schools of health sciences; two University managed teaching hospitals and one of the largest medical research programs in the nation.

More than 300 students are trained in the Center each year.

The School of Medicine, which sponsors the WAMI Experiment in Regionalized Medical Education, opened in 1940 with a first-year class of 50 medical students. Its entering class now stands at 125 with a total enrollment of nearly 500. An additional 200 students are enrolled in allied health programs and 280 postdoctoral fellows are engaged in training and research. The School also trains approximately 450 resident physicians throughout a system of some 15 hospitals and other clinical facilities throughout the state.

The University of Washington Medical Center has an enrollment of 3000.

University of Alaska Fairbanks

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Family Medical Center Omak

Omak, with a population of 4,400, is the largest town in Okanogan County. Its Family Medical Center Community Mental Health Clinic adjoins Mid Valley Hospital and provides daily care to many of the county's 22,500 residents. Omak also serves as a refueling point for physicians practicing in rural areas of Okanogan and neighboring counties.

The Family Medical Center (figure 10) was one of the first two practice groups to join the WAMI program as a Community Clinical Unit when the program was started in 1971. PCPs have been rotated 41 WAMI sessions. The doctors are taught in the doctors' private offices for six weeks each in pairs of their third or fourth year clinical experience on family medicine. Resident physicians began sessions in Omak in 1971. They stay in the Unit for one to three months, working with the Omak physicians and their patients in the physicians' offices and at Mid Valley Hospital.

The ROLE OF EACH SITE AND ITS EQUIPMENT REQUIREMENTS

The WAMI terminals provide communication via both the ATS 6 and ATS 1 satellites. All three sets will have computerized communication capabilities. These requirements are different between Seattle and Fairbanks or between Seattle and Omak.

The university-iniversity broadcasts will focus on basic science simulation, administrative interaction, computer-aided and medical consultation. Transmissions between the University of Washington and Omak and Omak and Seattle include student peer presentations, administrative interaction, and management conferences, peer consultations, and programs on continuing education for community practitioners.

Seattle/Fairbanks

The link between Seattle and Fairbanks will be the only one in the entire HET experiment in which transmission via ATS 6 is possible in full duplex mode. Thus a videoconference can be transmitted and received in both directions simultaneously. The full duplex capability is possible in this link because Seattle and Fairbanks are connected by satellite. Seattle will be transmitting at different frequencies from both Fairbanks and Seattle on C-band; C-band links will be used for traffic. Additional traffic will be transmitted from Seattle at frequencies of 2.18 GHz. This will allow program transmission and demonstration. At the same time, Seattle/ATS 6 can be received from the Washington satellite.

The ATS 1 half-duplex up-to-talk link is also available for the Seattle/Fairbanks network but will not be needed for programmed interaction. It will be used for auxiliary communications before and during broadcast.

The ATS 1 system is designed in such a way that when Seattle is transmitting to Omak on ATS 6, Omak is simultaneously transmitting on Seattle's voice channel. When the picture and sound for ATS 6 are originated in Seattle, ATS 1 provides audio and video information from Seattle to Omak.

In contrast to the university units where trained TV studio technicians are available, Omak's medical personnel will themselves be responsible for performing all equipment operations and for the reception of transmissions from Omak. They will be in the C-band and white video, which is required for operation of the equipment. The ATS 1 equipment includes a voice and white video combination, a small video monitor, and audio equipment. However, it has been used to have a commonwealth for a short period of time so that several transmissions from Omak can be made in order. This will allow the personnel in these experiments to compare their reactions in video in color versus black and white.

As there is no space available at the Family Medical Center, the Omak clinic is using this facility to accommodate the equipment in the treatment room at the Mid Valley Hospital in Omak. It is being used instead at the experiment and broadcast site.

UNIVERSITY PHASE EXPERIMENTS

The experiments being conducted at the University of Washington in Seattle and the University of Alaska in Fairbanks include simulations and demonstrations. These are formal courses in administrative interaction, Toni, and medical consultation. The participants are the 12 WAMI students enrolled in the University of Alaska for the first test of the final course and the WAMI program coordinator at both institutions. A variety of equipment is used in these educational simulation experiments.

Curriculum

Lecture/Demonstration/Discussions

The basic curriculum broadcasts take the form of lectures and demonstrations in combination with an interactive discussion. The emphasis is on interaction to make optimum use of the full duplex video and audio communication capabilities of the Seattle/Fairbanks link. No use is made of a video conference. The curriculum will cover the basics of a typical educational simulation experiment. The curriculum includes discussions of a typical educational simulation experiment. The curriculum will cover the basics of a typical educational simulation experiment. The curriculum includes discussions of a typical educational simulation experiment. The curriculum will cover the basics of a typical educational simulation experiment. The curriculum includes discussions of a typical educational simulation experiment. The curriculum will cover the basics of a typical educational simulation experiment. The curriculum includes discussions of a typical educational simulation experiment. The curriculum will cover the basics of a typical educational simulation experiment. The curriculum includes discussions of a typical educational simulation experiment.

Administration

A great deal of time and effort is presently expended to bring WAMI faculty and program coordinators at the University of Washington together with their Omak counterparts.

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Admissions interviews for the selection of new WAMI students also require extensive travel. Face-to-face contact appears to be equally important for this kind of decision making. The administrative experiments will determine whether the same sense of in-person contact can be achieved when people meet face to face by television.

Some of the transmissions are allocated to meetings between WAMI interviewees for discussion of administrative matters. Others will be between faculty who teach the same courses at the UW and UAA, in the administrative interview experiment the Medical School Admissions Committee at Seattle will meet with a member of the UA faculty and a group of Alaskan young people applying for admission to the UW School of Medicine. It is hoped that the video contact will contribute significantly to the Committee's ability to evaluate the applicants responses during interview. Follow-up student counseling will be part of this experiment.

Computer Aided Evaluation

The computer-aided evaluation (CAE) program made available in Alaska by ATS-6 will add depth to the instructional program by introducing the option of independent study.
A wide variety of basic science courses are already available in computer-aided forms to over 70 institutions in the United States through a communications network sponsored by the Lerner-Hill National Center for Biomedical Communications. A computer at Ohio State University controls the network. At the local level required for transmission of these data, there must be between the lower 48 states and Alaska, a satellite link between Seattle and Alaska is the only means available now for extending the program to Fairbanks.

Three CAD telepresence terminals have been installed at the University of Alaska for use by the WAMI students. The students pack on their answers to the study event questions and receive immediate feedback from the computer at Ohio State University as to their accuracy. The telepresence also permits the user to record the student's score for that study program allowing later comparison with the scores of other students using the program.

The CAD sensors planned between Seattle and Fairbanks will take place concurrent with other experiments such as the localized demonstration/disinfection or administrative conferences. While the latter broadcast use the video and one audio channel for the transmission of CAD data (Figure 34).

Medical Consultation

The Seattle/Fairbanks transmission will also include a series of broadcasts for medical consultation. These sessions provide service to both patients and physicians while educating the observing students. The majority of the Fairbanks consultations will be devoted to dermatology.

A dermatologist at the UW will examine patients presented to him by Fairbanks physicians with several Alaska WAMI students attending for instructional purposes. An important purpose of the experiment is to determine what kind of video equipment and techniques are required to obtain reliable television pictures of the lesions. Accurate representation of color and detail appear essential for accurate diagnosis.

Two additional dermatology consultations are scheduled between Omak and Seattle to compare the television pictures obtained by the color cameras and trained technicians available in the ETW studio at Fairbanks with the pictures that can be provided by the simple monochrome camera and nonprofessional operators at Omak. Several other sectors are planned between Seattle and Fairbanks for psychiatric consultation, so that comparable case presentations at Fairbanks as Seattle.

CLINICAL PHASE EXPERIMENTS

The experiment between Seattle and the Community Clinic at Omak includes student case presentations, evaluations and administrative conferences, medical consultation, and a survey of other programs ignoring the category of multi-disciplinary instruction set in the program to provide medical education and a clearer understanding of the differences between health care needs and practices in the rural and urban setting.

The participants on the Seattle-Omak transmission will be the two students enrolled in each successive six-week clerkship held at Omak during the academic year. The one resident physician there on rotation at any given time, Omak and UW faculty and coordinators, Omak pay telephone, nurses and other practitioners from the hospital and Seattle-based administrators and students.

Student Case Presentations

Some of the student case presentations will be spontaneous offers for spontaneous presentations some of the students' cases to be presented in the first encounter with the patient. In particular and the patients, the student then reviews the findings and tentative treatment plan for the observing UW and Omak faculty. Formal presentations require that the student clarify the patient's problem and progress over a period of time and document it thoroughly before presenting it to the faculty.

During spontaneous presentations the TV camera at Omak will be trained on students and patients so that the UW Family Medicine faculty can observe the student presentations between sites will be interactive via ATS-6 from Omak via ATS-6 from Seattle. The student will present his case to the faculty, and the faculty will respond with questions and suggestions for the student's treatment plan. The student will then relay these suggestions back to the patient and progress in dealing with the patient and discussing the next step in the patient's treatment plan.

These presentations will enable UW faculty to monitor the progress of students being supervised by private practitioners to see if students are removing the same levels of medical competence as those at the home site and to convey to Omak physicians the standards of performance expected of students in the UW program. The contacts also keep UW faculty in touch with the reality of practice in nonurban communities and allow them to respond with appropriate changes to their curriculum.

During the first six-week clerkship of full year 1974, all evaluations of case presentations will be made by the residents at Seattle. For comparison during the second six-week clerkship they will be made by the attending physicians.
Administrative Conferences

The administrative conferences are scheduled mainly for the period of the first six-week clerkship. During these interactions Omak and UW faculty will make summary evaluations of student progress, adjust individual or overall curricular programming, and discuss administrative matters or other concerns.

Medical Consultation

In addition to student case presentations private practitioners (the CCU physician faculty) in the Family Medicine Center will choose patients under their regular care who have problems on which they wish consultation. They will present them by writing to specialists on the faculty in Seattle, along with data from their preliminary work-up. WAMI students sitting in on these consultations will learn a little more about techniques of case presentation and about the medical problems involved. These experiences will resemble the videoconsultations to be conducted by the Indian Health Service inOmaha.

A more lengthy series of patient consultations are scheduled between psychologists from the Okanogan Community Mental Health Clinic and psychiatrists and psychiatric residents at the University of Washington. These seminars will provide one consultative backup for a group of practitioners working in a rural community. In every case the psychiatric expertise UW faculty can extend may be necessary for the psychologists to treat their patients at home instead of sending them to a larger city for psychiatric care. Two similar psychotherapy consultation seminars scheduled between Fairbanks and Seattle will permit comparison of interactions in which psychologists and patient can see each other and make plans, in total, to those between Seattle and Omak in which video can be transmitted in only one direction at a time of black and white.

These consultations will broaden the medical services available to Omak patients and provide Omak practitioners with specialized opinions on diagnosis and treatment while giving them valuable experience in case simulation. Medical education Omak nurses and other health care providers attending the seminars will also receive significant educational benefits.

Multidisciplinary Lecture/Demonstration/Discussions

The multidisciplinary broadcasts will be highly varied in format and content. They are intended to give Omak practitioners the opportunity to participate in continuing education activities ordinarily available only to people living in the vicinity of the University of Washington. Most of the programs are designed to be of interest to allied health professionals (nurses, lab technicians, physical therapists) as well as physicians and WAMI students in Omak.

The lecture/discussion/discussion will deal with such topics as psychiatric case management, emergency medical services in a rural setting, Studio [er] and so on as well as for other broadcasts, supplement the spoken material.

Other transmissions will take the form of dialogues. Omak nurses and other professionals define for their student and faculty counterparts in Seattle, their recommendations and educational needs in the rural setting. In a sense, the Seattle group responds to spoken identification by the Omak practitioners and discusses their own roles and educational programs in the metropolitan environment. Omak clinical psychology staff oversee some questions about laboratory rats or other problems in clinical psychology at the University of Washington. The CCU faculty and Mental Health Clinic psychologist consult on mental health needs in the rural setting. Faculty students and residents discuss the problems and advantages of education in rural areas.

Several transmissions in Omak will be devoted to grand rounds in which patient problems of interest are presented by residents and discussed by faculty. Thin time-efficient method of conveying education has always drawn large audiences of private physicians to teaching hospitals. Grand rounds will be videotaped and rebroadcast for residents with the original UW participants present in the studio for questions and discussion.

EXPERIMENT SCHEDULE

The WAMI experiments are scheduled for Tuesday and Thursday of every week for the nine-month duration of the HET Experiment. Broadcasts are scheduled to begin at 10:15 a.m. (PST) and end at 1:30 p.m. (PST).

The schedules listed below are for the 30-minute transmission following.

Figure 38: Allows University of Washington medical school faculty from the Department of Family Practice observe student practice at a rural hospital in Omak to assess the clinical skills. Omak residents view and vote via ATS-8 faculty at the UW respond by voice via ATS-1. Better Seattle may switch over to ATS-6 to prompt soon for the evaluation discussion following.
EQUIPMENT INSTALLATIONS

University of Washington Seattle

In Seattle, broadcasts will originate in the main studio of the College of Education Therapy Center, at the University of Washington Health Services Center (Figures 16). This studio is 100 feet away from the 5,000 square foot medical faculty and specialized equipment in research facilities can conveniently be brought to the studio for use. A television camera, a film camera, and four video recorders are available.

The studio has three broadcast galleries, each with its own equipment center. The equipment consists of three live camera, a film camera, and four video recorders. A special-effects generator and voice-talent monitor are also available. The studio is equipped with a control room, one large dressing room, one small dressing room, a control room, and a control room. A 125-foot antenna is used for transmission.

In addition, the studio is equipped with a number of additional facilities, including a control room, a large dressing room, a small dressing room, a control room, and a control room. A 125-foot antenna is used for transmission.

University of Alaska Fairbanks

The broadcasting facilities at the University of Alaska Fairbanks are similar to those at the University of Washington Health Services Center. The studio is located in the College of Education Therapy Center, at the University of Washington Health Services Center (Figures 16). This studio is 400 feet away from the 5,000 square foot medical faculty and specialized equipment in research facilities can conveniently be brought to the studio for use.

The studio has three broadcast galleries, each with its own equipment center. The equipment consists of three live camera, a film camera, and four video recorders. A special-effects generator and voice-talent monitor are also available. The studio is equipped with a control room, one large dressing room, one small dressing room, a control room, and a control room. A 125-foot antenna is used for transmission.

In addition, the studio is equipped with a number of additional facilities, including a control room, a large dressing room, a small dressing room, a control room, and a control room. A 125-foot antenna is used for transmission.
Mid Valley Hospital, Omak

There was not adequate space for the installation of equipment or conduct of experiments in the Family Medical Center at Omak, where student training actually takes place. The Omak broadcasts will be made from a room in the basement of the Mid Valley Hospital (Figure 39a) which is normally used for staff training purposes.

All of the equipment required for TV broadcasts as well as the equipment and resources for ATS 5 and the team center for ATS 6 is installed in this room (Figure 40). Approximately 122 feet of cabling connects the equipment to the antennas which were mounted on the ground in a large grassy area behind the hospital.

OPERATIONAL STATUS OF THE WAMI SYSTEM

Installation of terminal equipment for the three WAMI sites was performed over a period of months as the components were received. Equipment delivery was less than optimal. Delivery and shipping damage impaired the re-evaluation and training plan significantly. Particularly affected were Omak and Seattle where much planned training did not take place and where relative equipment agents of temporary equipment will be required.

Although delayed about three weeks, the Seattle bar is a portion of the experiments were modified to compensate for the time lost and no serious consequences are anticipated. Omak installation was delayed by two months and the factor will have to be taken into account in evaluating the experiments. A strong effort will be made early in the operational phase of the program to correct deficiencies in equipment and training.

Operational testing was held to a minimum in order to reduce time loss on the satellite.

EVALUATION AND IMPLICATIONS FOR THE FUTURE

The primary objective of the WAMI experiments with ATS 5 is to determine whether telecommunication is a viable alternative for bringing people together face to face in the same room. Specifically, WAMI wants to know if satellite mediated communications are:

1) Effective and acceptable? Can students keep their attention on a lecture who talks to them out of a television receiver? Do they ask questions as readily as if he were there?

2) Technically feasible? How reliably does the test terminal equipment function and how much adjustment or maintenance is required to set it right? Does the satellite line with scheduled transmission? Can the non-profit social operations at Omak operate the equipment without difficulty and obtain good pictures?

3) Less costly than alternate means? How much money is saved by reducing air travel and telephone costs and the time faculty spend in travel? How does the cost compare with the cost of the satellite communication equipment and the peripheral equipment and the time required for equipment operation and maintenance? Is it less expensive than having additional faculty for permanent locations at the decentralized sites?

EVALUATION

The WAMI experiments are being evaluated by the Office of Research in Medical Education at the University of Washington School of Medicine under direct contract to Luther Hall.

The data upon which the evaluation is based must be collected during the course of the experiments and all of the faculty and student participants and TV studio technicians will contribute.

Preliminary interviews and questionnaires are being used to obtain information on the perceptions of the prospective participants—students, faculty and other toward satellite mediated telecommunication. Evaluative data will then be obtained following each satellite transmission. The questionnaires will be primarily those that assess the opinions of the participants as to the effectiveness of the radio connection from their point of view. For some experiments, apprehension levels will also be documented. The evaluations will also periodically observe such transmission.

Technical feasibility will be evaluated largely by the TV production staff. The staff members will complete forms following each transmission that asks them to rate camera work, audio and visual quality, and other production parameters—excluding their impressions of the participants' reactions to technical activities within the studio environment.

Additional high will be kept to compare travel time and the volume of telephone communications between the experiment sites before and during the ATS 5 experiments.
To determine whether their attitudes about telecommunication were changed by the experience, when the
new-experience is complete, questionnaires and statements will again be administered to the participants
to assess their overall reactions to the program.

Implications for the Future

The WAMI Experiment in Regional Medical Education has greatly expanded the capacity of its parent
school to provide opportunities in medical education for students in three neighboring states and at a cost far less
than that required for the development of new institutions. The WAMI experiment with XTS-6 will help to
determine whether the use of satellite telecommunications can link the decentralized education and clinical
training units with the parent school can decrease the costs still further.

The experience WAMI and Laser Hill will gain from their experiments with the use of satellite communica-
tions in medical education will be applied to the design of future satellites and equipment and communica-
tion techniques bringing the possibility of permanent working systems nearer to reality.

If new satellites are developed with the application of sound and reliable available to the continents again they
could be used to interconnect the entire WAMI system. These and perhaps additional links with isolated com-
munities would have the added effect of improving medical service and providing increased incentive for
physicians to practice in such areas. With further exper-
emination broadcasts of continuing education programs such as lectures, grand rounds etc. from the University of
Washington could be transmitted to professional audiences throughout the northwest.

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Satellite communications can be applied to public services, that is, those services provided by local, state, and federal organizations on a non-profit basis. These applications would involve fixed, portable and mobile terminals. The fixed service applications include health and education and are mainly for the thinly populated remote regions where public services are not economically or readily available. The mobile service applications include emergency medical, disaster, and law enforcement communications requiring very low cost user equipment. Experiments with NASA's ATS-6 and CTS satellites have started the development of these new satellite services. However, the present apparent non-profitable nature of each individual service, the inherent political and institutional obstacles, and the need for satellite/ground terminal technology development prevent making these services affordable. A Federally sponsored program demonstrating the utility of high powered geostationary multi-beam switchable satellites accommodating large numbers of small terminals is needed to overcome these problems. The goal is to aggregate the diverse potential market such that commercial satellite operations could expand with minimal financial risk to profitably serve the public service sector. The quality and efficiency of communications in remote regions would be realized, leading to communications satellites of the future.

* Dr. R Cooper is the Director of NASA's Goddard Space Flight Center, and Dr. W Redisch is the Chief of its Communication and Navigation Division.

INTRODUCTION

Satellite-delivered communication services can be utilized in public service applications, where public services may be defined as those services provided by local, state, and federal organizations on a non-profit basis. These applications involve permanent, portable, or mobile communications terminals. Fixed direct reception service applications include health information, education, library, and other public services, mainly for thinly populated remote regions where conventional means of delivering these services may not be available or economically feasible. The portable and mobile service applications include emergency medical, disaster, and law enforcement communications requiring coverage over large geographic areas with very low cost user equipment (Fig 1).

A Public Services Communications Satellite System could alleviate some of the problems of inadequate service presently available to citizens who reside in remote regions. These are people without access to normal communications services such as telephone and television. There are also a growing number of people in rural areas who lack the access...
to medical professionals enjoyed by urban residents, and it is becoming increasingly difficult in the United States to keep medical professionals practicing in remote areas rather than in urban centers. In addition to other reasons, Continuing Medical Education (CME), required by practitioners to retain professional licenses, is difficult to obtain in remote areas, especially when physicians are simultaneously providing primary health care. A vast number of people in remote areas receive inferior general educational services because they cannot afford to avail themselves of the wealth of information existing elsewhere.

NASA's Applications Technology Satellite (ATS-6) is an experimental system designed to test such public service uses. Recently it began a Health and Education Telecommunications (HET) experiment to demonstrate the potential value of interactive television in Alaska, the Rocky Mountain States and Appalachia 1 (Fig 2) A one-year ATS-6 Satellite Instructional Television Experiment (SITE) was just recently concluded in India, where adults and children gathered around community direct-reception (one thousand dollar category) television terminals in 2400 widely scattered villages. History may prove this experiment to be a major milestone in the progress of developing nations 2 (Fig 3). The joint NASA/Canadian Communications Technology Satellite (CTS) is conducting further experiments with these services in the satellite broadcast 12 GHz band 3 (Fig 4). A federally sponsored Public Services Communications Satellite System could build upon this experience, and could lead to an economically viable, commercially offered communication system that would improve the quality and efficiency of fixed direct reception of public services in remote regions.

Communications capability for mobile applications does not exist to any significant degree at present. For moving vehicles traversing large geographical areas, satellite communication systems offer the most cost-effective communication channels. For ships in the Atlantic and Pacific, a commercial MABISAT service is now available. By the end of this decade, aircraft over the oceans should be able to communicate via Aerosat. Past experiments on NASA's ATS satellites gave great impetus toward developing and demonstrating this technology, and present ATS experimentation is aimed at land mobile and "personal" pocket-sized communications.

Fig 2 ATS-6 HET Experiments

Fig 3 ATS-6 SITE Experiment
Mobile applications such as tying data and voice between ambulances and hospitals, interconnecting emergency vehicles with medical and resource coordination centers, allowing law enforcement vehicles to communicate over vast geographical areas and across jurisdictional boundaries, public-safety communications that enable coordination of many organizations, reliable communications during disasters via both mobile and portable terminals set up after a disaster strikes an area, and multi-organization rescue forces able to communicate with each other are feasible with proper application of current technology. All these and many more services could be of great benefit to the public sector once made economically affordable. Just as the commercial telephone system today serves the public sector so effectively and economically via its paid utilization by non-profit public service organizations, so may these augmented mobile services be extended in many important areas.

The U.S. terrestrial telephone system has evolved over the past hundred years resulting in an enormous investment for an existing effective fixed communications system. For these new satellite-aided public services to come into being and augment the existing system, very large additional front-end capital investments are needed. Since any new non-profit public service is subject to inherent political, institutional and budgetary obstacles, the risk to the private sector of obtaining a reasonable payoff in a reasonable time is too great to warrant such large investments. This situation prevents existing technology from becoming affordable and new technology from being developed by the private sector thereby bringing mobile and personal communications to a practical reality.

A government-sponsored program for satellite-delivered communications for public service applications could provide a low-cost dedicated pilot program leading to reasonable risk/investment commercial operational system use of the already developed technology for low-cost fixed terminals would be possible to aggregate the very dispersed health and educational communities for their own evaluation of the economic advantages of a satellite-delivered service. The enormous potential of small mobile transceivers would be demonstrated by developing the space and mobile terminal technology necessary to spark the marketplace with equipment affordable by local rescue squads, police departments, and the like. The satellite delivery of communications for these public services suggests geostationary satellites using large solar arrays, high power transmitters, large multibeam antennas, and multiple access with on-board switchboarding techniques to accommodate large numbers of users with efficient spectrum conservation. The users would have very economical small terminals, allowing permanent direct reception in the 12 GHz frequency band and/or mobile ones in the new 900 MHz land mobile band, each with low radiated power (EIRP) and small G/T ratios (Fig 5). The economic/technical requirements would drive the overall design of such communications systems, and the effort must be tightly coordinated with the commercial communications interests to assure eventual transition from government sponsorship to profitable commercial operation.

BACKGROUND

When the space age was opened by the launch of Sputnik 1 in 1957, it was already obvious that communications via satellite had great potential.
because satellites could be simultaneously in view over very large geographic areas. Arthur C. Clarke in 1945 was first to describe the possibilities. In 1958, the launch of the United States Army SCOR, an experimental short-lived, store and forward repeater satellite, successfully tested the feasibility of relaying narrow-band voice and teletype from low orbiting satellites. The NASA Goddard Space Flight Center's early programs to exploit this great new potential included the 1960 Delta launching of the first ECHO satellite, a 30-meter diameter balloon-shaped passive reflector, and the 1962 launching of RELAY I demonstrating the feasibility of actively relaying real-time wideband communications signals, such as television between ground stations and low orbiting satellites. But it wasn't until the first SYNCHOS were launched in 1963 and 1964 that the advantages of geostationary communications satellites were realized. A spin-stabilized communications satellite was first proposed by the Hughes Aircraft Company in the autumn of 1959, and Project Syncom was initiated as a joint NASA/Department of Defense effort to develop the launch capability for earth-synchronous orbits and to demonstrate the utility of these orbits for satellite communications. These objectives were met and the fantastic growth of communications satellites started, with a billion dollar industry growing up in a decade.

The U.S. Congress established the ComSat Corporation in 1963 to transfer the government-developed technology into the private sector, with Intelsat being established in 1964. Intelsat is today one of the few healthy profit-making international organizations. While this explosion of commercial satellite communications was happening, NASA was implementing its Applications Technology Satellite series with a multitude of experiments and demonstrations to advance communications satellite technology. The Department of Defense launched TACSAT in 1969 with a dual-spin stabilization technology innovation of great importance. By 1970 Intelsat was providing fixed private service over the Atlantic and Pacific, and by 1972 COMSAT (ANIK) was providing service for Canada and the U.S. as a direct outgrowth of the technology and experience obtained from the NASA and DOD satellites. Applications for the first U.S. domestic communications satellite were made to the FCC in 1969. The actual launchings were delayed until 1974 when the FCC policy decision on open skies was made. Today, both domestic and international fixed point-to-point service satellites are a rapidly increasing reality.

TODAY'S EFFORTS

As satellite and launch technology progressed, it became apparent that greatly expanded usage of communication satellites could be obtained by putting more complexity and power in the spacecraft to simplify and economize the ground terminal equipment. A great advancement toward more sophisticated spacecraft occurred with the launch of ATS-6 in mid-1974. This spacecraft was NASA's first 3-axis stabilized synchronous satellite and featured a 9.1-meter pointable antenna with sufficient radiated power to work with low-cost, direct-reception small terminals. The multiple mission concept plus experimentation with advanced satellite communications technology opened the era of direct-reception satellite utilization. Dozens of experiments were successfully performed with ATS-6. Among them were the L-band experiments to communicate with
airplanes and ships to position-locate them, demonstrating the feasibility of maritime and aeronautical communications satellite technology. Today, commercial L-band service is available over both the Atlantic and Pacific Oceans via NARISAT. By the end of the decade aeronautical communication services should be available via AEROSAT.

**ATS-6 Experiments**

The ATS-6 Health and Education Telecommunications (HET) experiments introduced delivery of direct reception services to remote areas in the U.S. The education experiments were planned for the Rocky Mountain region, the Appalachian States, and the states of Washington and Alaska (Fig. 6). Each area had a slightly different configuration and different utilizations. The Educational Satellite project in Appalachia was developed out of the Appalachian Regional Development Act of 1964 which was established to coordinate Federal, State, and local attempts to improve the total economic development (roads, health service, education) in Appalachia. In 1971, the Commission surveyed 32,000 public school teachers in Appalachia and discovered that in-service training, particularly in the teaching of reading and career education, was needed. Twelve hundred teachers participated in the reading curriculum and 300 teachers were actually certified through the career education courses delivered by ATS-6. For the Rocky Mountain States, the video signals originated at the main Health, Education, and Welfare facility at Denver. This transmit/receive facility was connected by a microwave link to the Federation of the Rocky Mountain States at Diamond Hill in Denver.

Typical uses of the ATS-6 in the area of health care may be illustrated from the following summary excerpted from a medical case history:

Using ATS-6 link in Anchorage, a one-year old child in a remote village was observed sitting listlessly in her mother’s lap. The child was apathetic, showed no interest in her surroundings, and did not appear to be in acute distress. A chest x-ray, advised during the satellite consultation, showed a splotchy infiltrate on her left lung. Completion of the diagnosis showed active tuberculosis which has been successfully treated.

It was noted during the experiment that the observation of motion via the video link provided the means for recognition of helpful diagnostic clues. Village hospitals have x-ray capability and the images on the x-ray films were transmitted quite well over the ATS-6. The ability of a nurse in Fort Yukon, a physician at Tanana, and a specialist in Anchorage to hold a conference, examining the x-ray simultaneously, expedited decision-making and definitive care.

Another major ATS-6 direct reception public services experiment was the Satellite Instructional Television Experiment (SITE) which was operational during the second year of satellite operation. ATS-6 received video signals from Ahmedabad and Delhi, India, and retransmitted the video with two audio channels for different dialects to 6 clusters of 400 direct-receive stations for a total of 2400 direct-receive stations (Fig. 3). Morning programs of 1.5 hours per day were designed for classroom use, and evening programs of 2.5 hours duration were designed for village adult education. All the direct reception terminals, television sets, and antennas were completely Indian built.

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Fig 6 ATS-6 Satellite
India's needs for nationwide educational broadcasting are apparent. Its great size, vast population, high birthrate, rural economy, poverty, and illiteracy dictate the need for the most widespread and rapid educational technology available.

It comes as no surprise, then, that India desires to provide instructional television through the most modern delivery system available, the broadcasting satellite.

The ATS-6 has now returned from its position over India and is commencing its third year of public service demonstrations and experiments.

**CTS Experiments**

Last January the Communication Technology Satellite (CTS) was launched. CTS was a joint international effort between NASA and Canada's Department of Communications. The CTS was designed to transmit television to small, user-operated terminals in the 12 GHz satellite broadcast band. Where ATS-6 achieved its high effective radiated power by use of the 9-meter antenna, the CTS program developed high power (200 watt) transmitters fed by large solar arrays (14 kW DC) (Fig 7). The CTS radiates power levels 10 to 20 times higher than the present commercial communications satellites. Some of the US experiments and demonstrations that are being performed on the CTS follow.

![Fig 7 CTS Satellite](image)

An education curriculum sharing experiment enabling the students in one university to take courses in another, thousands of miles away, is being conducted between Stanford University in California and Carleton University in Ottawa.

A COMSAT experiment is demonstrating how a highly transportable terminal can quickly establish reliable communications via CTS between the site of a disaster and relief agencies. COMSAT has developed a small light-weight terminal that can be transported to the disaster area by a small van, helicopter or even a small boat. The terminal, set up by two people, can be operational in less than an hour providing emergency communications.

A Biomedical Communications Experiment sponsored by several agencies of the Department of Health, Education and Welfare is exploring the potential of satellite communications to solve immediate and future communications needs of the health community. The general objectives are to evaluate the video and voice communications as an aid to decentralized medical education, as a way to reduce the limitations of remote geographic location, as a way of providing continuing education to health professionals, and as a medium for more effective transfer of new knowledge generated by biomedical research.

A Library Services Experiment for a Satellite Library Information Network (SALINET) by the University of Denver is offering service training programs for community libraries in small towns in the Rocky Mountain area. To provide more effective service and to develop a video program to inform both government and private sector personnel of library resources with the potential to serve as a conduit for bibliographic data requests.
TODAY'S PROBLEMS

These and other ATS-6 and CTS experiments have demonstrated what today's space communications technology is capable of providing. Then why have these services not blossomed as the fixed point-to-point services have over the last decade? What are the obstacles?

There are many. By the nature of public services, they are provided by non-profit local, state and federal organizations, both government and non-government. Those that are government agencies must depend upon appropriated budgets, and better or increased public service at the cost of increasing these budgets is not, and it could be argued, should not be easily attained. Non-government public service institutions depend heavily upon donations and subsidies and more for more money is not enough. Everyone is for better public services, the question is who will pay? Just as non-profit organizations today include funds in their budgets to pay utility bills to profit-making entities, so must they be able to afford satellite services tomorrow. This requires the development of extremely low cost ground terminal technology, which in turn depends upon large demand, which of course in turn, depends upon low cost. One cannot expect private enterprise to make enormous new capital investment to get to the low cost/high demand stage. In their view, the risk of new technology is too high and the potential near-term payoff from the public service sector is too uncertain. It is uncertain because one cannot expect local school systems, or small town fire departments, or county sheriffs, or most local public service organizations to worry about subscribing to a possible system ready sometime in the future when they have continuing budget crises today. It is generally agreed that if the U.S. Federal government had not underwritten the risk and spent Research and Development funds to open the satellite communications era, then the price of overseas telephone calls would not have dropped as they have by more than a factor of two, and a solid profit-making satellite communications industry would not have evolved and paid back the U.S. via tax dollars.

There are other major problems and issues to be faced before development of a satellite communications system in support of public services can occur. Even when satellite services may be more cost-effective than existing terrestrial services, one cannot ignore the past investment and present profit aspects of institutions that have been providing these terrestrial services since their inception. There are always political-economical-institutional barriers toward implementing new technology which brings competitive changes. Different factions must be convinced that change is good and cost-beneficial to them.

In addition, when dealing with many local organizations, there are complex political issues that vary from area to area and involve a great many conflicting viewpoints. Issues that are real in some areas don't exist in others. The public services sector, such as local police departments, do not have that least common denominator-profit motivation that exists in the private sector such as in the mobile market for trucking and busing.

Hence, in addition to the technical and operational problems for which the experiments and demonstrations of ATS-6 and CTS were developed, there are these much broader problems and issues which must involve federal, state and local policy decisions. The chicken or egg risk/new investment problems, the obsoleting of previous terrestrial system investments/profits problem, thorny political problems associated with direct broadcasting, institutional issues of who does what for whom, and who pays, the hard potential market analyses and benefit/cost studies that are needed, the roles of government and industry in this public field of communications, all will shape the course of any communications satellite system utilized for public services.

TOMORROW'S POTENTIAL

A basic recognized role of federal government is to satisfy national needs. Some of the basic national needs are to have a strong economy, to have a stable social structure, and to provide adequate resources and a healthy environment. A focused Public Service Communication Satellite System can play a significant role in meeting these needs if the services can be made affordable to the public sector and economically viable to the private sector. A stable social structure requires public services in the fields of health, education, recreation and public safety which satellite delivered communications can enhance, contributing to a better quality of life.
In addition the strength of the economy in terms of a positive balance of trade can be assisted if the United States retains its leadership role in new space technology applications.

**Health Services**

Only medical experts can determine how health care, education or information should be delivered. The most a communications engineer can do is to determine how such services might be developed, pointing out the advantages and the disadvantages, and to focus effort toward the goal of delivering more and better health services for more people at lower costs. ATS-6 and CTS have been the most significant development in public services communications technology. Their technology demonstrates that sophisticated satellites can be built that have enough radiated power to allow direct reception of video signals by small, low-cost terminals. With enough terminals sufficiently low in cost, it is feasible for every hospital, clinic, medical school, nursing home and perhaps even doctor's office to be tied together in a network possessing tremendous information capacity.

The general areas of medical applications that are suggested are instruction of health professionals, telemedicine, public health education, and overall emergency medical services.

In the area of teaching health professionals, the production of formal courses for use in the curriculum (medical school, university, nursing school, pre-med college, etc.) has a potential for significant cost savings. It allows the use of high-quality, highly effective audio-visual presentation of materials suited to such presentations, and it can free the teacher from routine lectures for more creative and interactive work. Courses not primarily applicable to audio-visual delivery may be supplemented by occasional enrichment programming which could represent an improvement in education more than a cost savings.

Continuing education might make more extensive use of the satellite because in this usage the prime advantage would be in the delivery of the material to the health worker. The advantages in time, expense, and travel saved are obvious. In this case, in addition to ideally suited material not outstandingly suited to audio-visual presentation would be programmed, not to improve the quality of education but to make the process less costly and to make quality continuing education more available to all health workers.

A further use for satellites in the health area would be the possibility of presenting current medical research in a "Video Medical Journal." New surgical techniques might be demonstrated in such offerings.

Teledicine is a direct health care delivery use for satellites. Such a service would be valuable in remote diagnosis, consultation, and advice to health workers and patients in isolated regions. An "isolated region" could be on the Alaskan North Slope or could be Indianapolis if the specialist needed happened to be in San Francisco and the need were immediate. The main advantage in teledicine is the availability of the very best talent for any difficult case anywhere else in the country. Time and travel could be greatly reduced and at the same time better care would be more available using specialist time more efficiently. The exchange of data in almost any form—medical records, X-rays, EKG's could be quickly achieved. Access to central files of data or libraries could also be arranged along with the necessary privacy and confidentiality.

Public health education is conceptually quite different from telemedicine or instruction for professionals since in this utilization the user or viewer is the public. In cases where the job of the health worker is to "educate," "train," or instill or modify some behavior in the patient, programming could be used by the health worker in the clinic, hospital, doctor's office, etc. to serve in place of lectures or booklets. Such programming might include proper sanitary, nutritional, and exercise practices, advisories concerning drug, alcohol and food abuse, instructions for self-diagnosis of "warning signs," regimens for outpatients, and certain materials useful in psychotherapy and mental health treatment. As many people become more visually literate and less reading-literate, such approaches may prove more effective than printed information and may save the health worker a great deal of time and patience.
The Emergency Medical Services (EMS) Systems Act of 1973 provides assistance and encouragement for the development of comprehensive area emergency medical services systems. If the full potential of the EMS Systems Act is realized, a great step will have been taken toward the elimination of needless loss of life and limb due to catastrophic sudden illness, medical emergencies associated with the accidents, and trauma associated with disaster.

Studies by the Committee on the Interplay of Engineering with Biology and Medicine have focused on many problems which plague the provision of emergency medical care in this country. These and other studies have emphasized the key role of communications in linking the multiple elements involved in emergency medical services systems. There is a need for an integrated coordinated communications network that brings together all of the components of the emergency medical system to provide care, using well-established principles of modern emergency medicine.

The physicians who treat emergencies believe that the outcome of sudden illness or medical emergencies is predicted not so much on obvious symptoms or trauma as it is on a whole gamut of information on which very early decisions can be based.

The communications satellite capability offers the potential for the input of advice from a remote specialist to the emergency medical technician (EMT) at the scene for real-time decision making capability between EMT and physician specialist. The proper use of the systems for treatment and the method of transport based on telemetry data assures the right patient for the right medical facility for treatment and the method of transport based on the obvious symptoms or trauma as it is on a whole gamut of information on which very early decisions can be based.

The communications satellite capability offers the potential for the input of advice from a remote specialist to the emergency medical technician (EMT) at the scene for real-time decision making capability between EMT and physician specialist as to the most appropriate medical facility for treatment and the method of transport based on telemetry data. Many states, such as Maryland, are in the process of developing EMS radio communication systems which serve major cities and surrounding counties. These facilities interconnect emergency vehicles with medical and resource coordination centers and will undoubtedly prove highly beneficial as they are brought to fruition and used on a continuing basis. Modern satellite communication technology can aid significantly in realizing the full potential of the EMS Systems Act. Through the use of satellite facilities, uniform coverage of the U.S. is available for a nationally interconnecting system. This is particularly significant for rural areas outside the limits of ground radio systems. Through this technology, rapid high quality communications for voice, video, and medical telemetry could be achieved operationally in the 1980's.

**EDUCATION SERVICES**

Productivity losses exist at all levels of education, as studies indicate fewer students, more teachers, increased pay of school personnel and no compatible increase in student test scores. Telecommunications has the potential of providing large gains in educational productivity, increasing teaching effectiveness, and broadening the spectrum of educational opportunities.

Despite the institutional problems, the use of telecommunications to relay educational programs at all levels (primary, secondary, university, continuing and cultural) is increasing. One report forecasts a need for eighty educational television stations by 1985 for instructional television, video tape distribution and the Public Broadcast System. NASA has been assisting Federal and local educators in exploring the use of satellite communications using the ATS-6 and CTS satellites. There is a need to continue to work with these users until the technology is effectively transferred.

The Southern Educational Communication Association's (SECA) present project is an example of distributing television programming to member stations in the southeastern United States. The program material is oriented for instructional use in elementary and secondary schools or for evening distribution to the adult audience. Secondary usage exchanges program material over widely scattered regions of the United States and distributes quality multichannel audio and radio material throughout the same region.

All receiving equipments are located at the individual SECA stations and are owned by the member stations. Future plans would place uplink equipment at several different locations within the SECA region with the origination of the network at various points and with live interconnection between the member stations.

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PUBLIC SAFETY

The public safety community consists of the law enforcement organizations (including the courts), fire prevention and control units, rescue services, and civil defense organizations. Similar to the communications goals of the Medical and Educational Services, the objective of satellite communications services for the public safety community is to provide the service with cost or major performance benefit to the existing services or in areas where services do not presently exist. However, unique to public safety, is the requirement of providing communications services under disaster conditions such as earthquakes, floods, riots, and storms especially when existing facilities may be incapacitated. Many services are handled today adequately on a local basis by mobile radio, microwave phone and even cable. Satellite communications are amenable for coverage over large and remote areas. Higher data rates, video signals and great flexibility under abnormal conditions are easily attainable. The Law Enforcement Assistance Administration (LEAA) and the State Planning Agencies (SPA) were established by Congress to provide impetus to bring new technology into use in the Criminal Justice Area. ATS-I experiments, using facsimile were sponsored by LEAA to experiment with fingerprint transmission. The FBI is developing techniques for digital fingerprint classifications and automatic identification by computer. Using these techniques combined with satellite communications, states could, in the future, interrogate the FBI files directly rather than wait for the mail. LEAA and the States are very interested in mobile terminal experiments because in this area, public safety and law enforcement require many vehicles coordinating efforts with each other. The development of small, low-cost terminals, as well as the demonstrations to illustrate the functional and cost-effectiveness of satellite communications services, will lead to more effective and cost-efficient operations.

For small vehicles, especially land mobile vehicles, the cost of equipment to work with a satellite must be in the thousand-dollar category in order to be a reasonably small portion of the vehicle's cost. It is easy to see how the present Citizens' Band low priced radios have led to a craze that has exploded in the U.S. — people can now communicate directly, for pleasure and for business. It is easy to envision that this will lead to a demand for more telephone-like quality of land mobile communications.

In today's world one can pick up a telephone in almost any fixed location in the U.S. and direct dial almost any other location at a very reasonable cost. It has come about because of the highly developed terrestrial communications network that has grown over the years. Space links are supplementing the terrestrial links more and more, especially for long-distance communications, but it is the vast investment in wiring individual phones through extensive switching techniques that has led to our modern-day communications.

The mobile situation is far from having attained the same level of sophistication and economy that exists for fixed telephone service. However, with satellite communications a new era could be opened up, that is, the same way that one can communicate from almost any location via telephones in fixed locations, one should be able to communicate from any mobile location to any other location with the same ease and economy as in the fixed service.

Going even a step further into the area which is commonly known as personal communications, once one envisions mobile telephony in the above described manner, one can also envision the step after that — rather than the mounting of mobile stations mounted in automobiles, ships, planes, trucks, each individual would actually carry with him his own extremely light, small, economical telephone-like terminal, i.e., the so-called "Dick Tracy" wrist radio concept.

The public sector mobile market, including personal communications, will become indistinguishable from the private sector, except by frequency allocation, within the land mobile bands. Today, land mobile communications are used by trucking companies, busing companies, oil drills, geological exploration teams, and many others. An FCC staff report predicts a conservative estimate of 7.3 million land mobile transmitters in the U.S. by 1980. Several petitions for increased spectrum allocation have been filed before the FCC in Docket 12682. Considerable information has been developed already on land mobile requirements and the equipment market.
Off-shore drilling requires quick and reliable communications between the oil rigs or platforms and company headquarters. Further, communications are needed for service and supply ships and aircraft. For instance, the British North Sea oil operations have established criteria for an elaborate cable and radio network to meet projected needs. Geophysical exploratory teams require similar quick and reliable communications with their control facilities.

Besides the Health, Education and Public Safety Services, many other public services have been identified. The NASA Task Team Report on Satellite Communications identified and discussed 24 potential applications of satellite delivered communication services. These include search and rescue, environmental monitoring, hazard warning, electronic mail, individual data collection, data management and financial data management to name a few in addition to the examples given above.

There are various technological areas within which the state-of-the-art should be advanced to produce developments that would optimize the operation and reduce the overall costs of a Public Services Communications Satellite System. For example, from the overall systems viewpoint, technological advances are required in areas such as multiple access and modulation (digital communications, coding techniques, etc.) With respect to spacecraft technology, multi-beam antennas, high power transmitters, and microprocessors for on-board channel switching should be developed.

Ground terminal (fixed, portable, or mobile) technological advances should be aimed at high production level, low unit cost terminals that are easy and inexpensive to operate and maintain. NASA has already undertaken certain of these developments under other programs and is presently planning the additional long-range development programs that should be undertaken in the remaining areas not being covered by the private sector.

CONCLUSIONS

There are public needs for better health, education, safety, law enforcement, disaster, rescue and emergency services in remote, large geographic, and disaster-hit areas. These can be most economically met by high-powered communications satellites, working directly to small affordable fixed, portable and mobile ground terminals. Although these service needs have been recognized for years, satellites have not yet been utilized. The major obstacle to date is not the lack of available technology, but the absence of well-developed and consolidated institutional arrangements to overcome the many special/political problems. There is a lack of appreciation of the services that can be provided by satellites and their potential for both cost-effectiveness and for increasing the quality of life. Federally sponsored public service satellite communications can aggregate the dispersed market and make commercial services economically viable. Providing the space capability has proven thus far too costly and too risky to the private sector to undertake. However, the past history of communications satellites and associated technology indicates that, once started down the proper development/demonstration path, the rapid expansion of using satellites for communications will encompass the public services, and lead to new commercial communications satellites delivering more effective public services in the future.

REFERENCES

7. J. E. Miller, op cit.  
1. Introduction

The purpose of this Report is to identify some of the potential functional user requirements for domestic satellite services in the United States of America. These requirements may be satisfied within the Broadcasting-Satellite Service, the Fixed-Satellite Service, or both. The frequency bands within which these requirements might be satisfied will depend in part on operational requirements such as service availability and signal quality.

The scope of this Report is limited to identification and description of the functional user requirements. It is not intended to categorize each requirement by service, or to identify specific frequency bands. Furthermore, frequency band requirements can be inferred in some cases from bandwidth and IFD requirements.
The characteristics of some of the systems which may be required to satisfy these diverse requirements are not presently included in Report 215-3. Therefore, a discussion of user requirements may be useful to the CCIR in considering additional system examples, sharing criteria, and spectrum utilization.

The bibliography includes articles on innovative requirements for telecommunications for social services, and other discretionary services, even though satellites may not be identified therein as a potential transmission medium.

A summary of recent U.S. and US-Canadian satellite user experiments having possible applicability to future developments in either the Broadcasting or Fixed-Satellite Service is included as Annex I.

2. Description of potential user requirements

This section of the report describes possible satellite uses based on a particular need, extent of geographical service area, and whether the service is primarily suited for individual, group, or institutional use, as well as whether the service requirements include two-way (interactive) communications.

Two major categories of potential satellite users are discussed.

a) Education
b) Health and medical

c) Electronic mail
d) Law enforcement
e) General computer networks
f) Emergency communication and disaster warning advisories
g) Broadcasting
h) Securities and commodity exchange
i) Electronic publishing
j) Public telephone and telegraph

The paragraphs which follow describe briefly the functional user requirements for each of these services.

2.1 Educational services

Of the two divisions of educational services, public schools (primary and secondary), and higher-education, the latter involves a larger use base which extends beyond the institution and includes continuing education. Utilization by public schools may consist of national, state, and local distribution of educational program material to classrooms, and dissemination of program material for teacher improvement seminars. Depending on specific need, both can occur on a one-way or two-way basis.

Higher education user requirements may include national and regional distribution of educational program material between
Institutions, transmissions to individual receivers in the home or in a community learning center, two-way inter-university seminars, teacher improvement seminars, and program distribution to specialized institutions (e.g., vocational schools).

Table I portrays one investigator's prediction(1) of the total satellite channel capacity which may be needed to satisfy the above requirements on a time zone basis.

2.2 Health and medical services

Satellite communication systems have been proposed as a means of satisfying several classes of user needs related to public health and medicine. These uses include the following:

a) Telemedicine: A two-way service primarily for use in sparsely populated areas, in which a distant physician examines, diagnoses, and prescribes for patients in the care of local paramedical personnel. The typical system would involve a one-way color video channel, plus two-way data and voice circuits;

b) Medical teleconferencing: A two-way service permitting specialists to consult each other and exchange information. Typical circuit requirements include two-way audio and visual interconnection;

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### TABLE I

<table>
<thead>
<tr>
<th>1975-1985</th>
<th>15 Kbps, Voice, 50 Kbps Data Slow Scan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dedicated Networks</td>
</tr>
<tr>
<td>1.</td>
<td>Elementary and secondary school net</td>
</tr>
<tr>
<td>2.</td>
<td>Higher education net</td>
</tr>
<tr>
<td>3.</td>
<td>Public ETV net</td>
</tr>
<tr>
<td>4.</td>
<td>Library net (excluding video tape)</td>
</tr>
<tr>
<td></td>
<td>Total per time zone</td>
</tr>
</tbody>
</table>
o) Retrieval and update of medical histories: A centralized data bank on a national, regional, or state level permits rapid access to a patient's complete history by a physician unfamiliar with the case. This requires both data and facsimile circuits to retrieve information in the data base, as well as to add new information related to the present observation. This service could also be used for accessing general disease descriptions, and pharmaceutical products and their use.

d) Continuous remote monitoring of patient biomedical data either by direct observation or by computer analysis. The circuit capacity requirement is a data circuit from the patient to the monitoring center, and an emergency channel in the reverse direction for the purpose of alerting and instructing local personnel.

The total channel capacity which may be required for biomedical needs is summarized in Table II.

2.3 Electronic mail

Electronic mail involves the automated transmission and routing to the destination of written material now customarily handled by surface and air transport.
A system for hardcopy materials would typically involve encoding these materials by use of either a facsimile scanner or optical character reader, and transmitting the result to the destination mail handling center by satellite. The principal advantage of such a system is that it would result in faster delivery than is possible with presently available means.

Initial plans for the United States envision the implementation of an electronic mail system encompassing the 81 largest mail originating centers, some of which will serve clusters of cities. It is anticipated that 100 million pieces of mail per day could be processed by the system.

Bandwidth requirements are sensitive to a number of factors including:

a) Length of transmission period (twelve hours vs. full period);

b) Non-uniform volume requirements; it is anticipated that volume demands imposed on the system will vary by geographical region and, additionally will be subject to daily and seasonal fluctuations;

c) Variations in the length of a single mail piece;

d) Differing bit error rates acceptable for different types of service.

Present estimates indicate that each of the 81 postal centers would be served by 1000 two-way 50 Kbit digital circuits.

2.4 Law enforcement

Law enforcement communications needs include:

a) Remote data insertion and retrieval from a centralized data base,

b) Interconnection of federal, state, and local law enforcement agencies for video, voice and alpha-numeric communication;

c) Transmission of fingerprints, photographs, and "voice prints" to facilitate criminal identification.

The U.S. network presently planned to satisfy the above requirements is the National Law Enforcement Telecommunication System (NALECON). Classes of circuits needed for the NALECON system include video, facsimile, audio and digital channels. The estimated channel capacity required is summarized in Table XII.

2.5 General computer communication networks

General computer communication needs can be classed in the following categories:
### TABLE III
Summary of NWC 1983 traffic projection for 1983* (Best estimate)

<table>
<thead>
<tr>
<th>Item</th>
<th>Data-in-time</th>
<th>Demand</th>
<th>Deficit</th>
<th>Total gap (present)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Message volume (millions)</td>
<td>Average character length</td>
<td>Average bytes</td>
<td>Average character/bytes</td>
</tr>
<tr>
<td>1. <strong>CPI/SDI</strong></td>
<td>25.7</td>
<td>1.4</td>
<td>36.5</td>
<td>36.5</td>
</tr>
<tr>
<td>2. <strong>CPI/SDI</strong></td>
<td>14.2</td>
<td>1.4</td>
<td>20.6</td>
<td>20.6</td>
</tr>
<tr>
<td>3. <strong>CPI/SDI</strong></td>
<td>7.3</td>
<td>1.4</td>
<td>10.5</td>
<td>10.5</td>
</tr>
<tr>
<td>4. <strong>CPI/SDI</strong></td>
<td>3.7</td>
<td>1.4</td>
<td>5.6</td>
<td>5.6</td>
</tr>
<tr>
<td>5. <strong>CPI/SDI</strong></td>
<td>1.9</td>
<td>1.4</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>6. <strong>CPI/SDI</strong></td>
<td>0.9</td>
<td>1.4</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>7. <strong>CPI/SDI</strong></td>
<td>0.4</td>
<td>1.4</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>8. <strong>CPI/SDI</strong></td>
<td>0.2</td>
<td>1.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Total gap (present)</td>
<td>85.5</td>
<td>123.75</td>
<td>108.25</td>
<td>108.25</td>
</tr>
</tbody>
</table>

*From Table III, items 9 and 10, information was not available to stratify traffic and thus was not included in the above projection. Items 1 to 8 are from the same sources. The maximum volume of traffic is assumed to be a series of 3 to 4 characters/byte. Each character is assumed to be a series of 3 to 4 digits. Each byte is assumed to be a series of 4 to 5 digits.

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a) **Time Sharing Networks**, requiring two-way, real-time, non-dedicated, low-data-rate channels;

b) **Remote job entry systems**, requiring two-way, non-real-time, non-dedicated low-data-rate channels;

c) **Reservation and ticket service for airlines, -railroads, hotels, etc.**, requiring two-way, dedicated real-time low-data-rate channels;

d) **Remote access to centralized credit bureau information**, (two-way real-time low-data-rate channels);

**Time sharing networks in the United States are presently accessed primarily by means of switched telephone lines to local data centers, which are in turn connected to the computer center by dedicated terrestrial circuits. As the need for this service increases, more local centers will be established, and increased circuit requirements would make satellite service practicable. While an individual user channel is typically 4 Kbit/sec or less, it is the usual practice to multiplex the signals at the local center into a few high data rate channels between the local center and the main computer, the data rate and number of channels being proportional to the design volume of a particular center.**
Channels used for remote job entry may be scheduled in one direction for data transmission to the center, and reversed in a subsequent period for transmission from the center.

Reservation and ticket service uses require continuously available low data rate channels between user facilities and a "concentrator" terminal. At the concentrator terminal signals would be multiplexed for transmission on a higher rate channel. Operation of the high rate channels would be on a dedicated two-way basis.

The requirement for credit bureau information transfer is virtually identical to the above. A system satisfying U. S. needs would have sufficient capacity to handle 2000 50 Kbits/sec circuits, and 100 10 Kbits/sec circuits for higher rate users.

2.6 Emergency communications and disaster warning advisories

Emergency communications and disaster warning advisory by satellite communication was proposed in NARC 1971 Recommendation Epa 2-13. This Recommendation suggests that space radio-communications systems could provide a more survivable method of achieving disaster and emergency communications than terrestrial systems.

Emergency communications are envisioned to include:

- Transmissions to emergency agencies (police, fire departments, Red Cross, Civil Defense, etc., and/or the general public) of weather forecasts and warnings of floods, tidal waves, and other calamities both natural and man-made;
- Interconnection of disaster relief agencies.

Satellite transponders for emergency communications and disaster warning proposed for use in the United States would be designed to provide communications to fixed and mobile terrestrial units beyond the range of terrestrial transmission equipment. The need for such communication is generally local or regional in extent, the principal jurisdiction concerned being state governments. Thus a system configured for the United States would make use of multiple antenna beams designed to serve relatively small areas. It has been suggested that 27 one degree beams or alternatively 50 3/4 degree beams be employed to cover the 48 contiguous states.

The average state would employ two major earth stations, one hundred small fixed stations, and perhaps 1,000 mobile stations. Each major earth station would need about 10 audio and 10 data channels. The portable fixed and mobile units would be single channel devices capable of selecting the frequency in use for the particular emergency.
2.7 Broadcasting services

Broadcasting service user needs which may be satisfied by satellite include the following:

a) Direct broadcasting of commercial and/or non-commercial TV and sound signals to home terminals and low power terrestrial redistribution devices;

b) Transmission of news information directly to home or community terminals;

c) Networking of terrestrial facilities associated with the above services.

Requirements for and characteristics of systems for this type of service are discussed in detail in other Reports of Study Groups 4, 10 and 11.

2.8 Securities and commodities exchange

In the United States there are two principal national stock exchanges, and regional exchanges are located in several major cities. In addition there is an increasing over-the-counter market handled by the broker members of the National Association of Securities Dealers (NASD).

In the agricultural sphere, the major commodities exchange is located in Chicago, Illinois. Other commodities exchanges are located in major cities where agricultural and meat processing facilities are located.

There is also a commodities market in metals and other mineral materials, with exchanges located in several major cities.

Users need indicate requirements for one-way as well as two-way interactive service. The former would be concerned primarily with distribution of price information on near real time basis during the trading day. Additionally, continuous transmission of closing quotes during evening hours may be desirable.

The interactive service would be designed to permit both retrieval of latest quote, and the actual placing of orders on the exchange. This service would involve communication through regional transmission facilities. Subscribers would be interconnected to these facilities by terrestrial means. Each major transmission facility would be equipped with 100 transmit and receive channels each having 50 Kbit/sec capacity.
2.9 Electronic publishing

The concept of electronic-publishing includes:

a) Direct transmission of non-news publications to user facilities, including schools, community centers, libraries, etc., and ultimately individual users;

b) Remote operation of typesetting and printing equipment from central composing facilities.

Direct dissemination of non-news publications would typically involve an interactive form of operation in which the user places an order or subscription electronically and receives the publication either immediately or on a delayed basis. Services to regular subscribers would probably not be interactive. It is anticipated that the service would involve transmissions to subscribers from facilities serving a large region. Digital channels having rates lying between 50 kbit/sec and 1 Mbit/sec would be used.

For remote operation of printing equipment, material would originate in national or regional composing centers and be relayed in the form of digital signals to local printing equipment. The data rates required would be between 50 kbit/sec and 1 Mbit/sec.

2.10 Common-carrier and specialized common carrier

Public telephone, data and video service by satellite is already in operation in the United States, augmenting the terrestrial service. Three major types of user needs are being or will be served:

a) A two-way point-to-point service, augmenting the capacity of medium and long distance microwave service;

b) A two-way service to provide individual or community subscriber connection to the telephone system in regions where there is presently no service, and no economically feasible way of providing such service by terrestrial means (e.g., Alaska);

c) Data and video service on both a dedicated and switched basis.

These common carrier facilities may also be applicable to some of the requirements discussed in this Report but, as noted in the Introduction, categorization of the requirements by type of Service is beyond the scope of the Report.
3. Summary

This Report has identified some major potential functional user requirements for satellite services in the United States of America. These requirements may be satisfied within the Broadcasting-Satellite Service, the Fixed-Satellite Service, or both.

The number of terrestrial terminal facilities which might be required on a time zone basis for the user needs described in this Report are summarized in Table IV (adapted from (1)).

In this Table three types of earth terminal facilities are considered:

Type I - Central stations for transmitting audio, video and digital material,

Type II - Terminals which are primarily receiving in nature but are equipped with limited transmitting capabilities;

Type III - Receive only terminals.
Tables V, VI and VII contain a summary of the channel capacity requirements for Types I, II and III earth terminals respectively.

The frequency bands within which these requirements might be satisfied will depend on operational considerations such as service availability, signal quality, required bandwidth, and the impact of PTD limits.

<table>
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<tr>
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<tr>
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<td>10</td>
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<td>30</td>
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<td>80</td>
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<tr>
<td>Public Telephone &amp; Telegraph</td>
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<td>1500</td>
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### TABLE VI. Channel requirements - Type II stations (interactive facilities)

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<thead>
<tr>
<th>Scenario</th>
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<th>Channel 2</th>
<th>Channel 3</th>
<th>Channel 4</th>
<th>Channel 5</th>
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<td>5</td>
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<td>Rural</td>
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### TABLE VII. Channel requirements - Type III stations (receive only)

<table>
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<tr>
<th>Scenario</th>
<th>Type</th>
<th>Channel 1</th>
<th>Channel 2</th>
<th>Channel 3</th>
<th>Channel 4</th>
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</thead>
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<td>Suburban</td>
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<td>5</td>
<td>6</td>
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</tbody>
</table>

*Possible distribution to homes by cable or public broadcast*
REFERENCES


BIBLIOGRAPHY


8. RUPE, Howard H. Stepping up to a public service satellite consortium. Astronautics and Aeronautics, May 1975.

SATELLITE USER EXPERIMENTS

The following subsections are devoted to a brief discussion of the user oriented experiments presently supported by the ATS-6 spacecraft and those to be supported by the CTS spacecraft planned for launch in early 1976.

Applications Technology Satellites (ATS)-6

The ATS-6 spacecraft is to date the most powerful and versatile communications satellite in orbit. Differing from early space flight philosophy, the ATS-6 reflects a desire to simplify and lower the cost of the earth stations. The communications experiments being flown on ATS-6 are presented in Table I.

Communications Technology Satellite (CTS)

The objective of the CTS is to advance the state-of-the-art in spacecraft and related earth station technology for use in future educational broadcasting systems and remote area transmissions employing high levels of e.i.r.p., the CTS will make possible television reception and two-way voice communication with the use of small, low-cost earth stations.

Experiments in the areas of education, helath care, community and special services, and technology extension will be

TABLE I

<table>
<thead>
<tr>
<th>EXPERIMENT</th>
<th>MAJOR OBJECTIVES</th>
</tr>
</thead>
</table>
| Health, Education, Telecommunications (HET) | To evaluate a system that will permit relay of television programs through the satellite to facilities such as schools, CATV systems, and clinics.
| Satellite Instruction Television Experiments (SITE) | To demonstrate relay by geosynchronous satellite of CCIR quality television from a high-powered program transmitting station to small modified standard TV receivers located throughout rural India and to urban rebroadcast stations.
| Television Relay Using Small Terminals (TRUST) | To advance state-of-the-art in space communications by demonstrating CCIR quality wideband signaling between ATS-6 and inexpensive ground stations.
| Millimeter Wave (MMW) (20 and 30 GHz) | Investigation of atmospheric propagation at MMW frequencies. Feasibility of the application of MMW communications.
| Propagation (13 and 18 GHz) | Collect data on attenuation due to precipitation. Determine power margins needed in spacecraft communications systems. |
aboard the CTS. A brief description of each experiment is presented in the following paragraphs:

- College Curriculum Sharing. This experiment is designed to expand the scope of curriculum by sharing classes among universities and countries. It will demonstrate digital video compression techniques for bandwidth and power reduction.

- Appalachian Educational Satellite Project II. The objective of this project is to strengthen the teaching system in Appalachia by improving teaching skills and increasing the information available to the students. The project will also allow for graduate courses and credit for the teachers.

- Health, Education, Television. This experiment is designed to make available both live and pre-taped continuing health education programs for the use of health care facilities, no matter how remote.

- Project Interchange. This project will serve teachers in scattered parts of the country. It will involve the continuing exchange of materials and teaching techniques related to computer aided instruction.

- Satellite User Network (SUN). This experiment will investigate a telecommunications system requiring little human support. It will also provide data on counseling, job preparation, employment, and career development.

Health Care Experiments

- Health Communications. This experiment will conduct biomedical, clinical and continuing medical experiments among the 30 participating hospitals.

- Biomedical Communications. The purpose of this experiment is to promote the distribution of information between research institutions and the medical community. The experiment will also evaluate broadband teleconference to support continuing education among health care professionals.

- Communications Support for Decentralized Education. This experiment will define methods to improve techniques for administration and teaching, as well as procedures for decentralized medical education.

Community and Special Services

- Satellite Library Information Network (SALINET). The objective of this experiment is to improve the capabilities of both individuals and organizations to assess and disseminate information.
American Forces Radio and Television Wideband Direct User. This project will develop techniques for the transmission of worldwide special services programs. It will also experiment in converting analog information to digital for wideband transmission of time-compressed audio at video format speeds.

Communications in Lieu of Transportation. The purpose of this experiment is to establish whether or not an organization, dispersed over a large area, can substitute audio and video communication for travel.

Communication Link Characterization. The objective of the experiment is to measure and characterise the radio frequency links of the SHF transponder on the CTS with respect to natural and man-made components, for example, rain and interference. The experiment will also evaluate signal attenuation and degradation due to the absorption and scattering caused by precipitation.

Highly Transportable Emergency Earth Terminal Demonstration. This experiment will benefit local fire department, civil defense units and rescue squads. A highly portable, self-contained earth terminal would be used to demonstrate quick reaction emergency communications via satellite to and from areas isolated by disaster.
Introduction

This report has been developed to present existing and projected user requirements for the general time frame 1979-2000 in the Broadcasting Satellite Service (BSS) as developed by TFB Task Force B, chaired by Frank W. Norwood JRST/BBG, was established October 21, 1975; membership is listed in appendix A. The task force has met four times. Dates of the meetings are listed in appendix B. The principal objective of this report is to present estimates of functional user requirements and logical projections therefrom in the context of existing allocations and proposed new allocations.

Section A - Scope

This report is principally directed at US requirements. Estimated requirements are based largely on published requirement studies and experiment reports. There has been no attempt to generate an independent requirements assessment except that in Section B substantial demographic evidence is produced to indicate that in one-half of the states, substantial populations live in geographical configurations which are likely to benefit from use of BSS. At least two market surveys are in process; however no results of comprehensive market surveys as they pertain to BSS are known to exist. This report will provide information on the status of the two known market surveys and will incorporate any specific results which emerge before final submission. Requirements considered fall largely into the Community Reception mode of BSS for specialised audiences. Since the US has a fully developed general broadcasting system, requirements for this type of BSS are considered only peripherally, particularly as they pertain to the Public Broadcasting Service and National Public Radio. Special purpose direct-to-home satellite transmissions are considered a probable future development, but quantitative needs

*Entertainment, news, etc.
are not assessable at this time. Lastly, while this report is
principally directed at US requirements, the orbit-spectrum
capacity for all of Region 2 is important in determining ability
to meet the projected requirements expressed requirements pro-
jections of non-US Region 2 countries known to exist are as a
consequence, incorporated in this report.

It should be understood that this report presents a class
of requirements generally related to the use of communications
satellites for delivery of health care, assistance in primary,
secondary and adult education and other related social services
It is considered that all, or some important elements of these
requirements fall within the BSS However, no effort has been
made to determine that all the requirements discussed uniquely
meet all service definitions of BSS emphasis is on the require-
ment not the allocations.

Section B - General Population & Resources

The fundamental assumption of this report is that, in the
US, certain communication satellite services are more applicable
to thinly populated areas because

- Concentrations of services develop in densely
  populated areas.
- Concentrations of communications accompany the
  concentrations of services.
- Large scale demand is the driving force in development
  of such concentrations.
- Satisfaction of the demand is economically practicable
  by terrestrial means where large scale demand exists
  in concentrated form.
- Thiny populated areas do not normally develop large
  scale demand
- Concentrations of services and associated communications
  do not normally occur in thinly populated areas.
- Substitutes may be required in thinly populated areas
  for services which are readily available in urbanized
  areas.
Communications satellites are particularly effective in delivering services to a large area, whereas terrestrial techniques are more effective in delivery services to points or small areas.

Communications satellites are likely to be more effective in delivery of services to large, thinly populated areas than are terrestrial techniques, they may be able to supplement terrestrial techniques in densely populated areas, by providing in them services already being provided to thinly populated areas.

### Us Thilly Populated Areas

The criterion used in this report in identifying thinly populated areas in the US is to determine the area in each state per Standard Metropolitan Statistical Area (SMSA). Figure 1 shows the SMSA's in the US. For example, Oregon has an area of 96,000 square miles, has three SMSA's and, therefore, has 32,000 square miles per SMSA. Table 1 following lists the fifty states with area/SMSA based on 1974 Census Bureau estimates. The table also shows:

- Number of SMSA's
- Order among states in area/SMSA
- Population outside SMSA's
- Percentage of total population outside SMSA's
- Land area outside of SMSA's
- Percentage of total land area outside SMSA's

#### Table 1

<table>
<thead>
<tr>
<th>State</th>
<th>No of SMSA's</th>
<th>Area per SMSA</th>
<th>Population Outside</th>
<th>State</th>
<th>No of SMSA's</th>
<th>Area per SMSA</th>
<th>Population Outside</th>
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<td>60.2</td>
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<td>9</td>
<td>205,000</td>
<td>62.5</td>
<td>505,405</td>
<td>99.0</td>
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<td>87.7</td>
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<td>9,816</td>
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<td>2,172,000</td>
<td>73</td>
<td>88,406</td>
<td>97.4</td>
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<td>842,300</td>
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<td>92.1</td>
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<td>207,820</td>
<td>10.1</td>
<td>4,051</td>
<td>90.7</td>
</tr>
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</table>

**Note:**
- Population data from the 1974 Census Bureau.
- Area data from the 1974 US Census Bureau.

**Table 1 is developed from World Almanac and Book of Facts 1975**
Almost exactly one fourth of the total population of the states lies outside of any SMSA. However, a substantial portion of this population is located in states which are highly urbanized, and in which it is likely that no area will be far from a SMSA. For this reason a somewhat arbitrary criterion is established in making a determination as to states which should be considered as “ thinly populated.” This criterion is that the area/SMSA should exceed 10,000 square miles. In a perfectly regular square distribution the elements of the area outside of the SMSA would be as far as seventy miles away from the center of the SMSA and fifty miles away from the edge and the average element about thirty-five miles from the center and fifteen from the edge. These are line-of-sight distances associated road distances could be expected to be as much as 1.4 times greater. It is assumed that these distances are too great to be negotiated as a daily routine and represent potential problems areas in delivery of emergency services. These are twenty-five states with areas of 10,000 or more for each SMSA, and it is from among these states that it is necessary to look for most of the thinly populated areas. These states are listed in Table 2.

<table>
<thead>
<tr>
<th>Region</th>
<th>State</th>
<th>No of SMSA’s</th>
<th>Population Outside of SMSA’s</th>
<th>Total Population</th>
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<tr>
<td>NE 19</td>
<td>Maine</td>
<td>2</td>
<td>16,600</td>
<td>785,450</td>
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<td>Missouri</td>
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<td>1,340,100</td>
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<td>Texas</td>
<td>22</td>
<td>12,151</td>
<td>3,517,800</td>
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<td>SA 25</td>
<td>South Carolina</td>
<td>3</td>
<td>10,351</td>
<td>5,523,800</td>
</tr>
</tbody>
</table>

Total 25,623,000 35,269,000

Reviewing the totals, it can be seen that the twenty-five states with areas/SMSA equal to 10,000 square miles or more contain slightly more than one-fourth of the total US population. A little less than one-half of the population of these states (and, therefore about one-ninth of the national population) lives outside of SMSA’s. This represents one-half the total population living outside of SMSA’s. However, the total area (outside of SMSA’s) for the selected states is 2,471,100 square miles out of a total of 3,222,100 square miles; the average population density outside of SMSA’s in the selected states is one-third of that in the other twenty-five.

The grouping by regions is interesting. All of the mountain states fall into the selected twenty-five, as do all of the Pacific states except California (which is at 9816 square miles/SMSA misses only slightly the 10,000 criterion). All of the West North Central states qualify except Iowa. This is in keeping with the 9,381 square miles per SMSA. All of the West South Central states are included except Louisiana. The next least populous New England states qualify, two out of four East South Central states, and a single South Atlantic state (although Georgia, North Carolina and Virginia are close to qualifying). No state in the Middle Atlantic and East North Central groupings (the most densely populated) fall under the criterion. Thus it appears that the twenty-five states selected are in fact representative of the “ thinly populated” section of the US and are the most appropriate for concentrated study in identifying potential requirements for broadcasting satellites. Total personal income in the selected states is $13 billion per year (interpolated from 1973 data). While this is below the per capita average for the nation as a whole, it indicates that substantial income exists in the states most likely to be fit from satellite broadcasting, and that as benefits are identified resources exist to develop them.
Table 3 shows the distribution of doctors, hospitals, and hospital beds in the selected twenty-five. Also shown are the percentages of the fifty state total. It is interesting to note that almost one-half of the federal hospitals and almost one-third of the non-federal doctors are located in the selected twenty-five states while almost one-third of the federal doctors are located in the selected twenty-five states. While almost one-fourth of the doctors and hospital beds are located in the selected twenty-five states, they have less than one-fourth of the doctors and hospital beds indicating that hospitals are smaller on the average, than in the other twenty-five, and that doctors and hospital beds are proportionately less available. The proportionately large number of hospitals likely reflects an attempt to increase the geographical density of hospital beds at the cost of potentially inefficiently small installations. Table 4 shows the distribution within the selected twenty-five states of hospitals and beds within and outside of SMSA and a comparison to the total US. While the number of hospitals within SMSA's in the selected twenty-five is 26%, proportional to the ratio of the total population, more than 50% of the hospitals outside SMSA's are located in the selected twenty-five states. The density of non-federal hospitals in square miles/hospital is 1004 for the selected twenty-five while the density in the other twenty-five is 175 or a factor of six larger. Further, it is obvious that in the selected twenty-five states hospitals are smaller within 10 and outside SMSA's than the US average. Density in square miles per non-federal doctor is 40 in the selected twenty-five and 3.3 in the other twenty-five, a factor of 12 larger. In the individual states densities may be even less, in Alaska, for example, the number of square miles per non-federal doctor is 1855.7.

Table 3

<table>
<thead>
<tr>
<th>State</th>
<th>Active Doctors*</th>
<th>Hospitals**</th>
<th>Beds in Hospitals**</th>
</tr>
</thead>
<tbody>
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<td>-------</td>
<td>-----</td>
<td>---------</td>
<td>-----</td>
</tr>
<tr>
<td>1</td>
<td>37</td>
<td>116</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
<td>770</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>125</td>
<td>326</td>
<td>10</td>
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<td>10</td>
<td>51</td>
<td>527</td>
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</table>

Table 4

<table>
<thead>
<tr>
<th>State</th>
<th>Active Doctors*</th>
<th>Hospitals**</th>
<th>Beds in Hospitals**</th>
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</thead>
<tbody>
<tr>
<td>-------</td>
<td>-----</td>
<td>---------</td>
<td>-----</td>
</tr>
<tr>
<td>1</td>
<td>37</td>
<td>116</td>
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</tr>
<tr>
<td>2</td>
<td>34</td>
<td>770</td>
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</tr>
<tr>
<td>3</td>
<td>125</td>
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<tr>
<td>4</td>
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<td>5</td>
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<td>65</td>
<td>713</td>
<td>6</td>
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<tr>
<td>8</td>
<td>78</td>
<td>557</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>455</td>
<td>2,440</td>
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<tr>
<td>10</td>
<td>51</td>
<td>527</td>
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</tr>
</tbody>
</table>
While somewhat outdated, figure 2 shows that the number of GP's is approximately constant as a percentage of the total population regardless of geographical location (although the density factors previously referred to would obviously apply). It also shows that specialists accumulate in SMSA's, therefore the geographical density of specialists is greatly reduced in states where there are large areas per SMSA.

Community hospitals make up more than 70% of all hospitals in the US. Figure 3 shows the distribution by size of all community hospitals. Figure 4 shows the distribution of selected facilities and services at community hospitals. The reduction in facilities with smaller hospital size is obvious since there is a disproportionately large number of small hospitals in the selected twenty-five states, they provide an obvious area of study for technological means--such as communications--to substitute for certain missing facilities.

If the effects of reduced density of medical service availability as to reduce the quality, which appears to be the case, then alternative means of improving medical service and health care need to be considered. An obvious one is to use improved communications (in place of travel or residence) to provide improved specialist consultation, doctor-patient consultation, and in-service training. These techniques have been proposed and experiments...
Figure 2—Percentage Distribution of Community Hospitals by Bed Size Category, 1963 and 1973

Figure 3—Per Cent of Community Hospitals Reporting Selected Facilities and Services, 1963, 1965, and 1973.
conducted leading to the view that in fact improved communications can help make up for deficiencies due to reduced density of medical service These are described in a later section of the report.

Review of the public school system indicates a situation similar to that in medicine. The school system tends to be small in the selected twenty-five states. Table 5 shows the number of school systems in each state of the selected twenty-five, the distribution by size, and the percentage of the national total by size.

It is particularly noticeable that although the selected twenty-five states have only 25% of the total US population, they have almost 50% of the school systems with between 1,000 and 2,500 students, 60% of the school systems with less than 300 to 600 students and 74% of the school systems with less than 300 students. Figure 5 shows the US distribution of school systems and school enrollment by size. The small percentage of the total enrollment in the smaller systems is very apparent. The large incidence of these small systems in the selected twenty-five states is a clear indication of the thinly populated character of these states.

Distribution within the selected twenty-five states within and outside of SMSA's is shown in Table 6. As is the case with hospitals, the schools in the SMSA's within the selected twenty-five states represent a percentage of the US total which is roughly the same as the percentage of the population to the total US population. Outside of the SMSA's the percentage is approximately 50% indicating that in areas outside SMSA's the states in the selected twenty-five have about the same number of schools as the states in the other twenty-five; however, since the selected twenty-five states have approximately three times the area of the other twenty-five, density is proportionately reduced.

Section C - Presentation of Requirement
Study & Experiment Results

There have been numerous studies of potential requirements of BSS and reports of the results of those studies have been issued. Experiments in use of BSS have been conducted
using the ATS-6 satellite and reports of results have been published. Experiments on use of BSS are in process using the ATS satellite and reports have been published describing each experiment. A partial listing of these reports is included in the references. Since projections of the likely technology of BSS (particularly earth station sensitivity) have changed somewhat in the last four or five years, the requirements studies which are specifically considered here are limited to those published in 1970 and later.

BSS requirements studies have produced two types of output. In the most common type, specific applications of BSS are examined and their usefulness assessed in subjective terms but without numerical projections as to number of subscribers, total operating hours per day, channel requirements, and geographical distribution of channels. Other studies have resulted in specific numerical projections. Frequently, results specifying numerical projections are based on assessment of and consolidation of subjective evaluations. These kinds of reports will be presented separately. Frequently, reports stemming from BSS requirements studies have been published together in proceedings of seminars, conferences, and the like. It is important to observe the distinction (pointed out in Howard Hupte's paper of October 1974 in Educational Technology) between the distribution system and the learning system (or health care, or information system) of which it is a part, the ability of telecommunications to improve these systems can be studied separately and apart from the specific distribution system. The characteristics of the distribution system (particularly cost and coverage) will establish practical configurations of telecommunications within the learning (or health care, etc.) system. Characteristics of the distribution system will be established by the characteristics of the learning (or health care, etc.) system and by the characteristics of the environment which are likely to be the principal factors influencing choice of a particular type of system. As stated in Section B, half of the states of the US have characteristics which are favorable for the use of BSS.

In addition to the studies of BSS requirements, there have been extensive studies of the benefits of telecommunications dependent techniques in learning (etc.) systems which are independent of the specific type of distribution system. Some of these reports are also discussed in this paper. An important group of studies of the value of the application of telecommunications techniques for social purposes is contained in Reference 1. Studies of particular importance are:

Rockoff, Maxine L., "The Social Implications of Health Care Communications Systems" which shows that although some caution must be exercised, the most practical way to provide vitally needed expansion in our health care system is through improving the distribution of existing resources, and that wide area telecommunications can play an important or dominant role in this.

Hudson, Heather E. and Edwin B. Parker, "Telecommunication Planning for Rural Development". The advantages of satellites for providing telecommunication services to rural settlements are presented with some emphasis on the value of satellite broadcasting.

Another important group of study papers was presented at the First Annual International Communications Conference held at the University of Wisconsin in June 1975 (Reference 2). Papers of particular importance are:

Dreyfus, Lee Sherman, "Satellite and Cable" indicates the importance of satellites in improving educational performance.

Hype, Howard, "Economic Realities of Satellite use", indicates the importance of high power BSS satellites for educational programming in schools and universities, continued education of teachers, doctors and paramedics in remote locations, medical diagnosis with particular emphasis on poorly served remote or rural areas.

During the summer of 1974 a Summer Study was conducted by the National Academy of Engineering, on the Practical Application of Space Systems (Reference 4). Sections of particular value are: "Needs in Education" page 13 which strongly supports requirements for BSS in education for alleviation of adult illiteracy, supplementing high school, community college and four-year college course material and continuing professional education, and identifies potential revenue sources. "Needs in Health Care" page 15 indicate the necessity for wide band communications in health care—with satellite distribution as a basis pointing out that telemedicine systems have greatest applicability in rural
regions where conventional terrestrial communications are inadequate or unreliable, and where satellites may be the cheapest alternative for providing health care. "Rural TV and Teleculture" page 20. Rural satellite TV service in addition to Broadcast TV service could enable rural areas and communities to share in the cultural and educational activities now available in metropolitan centers.

An important group of papers on ATS-6 experiment results is contained in Reference 4. While these papers are principally on the technical performance of the experiment, a paper by Boor, John L.; Braunstein, Jean; Janby, J. M.; Ogden, D.; Potter, J.G.; Harper, J.G.; Whalen, A.A.; Hendersen, R. and Huse, H.H., includes a preliminary evaluation of the HET experiment which indicates that the health and education communities have reacted through the formation of the PSSC to accommodate the new techniques and education, health care and other social services demonstrated in the experiment.

Three important papers by Howard Huse are References 5, 6 and 7 which establish that markets exist in areas such as health, education and library service, that substantial public funding exists in these areas, and that satellite systems capable of providing a basis of improving dissemination are well within these funding levels.

Results of an important study on a particular aspect of health care delivery via satellite (limited to Alaska where distribution problems are very severe) are contained in Reference 8, the final report in the Alaska Health Segment of the HET experiment. Findings included:

Satellite communications using small ground terminals can reliably provide services of sufficient quality to be useful in the health care system in rural Alaska.

Useful consultations for practically any medical problem can be conducted using satellite video channels.

Satellite video communications can be successfully carried out by health care providers at all levels of training.

Reference 9 is the report of JI/GC Working Group D which studied requirement potential for BSS in the 11.7-12.2 GHz region. Although directed principally toward WARC 77 and the 11.7-12.2 GHz region it contains a valuable summary of terrestrial broadcasting facilities and use factors and extensive statement of potential special audience use of BSS/C.B.

Numerous studies cited in the references and particularly those summarized above have supported the potential utility of satellites as an optimum means to expand our national capability in health service delivery, education and other social areas to meet increasing needs and particularly to improve the quality of life in the "rural" or less densely populated areas by providing services equivalent to those in metropolitan areas. It is clear from Section 8 that there is a very substantial population in such areas—at least one-eighth and possibly as much as one-quarter of the total US population. This means from twenty-five to fifty million Americans who could, potentially benefit from BSS. However, expansion of this "potential" to hard channel projections is difficult, and has to be based on many factors which are only now coming into existence such as an organisation to react with the user community (a role which PSSC has started to fill) to assess needs; at least one-eighth and possibly as much as one-quarter of the total US population. This means from twenty-five to fifty million Americans who could, potentially benefit from BSS. However, expansion of this "potential" to hard channel projections is difficult, and has to be based on many factors which are only now coming into existence such as an organisation to react with the user community (a role which PSSC has started to fill) to assess needs; which ones can be best filled by satellite, realistically estimate costs, and assess customer resources. Based on something less than perfection in market research, two channel projections have been made by Washington University (Reference 10) and by CCIR study group 10/118 (Reference 11). The Washington University report was developed in 1975 after more than four years of study and analysis of the overall field of communications as an aid to education, with particular emphasis on application of satellites; references 14-11 report on some of this background work. The USGS-BC/838 is totally based on review of background reference material.

Requirements developed in USGS-BC/838 are summarised below:

<table>
<thead>
<tr>
<th>Average Number of Channels per Time-Zone (TV Channel Equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Biomedical</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Reference 11 is the report of JI/GC Working Group D which studied requirement potential for BSS in the 11.7-12.2 GHz region. Although directed principally toward WARC 77 and the 11.7-12.2 GHz region it contains a valuable summary of terrestrial broadcasting facilities and use factors and extensive statement of potential special audience use of BSS/C.B.
Business wide been questionnaire conducted requirements project1ons. However, the rssc the spontaneous substantial cost and effort and need to be directed toward service engaged channels a to be established in late 1974. The requirements developed for the last four months between interested parties. An important factor in the establishment of the PSSC was a response to a survey questionnaire from which a projected requirement for seven TV channels was developed. For the last four months PSSC has been engaged in a detailed market survey in which evaluation teams have been visiting with individual PSSC member organizations for indepth discussions of potential requirements and resources, and what promise satellite technology may hold for economical satisfaction of the requirements. This visiting, data gathering process is planned for completion by the end of April 1976. It is expected that analysis of the data and development of meaningful requirements projections will take several months; however, to the extent possible preliminary results of this survey which have been developed by June 1976 will be incorporated into this by addendum.

A second market survey is being conducted by the Public Interest Satellite Association (PISA). PISA was formed in the fall of 1975 to explore ways the newer satellite technologies intended for use in the higher bands can be adapted to meet the long-distance communications needs of non-profit groups. These include non-commercial broadcasters, community and social action organizations, and related public interest organizations. A questionnaire (Appendix D) designed to gather information about these groups' communications needs, uses, costs, and future plans has been sent to more than 2,500 organizations, including the entire universe of non-profit organizations with 10,000 or more members. PISA has hired a private research firm (Melvin A. Goldberg, Inc.) with extensive research experience in both the broadcast and communications satellite fields to conduct the study, which represents the first attempt over undertaken to broadly assess the communications requirements of the non-profit sector. An important aspect of this assessment will be the non-profit community's anticipated use of satellites for broadcast purposes. Reips to PISA's questionnaire are currently being tabulated and analyzed by computer. A final report is scheduled to be released by May 15, 1976. Its results also will be incorporated by addendum.

Section D - Market Surveys and Status

Market surveys are critical to establishing dependable requirement projections. However, since they represent a substantial cost and effort and need to be directed toward a specific set of objectives, they are not likely to develop spontaneously or as institutional research projects but to be conducted by organizations interested in "getting into the business." In the US such an organization is the Public Service Satellite Consortium (PSSC) representing a wide spectrum of potential users in the non-profit social service area. Membership in the PSSC is listed in appendix C.

The PSSC was founded in February 1975 after a series of meetings in late 1974 between interested parties. An important factor in the establishment of the PSSC was a response to a survey questionnaire from which a projected requirement for seven TV channels was developed. For the last four months PSSC has been engaged in a detailed market survey in which evaluation teams have been visiting with individual PSSC member organizations for...
Section G - Orbit Spectrum Capacity

Description of Existing Allocations

Existing Region 2 allocations for the BSS are as follows:

620-790 MHz - In the international allocation table, Footnote 332A authorizes assignments in this band to television stations using frequency modulation subject to a power flux density limitation to protect terrestrial services in the band and to agreement between administrations concerned and affected. In Region 2, the band is otherwise allocated to the Broadcasting Service only and in the US the footnote allocation to the Broadcasting Satellite Service has been suppressed.

7500-2690 MHz - Shared with the Fixed Satellite Service (FSS) (Space to Earth) at 2500-2515 MHz and (Earth to Space) at 2655-2690 MHz and with the Fixed and Mobile (except Aeronautical Mobile) Services over the entire band. Use is limited to domestic and regional systems for community reception. Power flux density limitations to protect the terrestrial services are imposed on the space services. This is the allocated band which is best for near-term use. It is the band in which the US ATS-6 health and education experiments have been conducted and in which the most-developed technology exists. It has the most favorable propagational characteristics. However, it has rather limited orbit-spectrum capacity due to its so-called limited bandwidth and satellite separation angles which are proportionately larger than those of the higher frequency bands.

11 7-12.2 GHz - In the international allocation table for Region 2, this band is shared with the FSS (Space to Earth), Fixed, Mobile (except Aeronautical Mobile), and Broadcasting Services. However, in the national allocation tables of the US and Canada, the allocations to the Fixed and Broadcasting Services have been suppressed and that for the Mobile Service reduced to secondary status. Use in limited to domestic systems and there are no power flux density limitations on satellite systems. Orbit-spectrum capacity is considerably greater than that of the 2600 MHz band. However, required rain margins impose system constraints exceeding those of the 2500-2690 MHz band.

<table>
<thead>
<tr>
<th>Channels</th>
<th>Channels</th>
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</thead>
<tbody>
<tr>
<td>CCIR</td>
<td>Washington University</td>
</tr>
<tr>
<td>Education</td>
<td>9 1/4</td>
</tr>
<tr>
<td>Medical</td>
<td>55 2</td>
</tr>
<tr>
<td>TV (per time zone) 15 MHz, Voice, data (per time zone)</td>
<td></td>
</tr>
<tr>
<td>TV (total)</td>
<td></td>
</tr>
</tbody>
</table>

Section F - Projection of Requirements

Neither study predicts a specific "time now" for the requirements. Based on technology and economic factors it is projected that complete satisfaction of the indicated requirements could not occur until 1980-1985, which is considered to represent the "time now" for the requirements. Using a factor of X-4 for S.75, US Video growth from 1985 to 2000 (projected from data in Reference 12) the projected US end of the millennium requirement will be in equivalent BC television channels.

\[ \frac{7.26 \times 10^7}{10^7} \]

Total ground terminals 60,000-70,000

**Footnotes**

1. Footnote 332A allows the use of the CCIR educational requirements for the CCIR educational requirements.

2. Footnote 332B allows the use of the CCIR educational requirements for the CCIR educational requirements.
This is the band in which the CTS health and educational experiments are being conducted. Technology is in a well-developed stage, although equipment may be somewhat more costly than for the lower frequency bands.

41-43 GHz - In the international table, this band is allocated on an exclusive world wide basis to the Broadcasting Satellite Service, although a recently adopted FCC Report and Order (Docket 19973) modifies the US national table to include sharing with the Fixed and Mobile Services. This is a band where equipment technology and knowledge of environmental conditions are not well developed. It may be applicable to services which do not require very high circuit reliability or alternatively, where diversity reception is possible. The utility of this band will probably increase toward the end of the century with expected improvements in technology.

84-86 GHz - The comments about the 41-43 GHz band also apply here.

Capacity of Existing Allocations

The capacity of the broadcasting-satellite bands of most immediate interest (at 2500 MHz and 12 GHz) have been estimated for the baseline Fixed Satellite and Broadcasting Satellite Systems described in Rand Report R-1463-NASA using methods described in that report. In making these estimates, the total arc of the geostationary orbit usable within Region 2 is taken to be 150 degrees.

The capacity estimate for the band 11.7-12.2 GHz is taken from Table 3 (Reference 13) for the following conditions:

- Copolarization
- Cochannel
- Community Reception
- Sharing ratio with FSS 25 75
- Large FSS Earth Station
- Orbit division
- Paring of service areas in Northern and Southern hemisphere

and is 648 BC equivalent TV channels. Based on linear frequency scaling from the 12 GHz capacity the 2500 MHz capacity is

\[
\frac{2500}{12} \times 648 = 52.5
\]

BC equivalent TV channels, however, since there is no sharing ratio with FSS total capacity would be 210 BC equivalent TV channels or assuming that 1 TV channel equals 1,000 one-way voice channels, the total capacity would be equivalent to 850,000 one-way voice channels. If techniques discussed in Rand R-1463-NASA including cross-polarization, frequency interleaving and crossed-path geometry are used these capacities might be doubled. As previously noted, the orbit-spectrum capacity for BI TV channels will be about 0.175 times the maximum BC capacity.

Section H - Adequacy of Existing Allocations

The table below shows in consolidated form the requirements and the capacity estimated in previous sections.

<table>
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<th>Time</th>
<th>US</th>
<th>Other Region 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980-85</td>
<td>420-460</td>
<td>1296</td>
<td>2598-2728</td>
</tr>
<tr>
<td>2000</td>
<td>1302-1422</td>
<td>1296</td>
<td></td>
</tr>
</tbody>
</table>

Capacity

<table>
<thead>
<tr>
<th></th>
<th>2500 MHz</th>
<th>12 GHz</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>210</td>
<td>648</td>
<td>858</td>
</tr>
<tr>
<td>Improved sharing</td>
<td>420</td>
<td>1296</td>
<td>1716</td>
</tr>
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</table>

It can be seen that the 1980-85 US requirement cannot be met within the basic orbit-spectrum capacity of the 2500 MHz band and that even with the use of improved sharing techniques.
at some point between 1985 and 2000 the combined capacity of the 2500 MHz and the 12 GHz bands may not be adequate for the projected Region 2 requirement. To retain existing belts.

Section I - Recommendations for New Broadcast Satellite Allocations

Considering that the existing allocations may not be adequate to meet projected Region 2 requirements, and that unforeseen requirements for BSS beyond those described developing through the end of the century, allocation of spectrum to the BSS in addition to the existing allocated bands is recommended. In all cases these recommended additions involve sharing with other services and are conditional on development of mutual acceptable sharing criteria. Basically the recommended additions fall in two broad regions of the frequency spectrum and will be described below on that basis.

1. Below 4 GHz. The region between 2 and 4 GHz is the most suitable for all kinds of satellite communications and is the region where the technology and environmental knowledge is best developed and essentially no margin for atmospheric phenomena is required. It represents the most practical region for early BSS development.

a. 420-450 MHz Selected channels not to exceed 6 MHz total (35 FM channels) Although the desirability for FM aural broadcast for special purposes such as education and medicine is well established, frequency bands allocated to BSS while suitable for TV are not well adapted to aural broadcast because of ground station cost. Equipment from the nearby Land Mobile band could be used to provide moderate cost stations. This recommended extension would involve sharing with RADIOLOCATION which is now allocated on a primary basis and Amateur and Amateur Satellite which are allocated on a secondary basis.

b. 2300-2500 MHz This recommended expansion at the lower end of the existing 2500-2690 band would involve sharing with FIXED and RADIOLOCATION which are now allocated on a primary basis and with Amateur, Mobile and Fixed which are now allocated on a secondary basis.

Sharing between RADIOLOCATION and FSS (Space-to-Earth) has already been determined to be feasible (see reference 1). This action would double the orbital-spectrum capacity for early types of BSS.

c. 3400-3700 MHz. This recommended expansion is already allocated to FSS in Regions 2 and 3, and would involve sharing with FIXED-SATELLITE, FIXED, MOBILE and RADIOLOCATION. Sharing between RADIOLOCATION and the FSS has been determined to be feasible (see reference 31). This band is technically at least as desirable as the 2500 MHz band for BSS and represents an orbit-spectrum capability exceeding that of the existing 2500 MHz band.

2. Above 4 GHz. BSS allocations above 4 GHz start at 11.7 GHz, and up to 86 GHz. While the 12 GHz region is technically suitable for BSS, rain attenuation imposes system penalties which may have economic consequences. The next BSS allocations are in the 40 and 80 GHz regions which also have severe rain attenuation and depend for usefulness on growth of the technology and can only be considered in long term planning.

da. 12 to 12.5 GHz. This recommended expansion on the upper end of the 11.7-12.2 GHz band would make Regions 2 and 3 consistent with Region 1. It would involve sharing with FIXED, MOBILE except Aeronautical Mobile, and BROADCASTING; these are already shared regionally in the 11.7-12.2 existing allocation. This action would provide a 40% increase in orbit-spectrum capacity in the 12 GHz region.

db. 19.7-21 2 GHz. This band is currently allocated to FSS (Space-to-Earth) on an exclusive basis. Sharing between BSS and FSS on the same basis as in the 11.7-12 2 band is recommended; projected technology improvements should render this spectral region useful for second generation systems, while orbit-spectrum capacity would be expected to be very great. Propagation characteristics are not as good as at the lower frequencies and the band might initially be most applicable to service not requiring very high circuit reliability. It is not now known whether orbit sharing with FSS is possible but considering the general increase in antenna directivity with frequency, sharing should be at least as feasible as on the 11.7-12.2 GHz band. Further, there are no...
terrestrial allocations in this band which require power flux density limits, thus permitting use of higher satellite power to overcome atmospheric attenuation.

Recommendations for Uplinks for BSS Allocations

The uplinks for the BSS are part of the PSS. Since there is not a one-for-one correspondence between the bandwidth allocated for BSS (uplink) and the \( \frac{\text{GHz}^2}{\text{Hz}} \) of the bandwidths allocated for PSS (downlink) and BSS, there appears to be a potential problem in providing sufficient uplink connections for BSS, particularly in applications where interaction is vital (such as doctor-patient consultation). It is recommended that proposals for PSS (uplink) allocations provide for adequate capability for BSS uplink connection.

**Glossary**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>BSS</td>
<td>Broadcasting Satellite Service</td>
</tr>
<tr>
<td>BC</td>
<td>Community reception in the BSS</td>
</tr>
<tr>
<td>BI</td>
<td>Individual reception in the BSS</td>
</tr>
<tr>
<td>CCIR</td>
<td>International Radio Consultative Committee</td>
</tr>
<tr>
<td>FSS</td>
<td>Fixed Satellite Service</td>
</tr>
<tr>
<td>JI/GC</td>
<td>Joint Industry-Government Committee for WARC '77</td>
</tr>
<tr>
<td>WGD</td>
<td>Working Group D &quot;Functional Requirements&quot;</td>
</tr>
<tr>
<td>WGB</td>
<td>Working Group B &quot;Sharing Principles&quot;</td>
</tr>
<tr>
<td>SMSA</td>
<td>Standard Metropolitan Statistical Area</td>
</tr>
<tr>
<td>WARC</td>
<td>World Administrative Radio Conference</td>
</tr>
</tbody>
</table>
References

15. Singh, Jai P., "Operating Frequencies for Educational Satellite Services", Washington University Memorandum 71-10, November 1971
27. NSF Division of Systematics General Corp., "Interim Results from 80 and 80 GHz Technology Assessment and Forecast." Under contract no. NAS-3-19724 for NASA Lewis Research Center.
31. CCIR Report 1W PLEN 2, Doc 1, November 4, 1975.

Appendix A-I

WARC 1979

BROADCAST BUREAU SERVICE GROUP ON SATELLITE BROADCASTING (BSG/SAT)

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(Continued)
Appendix A-2

Meetings of Task Force D RSG/SAT

1st January 23, 1976
2nd February 5, 1976
3rd February 27, 1976
4th April 16, 1976

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Appendix C

Public Service Satellite Consortium

MEMBERS

Alabama ETV Commission  
State of Alaska  
Aloha System Project  
American Academy of Orthopedic Surgeons  
American College of Physicians  
American Library Association  
Aspen Institute  
Bilingual Children's Television, Inc  
Brigham Young University  
California Instructional Television Consortium  
Catholic Television Network  
Coast Community College District  
Committee on Institutional Cooperation  
Communications Satellite Planning Center-Stanford University  
Community Television of Southern California-KCET  
Corporation for Public Broadcasting  
Federation of Rocky Mountain States  
Indiana Higher Education Telecommunication System  
Indiana University School of Medicine, Medical Education Resources Program  
Joint Council on Educational Telecommunications  
Kansas Public Television Commission  
Maryland Center for Public Broadcasting  
Medical University of South Carolina  
Missouri Public Broadcasters  
Mississippi Authority for ETV  
Mountaineer Television Network  
Mountain States Health Corporation  
National Education Association  
National Public Radio  
North Dakota Educational Broadcast Council  
Oregon State System of Higher Education  
Public Broadcasting Service  
Public Interest Satellite Association  
SALINET (Satellite Library Information Network)  
San Diego County, Department of Education  
San Diego State University  
South Carolina Educational Television Network  
Southern California Consortium for Community College Television  
Southern Educational Communications Association  
United Methodist Board of Discipleship  
United States Catholic Conference  
University of California  
Univ. of Calif., San Francisco-Dept. of Public Programs & Continuing Education  
University of Hawaii  
University of Indiana  
University of Maryland  
University of Southern California  
University of Wisconsin-Stevens Point  
Virginia Public Telecommunications Council  
Western Interstate Commission for Higher Education  
University of Alabama in Birmingham

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<th>(1)</th>
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<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commun Used</td>
<td>Communications Technique</td>
<td>Type of Service</td>
<td>Usage Frequency</td>
<td>No of Items Cost</td>
<td>Annual Cost</td>
</tr>
<tr>
<td>Mail Mailings (General)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Mail Newsletters</td>
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</tr>
<tr>
<td>Mail Magazines</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Mail Promotions</td>
<td></td>
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</tr>
<tr>
<td>Mail Surveys</td>
<td></td>
<td></td>
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<tr>
<td>Mail ballots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mail Renewals</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
### Appendix D-2
#### Public Interest Satellite Association

<table>
<thead>
<tr>
<th>Communication Technique</th>
<th>Type of Service</th>
<th>No of Items</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>Long Distance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>WATS Lines</td>
<td></td>
<td></td>
</tr>
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<td>Telephone</td>
<td>Tie Lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>Leased Lines</td>
<td></td>
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</tr>
<tr>
<td>Telephone</td>
<td>Foreign Exchange Lines</td>
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<td></td>
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<tr>
<td>Telex</td>
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<td>Telex</td>
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<td></td>
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<tr>
<td>Telex</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Telex</td>
<td>Telex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mailing/Facsimile</td>
<td>Mailgrams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telex</td>
<td>Telex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telex</td>
<td>Telex</td>
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<tr>
<td>Radio</td>
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<td></td>
</tr>
<tr>
<td>Radio</td>
<td>Radio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Television</td>
<td>Television</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td>TV-Closed Circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV-Slow Scan</td>
<td>TV-Slow Scan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ptt Micro Wave</td>
<td>Ptt Micro Wave</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Transmission Data</td>
<td>Data Transmission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meetings/Conferences</td>
<td>Meetings/Conferences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National or Regional</td>
<td>National or Regional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Please list)</td>
<td>Other (Please list)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Appendix D-3
#### Public Interest Satellite Association

3. If satellite service dedicated to non-profit organizations were made available, for which 5 of services would you give first priorities? Please list the Top 5 (1 is highest)

- Long Distance Telephone
- Telex
- Data Transmission
- Television
- Closed Circuit TV
- Slow Scan Television
- Telegram
- National/Regional Meetings

4. To what other uses, if any, would you put the satellite service, if it were made available to your organization?

---

Name of Organization __________________________
Address __________________________
City and State __________________________ Zip Code __________________________
Telephone (____) __________________________
Number of Chapters __________________________
Number of Members __________________________
Purpose of Organization __________________________
Name of Person Filling Out This Form __________________________
Title of Person Filling Out Form __________________________
Date __________________________
APPENDIX 5
PANEL PRESENTATIONS

The following pages contain the results of the panel deliberations and their presentations of user requirements for public service communications satellite system.
PANEL II
COMMERCIAL SERVICES

Don Jamasky, Chairman
Joseph Snyder, Secretary

COMMERCIAL CARRIERS / COMM SAT
SPACECRAFT / EQUIPMENT MANUFACTURERS
REGULATORY AGENCIES

PURPOSE:
- Determine the relationship between Industry and a
  Government-sponsored Public Services Satellite Communications System

APPROACH:
- User Needs / Shopping List
- Aggregate Needs - Define System Requirements
- Design System
- Join Government / Commercial / User
- Demonstrate Grass-Operational System
- Full Commercial System
GROUND RULES:
- Applications which can be satisfied by existing
  commercial satellite systems should not be considered.
- Interstellar system is required for application.
  Criterion should be:
  - New spacecraft system is required for application.
  - Cost of user equipment not economically feasible.
  - Ground rules relative to commercial service.

THE RSCS
- The program is to establish a market validation
  demonstration approach.
- The market will be established through a
  demonstration approach.
- RSCS should involve industry to establish
  the proper crossover to a full commercial system.
I. THE POSSIBLE CONFIGURATION AS IS POSSIBLE

- Stability of system parameters is of major importance (legislative agencies).

- Diffusion alternatives should be examined.

- Establishing system.

- Providing incentives for industry to develop the services.

- Government developed system in cooperation with commercial services.

THE USER

- Should have some financial commitment to the system.

- Should have no major increase in financial operating costs.

- For long users a gradual increase to ease the transition to a commercial system.

A5-4
<table>
<thead>
<tr>
<th>REQUIREMENTS</th>
<th>DATA RATES (bits/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SENSORS</td>
<td>0</td>
</tr>
<tr>
<td>2. DATA TERMINALS (INTERACTIVE)</td>
<td>0</td>
</tr>
<tr>
<td>3. COMPUTER INTERFACE</td>
<td>0</td>
</tr>
</tbody>
</table>

PSSMP
PUBLIC SERVICES SATELLITE

MASSAGE PARLOR
REQUIREMENTS
TRANSACTIONS (bits)

1. DATA INQUIRY
   (Library, medical record,
    sensor data, ...)
   200

2. RESPONSE
   4000

3. ELECTRONIC MAIL
   (single page)
   20,000

4. HIGH RESOLUTION IMAGE
   10^7

Example: ATS-6 transponder, small
earth Terminal 5 x 10^4

USER COMMONALITY REQUIREMENT

MEDICAL SENSORS
WEATHER SENSORS
DIGITIZED VOICE
BULK DATA TRANSFER
INQUIRY SYSTEM
INTERACTIVE DATA PROCESSING
ELECTRONIC MAIL

PACKETS

control

A5-6
DIRECT DELIVERY TO USER

1. Programmable Hand Calculator
2. Citizens Band
3. Digital Citizens Band

USER CONNECTIVITY

1. HUMAN COMMUNICATION
2. RECONFIGURATION AND GROWTH
3. MODULARITY
   (a) START-UP COSTS
   (b) COMPATABILITY

PACKET BROADCASTING

POINT-TO-POINT ALTERNATIVE

100,000 node network requires

\[
\frac{100,000 \times 99,999}{2} \approx 5 \times 10^9 \text{ links}
\]
Model: Catholic TV-NET

Objective

To meet instructional needs of elementary & secondary students and their teachers

Sample Applications

- Access to educational diagnostic specialists
- Obtain remotely stored instructional materials and resources
- Supplement teaching staff
- Individualize instruction
- Provide instruction for homebound students
- Provide computer-assisted instruction
- Facilitate enrichment activities
- Meet unique needs of handicapped learners

School Users [Est.]

600,000 Students (K-12)
25,000 Teachers
1,300 Schools

13,000 "Terminals" (TV Sets)

CTN also Serves:

Hospitals, Community Colleges, Adult Education
TERMINAL CONFIGURATION REQUIREMENTS

- Two-way audio
- Two-way video
- Computer terminal
- Facsimile receiver
- Video tape recorder
- Audio tape recorder
- Multi-channel capability
- Remote call-up capability
- Teleconference capability

NUM.ER

- Minimum of one per school (65,000+)
- 1,000 mobile terminals (20/states)

VOLUME

- Operational 7 hrs/day 5 days/week
- Eastern thru Hawaiian time zones

OBJECTIVE

To provide access to information needed by teachers to teach elementary & secondary teachers

TEACHER NEEDS

- Student data
- Programs of study
- Instructional objectives
- Learning activities
- Learning modes
- Media resources
- Measurement devices
- Diagnostic/remedial activities
- Management information

ASSUMPTIONS

- Information is "raw material" of instruction
- User should dictate form, time, place of needed information
CHEAPER TO MOVE INFORMATION ELECTRONICALLY
* MOST INFORMATION CAN BE STORED, UPDATED AND RETRIEVED ELECTRONICALLY
* ALL ELECTRONICALLY STORED INFO CAN BE DISTRIBUTED TO LARGE NUMBER OF USERS
* STORED INFO CAN BE GIVEN TO USERS IN ANY ELECTRONIC FORM.

**SATELLITE APPLICATION TO**

**Elementary & Secondary Education**

<table>
<thead>
<tr>
<th>Function: STORAGE</th>
<th>Mode: PRINT</th>
<th>Location: HOME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FILM</td>
<td>CLASS</td>
</tr>
<tr>
<td></td>
<td>VIDEO TAPE</td>
<td>SCHOOL</td>
</tr>
<tr>
<td></td>
<td>AUDIO TAPE</td>
<td>REGION</td>
</tr>
<tr>
<td></td>
<td>DATA</td>
<td>NATIONAL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distribution: MAIL</th>
<th>Mode: UHP/MP</th>
<th>Location: HOME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CABLE TV</td>
<td>JOBSITE</td>
</tr>
<tr>
<td></td>
<td>TELEVISION</td>
<td>SCHOOL</td>
</tr>
<tr>
<td></td>
<td>ITS</td>
<td>HOSPITAL</td>
</tr>
<tr>
<td></td>
<td>SATELLITE</td>
<td>COLLEGE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Utilization: BOOKS</th>
<th>Mode: FACSIMILE</th>
<th>Location: SAME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CRT DISPLAY</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CAI</td>
<td></td>
</tr>
</tbody>
</table>
Presently served 25 to 40 million adults
Fastest growing segment of education
Port-time enrollments now exceed full-time enrollments
Envision an enrollment potential of 60 million in the '80s
Yet higher education has failed to take advantage of communications technology.
How motivate the use?
Need for entrepreneurs
Need for federal policy and resources

Populations to be served:
1) Occupational training
2) Continuation professional education
3) Military training
4) Institutional uses - in-service training
5) Education in sparsely populated areas
6) Immobilized persons - handicapped or incarcerated
7) Mass distribution of content of meetings of professional societies
Need for further study, but can recognize:

1) Relicensing laws
2) State and federal regs
3) Degree requirements for graduation
4) Requirements to protect privacy
5) Liability concerns
6) Market aggregation - district independent
7) Equality of access
8) Timeliness of information
9) Pooling and sharing of resources
10) Catalytic effect of achieving change
11) Responsiveness - potential two-way communication
12) Economic advantage
General - Satellite will allow access to all modes depending on situation - telecopying computer systems 2-way audio 2-way color video

Quality may be variable. Color not always necessary. Nor is two-way video. Interactive mode may require only digital response, or voice, or voice and video.

Continuous use of available time -

Daytime - schools, military institutions and industry.

Evening - continuing education programs for adults.

Night - taping programs for storage and future use.

One present system - Appalachia plans use of 20 hrs/wk.

We foresee as much use as facilities development will allow.

We see problems of access. Who will decide? Commercial? Public Service?
Presently primarily local, fluid, and regional.


Public Broadcasting System, State Networks (e.g., South Carolina).

We foresee a need for interconnecting existing facilities both locally, regionally, nationally, and internationally.

Ideally, each site would have a receiver/transmitter.

Privacy
Copyright
Legislative action
Licensure and relicensure
Segmentation of curriculum among jurisdictions
Engineering and Technical
NASA and FCC requirements
Picture quality
Frequency spectrum problems
Accreditation and awarding of credit
Availability of funding
Jurisdiction within institutions or consortia.
RECOMMENDATIONS: (not concurred in by all in panel)

1. NASA should undertake an active study of applications of satellite systems and make recommendations for benefit of government and potential users.

2. There should be a detailed study of the continuing education needs of the professions which could be served by satellites.

3. There is a need for a clearinghouse to provide information exchange about the present availability and potential of satellite systems.

4. There is need for a means to inform potential users about possibilties of satellite systems.

5. Government should convene a meeting of all federal agencies involved with satellites to establish policies for the federal government role in development of satellite systems.

6. NASA should continue its efforts to develop high powered satellites so that necessary earth terminals can be obtained inexpensively and used widely in the many applications appropriate to continuing education.

7. NASA should encourage further research in the higher frequency spectrum so as to increase the frequency spectrum available for public service transmission.

8. So that the learnings from this workshop are not lost, a similar workshop should be convened periodically to update and extend the information and recommendations of an informed group.
Introduction:

The Medical Education Panel Report is a statement of the future (next decade) needs of health care professionals for health science education which will be most effectively met by information transfer systems via a communications satellite. The Panel recognizes the magnitude of medical education needs of both the patient and the general public but did not include that aspect in the discussion upon which this report is based.

1.0 Objectives

1.1 Discipline Objectives - The objectives of medical education are to maintain and improve professional services through the education and training of physicians and other health professionals and through biomedical and health services research. The major educational phases for the health professions are undergraduate, graduate and continuing education with different emphases on these phases in each specific discipline (medicine, dentistry, nursing, allied health professions, pharmacy, etc.).

1.2 Statutory Requirements - There are no federal statutory requirements for the practice of health professions. Each state regulates the practice of these professions and, particularly of medicine through its medical practice act. Some states have introduced a statutory requirement of continuing medical education as a prerequisite for relicensure of physicians and other health professionals. All other requirements for educational or professional standards in medicine are established by voluntary organizations.

1.3 The objective to which Satellite/Telecommunications can make a contribution is to provide a wider distribution to rational geographic areas for interconnection to terrestrial systems in order to more efficiently reach a wider specialized audience. It would also enable a national continuing education facility to more efficiently provide the programming input to such a system via a multiple capability uplink.

1) LEX, NBME, e.g. The most common provisions for medicine are:
   1) that the individual has to have graduated from an accredited U.S. or Canadian medical school (undergraduate education), 2) that the applicant must have one or two years of house-staff training (graduate medical education), and 3) that the individual must have received a passing score on the examination.

2) CCME, LONE, LOGME, LCOME, specialty boards, etc.
<table>
<thead>
<tr>
<th>Panel 7</th>
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### DISCIPLINE COMMUNICATIONS NEEDS

#### 2 1 Purposes

<table>
<thead>
<tr>
<th>Type of Communication</th>
<th>Date: 4/4 107</th>
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</thead>
<tbody>
<tr>
<td>Telediagnosis and selected mass information transfer as in medical school classroom, multiple branches of a school or multiple schools, etc.</td>
<td>Audio-video-color 2 way (option - may be used with teleprocessing)</td>
</tr>
<tr>
<td>Computer Data Banks</td>
<td>High Data Rate (Digital) - audio - combination</td>
</tr>
<tr>
<td>Business/Educational (see note)</td>
<td>Audio-video color 2-way Practical to meet some of this need - expansion of use probably necessary</td>
</tr>
<tr>
<td>Requirements of hospitals, clinics, groups (Eventually may be practical for individuals)</td>
<td>Audio-video use practically now, program content very critical</td>
</tr>
<tr>
<td>Health Education for the Patient(s) Type I - Health Education: For the general public, believed to be a public health function</td>
<td>Audio - 2-way, video is helpful, if available</td>
</tr>
<tr>
<td>Type II - Physician to patient about specific condition, a health system function - completely confidential requiring physician input</td>
<td></td>
</tr>
</tbody>
</table>

#### 2 3 Communications Networks

- At present needs can be identified through recently conducted experiments
- The use needs of a dedicated broadband network for health has not been determined

#### 3 0 CONSTRAINTS AND PROBLEMS AREAS

#### 3 1 Constraints - statutory restraints are state and not Federal at this time and they can be unique to a given state

#### 3 2 Regulatory Constraints - None now, but disclosure regulations regarding drugs under auspices of FDA have been recognized

#### 3 3 Institutions are not funded to develop or distribute continuing medical education programs utilizing broadband or any other distribution modality

#### 3 4 A MODERN AREA RELATES TO CONFIDENTIALITY OF DATA

#### 4 0 POTENTIAL BENEFITS

Overcomes restraints of geographic separation and thereby facilitates sharing of human and physical resources

#### 5 0 CONSENSUS

Federal government should consider providing funds for subsidizing the dissemination of educational programs
PUBLIC SAFETY

CHR: SMILEY ASHTON LEAA

PUBLIC SAFETY
GENERAL

CONSTRAINTS

• No communications links to be provided to further computer linkage (Federal type)
• Computerized criminal history and other criminal justice records require special handling.
• Privacy of information related to specific individuals to be respected (no linkage of individuals by name to statistical analysis).

FEATURES

• Privacy and/or encryption of links is required in some instances to ensure protection of sensitive information.
• Public safety communications links should strive for maximum reliability and afford 100% availability since emergencies cannot be anticipated and effective service is often a matter of life or death.
PUBLIC SAFETY REQUIREMENTS ANALYSIS

VOICE

(ONE-WAY RADIO NATIONWIDE COVERAGE)

DISASTER ALERTING NETWORK
OTHER PUBLIC SAFETY REQUIREMENTS

362 CHANNEL

SHELTER RADIO

MOBILE/MOBILE; BASE/MOBILE AND MOBILE/BASE
CSEB WITHIN 300 MILE RANGE; 20 NATIONWIDE
100% RELIABILITY; 100% AVAILABILITY; 3X AVERAGE
USAGE FOR 250,000 STATIONS)

NATIONAL EMERGENCY COORDINATION CHANNEL

CTRL RELIABILITY; 100% AVAILABILITY; 3X AVERAGE
USAGE NATIONWIDE, COORDINATES ALL ELEMENTS OF DISASTER-
POLICE, FIRE, SEARCH AND RESCUE, RED CROSS, EMERGENCY
MEDICAL SERVICES, ENVIRONMENT PROTECTION, CIVIL DEFENSE
AND OTHER SPECIALIZED SERVICES)

NOTE: DOES NOT INCLUDE ADMINISTRATIVE/OPERATIONAL TELEPHONE SERVICE NOT PECULIAR TO PUBLIC
SAFETY OPERATIONS; THESE ARE INCLUDED IN GENERAL ADMINISTRATIVE SERVICE BY FEDERAL,
STATE AND LOCAL LEVELS.

PUBLIC SAFETY REQUIREMENTS ANALYSIS

RECORD TRAFFIC: 68 Kbps

ESTIMATED CRIMINAL JUSTICE SYSTEM REQUIREMENTS FOR INTERSTATE TRAFFIC IN 1993
(INCLUDES OPERATIONAL TRAFFIC, COMPUTERIZED CRIMINAL HISTORY RECORDS, CRIMINAL JUSTICE
PLANNING, INTELLIGENCE INFORMATION, CRIMINALISTICS LABORATORY REQUESTS AND RESPONSES,
AVERAGE MESSAGE LENGTH 377 CHARACTERS PER MESSAGE.)

LETTER TRAFFIC:

APPLICANT FINGERPRINTS (8x8 CARDS) FROM STATES TO NATIONAL (FBI) 20,000/DAY.

OTHER NORMAL ADMINISTRATIVE REQUIREMENTS NOT UNIQUE TO PUBLIC SAFETY ARE NOT
INCLUDED IN THESE LETTER TRAFFIC REQUIREMENTS.
### Public Safety Requirements Analysis

**Video - 6400 Channels**

<table>
<thead>
<tr>
<th>Category</th>
<th>One Way (Nationwide Audience)</th>
<th>Interactive with Audio Only</th>
<th>Interactive with Video</th>
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<tbody>
<tr>
<td><strong>Federal Law Enforcement Agencies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEA, FBI, CUSTOMS, INS, ETC...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Search and Rescue</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Red Cross</td>
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<td></td>
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</tr>
<tr>
<td><strong>Disaster</strong></td>
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<td></td>
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<tr>
<td>Fire, Police, Search and Rescue, Civil Defense, Etc...</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>9</td>
<td>11</td>
<td>1</td>
</tr>
</tbody>
</table>

**Public Safety Requirements Analysis**

**Facsimile**

**Voice Grade Channels**

- Transmission of Arrest Fingerprints from State to National and Intrastate (4800 BPS Using Data Compression Techniques) **200**

- Dissemination of Mug Shots and Identification Pictures **3**

- Inter- and Intrastate Transfer of Maps, Footprints, Shoe Images and Other Identification Data to Facilitate Search and Rescue **10**

A5-20
PUBLIC SAFETY REQUIREMENTS ANALYSIS
TELECONFERENCING

<table>
<thead>
<tr>
<th>AUDIO</th>
<th>1 KHZ CHANNEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMERGENCY LOCATION TRANSMITTERS RECEPTION/LOCATION</td>
<td>1 FULL TIME</td>
</tr>
<tr>
<td>INTERAGENCY COORDINATION OF PUBLIC SAFETY AGENCIES</td>
<td>1 PART TIME</td>
</tr>
</tbody>
</table>

AUDIO AND VIDEO

REQUIREMENTS IN THIS AREA FOR PUBLIC SAFETY WILL BE SATISFIED BY COMMON USER LINKS PROVIDED FOR GENERAL ADMINISTRATIVE USAGE.

PUBLIC SAFETY REQUIREMENTS ANALYSIS
DATA TRANSFER

<table>
<thead>
<tr>
<th>VOICE GRADE CHANNELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIGITAL COMMUNICATIONS MOBILE/MOBILE, MOBILE/BASE, AND BASE/MOBILE</td>
</tr>
<tr>
<td>VEHICLE TRACKING AND LOCATION</td>
</tr>
<tr>
<td>ANALOG COMMUNICATIONS MOBILE/MOBILE, MOBILE/BASE, AND BASE/MOBILE</td>
</tr>
<tr>
<td>(LOW SPEED TELMETRY AND VOICE ASSOCIATED WITH POLICE-OPERATED EMERGENCY MEDICAL SERVICE)</td>
</tr>
</tbody>
</table>

A6-21
<table>
<thead>
<tr>
<th>Service Type</th>
<th>Annual Cost</th>
<th>Proposed Additional Expenditures</th>
<th>New Augmented Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search and Rescue</td>
<td>$210,000,000</td>
<td>$450,000,000</td>
<td>$660,000,000</td>
</tr>
<tr>
<td>Federal Level</td>
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<tr>
<td>Environmental Protection</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>State and Local Level</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
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<td></td>
</tr>
<tr>
<td>Federal</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>State</td>
<td></td>
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</tr>
<tr>
<td>Local</td>
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<td>This Figure Unavailable In This Panel</td>
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</tbody>
</table>
PLANNING NEEDS

NATIONAL

STATE

LOCAL

• INCREASING SERVICE DEMANDS
• FUNDING LIMITATIONS

SERVICES NOT AVAILABLE
BECAUSE:

• NEEDS NOT AGGREGATED
• TECHNOLOGY NOT DEMONSTRATED
• ECONOMIC FEASIBILITY UNPROVEN

ACCELERATED EVOLUTION IS NEEDED

• GOVT. UNDERWRITING OF SATELLITE DEVELOPMENT
• PSSC-TYPE MARKET DEVELOPMENT
MARKET AGGREGATION

PUBLIC SERVICE

• COMBINE SIMILAR USERS
• COMBINE CLASSES OF USERS

PRIVATE SECTOR

DESIGN SYSTEM TO MEET ALL COMMON NEEDS

SYSTEM OPERATION

• MUST BE SELF-SUPPORTING

• REVENUE SOURCES
  • USERS
  • OTHERS (SUBSIDIES)

• SUBSIDIZED OPERATION
  • INDIRECT - GOVERNMENT OPERATION
  • DIRECT - TO SYSTEM
    • TO USER
SOFTWARE PRODUCTION

low-cost distribution

many users

adequate revenues

quality programming

(TEXTBOOK ANALOGY)
APPENDIX 6
APPENDIX TO ELEMENTARY AND SECONDARY EDUCATION REPORT
ASSUMPTIONS ABOUT THE ELECTRONIC TRANSFER OF INFORMATION

1. "Information" = "raw material" of instruction/learning

2. "User" should dictate format/size of needed information

3. It is cheaper to move information (to user) than to move users (to information sources)

4. It is cheaper to move information electronically than any other way

5. Most information can be/updated/electronically retrieved

6. All electronically stored information can be electronically distributed to large numbers of remote users

7. Electronically stored and transmitted information can be given to the user in any electronically related form: CRT screen (still, motion) full audiovisual computer printout facsimile

CATHOLIC TELEVISION NETWORK - hypothetical system

Current "network" description

10 ITV systems (2 - 4 channels) = NY, Brooklyn, Rockville Centre
Boston, Miami
Detroit, Chicago, Milwaukee
LA, San Francisco

Interconnection
- with cable TV; SF, Chicago, B Centre
- with other ITV; NY-Brooklyn-B Centre
- with satellite (CNN); SF

(estimated) (exact numbers can be provided)

SCHOOL USERS

600,000 students (elementary + secondary)
25,000 teachers
1,300 schools
13,000 "terminals" (+TV sets)

(NB) Current school users = approximately 1/3 of potential users in Catholic schools of the 10 systems

In addition to schools, one or more CNN station is serving - hospitals
- community colleges
- adult education centers
1. Objectives

1.1 discipline objectives: to support teachers in all instructional tasks (see list of "teacher information needs")

1.2 No statutory requirements apply here

1.3 Satellite contribution to 1.1 make INFORMATION available to teachers
   -- larger quantity
   -- better quality
   -- greater variety
   -- multiple forms
   -- faster access
   -- lower unit cost
   By
   remote-access to shared electronic information systems
   (computer storage, update, retrieval)

2. Communications Needs

2.1 Types (prioritized)

   A -- library/info retrieval (image + alphanumeric)
      -- CMI (computer managed instruction)

   B -- live teleconferencing (two way audio)

   C -- live teleconferencing (one way video, two way audio)
      -- CAL (computer assisted instruction)
      -- TV program distribution (live real-time)

   D -- TV program distribution (real time)

2.2 Volume of communications

   Present: approx. 30-40 channel hours per day
   of 1-way TV program distribution in
   most CST stations
   occasional teleconferencing
   (one way video, two way audio)
   experimental - facsimile transmission
   - data transmission

   No quantitative estimates possible
2.3 Networks

Present (see Page 1, current description, interconnection.

Short- (interconnection of CTV stations NOT with each other
Long (but with shared library and information sources
Term ((e.g. central computer for ON/CNI)

4.0 Potential benefits

(seen) 1.3 on page 200. Appendix B

greater individualization
and personalization
of instruction made possible
of the information/communication
system relieved teachers of
"information" tasks.
Teacher Control

Teachers are charged with development of instructional programs. They must be concerned about requirements, content, relevancy and schedules. If they use television as part of their classroom instruction the programs must fit.

Systems must be developed and implemented which will provide input from teachers to assure that they will get what is needed and wanted.

It's recognized that all of the needs of individuals can't be met. However, within the available time frames, efforts should be made to provide programs which will meet the needs of the majority as far as such needs can be determined.

Use of a VTR will assist the teacher with scheduling. While it's true not all teachers have access to VTR equipment, there exists a limited number which is bound to increase.

Observed Interactions

Interactions through use of television and the telephone is an effective process. Some reject the possibilities because of the limitations imposed. Only a few can get in the act.

Because of the time limitations it's necessary to program the interactions so that specific persons are involved. For instance in a district composed of numerous schools, one classroom of students could be designated for the interaction. The rest of the students would be observers. Participation has greater value than observing yet the probability that the students in the classroom designated to ask questions will raise most of the questions which might be asked from any of the total number of students is great. Observed interaction is valuable and should be used regularly in connection with use of instructional television.

User Involvement

User developed programs are usually used. They are relevant and reflect the desires of the user. Prescribed programs may be valuable but it's far more difficult to relate the subject matter to the specific plans of the user.

A system should be developed to assure user involvement in program development and evaluation.

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APPENDIX 7
APPENDIX TO MEDICAL EDUCATION REPORT
8 Organizations which sponsor Self-Assessment Programs

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<tr>
<th>Allergy Foundation of America</th>
<th>American Academy of Dermatology</th>
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<tr>
<td>American Academy of Ophthalmology and Otolaryngology</td>
<td>American Academy of Orthopaedic Surgeons</td>
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<tr>
<td>American Academy of Pediatrics</td>
<td>American Academy of Physical Medicine and Rehabilitation</td>
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<tr>
<td>American Association of Neurological Surgeons</td>
<td>American Board of Thoracic Surgery</td>
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<tr>
<td>American College of Cardiology</td>
<td>American College of Chest Physicians</td>
</tr>
<tr>
<td>American College of Emergency Physicians</td>
<td>American College of Obstetricians and Gynecologists</td>
</tr>
<tr>
<td>American College of Physicians</td>
<td>American College of Radiology</td>
</tr>
<tr>
<td>American College of Surgeons</td>
<td>American Neurological Association and American Academy of Neurology</td>
</tr>
<tr>
<td>American Psychiatric Association</td>
<td>American Society of Anesthesiologists</td>
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<tr>
<td>American Society of Clinical Pathologists</td>
<td>American Society of Colon and Rectal Surgeons</td>
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<tr>
<td>American Society of Family Physicians</td>
<td>Connecticut &amp; Ohio Academies of Family Practice</td>
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<tr>
<td>Philadelphia County Medical Society</td>
<td>University of Wisconsin Department of Continuing Medical Education</td>
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9 Continuing medical education requirements for state Osteopathic Associations, as of October 1975

<table>
<thead>
<tr>
<th>State</th>
<th>Requirements</th>
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<tbody>
<tr>
<td>Arizona</td>
<td>2-day course approved by AOA</td>
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<tr>
<td>Arizona</td>
<td>11 months per year</td>
</tr>
<tr>
<td>Arkansas</td>
<td>25 hours per year</td>
</tr>
<tr>
<td>California</td>
<td>150 hours in 3-year period</td>
</tr>
<tr>
<td>Colorado</td>
<td>50 hours per year, 40% must be Osteopathic</td>
</tr>
<tr>
<td>Connecticut</td>
<td>25 hours per year, will be increased in 1976 to 50 hours per year</td>
</tr>
<tr>
<td>Florida</td>
<td>In 3-year period</td>
</tr>
<tr>
<td>Florida</td>
<td>10 hours over a 2-day period</td>
</tr>
<tr>
<td>Florida</td>
<td>In 3-year period, or 50 hours per year</td>
</tr>
<tr>
<td>Florida</td>
<td>150 hours every 3 years for 3-year licensure, 50% must be obtained in programs where majority of speakers are DOs</td>
</tr>
<tr>
<td>Georgia</td>
<td>50 hours per year</td>
</tr>
<tr>
<td>Ohio</td>
<td>2 days each calendar year</td>
</tr>
<tr>
<td>Tennessee</td>
<td>2 days each calendar year</td>
</tr>
<tr>
<td>Nebraska</td>
<td>20 hours per year</td>
</tr>
<tr>
<td>New Mexico</td>
<td>150 hours in 3-year period</td>
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</tr>
<tr>
<td>Oklahoma</td>
<td>50 hours per year, 150 hours in 3-year period for ADA</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>25-50 hours</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>20 hours per year</td>
</tr>
<tr>
<td>Vermont</td>
<td>150 hours in 3-year period</td>
</tr>
<tr>
<td>West Virginia</td>
<td>2 days, requirement expected to be increased to 25-50 hours</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>50 hours per year, 150 hours in 3-year period for ADA</td>
</tr>
</tbody>
</table>
The Regionalisation of Academic Medicine: The Metamorphosis of a Concept

Edward D. Pugliese, M.D.

Metamorphosis: a sacred process in the life history of any organism which results in radical changes in its structure with a relatively short period of time.

The regionalisation of academic medicine is a form of metamorphosis. The changes in the academic medical centers' role in the nation's health care system have been sweeping and profound. These changes, coupled with large financial investments by government and philanthropic foundations, have led to a transformation of academic health centers into community hospitals, the need to provide a wider spectrum of medical services, and the need to support academic research. This transformation has been accompanied by a new emphasis on the academic mission of the institution and its relationship to the community.

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Volume 41 February 1973

Congruence between educational and societal ends in health is the paradigm of how universities can meet their responsibilities in putting their resources at the disposal of the communities they serve. A responsive, intelligent, and substantial structure of academic medicine is thus demanded.

As John Burnham (1) recently observed at this conference, "Responsibly requires two gifts: the imagination of what can and the perception of adequate means." Up to now, we have been fascinated with means but lacked passion and boldness in the conception of ends.

The ends of social and public needs must be given prior emphasis as we begin to design the next steps in the evolution of our academic health centers.

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The ends of social and public needs must be given prior emphasis as we begin to design the next steps in the evolution of our academic health centers.
Regulation of Academic Medicine/Philippines

Add to this the more noticeable in the field are health care manpower difficulties because of from well-developed educational activities. The hospitals in particular, for instance, are not equipped with adequate personnel, and there is a lack of personnel in universities and teaching hospitals. The University of the Philippines College of Medicine, for instance, has only 27 faculty members for its 3,500-student body. This is a serious problem because the Philippine health care system is heavily dependent on foreign-trained physicians. The lack of local physicians is particularly acute in rural areas, where the population is increasing rapidly but health care facilities are not keeping pace. The situation is complicated by the fact that many physicians trained abroad are not willing to return to the Philippines after their training, and the recruitment of foreign-trained physicians is not sufficient to meet the country's needs. The government has taken some steps to address this problem, such as increasing the number of medical schools and providing incentives for physicians to train in the Philippines, but these efforts have been slow to produce results. The shortage of medical staff is a major challenge for the health care system in the Philippines, and it will require a concerted and sustained effort to address.
Regionalization of Academic Medical Centers

Programs just recently funded. I shall emphasize some of those principles further by a brief description of the consortium known as the New York City-wide Medical Education Research Center for Metropolitan Hospitals, under the auspices of the new Health Sciences Center, near the University of New York. Such a concept of some degree should be realized correctly later in this record.

The Health Sciences Center at Stony Brook is a new academic medical center on Long Island, under the auspices of the New Health Sciences Center, near the University of New York. Such a concept of mental capacity is being realized in this record. The regional component of the center is the subject of our study. It is a hospital and an educational center, and the programs are expected to be the same in this record.

The consortium includes all residents of Nassau and Suffolk counties and part of Queens with a combined patient population of more than 1,000,000. The center comprises all public, private, and academic hospitals. The consortium includes all residents of Nassau and Suffolk counties and part of Queens with a combined patient population of more than 1,000,000. This consortium is expected to be the same in this record. The regional component of the center is the subject of our study. It is a hospital and an educational center, and the programs are expected to be the same in this record.

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TABLE 1

Classic Concepts in the Modern Living Room: Healthy Interactions

<table>
<thead>
<tr>
<th>Concept</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Effective listening and active speaking</td>
</tr>
<tr>
<td>Decision-Making</td>
<td>Making informed choices with input from all stakeholders</td>
</tr>
<tr>
<td>Conflict Resolution</td>
<td>Resolving disagreements through negotiation</td>
</tr>
<tr>
<td>Leadership</td>
<td>Guiding others towards a common goal with respect for diverse perspectives</td>
</tr>
<tr>
<td>Empathy</td>
<td>Understanding and sharing emotions of others</td>
</tr>
</tbody>
</table>

In conclusion, regular communication and governance are essential for maintaining a healthy living room environment. It is crucial to foster an atmosphere of open dialogue and mutual respect among all members of the household to ensure a harmonious and productive living space.

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This survey and evaluation of approaches to physician performance measurement was undertaken under the direction of Dr. Avin R. Bera as research associates for the Association of American Medical Colleges Longitudinal Study Project. Dr. Bera is now an administrative evaluator at the Office of the Director, School of Medicine, State University of New York at Stony Brook. The project was supported by the National Center for Health Services Research and Development, Department of Health, Education, and Welfare, under contract number 110-72-76.

The purpose of this survey is to provide background information for the selection of performance measurement instruments to be used in connection with the preferred follow-up of the longitudinal study of medical students of the class of 1970.

The preliminary version of this manuscript was prepared for a workshop entitled "Following Up the Performance of Physicians in the AAMC Longitudinal Study," which was held June 1972. This final version incorporates some comments and suggestions received from the workshop participants and from the reviewers of the draft by the National Center for Health Services Research and Development. Additional comments and suggestions will be welcomed by the editors at SUNY, Stony Brook, and by the Division of Educational Measurement and Research of the Association of American Medical Colleges.

Aviva G. O'Connor, Ph.D., Associate Director
Division of Educational Measurement and Research
Principal Investigator of the AAMC Longitudinal Project

A7-8
Introduction

Raising the quality of medical care is a major concern in our country today. "Efficiency and cost" is one of the key issues in the delivery of health care. A major portion of this concern is the responsibility of delivering quality care.

Thus, the evaluation of medical care's performance is raised to the level of medical care itself. A strong desire to improve the quality of physicians is evident. Efforts to develop better physicians are reflected in changes in selection and admissions procedures in medical schools, as changes in content and presentation of medical education and new approaches to evaluation of medical students.

The physician's performance, as a high level of performance in practicing physicians, is a primary performance in self-actualization programs, in medical education programs, and in the development of explicit criteria by which their performance can be assessed.

Stage of the Study

The purpose of this study is to investigate the dimensions and levels of the performance. The evaluation here is done to determine the extent to which the care provided and the health of the patient is affected by the treatment. The analysis of the data will allow conclusions to be drawn about the quality of care, the efficiency of the medical personnel, and the need for improvement.

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Physician Performance Measurement

Studies have shown that the physicians concerned with many problems that are not in the medical care area are concerned with the quality of the physicians' practice. Physicians are concerned with the quality of the physicians' practice.

In a study of general practice in Massachusetts, Brown (1) found that the percentage of physicians' practice was defined in terms of their problems and found that the resulting percentage of physicians' practice was defined in terms of their problems.

In a study of general practice in Massachusetts, Brown (1) found that the percentage of physicians' practice was defined in terms of their problems.

Physicians' performance is measured by the extent to which the medical care is affected. A number of factors are considered in the data, such as the number of patients treated, the quality of care, and the efficiency of the medical personnel.

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In Canada, Christ (11) applied Peters's methodology to a study of general practitioners in which two physicians shared the responsibility of observing 313 patients for three days. Christ, however, modified Peters's approach in two respects. First, he altered the weighting scheme giving equal weight to history taking and physical examination each month to 30 per cent. Second, the number of patients did not vary; a number of categories, such as functional status, were assessed. Christ and Peters's studies of general practitioners are comparable, and an interesting contrast is that in Christ's study the physician had no separate assistant. We would expect that a more definitive study would be undertaken in the near future.

Stone and others (12) applied Peters's methodology to 138 general practitioners, using Christ's definition of history taking. Unlike Peters and Christ, they gave history-taking double weight on the grounds that it is the most important skill of the general practitioner.

EVALUATION

The development of a performance rating scheme is often described as the structure above the following scales may be used to evaluate a candidate's performance in a number of aspects. The validity and usefulness of the scheme are determined by the reliability and validity of the measurement technique.


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Chapter 2

Interpersonal Process Approaches

Many workers have described the interactions between the doctor and patient. Although certain theorists have been advanced about what kind of relationship is good in obtaining desired results, few empirical efforts have been made to identify the factors particularly from the viewpoint of the patient (Sills 1973). In this discussion, a brief review of the characteristics of sociological and psychiatric theories to the understanding of the doctor-patient relationship is followed by a description of what types of physicians' behaviors or skills are relevant in the relationship and how and when they have been measured.

Sociological Theories

Much of the sociological theory can be traced to Talcott Parsons' description of the doctor-patient relationship as a social system (196) in which the physician and patient are seen as roles and the interaction as a set of rights and obligations. Parsons defines the "医生" and patient roles and the rights and duties of the doctor are determined by the nature of the role. The more important aspects of the physician's social relationship are effective communication whereby he is supposed to reflect all of the patient's thoughts and feelings. For example, the physician's role can affect therapeutic outcomes, the patient's perception of the therapist, and the patient's perception of the relationship.

Parsons' theories are applied to the doctor-patient relationship by the doctor and patient. The doctor perceives the role and the patient perceives the role as the role of the patient. In the medical practitioner model, physicians and patients carry out the treatment together, which can improve the therapeutic outcome. This interrelationship between the doctor and patient is crucial.

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a number of devices have been used to stimulate the physician's schema to fill in the gaps in information. These devices include patient management systems, computer-assisted decision-making systems, and computerized clinical decision support systems. However, the use of these devices is limited by the quality and quantity of information available to the physician. Therefore, the physician often relies on their own clinical experience and judgment to make decisions.

Chapter 3: Simulated Process Approaches

A patient management problem occurs when the physician is not able to provide adequate care to the patient. This can be due to a lack of knowledge, resources, or time. In such cases, the physician may use patient management systems to assist in decision-making. These systems provide information and guidance to the physician, helping them to make informed decisions.

A diagram illustrating the process of patient management is shown in Figure 1. The diagram highlights the different levels of decision-making involved in patient management. It shows the relationship between the different components of the system and how they interact to provide care to the patient.

Figure 1: Diagram of Patient Management Process

The diagram is divided into three main sections: (1) the patient, (2) the physician, and (3) the information system. The patient's needs and problems are identified, and the physician uses this information to develop a treatment plan. The information system provides support and guidance to the physician, helping them to make informed decisions.

A key to the diagram is provided in Table 1. This table lists the different components of the system and their functions.

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>- Symptomatology (PA)</td>
</tr>
<tr>
<td>Physician</td>
<td>- Treatment Plan (T)</td>
</tr>
<tr>
<td>Information System</td>
<td>- Support (S)</td>
</tr>
</tbody>
</table>

This diagram provides a useful overview of the patient management process and highlights the importance of the information system in supporting the physician. It also emphasizes the need for continuous improvement and refinement of these systems to ensure that they are effective in supporting the physician in providing quality care to their patients.
The Unions' response was that the PMP differs so at least four important conclusions from the National Board's approach. First, the statement of the patient's problem was too imprecise or inadmissible in the given.
Chapter 4
Approaches for Measuring Outcome

In the last analysis, whether a physician is good or effective depends on how close he comes to producing the best possible outcome for his patients. Process measures (how the care was delivered) are ranked only in the extent that they capture good patient care practices which lead to the desired outcome. Recognizing this, a number of researchers have conceptualized or developed instruments to carry out direct, external based measurement of physician performance.

Defining Outcome

Different views concerning outcome vary with respect to (a) emphasis on final (red blood cell) or intermediate (consequences of medical intervention), (b) how long the versus short-term endpoints, and (c) severity versus specific measure in particular diseases or problems. At the general level, the result of the spectrum, we had the following definitions of outcome and reviews based on Batey. (67) estimates that the assessment of outcomes in terms of health and satisfaction. Sloane (66) notes that the term "end results" refers in some measure to the health status which is influenced by a particular element or group of these outcomes. "Satisfaction" (64) defines end results as "the effectiveness of a treatment program as determined by the consequences of the best possible patient care for patients, excluding expressed wishes of patients. More specifically, satisfaction (70) refers to the extent that the generally accepted aspects of care are delivered, especially quality, disability, and rehabilitation.

Measured toward somewhat greater specificity, Batey (67) refers to the monitoring quality of care in health care organizations, prospective care and outcomes of outcome studies which could be described through large scale prospective studies of mortality, morbidity, mortality, death rates, for specific diseases, and complications.

Chapter 4.1 Measuring Outcome

Skehan (66) notes that the per cent of patients who show improvement or who recover from the disease or condition. For example, evaluations of functional capacity would include measures of functional ability as well as the quality of life. Toward this end, we seek to examine various measurement instruments that have been developed or used in medical practice. A number of such instruments have been described in the last analysis, whether a physician is good or effective depends on how close he comes to producing the best possible outcome for his patients. Process measures (how the care was delivered) are ranked only in the extent that they capture good patient care practices which lead to the desired outcome. Recognizing this, a number of researchers have conceptualized or developed instruments to carry out direct, external based measurement of physician performance.

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1028 Approaches for Measuring Outcomes

Physician Performance Measurement

Methodology

Lobertson (1978) noted that a physician's performance is measured by the outcome of health care delivered. However, many studies have shown that physicians' performance cannot be accurately measured by the outcome of their care alone.

Lobertson's work highlighted several issues that contribute to this problem. First, the outcome of a patient's care can be influenced by factors outside the physician's control, such as the patient's compliance with treatment or the patient's genetic predisposition to disease. Second, the outcome of a patient's care may not be directly related to the physician's actions. For example, a patient's health outcomes may be influenced by factors such as lifestyle, diet, and exercise, which are outside the physician's control.

Physicians' performance can be measured using a variety of approaches, including patient satisfaction surveys, peer review, and medical record reviews.

VITAL FUNCTION

Scales have been developed to evaluate the outcomes of physician care. These scales are based on the impact of the physician's care on the patient's health, as well as the patient's satisfaction with the care received.

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Chapter 5

Qualities Approach

Prove and his associates at the University of Utah have developed an approach to measure physician performance. They focus on the qualities or attributes of a physician. Prove (38) explained that many different components of qualities are associated with superior performance. These include technical skill, knowledge, judgment, and interpersonal skills. When all these qualities are present, the physician is more effective in achieving patient outcomes.

One problem with these studies is that they often miss important aspects of physician performance. In order to fully assess the quality of a physician, the presence of these qualities must be measured. To overcome this problem, new methods have been developed to assess physician performance.

The Qualities Approach to physician performance evaluation can be summarized:

1. Identification of the qualities
2. Development of a questionnaire
3. Administration of the questionnaire
4. Analysis of the results
5. Feedback to the physician

The Qualities Approach is designed to measure the qualitative aspects of physician performance.

Chapter 6

Conclusions

The following general imperatives of the construction of a set of physician performance measurement emerged from this study.

1. Reliability
2. Validity
3. Objectivity
4. Feasibility

In conclusion, the development of a set of physician performance measures is a complex and challenging task. It requires the cooperation of physicians, researchers, and policymakers. The Qualities Approach to physician performance evaluation can be used to improve the quality of medical care.
Physical Performance Measurements

QUALITY COST

There appears to be a definite inverse relationship between the quality of a measurement method and the cost and accuracy of applying it. The methods that support more confidence—direct observation and direct measurement—are very expensive and time consuming.

Methods that are most practical to use on a large scale, such as questionnaires and the
collection of a physician's diagnosis (when one is not used without direct observation), have serious reliability problems at the present time. Record based methods, which fall between in practicality and economy suffer from the aforementioned usability and bias problems. Anyone selecting a method for use today must consider this cost quality trade off.

1. References

- 1. This is a reference to the literature or a study that supports the claim made in the text. It provides a source for further reading or validation of the method or concept discussed.

- 2. The text continues to discuss the methods and their costs, emphasizing the trade-offs involved in choosing the most appropriate method for a given purpose.

- 3. Further references are provided to support the arguments made in the text, offering additional perspectives on the topic.

- 4. The discussion concludes with a call to consider the cost-quality trade-off when selecting a method for use today.

- 5. The text emphasizes the importance of selecting the most practical method for large-scale use, balancing practicality with accuracy and cost.
Individual Physician Profile: Continuing Education Related to Medical Practice

Submitted by: Swanson, M.D., Thomas C. Meyer, M.D., Richard Strauss, and Adolph Schneiders

Abstract—Planning for continuing medical education requires many variables. The Individual Physician Profile is one method bringing these variables into focus. Problems patients bring to a physician are multiplied if the physician is not aware of their problems and, with added personal information, conclusion leads to a tailor made educational program. To expedite this method it was necessary to develop comprehensive techniques for average and retrieval of practice data relevant to questions, and learning resources. The Individual Physician Profile permits better investigation of daily physician's work and energy full education in the needs of his practice. It points to the need for a new area in continuing medical education—an educational consulting service (or consultant) for the physician.

A major problem for a physician is to meet the knowledge and skills required to meet the needs of the profession and the community. The faculty of the University of Wisconsin Department of Postgraduate Medical Education identified the following factors as being significant in dealing with this dilemma: problems patients bring to their physician or generation of the practice community setting, and the physician's personal likes and dislikes relating to his practice and his medical education. The Individual Physician Profile is a tool to meet this need in continuing medical education. All are determinants of the type of practice he builds and the quality of care he delivers. It was out of the need to determine these variables for any physician that the Individual Physician Profile (IPP) was created. (This method has a large range of uses and is continuously evolving as experience dictates the need for change.) It is the authors' intent here to describe the basic techniques.

Profiles: The Individual Physician Profile is a three step process: profile, consultation, and educational consultation and design of a continuing medical education program.

Profile: The profile is obtained by having the physician fill out a small form regarding his practice. The profile is evaluated and used to determine the most effective educational program. The profile is to be used as a guideline for the continuing medical education program.
For nearly three years apprenticeship in "the job training" was available at only a few medical centers. Recently, however, the job training programs have fallen and can be co-aligned with centers within the nation. The idea is out of every state where in many cases become readily available and suitable for strict "on the job training." Diabetic Diabetes.

The development of the procedures and requirements for taking place over a three-year period and was somewhat consistent. During the three-month period, 93 physicians participated and resulted in reducing some major problems which arose. In the same three-month period, 93 physicians participated. The results were a product which appears to be useful in identifying individual diabetic needs for preventing diabetes.

"Call" of patient data was usually done by a medical secretary who followed the physician and recorded information about each patient's visit for a week. Later on, in a three-month period, the plan of the secretary and a possible to spread the sample over a three-month period, even though the volume of data was not increased.

The four-day period of the physician's practice is still considered a weakness in the procedure. However, if a reasonable compromise is made between the two methods of data collection and a medical secretary, the situation is likely to result in increased data collection, although some physiatrists still force residents to apply self-recorded appointments.

Diabetes Testing

The testing procedure underwent some desirable change during the three-year period of research. The examination was usually performed in the physician's office or in a portable region which was connected to a computer in Mexico. This proved to be experience during a very satisfying environment. The patient was interviewed and met with the physician, who returned the sheet for scoring. The answer sheet was to be sent to the American Medical Association and the test results were used to calculate the physician's score in preventing diabetes.

A major problem in testing, however, was the question of the question. The related questions were for the major part, written by students for use as formal education programs. As noted previously, it seems being apparent that many of these questions were relevant to clinical practice. Consequently, the medical questions were virtually abandoned and replaced by the new procedure for questionnaires.

A further weakness of the test which has been partially corrected is the overemphasis on the cognitive domain in the test, and in measuring learning in the cognitive domain which does not imply the analytical process in using medical problems. Reinforcing questions so that they will be included in a test and make meaningful in the context of mental training.

Further, the arbitrary limitations of a medical specialty are obvious. The cutoff ability to explore in depth the physician's knowledge in specific areas of medicine, however, its been possible to raise the awareness of physicians in the importance of the practice. The result is that there may be a need to do a new project to continue medical education for medical educational consultant with specific techniques and resources to be made a prerequisite for successful in limiting this role, which appears to be desired to do so in some extent that can be taught and based on the items in the educational program.

During the first research phase, the procedure used in the consultation, the participating physicians were asked to describe their experiences and to summarize their results. Some of the participants expressed their satisfaction with the results; however, many others had not changed their practice. Some of these results are described in the following section of the report. In addition, the participants were asked to identify the new methods of medical consultation which were used in the research project. The results are presented in a tabular form in the next section of the report.
The Continuum of Medical Education

Ivan L. Bennett, Jr., M.D.

Many months ago, I agreed to help round out the program for this meeting of our Association and tentative agreement was reached that the subjects would be "The Continuum of Medical Education." My acquaintance, I should add, occurred during a transitory period of prescientious susceptibility engendered by the manifoldings of some old and trusted friends who were responsible for the program. Once we had passed company my strength of sport and firmness of mind were restored and I retracted into my spongy sanctuary of fruitless endeavor to enter into a period of regret which will terminate about thirty minutes from now.

It is not my intention to address the announced topic of a continuum in any systematic, indeed, in any detectable way. Rather I would like to take the unearned after but valuable opportunity to give an overview of what seems to be going in medical education and what I think we should be trying to accomplish in the future.

As an aside, I can say that I think that it is probably a good policy to hear from an occasional dean at these plenary sessions of our Association, and I am glad today to represent the boys who jump up after the cheering has stopped and the crowd has gone home.

Most of you will be relieved to know that my remarks will not be covered by the I.W.W., for I will adopt the viewpoint once suggested by A. N. Winchell as a code of intellectual inquiry— to seek simplicity and then destroy it.

In his Presidential Address before the Association of American Physicians in 1973, Dr. Lee H. Mushbom identified a "vency" which I believe to be of paramount importance as we look at trends and objectives in medical education. He reminded us that medical, as a profession, is both a service and a service and that we must prepare our students for both. He stated his unequivocal opinion, (with which I am in complete agreement) that science must take priority over service in medical education since it is a science that looks to the future while service looks only to the present.

I would like to say just a bit about the general business of looking at the future. My own clinical experience as a futurist has taught me, if nothing else, the wisdom of Winston Churchill's remark: "It is always wise to look ahead, but difficult to look farther than you can see."

To begin with the next 10 to 20 years of an enterprise as complicated as medical education is a relatively safe subject for prediction or forecasting. After all, who in this audience really expects a
The Continuum of Medical Education

The Continuum of Medical Education is a concept that describes the ongoing nature of medical education. It is a lifelong process that begins during medical school and continues throughout a physician's career. The model emphasizes that medical education is not a series of discrete phases or steps, but a continuous process that evolves over time.

In medical school, students are introduced to foundational knowledge and develop skills in patient care. They learn the basic sciences and clinical medicine, and begin to develop a sense of professionalism and ethical practice. As they progress through medical school, students gain more experience in clinical settings and become more adept at diagnosing and treating patients.

After medical school, residents and fellows undertake additional training in specific medical subspecialties. During this time, they deepen their knowledge of their chosen field and develop advanced clinical skills. They also receive training in research, as well as in communication, leadership, and patient advocacy.

Finally, as practicing physicians, doctors continue to learn and grow throughout their careers. They engage in lifelong learning and professional development, staying current with the latest research and advances in their field. They also continue to develop their interpersonal and communication skills, as well as their ability to work effectively in teams.

The Continuum of Medical Education underscores the importance of ongoing learning and development throughout the medical profession, reflecting the dynamic and complex nature of healthcare delivery.


43. Journal of Medical Education

44. Journal of Medical Education

45. Journal of the American Medical Association

46. Journal of the American Medical Association
past experiences gain evidence of a moderate emotional ability to handle stress caused by exposure to the medical school curriculum.

A third quality is the capacity for hard work including physical contact and eventually physical labor. This is a major element in the building of a roasting faculty and the maintenance of work ethic. This might also be referred to as endurance and work ethic. The lack of these in a physician results in professional shame or chronic mental state without a clue. Only the sincere pursuit of something will unwillingly have such an individual out of a creative approach, learned in the past as a refined thing. Lack of instruction and the absence of sufficiently demanding intellectual curiosity are probably responsible for more recent medical practice than you might think

In an attempt to discuss the qualities which are primarily important to medical education, it is apparent that there is no single answer that will provide a formula for the type of physician that will be a scientist for a lifetime. However, an individual of refined abilities in another field and another career with a central role in the career of the future, may be a psychiatrist or a medical society that is designed to evaluate the student's performance in an advanced medical curriculum as to allow an adequate preparation for the rank order of the student.

The Harvey essay on this question is a significant one. The student puts his tears in the platypus jumps on the bigger and comes out of the optour of the moment a lack of understanding in how to help someone in a way that makes sense. Understanding is the key to a joined profession and a better world than that will permit for a lifetime.

To be a physician requires an individual of refined abilities in another field that is an interest in the career of the future. For the career of the future, it is necessary to understand the nature of the red gurney, the clerk in the medical society of the future, and possibly to understand the nature of the three young scientists and after starting at the frightened young man in the tree turned away and entered the forest.

After writing for several hours, Harvey, the young man who had only some extremely common down and went into a village.

And the tale ends with the Goldsticker, tenure of the story going sour.

One learns many things
And the lesson is one of the

Common sense is the enzyme that catalyzes the synthesis of judgment from the substrate of experience and collection. To return to medicine, I would submit that without surgical judgment—"surgeon is likely to be a dangerous man. I would further submit that the greater his facility in surgical technique, the more dangerous he is likely to be. While it may not be so obvious in other fields of endeavor, I believe the absence of judgment is just as dangerous as it is in surgery. Judgment is closely related to integrity, the first quality we desire in the physician and the one with respect to which the student may have been consistently conditioned by family and social environment before reaching the medical school. Probably the best that the school can do is to have a faculty that will act on the basis of example in its own experience and not having a curriculum that will give the student ample opportunity to exercise his own judgment in situations involving responsibility so that he may learn by his own experience. Realism is in no respect and without an organic system of reward or penalty for good or bad judgment, such exercises are largely meaningless and ineffective.

The last quality which Dr. Harvey cited in his essay, is the proper application of medicine. This is a faculty for surgery in teaching the surgery of a matter it is to note in its knowledge which does not correspond to reality. There is a danger under any circumstances and particularly to the future physician who knows that at its very center is a knowledge of a changing world.

The physician is not the same as the grinder of the vintage era but the idea of the patient is always an important one in the present moment creatively evaluated by the professional faculty of constantly facing problems in the field.
Toward a Continuum in Medical Education

Thomas L. Meyer, M D

Medical education is a continuum beginning with preprofessional training and ending with retirement. One portion of the continuum is that of the first-year medical student. Critical, then, is the extent to which medical education is aimed at teaching the fundamental of scientific information—a task sharing change in the attitude of overwhelmed students toward their role, their responsibilities, and their traditional functions as a demanding and creatively intellectual profession.

During the second and third decades of this century, medical schools made a well-considered, well-conceived body of knowledge available to their students, taught them a formal number of skills, and then evaluated their competence. This body made, with pride saved, the $105 million and allow them to proceed with little confidence that these graduates were scholars enough to keep abreast of the small volume of literature supporting the complicated and dynamic advance in knowledge. The skills changed, but the emphasis and the attitude of a physician's and surgeon's skills required more than time. It was a comparatively unimportant part of the program. Continuing education had then taken the most important role of updating and expanding the knowledge base. Continuing education has become the key to the next Continuing education.

As we move into another dawn, Department of Health, Education, and Welfare, to the next generation.

The data we designed to test reliable educational practices. The test results become another factor in the design of the person's professional educational program. The data show that practices do vary significantly, and that practices do not necessarily produce different results. If we believe what we are told, we take home some education that is comparatively unimportant part of the program. Continuing education had then taken the most important role of updating and expanding the knowledge base. Continuing education has become the key to the next Continuing education.

We also appeared to determine the learning behaviors of the physician. They were asked, "Do you have new ideas how you learn best?" A small percentage could answer this directly. More frequently, we failed to discuss the role that they discuss the role that they have been assigned. We have yet to be sufficiently sophisticated at the level of the physician. Indeed, the challenge for teaching education and media and methodology in continuing education are obvious. Attention must be given to providing educational content in the electronic forms by which the individual physician learns best.

The 63 family physicians involved in the course, most of whom were in the category of "Specialty Conditions," and whose homes were in the village of the medical school, were evaluated. The implications for teaching education and media and methodology in continuing education are obvious. Attention must be given to providing educational content in the electronic forms by which the individual physician learns best.

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Continuing Medical Education at Stanford: The Back-to-Medical-School Program

dward Robins, M D

A purpose of the Back-to-Medical-School Program at Stanford Medical School is to provide an educational environment where students can continue to learn and grow in their medical careers. This program allows students to re-enter the medical school curriculum and gain valuable experiences in clinical medicine, research, and teaching.

The program is designed to be flexible and accommodate the diverse needs of participating students. It offers a variety of educational opportunities, including workshops, seminars, and rotations in different specialties. Students can choose to focus on specific areas of interest or take a more broad approach to their learning.

The Back-to-Medical-School Program also provides opportunities for students to contribute to the medical education community. They can participate in teaching sessions, mentor junior students, and contribute to the overall educational environment.

In summary, the Back-to-Medical-School Program at Stanford Medical School is an innovative and valuable resource for medical students seeking to continue their education and contribute to the medical profession.
coming months, the remaining courses in the core curriculum will be offered, as well as a number of elective programs concerning newly emerging concepts and techniques. Therefore, increasing emphasis will be placed on educational needs unprompted by audit procedures.

Continuous evaluation will be made, and eventually the program will be analyzed in order to determine its feasibility and possibility of expansion elsewhere in the field of continuing medical education.


During the eight months after the intensive care fellowship, the number of lectures per month was 17 (p < 0.01).

During September and 11 1970, the importance of obtaining a lung scan was emphasized in the daily ward rounds for pulmonary medicine patients. During the nine months, the average number of lung scans performed per month was 11 (p < 0.01). The number increased during the subsequent 12 months to 30 (p < 0.05) (Figure 7).

A unique opportunity presented itself in February 1971 when an article by Suter and his colleagues (1) appeared in the Journal of Internal Medicine, reporting on their experience with the results of lung scans with arterial oxygen tension in excluding the presence of pulmonary embolism. This report made it possible to see the benefits of a journal report on clinical practice at Mills Memorial Hospital and also the effect of treatment on the patient's course (2).

During the eight months, the number of lectures on the topics of the intensive care fellowship increased from 17 to 32 (p < 0.01) (Figure 8).
Section IV

Continuing Medical Education

Contributors: Anna E. Crowley, PhD; Charlotte Hurd; Anne M. Ross, MD; and L. L. Leonard, MD, Clark; W. Menges Jr. NII

During the past year, the interest and activities of individual physicians and medical organizations that have been devoted to continuing medical education have continued to increase. This has been manifested several ways:

1. Increasing numbers of physicians have been applying for the Physician's Recognition Award (PRA).

2. Five additional state associations have passed resolutions that are likely to require physician participation in continuing medical education as a condition for membership.

3. Through medical specialty societies, there is a trend to establish committees and provide staff support for planning, administering, and evaluating continuing medical education programs.

4. Many specialty societies are reviewing the need and desirability of documenting physician participation in ongoing medical education programs in their particular specialty.

5. Medical specialty societies are continuing to expand the availability and scope of their continuing education programs.

6. Medical specialty societies are beginning to comprehend the need for incorporating peer review findings into the process of identifying continuing medical education needs and using these needs as a basis for their continuing medical education programs.

7. Medical specialty societies are recognizing the desirability and the advantages of a centralized system for recording the participation of their members in continuing medical education.

Supplementing the 1972 Survey on the Continuing Medical Education Activities of State Medical and Medical Specialty Societies

A summary of the 1972 survey on continuing medical education was reported in last year's Education LIVINE JAMA Since that report five additional state medical associations have adopted resolutions, the effect of which will be to require evidence of continuing medical education as a condition for membership. The state associations that now have adopted these kinds of resolutions are:

- Alabama
- New Jersey
- Arizona
- North Carolina
- Florida
- Oregon
- Kansas
- Pennsylvania
- Massachusetts
- Vermont
- Minnesota

An asterisk indicates state associations that have adopted resolutions since the report of the 1972 survey.

Among medical specialty societies, there are now two that have passed resolutions, the anticipated result of which will be to require evidence of continuing medical education as a condition of membership. These specialty societies are the American Academy of Family Physicians and AMA College of Radiology. The resolution requiring evidence of continuing medical education for the American College of Radiology was adopted during 1974. During the past year, there has been much discussion among the medical specialty boards as to whether recertification should be required at periodic intervals. The American Board of Medical Specialties indicates that all 72 of its organizational members have now accepted the concept of periodic recertification. Four state boards of medical examiners are known to have legislation that authorizes them to require evidence of physician participation in continuing medical education as a requirement for re certification or renewal of their licenses to practice medicine in their state. The four states are Kansas, Kentucky, Maryland, and New Mexico.

Table 1: Physicians Qualifying for and Holding PRA

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Physicians Continuing for PRA</th>
<th>No. Physicians Holding Valid PRA at Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>28,024</td>
<td>28,024</td>
</tr>
<tr>
<td>1972</td>
<td>29,000</td>
<td>29,000</td>
</tr>
<tr>
<td>1973</td>
<td>29,000</td>
<td>29,000</td>
</tr>
</tbody>
</table>

Programs for the Physician's Recognition Award

The number of physicians applying for the AMA Physician's Recognition Award and the number of physicians qualifying for it have increased.

Medical Education
The Continuing Medical Education (CME) program is undergoing major changes as a result of recent legislation. The new regulations aim to improve the quality and relevance of the educational programs offered to physicians. The program is designed to meet the needs of healthcare professionals, particularly in the areas of patient care and public health. The reforms have been prompted by concerns about the effectiveness and value of existing programs.

The changes include:

1. A more rigorous assessment process for evaluating educational programs.
2. A stronger emphasis on evidence-based medicine.
3. The introduction of new formats for delivering educational content, such as online courses and virtual reality simulations.
4. A greater focus on the practical application of new knowledge.
5. The establishment of a central database to track the participation and performance of physicians in CME activities.

These changes are expected to enhance the educational value of CME programs and improve the quality of patient care. Physicians are encouraged to participate actively in these new programs to stay updated with the latest medical advancements.
The Vail Report in 1955 reviewed the status of the field of continuing medical education. An advisory committee, the Council on Continuing Medical Education, was established by the AMA House of Delegates in 1970. The council is headquartered in Washington, D.C., with regional offices in Dallas, Cleveland, and San Francisco. The council's primary function is to provide a forum for the exchange of ideas and information among members of the medical profession who are engaged in continuing medical education.

The council sponsors conferences, workshops, and other educational programs for physicians and other health professionals. These programs are designed to provide continuing education and professional development opportunities for physicians and other health professionals. The council also sponsors research grants and fellowships to support the development of new educational programs.

The council's annual report provides a comprehensive overview of the field of continuing medical education. The report includes data on the number of continuing medical education programs offered, the number of participants in these programs, and the types of programs offered. The report also includes a summary of the council's activities during the year, including the development of new programs, the evaluation of existing programs, and the dissemination of educational materials.

The council's annual report is an important resource for physicians and other health professionals who are interested in continuing medical education. It provides valuable information on the current state of the field, as well as insights into the future directions of continuing medical education.
for 1974-1975 do not show a further trend toward a single class of continuing education courses, at which all physicians, whether specialists or generalists, are permitted to attend. For 1974-1975, 82% of all courses listed are open to both specialties and generalists, compared with 84% in 1973-1974 and the same percent in 1972-1973. Only 8% in 1973-1974 and 10% in 1972-1973 are made available to medical schools. It is even lower for courses offered by medical schools, with 16% of medical schools' courses designed for both specialties and generalists in general or private specialty practice.

Examination of the principles of course for the technical courses that require that physician participants already have competence in a specialty to benefit from the course offerings. Only 50% of all courses offered are limited to specialties or generalists and only 20% of courses offered by medical schools are so classified.

Comparison noted last year toward smaller class size in continuing education courses is also noted for the courses listed for 1974-1975. Twenty-one percent of the courses offered are listed as having restricted class enrollment of 25 students or less, as compared with 16% in 1973-1974, 15% in 1972-1973, 18% in 1971-1972, 20% in 1970-1971, and 21% in 1969-1970.

In table 9 for 1974-1975 compared with 1973-1974, the number of courses taught in the academic year is shown by type of teaching load. The number of courses offered each year is shown by the number of sessions, sessions, and number of students attending. The number of courses offered is shown by type of teaching load. The number of courses offered each year is shown by the number of sessions, sessions, and number of students attending. The number of courses offered each year is shown by the number of sessions, sessions, and number of students attending. The number of courses offered each year is shown by the number of sessions, sessions, and number of students attending. The number of courses offered each year is shown by the number of sessions, sessions, and number of students attending.

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To be noted that the accuracy of these figures is open to question, since many institutions do not keep careful records of individual physicians who attend their individual courses. It is neither clear that only a few of the total number of medical degrees and board examinations are listed in Table 9. It is neither clear that only a few of the total number of medical degrees and board examinations are listed in Table 9. It is neither clear that only a few of the total number of medical degrees and board examinations are listed in Table 9. It is neither clear that only a few of the total number of medical degrees and board examinations are listed in Table 9. It is neither clear that only a few of the total number of medical degrees and board examinations are listed in Table 9. It is neither clear that only a few of the total number of medical degrees and board examinations are listed in Table 9.

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Preparation of this section is due to insufficient registrations, although it is possible that other administrative or faculty problems contributed to the cancellations.

There is an increase in the number of voluntary health agency appointments and the total number of courses sponsored was slightly greater. The total number of placing personnel is higher than that reported in 1971-1972. Registrations for the category "other" also increased.

The increase in the number of continuing education courses is due to an increase in the number of medical schools that have continued to report. A special note is made for medical schools that have reported. It should be noted that the preparation of this section is due to insufficient registrations, although it is possible that other administrative or faculty problems contributed to the cancellations.
COUNCIL OF MEDICAL SPECIALTY SOCIETIES (CMSS) INTERSPECIALTY COUNCIL - AMA (ISC)

1. American Academy of Dermatology
2. American Academy of Family Physicians
3. American Academy of Neurology
4. American Academy of Ophthalmology & Otolaryngology
5. American Academy of Orthopaedic Surgeons
6. American Academy of Pediatrics
7. American Academy of Physical Medicine & Rehabilitation
8. American Association of Neurological Surgeons
9. American College of Preventive Medicine
10. American College of Obstetricians & Gynecologists
11. American College of Physicians
12. American College of Radiology
13. American College of Surgeons
14. American Psychiatric Association
15. American Society of Anesthesiologists
16. American Society of Colon & Rectal Surgeons
17. American Society of Plastic & Reconstructive Surgeons
18. American Urological Association
19. College of American Pathologists
20. American Academy of Allergy/American College of Allergists
21. American Association of Public Health Physicians
22. American Association for Thoracic Surgery
23. American College of Cardiology
24. American College of Gastroenterology/American Gastroenterological Association
25. American Society of Internal Medicine

ASSOCIATION OF AMERICAN MEDICAL COLLEGES

EXECUTIVE COUNCIL

PRESIDENT

DEPARTMENT OF INSTITUTIONAL DEVELOPMENT

DEPARTMENT OF HEALTH SERVICES AND TEACHING HOSPITALS

DEPARTMENT OF PLANNING AND POLICY DEVELOPMENT

DEPARTMENT OF ACADEMIC AFFAIRS

DEPARTMENT OF EDUCATIONAL RESOURCES

A7-32
To obtain some estimate of potential need for continuing medical education, a hypothetical scenario for a continuing medical education system was developed. This scenario assumes that all organizations representing physicians, medical education and hospitals agreed that a unified national system was acceptable and effective. The system is described schematically in the following figure and in more detail below. No such system is being planned or contemplated in its entirety, while segments are presently in operation.

**Coordination**

- **Program Development**: AAMC
- **Curriculum Development**: CHES
- **Specialty Medicine**: AHA

**Curricula**

1. **General Medicine Core**: Core curriculum for all physicians.
2. **Specialty Medicine Core**: Core curriculum for specialty physicians.
3. **Multidisciplinary Video Reports**: Additional curriculum modules.

**Objective**: To provide continuing medical education to all practicing physicians in the United States.

**Requirements**: To fulfill requirements for state relicensure and for specialty board recertifications.

**Target**: Approximately 280,000 practicing physicians.
Water System - National Network interconnect via satellite to existing terrestrial systems, uplink of program material for satellite interconnection to the terrestrial institutional network; downlink located at hospital, medical schools, group or individual practice or physician's home.

Capability - broad band video color
- duplex audio
- data and hard copy service
- teleprocessing
- electronic response

Channel Time - The following estimates are presented:

Program 1 - General Medicine Core: ½ hour broadcast repeated twice each week for 50 weeks. Each program consists of 5 minute pre- and post-tests and 20 minutes instruction

Program 2 - Specialty Medicine: For each specialty (22) ½ hour broadcast repeated twice each week for 50 weeks.

Program 3 - Video Reports: 4 hours broadcast every week repeated twice for 50 weeks.

Evaluation and Credit - For performance assessment and for credit registration, data return and land-based computer are required.

Coordination of System - Liaison Committee on Continuing Medical Education.

GRAND ROUNDS IN SURGERY

WAT 21

presents

"GRAND ROUNDS IN SURGERY"

- 12 Noon (Indianapolis time), the first Wednesday of each month
- Live Rounds
- Patient interviews
- Comprehensive discussion of medical indications for surgery
- Color videotape of surgical procedures
- Two-way discussion between presenting physician and viewer-physicians
- Presented by the Medical Television Facility and the Department of Surgery, Indiana University School of Medicine

Thomas V. N. Ballantine, M.D., Assistant Professor of Surgery, is coordinator and program host for "Grand Rounds in Surgery".

May 5, 1978

CROHN'S DISEASE

The surgical approach to Crohn's disease will be presented by John E. Jessup, M.D., Professor and Chairman of Surgery.

The Indiana University School of Medicine will make available to you a packet of articles relevant to the case being presented on Grand Rounds in Surgery. Requests for copies should be addressed to Mrs. Gellis, I U School of Medicine Library, 1100 W Michigan Street, Indianapolis 46202.

Your comments on Grand Rounds in Surgery are welcomed by Thomas V. N. Ballantine, M.D., Pediatric Surgery Section, Dept. of Surgery, James Whitcomb Riley Hospital for Children, 1100 W Michigan Street, Indianapolis, Indiana 46202.

Grand Rounds in Surgery is a television presentation of the Medical Educational Resources Program of the Indiana University School of Medicine.
1976-1977
12 Noon (Indianapolis time)

In these televised Rounds surgeons take a comprehensive look at the medical indications for surgery — usually with a guest consultant whose specialty is representative of the case under discussion. Viewers may assess patients firsthand when Rounds features preoperative history taking/patient examinations on videotape. Selected segments of surgical procedures are presented on color videotape and viewers are encouraged to participate in the live discussion periods.

September 1, 1976
VOMITING IN INFANCY
Thomas V. N. Ballantine, M.D.
Assistant Professor Pediatric Surgery

October 6, 1976
PANCREATIC SURGERY
Robert Lempke, M.D.
Chief, Surgical Service
Veterans Administration Hospital and Professor of Surgery, IU School of Medicine

November 3, 1976
RENAL TRANSPLANT IN INDIANA
Ronald Filo, M.D.
Chief, Transplantation Section
Veterans Administration Hospital and Assistant Professor of Surgery, IU School of Medicine

December 1, 1976
THERAPEUTIC APPROACH TO NECK MASS
William Cocke, M.D.
Chief, Plastic Surgery
Wooton Memorial Hospital Indianapolis and Associate Professor Surgery, IU School of Medicine

January 5, 1977
ORTHOPAEDIC PROBLEMS IN CHILDHOOD
Richard Lindsell, M.D.
Head, Pediatric Orthopaedics and Professor of Orthopaedic Surgery

Paul DeRosa, M.D.
Chief, Neurosurgical Diseases and Assistant Professor of Orthopaedic Surgery

February 2, 1977
CARCINOMA OF THE BREAST: A COMBINED APPROACH
James A. Madura, M.D.
Associate Professor of Surgery

March 2, 1977
CURRENT STATUS OF CORONARY ARTERY RECONSTRUCTION
Robert King, M.D.
Professor of Surgery

April 6, 1977
ANESTHETIC CONSIDERATIONS OF IMPORTANCE TO THE SURGEON
Robert Browning, M.D.
Professor of Pharmacology and Anesthesiology

May 4, 1977
CARCINOMA OF THE COLON
John E. Jessup, M.D.
Professor and Chairman of Surgery

March 2, 1977
CURRENT STATUS OF CORONARY ARTERY RECONSTRUCTION
Robert King, M.D.
Professor of Surgery

May 4, 1977
CARCINOMA OF THE COLON
John E. Jessup, M.D.
Professor and Chairman of Surgery

Thomas V. N. Ballantine, M.D., Assistant Professor of Pediatric Surgery, Indiana University School of Medicine, is host and coordinator for Grand Rounds in Surgery.

Copies of articles relevant to the cases presented on Rounds will be provided at no charge by the Indiana University School of Medicine Library. If you are interested in receiving this correspondence material, indicate which programs you plan to see and send your request to WAT 21 Station Manager, University Hospital A118 IU School of Medicine, 1100 W. Michigan St., Indianapolis 46202.
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</tr>
</tbody>
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WAT 21, Indiana University School of Medicine's Instructional Television Fixed Station, is operated by the School's Medical Educational Resources Program.

WAT 21 serves Indiana's physicians and allied health professionals with Continuing Medical Education Programs four hours a day, five days a week.

The daily, four hour schedule is repeated in the evening to all Marion County Indianapolis hospitals. Hospitals in other cities receive the evening programming as shown below.

Monday  Bloomington from 7-10 p.m.
        Kokomo Lafayette and Muncie hospitals from 8-10 p.m.
Tuesday  South Bend Valparaiso and Lake County hospitals complete schedule
Wednesday Lake County Valparaiso and South Bend hospitals complete schedule
        Bloomington from 7-10 p.m.
        Kokomo Lafayette, Muncie and Vincennes hospitals from 8-10 p.m.
Thursday Lake County Valparaiso and South Bend hospitals from 8-10 p.m.
        Bloomington Lafayette, Muncie and Vincennes hospitals from 8-10 p.m.
Friday   All hospitals complete schedule

Programs are subject to change without notice.

Direct questions regarding programming to Sharon C Greene, WAT 21 Station Manager
or
Don Greene, Producer/Director, Television Facility
Medical Educational Resources Program
Indiana University School of Medicine
1100 W Michigan Street
Telephone: (317) 264-4316

Program listings are Indianapolis time

<table>
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<tr>
<th>Time</th>
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<tr>
<td>7-10 p.m.</td>
<td>Bloomington, Kokomo, Lafayette, Muncie</td>
</tr>
<tr>
<td>8-10 p.m.</td>
<td>South Bend, Valparaiso, Lake County, Kokomo, Muncie, Vincennes</td>
</tr>
<tr>
<td>9-10 p.m.</td>
<td>Bloomington, Kokomo, Lafayette, Muncie, Vincennes, South Bend</td>
</tr>
</tbody>
</table>

AAFP AND AMA CREDIT FOR CONTINUING MEDICAL EDUCATION OPPORTUNITIES IN VIDEO TAPE REPLAYS AND MEDICAL TELEVISION

The Division of Postgraduate Medical Education of the Indiana University School of Medicine has arranged with the Indiana Academy of Family Physicians to receive elective hours for all the videotape and television programs of the Statewide Medical Education Network.

1. The participating physician must have the Director of Medical Education or authorized representative of the hospital certify that he did in fact view or participate in the programming.

2. This certification is to be done on the special three-part form distributed to the hospitals in the Network.

3. If more than one program is viewed in a single day, they can all be listed on one form.

4. The hospital will forward the completed forms to the Division of Postgraduate Medical Education, which will forward to the Academy.

5. Credits will be given for the amount of time viewed, however, viewing hours must be based on complete programs.

For further information contact your hospital’s Director of Medical Education or the Division of Postgraduate Medical Education, (317) 264-6353.

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WAT 21

VIEWER AREA

WEEK OF SEPTEMBER 13

MORNING — WEDNESDAY — FRIDAY

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: JOSEPH T. WEISK B.M.D. (C)

10:15 a.m.  BLOOD ADMINISTRATION (C)

11:30 a.m.  INTRA-ARTERIAL VASOPRESSIN IN THE TREATMENT OF GASTRO-INTESTINAL HEMORRHAGE: A CONTINUED CLINICAL TRAIL (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

1:00 p.m.  THE DILEMMA AND NATURAL OF A PULMONARY INTENSIVE CARE UNIT (C)

2:30 p.m.  THE RIGHT TO LET DIE (C)

12 Noon  Wed only

THURSDAY

12:15 p.m.  THE DAILY DUTY (C)

1:30 p.m.  THE INFUSION TECHNIQUE (C)

2:30 p.m.  THE RIGHT TO LET DIE (C)

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: MATTHEW WALKER M.D. (C)

10:00 a.m.  ACUTE EXTREME ARTERIAL OCCLUSION WITH DELAYED THROMBECTOMY (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

WAT 21

VIEWER AREA

WEEK OF SEPTEMBER 20

MORNING — WEDNESDAY — FRIDAY

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: MATTHEW WALKER M.D. (C)

10:15 a.m.  ACUTE EXTREME ARTERIAL OCCLUSION WITH DELAYED THROMBECTOMY (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

12:15 p.m.  THE DAILY DUTY (C)

1:30 p.m.  THE INFUSION TECHNIQUE (C)

2:30 p.m.  THE RIGHT TO LET DIE (C)

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: JOSEPH T. WEISK B.M.D. (C)

10:00 a.m.  BLOOD ADMINISTRATION (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

WAT 21

VIEWER AREA

WEEK OF SEPTEMBER 27

MORNING — WEDNESDAY — FRIDAY

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: MATTHEW WALKER M.D. (C)

10:15 a.m.  ACUTE EXTREME ARTERIAL OCCLUSION WITH DELAYED THROMBECTOMY (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

12:15 p.m.  THE DAILY DUTY (C)

1:30 p.m.  THE INFUSION TECHNIQUE (C)

2:30 p.m.  THE RIGHT TO LET DIE (C)

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: JOSEPH T. WEISK B.M.D. (C)

10:00 a.m.  BLOOD ADMINISTRATION (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

MEDICAL TELEVISION

WEEK OF SEPTEMBER 13

TUESDAY — THURSDAY

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: MATTHEW WALKER M.D. (C)

10:15 a.m.  ACUTE EXTREME ARTERIAL OCCLUSION WITH DELAYED THROMBECTOMY (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  THE RIGHT TO LET DIE (C)

12:45 p.m.  BLOOD ADMINISTRATION (C)

1:30 p.m.  DIAGNOSIS IN CHILDREN'S ORTHOPAEDICS: THE LEG AND SPINE (C)

2:30 p.m.  BLOOD ADMINISTRATION (C)

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: JOSEPH T. WEISK B.M.D. (C)

10:00 a.m.  BLOOD ADMINISTRATION (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

WEEK OF SEPTEMBER 20

TUESDAY — THURSDAY

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: JOSEPH T. WEISK B.M.D. (C)

10:00 a.m.  BLOOD ADMINISTRATION (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

12:15 p.m.  THE DAILY DUTY (C)

1:30 p.m.  THE INFUSION TECHNIQUE (C)

2:30 p.m.  THE RIGHT TO LET DIE (C)

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: MATTHEW WALKER M.D. (C)

10:00 a.m.  BLOOD ADMINISTRATION (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

WEEK OF SEPTEMBER 27

TUESDAY — THURSDAY

10:00 a.m.  LEADERS IN AMERICAN MEDICINE: JOSEPH T. WEISK B.M.D. (C)

10:00 a.m.  BLOOD ADMINISTRATION (C)

11:30 a.m.  ENDOGRAFT IN AORTIC (C)

12 Noon  TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLICATIONS (C)

The Daily section and medical television programs are scheduled during the week, providing comprehensive medical knowledge and information for viewers.
WAT 21

VIEWING AREA

WEEK OF SEPTEMBER 27
MONDAY — WEDNESDAY — FRIDAY

10:00 a.m. LEADERS IN AMERICAN MEDICINE, MARTIN W. CUMMINGS, M.D.

10:45 a.m. BREAST FEEDING, PRENATAL AND POSTPARTUM PREP

11:15 a.m. TECHNIQUES OF ARTERIAL BLOOD SAMPLING IN THE NEWBORN

12:00 p.m. HYSTEROSONORESINE, BUT A RARE DISEASE

12:30 p.m. MEDITATION: A SECOND LOOK

12:30 p.m. BREATHE, BREATHE: THE WAY TO BREATHE

1:00 p.m. THE VITAL SIGN: TEMPERATURE

1:30 p.m. THE VITAL SIGN: TEMPERATURE (C)

2:00 p.m. HEART (ANGINA) (Patient Education) (C)

2:30 p.m. EARLY SYMPTOMS FOR HEART DISEASE

3:00 p.m. SERILE BRAIN DISEASE (Patient Education) (C)

3:30 p.m. CONTINUING MEDICAL EDUCATION FOR INDIA'S

3:45 p.m.

4:15 p.m.

5:00 p.m.

6:00 p.m.

7:00 p.m.

8:00 p.m.

9:00 p.m.

10:00 p.m.

11:00 p.m.

WEEK OF OCTOBER 4
MONDAY — WEDNESDAY — FRIDAY

10:00 a.m. LEADERS IN AMERICAN MEDICINE, KARL F. MEYER (C)

10:45 a.m. ACOUSTIC TUMORS (C)

11:15 a.m. SERIOUS SFXITIES MEDIA (C)

11:30 a.m. VEGETATION OF THE HEART MURAL STENOSIS (C)

12:00 p.m. THE ARGINA PATIENT MAINTAINING OPTIMAL FUNCTION

12:30 p.m. IBDARD KROUSE IN SURGERY: PANCREATIC SURGERY (C)

1:00 p.m. BERTHIN (C)

1:30 p.m. BERTHIN (C)

2:00 p.m. BLADDER (Patient Education) (C)

2:30 p.m. TOBACCO AND SMOKING (Patient Education) (C)

3:00 p.m. CONTINUING MEDICAL EDUCATION FOR INDIA'S

3:15 p.m.

3:30 p.m.

4:00 p.m.

4:15 p.m.

4:30 p.m.

5:00 p.m.

6:00 p.m.

7:00 p.m.

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9:00 p.m.

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11:00 p.m.

11:15 a.m.

11:30 a.m.

12:00 p.m.

12:30 p.m.

1:00 p.m.

1:30 p.m.

2:00 p.m.

2:30 p.m.

3:00 p.m.

3:15 p.m.

3:30 p.m.

4:00 p.m.

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4:30 p.m.

5:00 p.m.

6:00 p.m.

7:00 p.m.

8:00 p.m.

9:00 p.m.

10:00 p.m.

11:00 p.m.

WAT 21

VIEWING AREA

WEEK OF OCTOBER 4
TUESDAY — THURSDAY

10:00 a.m. LEADERS IN AMERICAN MEDICINE, MARTIN W. CUMMINGS, M.D.

10:45 a.m. ACOUSTIC TUMORS (C)

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3:30 p.m.

4:00 p.m.

4:15 p.m.

4:30 p.m.
UPCOMING PROGRAMS

GRAND ROUNDS IN SURGERY

Grand Rounds, presented by the Department of Surgery IU School of Medicine, is seen the first Wednesday of each month (Sept-May). The five programs begin at 12 Noon (Indiana time) and feature color videotapes of surgical procedures relating to the topic under discussion. Host for the monthly series is Thomas V. N. Gallant, M.D., Assistant Professor of Pediatric Surgery. Each Round offers two-way discussion via the telephone linkback.

November 3 Renal Transplant in Indiana
Ronald Fio, M.D., Chief Transplantation Section
Veterans Administration Hospital
and Assistant Professor of Surgery
Indiana University School of Medicine

TODAY'S MEDICINE

Today's Medicine, a series of special programs by IU School of Medicine physicians, is seen at 12 Noon (Indiana time) the second Thursday of each month (Sept-May). The programs offer two-way discussion via the telephone linkback.

November 11 Retrolental Fibroplasia
Eugene Hevelston, M.D.
Professor of Ophthalmology
Indiana University School of Medicine

Reports of articles related to the topics presented on both 'Grand Rounds and "Today's Medicine" are available at no cost, as a courtesy to the IU School of Medicine Library. Requests for articles and the year's complete schedule of programs should be addressed to the WAT 21 Station Manager.

To receive postgraduate credit for programs, obtain registration forms from your Director of Medical Education or the Division of Postgraduate Medical Education, (317) 264-8353. See pages 4 and 5.
### Types of Communications

**Voice (telephone)**
- Record Message (TWX, letter)

**One Way TV** (educational broadcast), to one or many terminals

**Interactive TV** eg. teacher to many classrooms with communication from classrooms to teacher
- a) Voice
- b) Voice and video

**Facsimile** (to one or many terminals)

**Teleconferencing** (many terminals)
- a) Audio
- b) Audio and video
- c) Audio and facsimile
- d) Audio and facsimile and video

**Data transfer**
- a) High data rate (Digital) eg. computer to computer
- b) Low data rate (Analog) eg. ambulance XYG

**Note:** Consider giving attention to:
1. Substituting electronic communications for other forms (eg. personal meetings: call)
2. Augmenting existing communications

### Marketing Information

People doing the marketing study are looking for the following information:
1. What the user is presently paying for all types of communications by category/service.
2. Estimate of what the user would be willing to pay for new or augmented services.

---

**List of References**

2. Interim Working Party Plan/2 (Possible Broadcasting Satellite Systems and Their Relative Acceptability) International Radio Consultative Committee (Final Report)
6. Tele-Education/Medicine Experiment Plan. Summary. NASA, Dr. Richard B. Marsten, Study Manager
7. Communications for Social Needs: Technological Opportunities NASA, Dr. Richard B. Marsten, Study Manager
APPENDIX 8
APPENDIX TO STATE AND LOCAL GOVERNMENT REPORT
Responsibilities

The Office of Telecommunications is responsible for the general oversight and development of the City's Telecommunications (Radio, Cable TV and Audio-Visual) Program. The Director of the Office of Telecommunications is charged with the establishment of a Telecommunications Program to combine and revise communications programs existing throughout the city and to introduce new communications technology when feasible. The program of the Office of Telecommunications provides for:

- Frequency management.
- Communications operator training
- Communications equipment maintenance, inventory and purchasing procedures.
- Communications system design.
- Assessment of agency communications needs.
- Other activities as maybe required by federal and state laws.
- Communications committees.

Existing Telecommunications Programs

By Executive Directive, agencies using radio, television or audio-visual equipment are responsible for obtaining prior approval from the Telecommunications Director to:

- Purchase or transfer communications equipment
- Conduct City telecommunications business with private industry and with local, state and federal government.
- Alter existing tables of organization of communications personnel

After conducting a Needs Assessment of intra state and inter state interconnection telecommunications services which are, or should come to be, required by the numerous State agencies and institutions, the VPTC has summarized its tentative findings as follows:

- Exclusively included from this summary are conventional voice-grade CCO-supplied services except slow-speed data and facsimile transmission.

VPTC 4/12/76
Public Television Networking

All RTV Entities (5-6 sites)

Video Site Monitoring  (Only where feasible extendible)

Environmental Agencies (Smoke Abatement, etc)
Highway Department (Traffic Flow)
Forestry (Fire Monitoring)
Engineering and Buildings (Construction status compilations on VTR)

Slow-Scan Data

Virtually all agencies and institutions having field offices, installations or activities
ADP (Acting for other agencies and institutions)

Alert and Alarm Signaling  (Separate from CCO Systems)

State Police
Office of Emergency Services (Civil Defense)
Highway Department (Traffic Interruptions)

Emergency Voice Networking  (Separate from CCO Systems)

State Police
Office of Emergency Services (Civil Defense)
Highway Department (Traffic Interruptions)

Telemetry Signaling

Highway (Traffic counting and structural stress monitoring)

Environmental Agencies (Air and Water Monitoring)

Medical Institutions (Diagnostic Examinations)

Serve Control Signaling

Highway Traffic Control (Computerized or manual)
Virtually all agencies and institutions having field offices, installations or activities

Public Radio Networking
All Public Radio Stations (10 Sites – Voice grade only)

Instructional Programming (Audio and/or Slow scan Video)

Higher Education (Internal and via radio)
Public Education (largely via radio)
State Personnel Training (especially through State Personnel System)

Administrative Audio Conferencing

Virtually all agencies and institutions

Aural Monitoring

Environmental Agencies (Voice Control)

Video Site Monitoring (Slow scan)

Environmental Agencies (Smoke detection, etc.)
Highway Department (Traffic Flow)
Forestry (Fire Monitoring)

In Virginia a PUBLIC SATELLITE SYSTEM which can be used
primarily, broadband transceiver capacities in those 31 Virginia
“locality clusters” having state-supported institutions of higher
education, perhaps with common-carrier-supplied (or radio-spectrum)
narrow-band extensions to each nearby School Division Headquarters,
DMV local office, Highway Department Depot, State Hospital facility,
local hospital, Corrections Installation, Health Department Office,
Welfare Office, Environmental Monitoring Office, Employment Office,
Public Telecommunications Entity*, public radio stations**, State Police
Headquarters as well as the principal sites of local government and local
law enforcement administration. In those 8 localities where there are
several institutions of higher education in close vicinity, broadband
sites can be used to inter-connect them with the nearby transceivers.
(There are 16 such installations in all).

(b) perhaps also, narrow-band transceiver capacities in all or certain of those
31 Virginia “locality clusters” lacking an institution of higher education
but having a School Division Headquarters with common-carrier-supplied
(or radio spectrum) narrow-band extensions to each nearby DMV local
office, Highway Department Depot, State Hospital facility, local
hospital, Corrections Installation, State-owned radio station, Health
Department Office, Welfare Office, Environmental Monitoring Office,
Employment Office, State Police Headquarters as well as the principal sites
of local government and local law enforcement administration.

*The five regional Public Telecommunications Entities would actually
provide suitable broadband links from their Master Control Rooms to and
from the closest transceiver sites

**Similarly, CPB-qualified public radio stations in Richmond, Norfolk, Roanoke,
Harrisonburg and Fairfax would provide high-fidelity, audio-bandwidth links
to and from their own Control Rooms

N.B. Broadband and/or narrowband extensions could also often be accomplished
through local CATV systems
The regional multiplexing broadband facilities could be employed to receive, send and relay duplexed video (electronic), high fidelity or voice-grade audio (including various slow-scan video formats), high-speed and slow-speed data (including facsimile, telemetry, servo and alarm signals).

The local limited multiplexing narrowband cognitions could be employed to receive, send and relay duplexed voice-grade audio (including certain slow-scan video formats) and slow-speed data (including facsimile, telemetry, servo and alarm signals).

**FIP Terminal Systems would include**

- Video Monitors and/or recorders
- High-fidelity Audio Monitors and/or recorders
- High-speed Facsimile Print-outs and/or copiers
- High-speed Computer Inter-faces
- Parallel Telemetry Mechanisms and recorders

**NIP Terminal Systems would include**

- Slow-scan Video Monitors and/or recorders
- Audio Monitors and/or recorders
- Slow-scan Facsimile Print-outs and/or copiers
- Slow-speed Computer Inter-faces (including Teletypewriters)
- Telemeters and/or signal recorders
- Servo Control Mechanisms

**Consultant Origination Systems would include**

- Video Cameras and Mixers
- Audio-video recorders/playback machines
- Microphones and Audio Processors/ mixers
- Audio recorderPlayback machines and Rate Change Devices
- Facsimile Encoders (Micro-form and other)
- Teletypewriters
- Keypunchers and Readers
- Cathode-ray writers and similar electro-optical device systems
- Data recorders/playback machines
- Environmental Sensors and Detectors (Heat, Light, Chemical, etc.)
- Stress and pressure sensors and meters
- Signal Activators (Manual and programmed)
- Computers (Digital or Analog)
- Medical Sensor Instruments
The envisioned broadband interconnection system would likely require:

(a) 2 hours of broadband single-channel service between 8 a.m. and 5 p.m. each weekday.
(b) 2 hours of broadband single-channel service between 3 p.m. and 11 p.m. each weekend.
(c) 2 hours of broadband single-channel service between 11 p.m. and 8 a.m. each day.

If double-channel broadband capacities were made available, overall time requirements might be halved.

Narrowband requirements would be
(a) 24 hour instant access to an emergency channel.
(b) 10 minutes per hour on a data conditioned channel (to be used largely in a polling, share-time mode for critical update relaying).
(c) 2 continuous hours in the 8 a.m. - 5 p.m., 5 p.m. to 11 p.m. and 11 p.m. to 8 a.m. time periods each day.
(d) 1 minute in every 5 for relay of telemetered data on a conditioned channel (to be used in a polling, share-time mode).

All figures are minimum.

**NOTE:** It is presumed that Narrowband facilities would be devised and used only where, and to the extent that, CCO-supplied circuits or conventional microwave or radio links are unavailable, more expensive, significantly less reliable, or technically inferior.

**SYSTEM REACH**

The envisioned intra-and-inter-state Interconnection System should be designed to allow any Virginia Transceiver to interconnect directly with any other technically compatible transceiver within satellite range but under strict traffic protocols which are managed from a central organizational point in Richmond and which are in turn fully integrated with overall traffic configurations determined by the national satellite operating authority.
The VPIC believes that there is strong merit in the concept that the five public telecommunications entities in Virginia become jointly the principal intra-state operators of the public satellite system elements described heretofore, interfacing them where logical with COO and state-owned radio-spectrum or computer facilities. Such an arrangement might best be affected by having the entities incorporate with the VPIC (acting on behalf of the Commonwealth government) as in MODEL VALUE NETWORK ORGANIZATION (AVNO). In this way, the intercommunication system would be "synergized" through the regular accessing of media production, storage, maintenance, design, and management resources.

The AVNO, centered at Richmond, would be responsible for clearing and implementing all intra-state and inter-state switching protocols with the national satellite operating organization.

- 10 -
Possible, additional "on-line Transceiver" Points ("Facility Clusters")

(it is likely that transceivers will not be needed at all points identified below):

1 - Northampton County
2 - Suffolk
3 - Isle of Wight County
4 - Surry County
5 - Lancaster - Northumberland Counties
6 - King and Queen - Middlesex Counties
7 - Sussex County
8 - Essex County
9 - Westmoreland County
10 - King George County
11 - Caroline County
12 - Hanover County
13 - Greensville County
14 - Mecklenburg County
15 - Botetourt County
16 - Amelia County
17 - Powhatan County
18 - Guochland County
19 - Louisa County
20 - Fluvanna County
21 - Buckingham County
22 - Appomattox County
23 - Charlotte County
24 - Halifax County
25 - Franklin County
PHASING PRIORITIES

Assuming the demonstrated cost-effectiveness of the experiments and facilities to be involved at each installation phase, the VPTC tentatively anticipates the following priority schedule for the development of the interconnection system envisioned:

(a) 4th ITP at Richmond interconnected through satellite to comparable State ITPs elsewhere (but especially in the East) and ITPs at Norfolk, Roanoke and Fairfax (4 ITPs)

(b) ITPs at Harrisonburg and Wise (2 ITPs)

(c) ITPs at Danville, Fredericksburg, Wallops Island, Williamsburg, Farmville, Abingdon, and Charlottesville (7 ITPs)

(d) ITPs at Franklin, Warsaw, Petersburg, Alberta, Middletown, Lexington, and Wytheville (7 ITPs)

(e) ITPs at Clifton Forge, Lynchburg, Richlands, Martinsville, Blacksburg, Newport News, and Lessburg* (4-7 ITPs)

(f) ITPs at Keysville*, Waynesville*, Dublin* and Cleona* (up to 4 ITPs)

(g) ITPs at Greensville County, Halifax County, Lee County, Highland County, Louisa County, Culpeper County, Crayson County, Lancaster-Northumberland Counties (6 ITPs)

(h) Other ITPs as required (up to 44 ITPs)

*Engineering studies might obviate need for these ITPs by extending broadband services from other locality clusters nearby.
Division of State Planning & Community Affairs
State Water Control Board
Office of Emergency Services
Council On Higher Education
Department of Highways & Transportation
Division of Automated Data Processing
Air Pollution Control Board
State Library
Department of Health
Department of Purchases & Supply
Department of Community Colleges
Highway Safety Division
State Corporation Commission
Department of Mental Health & Mental Retardation
Department of Corrections
Department of Welfare
Division of Motor Vehicles
Department of Education
Division of Engineering & Buildings
Employment Commission
Virginia Institute of Marine Science
State Police
State Forestry Service
VPI & State University
Medical College of Virginia - Health Science Division
APPENDIX 9
APPENDIX TO VOLUNTARY AND SOCIAL SERVICES REPORT

A STUDY OF
COMMUNICATIONS NEEDS, USES AND COSTS
OF
NON-PROFIT ORGANIZATIONS

Conducted for

PUBLIC INTEREST SATELLITE ASSOCIATION
53 West 44th Street
New York, New York 10036

(212) 661-2340

Melvin A. Goldberg Inc /Communications
347 Madison Avenue
New York, New York 10017

A9-1
The study further presumes that organizations in the non-profit world are involved in three basic kinds of communications: intra-organizational (organizations to their own chapters and members), intra-organizational (organizations to other organizations), and communications to the public-at-large. This last form of communication -- organizations reaching members of the general public -- is particularly important so far as the work of Bug/Sat is concerned. The study indicates that hundreds of millions of dollars are being spent by groups to deliver messages to individuals in the form of conventional means as direct-mail and telephone campaigns, and, to a lesser degree (because of the high costs involved), radio and television spots. The desirability of pursuing less-cost alternatives to serve this significant communications requirement seems great. The advent of direct-to-home/office radio and television broadcasting via satellite would constitute a quantum jump in the non-profit sector's ability to communicate.

Based upon the findings presented in this report, the Public Interest Satellite Association, which commissioned this survey conducted by an independent communications research company, is convinced that there is a need for low-cost satellite communications for the non-profit sector of society. PISA also is convinced that the extent and depth of this need argues strongly that international and domestic policy options be kept open for the development of the kind of satellite technology that can deliver communications signals to small, inexpensive ground terminals for home and office use. While the study is by no means all-inclusive (although the section on methodology does show how truly representative it is), it offers considerable evidence supporting the view that it would be a disservice to the public interest to foreclose future satellite possibilities and opportunities in the absence of more extensive study and until much more information about the potential of the technology can be made available to the entire non-profit and social service communities.

PISA believes that it must clearly be understood that, with satellites, the world is positioned at another crossroads in the history of telecommunications. The most obvious difference between this point and those of the past is that the public is developing a stronger awareness of its needs and of its rights than ever before. Yet much more needs to be known, despite the pressures of arriving at a policy prior to both the 1977 and 1979 World Administrative Radio Conferences to create policy in the absence of knowledge that can be obtained represents a violation of the democratic process. While telecommunications policy makers have done this before, there seems little excuse now, especially in light of announced

Dear Mr. Fino:

The attached survey of the communications needs, uses, and costs of a representative sample (207) of non-profit organizations in the United States is hereby transmitted to the Federal Communications Commission as an addendum to the Report of the Broadcasting Service Group on Satellite Broadcasting (Bug/Sat). It is submitted by the Public Interest Satellite Association (PISA), a non-profit unincorporated association with principal offices at 55 West 44th Street, New York, New York 10036. PISA has been an active participant on the Task Force designated by Bug/Sat (Task Force B) to assess the anticipated needs, prospective users, and spectrum requirements for satellite broadcast services over the general time frame 1979-2000.

From all available evidence, this survey represents the most comprehensive study ever undertaken to explore the techniques currently being used by organizations in the non-profit sector to meet their telecommunications needs, to determine how extensively various techniques are being used, and to ascertain how much money non-profit groups are spending today to communicate. (A copy of the Questionnaire and the cover letter that was sent out is appended to the study.)

The study is predicated on the belief that satellite telecommunications services may soon become available to this segment of society at a level of technology it can manage and at costs it can afford. Hence, the survey includes an assessment of what the respondents would like to do with a satellite if one were to be put at their disposal. The results are surprising. Billions of dollars are being spent today by non-profit organizations for communications. The predominant use is of narrow-band communications; the predominant preference would be for telephony first, radio second, and television third.

1 June 1976

Mr. Harry Fino
Chairman, Steering Committee for
Preparations for 1978 WARC
Office of Chief Engineer
Federal Communications Commission
1919 H Street, N.W.
Washington, D.C. 20554

Dear Mr. Fino:

The study is premised on the belief that satellite telecommunications services may soon become available to this segment of society at a level of technology which it can manage and at costs it can afford. Hence, the survey includes an assessment of what the respondents would like to do with a satellite if one were to be put at their disposal. The results are surprising. Billions of dollars are being spent today by non-profit organizations for communications. The predominant use is of narrow-band communications; the predominant preference would be for telephony first, radio second, and television third.

The study further presumes that organizations in the non-profit world are involved in three basic kinds of communications: inter-organizational (organizations to their own chapters and members), intra-organizational (organizations to other organizations), and communications to the public-at-large. This last form of communication -- organizations reaching members of the general public -- is particularly important so far as the work of Bug/Sat is concerned. The study indicates that hundreds of millions of dollars are being spent by groups to deliver messages to individuals in the form of conventional means as direct-mail and telephone campaigns, and, to a lesser degree (because of the high costs involved), radio and television spots. The desirability of pursuing less-cost alternatives to serve this significant communications requirement seems great. The advent of direct-to-home/office radio and television broadcasting via satellite would constitute a quantum jump in the non-profit sector's ability to communicate.

Based upon the findings presented in this report, the Public Interest Satellite Association, which commissioned this survey conducted by an independent communications research company, is convinced that there is a need for low-cost satellite communications for the non-profit sector of society. PISA also is convinced that the extent and depth of this need argues strongly that international and domestic policy options be kept open for the development of the kind of satellite technology that can deliver communications signals to small, inexpensive ground terminals for home and office use. While the study is by no means all-inclusive (although the section on methodology does show how truly representative it is), it offers considerable evidence supporting the view that it would be a disservice to the public interest to foreclose future satellite possibilities and opportunities in the absence of more extensive study and until much more information about the potential of the technology can be made available to the entire non-profit and social service communities.

PISA believes that it must clearly be understood that, with satellites, the world is positioned at another crossroads in the history of telecommunications. The most obvious difference between this point and those of the past is that the public is developing a stronger awareness of its needs and of its rights than ever before. Yet much more needs to be known, despite the pressures of arriving at a policy prior to both the 1977 and 1979 World Administrative Radio Conferences to create policy in the absence of knowledge that can be obtained represents a violation of the democratic process. While telecommunications policy makers have done this before, there seems little excuse now, especially in light of announced
plans for low-cost satellite systems in other countries, to yield to any clamor for haste (indeed, attached as an appendix to this study are the views of several national non-profit organizations which have already indicated an awareness of the potential). They, with PISA, ask that the benefit to the public -- the "public dividend" of its investment in space technology -- be dealt with in the serious and deliberate manner the issues demands and deserves.

PISA's overriding purpose in both commissioning and disseminating the results of this survey, in filing them with the appropriate regulatory bodies, and in placing them before this policy-making forum is to urge upon all concerned that there is a need to respond to the "public interest, convenience and necessity." That phrase has ample precedent in both law and practice. Satellites -- and their future development -- represent a totally new opportunity for regulatory agencies to honor their commitment to both.

The attached is,

Respectfully submitted,

Andrew Horovitz
Co-Directors, The Public Interest Satellite Association

Christian Service Brigade

Public Interest Satellite Association
55 West 44th Street
New York, New York 10036

Gentlemen

I trust you will mount the strongest possible effort to petition the Federal Communications Commission to consider the needs and interests of non-commercial, public-interest organizations in the availability of satellite communications technology.

As a representative of the non-profit sector I can conceive of numerous applications for satellite communications capability if it could be made available. Since most of the technology to date has been developed at public expense, it seems reasonable to expect some public benefits.

Sincerely,

Samuel Gray
Executive Director
The following resolution was adopted by the membership of the committee to save A26D May 13 1976.

The Committee to Save A26D adopts and endorses the text of the January 24 1976 resolution of Consumer Federation of America encouraging action by the Federal Communications Commission directed to developing applications of communications satellite technology to benefit non-commercial public interest organizations. We support the efforts of the Public Interest Satellite Association to open consideration of the feasibility of public interest communications by satellite and urge the PCC to make a thorough study of such opportunities at which this new technology can be utilized for the public good.

The Committee to Save A26D not affiliated with A26D Inc is an association representing approximately 10,000 San Francisco Bay Area members and viewers of public television station A26D.

Lawrence S. Hall President
Tows Chest Ave
Oakland CA 94605
01554 EST
55 West 44th Street
New York City 10036

Public Interest Satellite Association
55 West 44th Street
New York City 10036

Federal Communications Commission
Washington, D.C. 20554

The Community Video Center, incorporated under the laws of the State of California, is a non-profit organization chartered to manage public access channels on CATV systems in San Diego County, surrounding municipalities, and San Diego County. Due to our proximity to cable operators, associations with regulatory bodies, attendance at the NCTA convention in Dallas; participation in a California-wide "Citizens for Cable" conference; and general knowledge of communications technology we are acutely aware of the issues surrounding the imminent prifligation of satellite technology at the hand of commercial business involved in communication.

There is a great danger that the communications industry—in its fervor for advances, through its strong lobby in legislative corridors—will consume all the benefits of the satellite system, present and future, in their excess of demand and leave no part of the system available for those communications entities which act in direct interest of the public but lack funding comparable to that of free-enterprise corporations.

This danger has been extensively discussed in my own committee of the Community Video Center, within a group of public access supporters at the NCTA.
Satellites should not become another tool for commercialism without a portion of their capabilities being set aside for the use of non-commercial, public interest organizations. The concept of "public access"—defined and actualized in the FCC's 1972 Report and Order—should strongly prevail in these vital considerations.

The attached resolution will be entered into Committee at our next meeting, May 12, 1976 When accepted, the document will be immediately forwarded to PISA once again.

Paul B. Donn, Administrator
Community Video Center

ON JANUARY 24, 1976, THE FOLLOWING RESOLUTION WAS ADAPTED BY THE MEMBERSHIP OF THE CONSUMER PPDDFAITION OF AMERICA

Because communications satellite technology was developed at public expense, CPA believes that, as satellite frequencies are allocated, the needs and interests of non-commercial, public-interest organizations, and of those potential users who would most benefit by small and inexpensive technological methods, must be protected through legislation and regulatory policies.

CPA urges the FCC to initiate a full-scale study of the use of satellites to transmit programs directly to home television sets. Direct satellite-to-home transmission would increase programming diversity by allowing consumers to receive many more channels than the average three or four now being received, and by fostering the development of additional networks. Since the technological capability to provide these consumer benefits will exist shortly, the FCC should immediately proceed to encourage realization of such benefits.
April 28, 1976

Dear Friends,

I have been reviewing information from PISA in reference to Direct Broadcast for Public use. In my official position as Director of Business Affairs for Liberal Religious (a non-profit corporation), I feel that the FCC should study PISA's user-neds study with great care. A decision made in this area will have far-reaching effects on this and future generations; we must act with all the peoples of the world in mind.

Sincerely,

Gary Decker
Director of Business Affairs
May 18, 1976

Andy Horowitz
PISA
55 W 44th St
New York, NY 10036

Dear Andy,

After due consideration, the National Citizens Committee for Broadcasting has decided to endorse your work to develop a user-needs study to determine the extent to which the public interest community can utilize satellite technology. We strongly urge that the FCC consider the study that you are conducting with great care and that the results of the study deserve serious consideration in the process of allocating satellite frequencies.

Sincerely,

Frank Schira
Chairman, Board of Directors

Mr. Bert Cowan
Public Interest Satellite Association
55 West 44th Street
New York, New York 10036

Dear Mr. Cowan,

Due to the fact no Board of Directors meeting was scheduled prior to 15 May 1976, a telephone conference was handled with each Board Member.

The Consumer Federation of America Resolution was read to each Board Member with the unanimous vote to adopt this Resolution and to urge the Federal Communications Commission to study with great care the Public Interest Satellite Association's user-needs report and to urge more time for study of the issues.

Sincerely,

Frank Schira
Chairman, Board of Directors

PISA/ask

National Citizens Committee for Broadcasting
1340 Connecticut Avenue, Washington, DC 20036 202-466-5407

NATIONAL POLICE OFFICERS ASSOCIATION
OF AMERICA

22 April 1976

Mr. Bert Cowan
Public Interest Satellite Association
55 West 44th Street
New York, New York 10036

Dear Mr. Cowan,

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Sincerely,

Frank Schira
Chairman, Board of Directors

PISA/ask

National Citizens Committee for Broadcasting
1340 Connecticut Avenue, Washington, DC 20036 202-466-5407
RESOLUTION

BE IT RESOLVED THAT

Whereas at least fourteen states now mandate continuing education for renewal of pharmaceutical licenses and

Whereas Rho Pi Phi International Pharmaceutical Fraternity was one of the original non-profit purveyors and providers of such Continuing Education and

Whereas it is of the utmost importance that low-priced, expedient and far-reaching communications be made available to our fraternity and to all other organizations seeking to provide Continuing Professional Education in many fields

Rho Pi Phi International Pharmaceutical Fraternity does hereby request that the Federal Communications Commission ensure that low-cost satellite technology remain open as an option to the non-profit sector

Under mandate of the Supreme Council of Rho Pi Phi International Pharmaceutical Fraternity, and given under my hand this sixteenth day of May, 1976 at Ft. Lauderdale, Florida, County of Broward

Murray H. Wolfe, Ph. D., F.R.S.H.
Director of Continuing Education

April 19, 1976

Mr. Bert Cowan
Mr. Andy Horowitz
Public Interest Satellite Association
57 West 44th Street
New York, NY 10036

Dear Messrs. Cowan & Horowitz

While we would like to be in a position to support your request that we contact the Federal Communications Commission relative to the allocation of satellite frequencies for use by the non-profit sector, our Charter specifically precludes us from contacting any government agency or legislator to endorse a specific piece of legislation or otherwise influence decisions by an agency at any governmental level, local, state or national.

We do, however, wish you success in your efforts to insure that the non-profit sector's interest in gaining access to low cost satellite technology are not foreclosed.

Sincerely yours,

Stuart Grout

SG 88

The Seeing Eye, Inc., Morristown, New Jersey

April 19, 1976

Mr. Bert Cowan
Mr. Andy Horowitz
Public Interest Satellite Association
57 West 44th Street
New York, NY 10036

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We do, however, wish you success in your efforts to insure that the non-profit sector's interest in gaining access to low cost satellite technology are not foreclosed.

Sincerely yours,

Stuart Grout

SG 88
April 26, 1976

Public Interest Satellite Association
55 West 44th Street
New York, NY 10036

Gentlemen

United Calvinist Youth will not have an organizational meeting which could pass a resolution such as that passed by the Consumer Federation of America, before May 15.

I, on behalf of UCY, however, urge the Federal Communication Commission to consider the needs of the non-profit community in the design of satellite policy. The benefits which accrue to the general public through the activities of non-profit organizations should be protected in the area of satellite utilization also.

Yours very truly,

A. W. Gansvoort
Administrator

MALVIN A. GOLDBERG INC
347 Madison Avenue
New York, New York 10017

May, 1976
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STUDY OBJECTIVES

To determine present usage, costs and needs and potential usage, costs and needs for telecommunications facilities of a sample of non-profit/public interest/community organizations/social action organizations.
METHODOLOGY

A questionnaire with a covering letter stating the purpose of the study and the nature of the Public Interest Satellite Association was sent to a sample of five groups of organizations, all of which are non-profit.

The primary source for the sample was a list of non-profit organizations having 10,000 or more members, which is maintained by Dr. David Horton Smith, Department of Sociology, Boston College. This list is based on the organizations listed in Gale's "Encyclopedia of Associations." This list was updated to conform with the 1975 edition of Gale's, and was placed in the Master File at Boston College. A computer print out of mailing labels of non-profit organizations having 10,000 or more members was utilized for questionnaire distribution.

897 questionnaires were sent to the Gale/Smith list. These represent the non-profit organizations having 10,000 or more members. Telephone follow ups were made in the New York and Washington areas of those organizations that did not respond by April 23.

Additional organizations were sent questionnaires as follows:

139 Members of the National Citizens Committee for Broadcasting (NCCB)
All Educational Radio Stations -- 640
All Educational Television Stations -- 215

Other organizations in the Public Interest field whose names were known to PISA but who were not included in the other lists of names -- 160

In all 2031 questionnaires were sent out. Self-addressed stamped envelopes were enclosed to make return mail easier. Respondents were given less than three weeks to return the questionnaires in order to have the report ready in time for submission to FCC. For the Gale's list, the questionnaires were sent out March 29, to be returned by April 20.

The questionnaires to the other groups were sent out April 15, with replies due by April 30. May 7 all replies were cut off, and coding began. At that time, replies were received from 207 organizations.

In the questionnaire, respondents were asked to check off those communications techniques they utilized, even if they did not have the figures on usage or costs. Best estimates were requested even if actual data was unavailable.

We believe that the results of the survey do give an indication of usage and costs of the communications facilities used by non-profit organizations, despite the small sample. We suggest that the sub-group information, that is, the data on usage of small vs large membership groups, and organizations that are concerned with social problems vs those with other purposes, are more indicative of the usage of similar organizations. Although not statistically significant, the insights provided can be indicative of potential use of satellite service.

*After the cut-off date an additional 40 questionnaires were received which could not be included in this study.
Dear Friend,

please bear with us as we, a non-profit organization like your own, explain why it is essential that you cooperate by filling out the attached Questionnaire and return it by April 20th.

The information we are asking you to provide is vitally needed to achieve one basic purpose: to have an effect upon policy decisions now being made that could make it possible for you to take advantage of low-cost communications facilities. These, in the years ahead, will allow you to communicate more economically with your clients and members, to other organizations and to the public in large if the voice of the non-profit community is heard now.

You know, of course, about telecommunications satellites and their capability of providing world-wide television, radio, data, telex and facsimile services to business, industry and the military that you may not know, though, is that the development of this powerful space technology has been wholly subsidized with nearly $6 billion in public funds, although public groups have not had an opportunity to enjoy its many benefits.

The Public Interest Satellite Association (PISA), now has been formed to do something about this. We are convinced that satellite technology, if permitted to develop in the right ways, can provide you with communications facilities that will be cheaper, better and faster than those you now use. And, in the end, we believe that the public sector, the non-profit and service organizations, may benefit most from a non-profit satellite designed to meet its needs.

This Questionnaire, which is an attempt to ascertain these needs, is the beginning of what must be done.

Decisions about satellites are made at the level of World Administrative Radiocomferences. This is done under the auspices of the International Telecommunications Union, in order to ensure that all needs are met. Free from interference between one country and another. The next such Conference (called WARC) will take place in 1979. Decisions made at that meeting will be binding, for all practical purposes, until the end of this century. If the public sector is not heard from now, does not participate in the decision-making process, satellites will remain a totally commercial entity and their benefits will not be available to the public-service, non-profit organizations.

We are trying to keep opinion open, trying to prevent foreclosing the application of this technology for low-cost public use.

The timing, however, is critical. The year 1979 seems a long way off, but policy is made slowly and through a series of determinations by regulatory and other agencies. These agencies must be made aware of what non-profit users want and need. If there is not a strong response by the public sector, it is certain only the needs of commercial interests will be served.

For some time, there has been a Federal Communications Commission Joint Government/Industry Working Group to consider these matters. PISA has been a member of it. The final report of that Working Group must be submitted to the Federal Communications Commission in mid-May of 1976. PISA only recently obtained the necessary funding to undertake this study of user-needs.

This timing has placed upon us the kind of burden that can only be alleviated with your cooperation. The attached Questionnaire is for the user-needs study the FCC requires in order to make its judgments. Their recommendations, in turn, go passed on to the State Department, and, in turn to the World Administrative Radiocomference.

All replies will be kept confidential. Only the aggregate data will be submitted. If we have your answers back by April 20th, we will be able to analyze the needs of the non-profit sector and prepare a submission to the FCC. With your cooperation, the return of completed Questionnaires should be sufficient to yield an adequate and representative sample of public interest organizations.

We know the time is short and that we are asking for complicated information. But, as short as is the time, so are the stakes high. The potential is too great to allow satellites to remain solely the province of the network broadcasters, the commercial carriers, industry and the military. The public and the public sector have helped pay for the development of the technology, and are entitled to benefits from it.

The Questionnaire can be made to care about, but only if you help.

Please join us in this effort by filling out the attached.

Thank you.

[Signatures]

P.S. Even if you can't complete all the questions asked, please return the Questionnaire with the information you can answer. And, of course, we will be happy to make the results of the full study available to you.
The objective of this questionnaire is to obtain information on your communications uses and needs. Even if you can't complete all of the questions asked, please return the questionnaire with the information you can answer. All replies will be kept confidential.

1. Would you please indicate (in the appropriate space in column 1), which communications techniques are used by your organization to communicate with its members or chapters, with other organizations and with the general public. Place an X in the space in Column 1 next to that communications technique.

2. For each communications technique used by your organization (and marked in column 1) fill in the appropriate spaces in columns 4, 5, and 6 to indicate the following:

   a) The number of times yearly the specific communications facility is used (column 4) (Example: If there are two mailings per year to members, the number 2 would be written next to mailings in column 4).

   b) The number of units (items) (pieces) distributed each time (column 5) (Example: If there are 10,000 members to whom the mailing is sent, the number 10,000 would be written in column 5).

   c) The yearly cost for the communications service used (col 6).

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Public Interest Satellite Association

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</table>
Public Interest Satellite Association

3 If Satellite Service dedicated to non-profit organizations were made available, for which kinds of services would you give first priorities? Please rank the Top 5 (1 is highest)

Long Distance Telephone________ Mailgrams________
Telex________ Telecopier/Facsimile________
Data Transmission________ Radio________
Television________ Closed Circuit Radio________
Closed Circuit TV________ Slow Scan Television________
Telegram________ National/Regional Meetings________

4 To what other uses, if any, would you put the satellite service, if it were made available to your organization?

Name of Organization ____________________________________________________________

Address ____________________________________________________________

City and State __________________________ Zip Code __________

Telephone (____ ) __________________________

Number of Chapters __________________________

Number of Members __________________________

Purpose of Organization ____________________________________________________________

________________________

Name of Person Filling Out This Form __________________________

Title of Person Filling Out Form __________________________

Date __________________________

DEFINITIONS

In analyzing the data, the organizations in our sample were categorized according to the major purpose for which they were establishe. They were grouped under general definitions for clarification, our broad categories are shown below with the sub-groups of which they are comprised.

SOCIAL

Socially active organizations involved in Civic affairs, Political Action, Voting, Community Services, Social Welfare and Social Problems, Consumer Services, Family Services, Health, Racial and Ethnic Affairs

COMMUNICATIONS

Organizations involved in Communications, Media and Public Relations

EDUCATIONAL

Organizations concerned with Education, Cultural, Aesthetic or Artistic Affairs, Scientific Learned or Religious Interests

CLUBS & HOBBIES

Fellowship Organizations, Social or Kinship Clubs, Fraternities, Veterans Organizations, Sports and Hobby Organizations

EMPLOYMENT

Organizations whose major interest is occupational — Labor Organizations, Business Associations, Professional and Non-professional organizations, Agricultural Organizations
SUMMARY

A STUDY OF

COMMUNICATIONS NEEDS, USES AND COSTS
OF

NON-PROFIT ORGANIZATIONS

Conducted for

PUBLIC INTEREST SATELLITE ASSOCIATION

55 West 44th Street

New York, New York 10036

(212) 661-2540

Communications Usage by Size of Membership

The degree to which the communications facilities and techniques are used will vary according to size and type of organization.

While most larger organizations are more likely to have general mailings, magazines, promotions, ballots and renewals, smaller organizations are as likely to use the mail for surveys as are the very large ones. Those organizations having 50-100,000 members mention the mail least, but at a level of better than 50% for general mailings. For Newsletters, 62% of the 25-50,000 member organizations were mentioned. At the low end, only 49% of those with less than 25,000 mention magazines. Almost 2/3 of the largest organizations mention Promotions as compared to almost 1/3 of those with memberships of 50-100,000.

While 82% of the respondent organizations indicate they use long distance telephone service to communicate with members and other organizations, the degree of usage seems to vary. For example, all of the organizations in our sample with 25,000-50,000 members, say they use long distance as compared to 73% of those with 100,000 or more members. WATS lines are used almost equally by these two groups, while only 7% of those with 50-100,000 members say they use WATS lines.

The lines are used least by the smaller organizations while leased lines are used most.

Approximately a fifth of the organizations use Mailgrams and Telegrams, with the larger membership organizations more likely to use them.
Radio Tape usage is used least by the organisations having 25,000-50,000 members (10%) and most by the larger and smaller groups.

Television usage goes from a low of 14% among the 25,000-50,000 group to almost a third of those with 100,000 or more members. National and Regional Meetings as a means of communicating with membership is very popular. On average, more than half use it. However, the 50-100,000 membership group tends to make the greatest use — 92% mention meetings.

This group is also more likely to use National and Regional training meetings as well — 53%, twice the average.

### Table: Usage of Communications Techniques

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<th>Under 25,000 (21)</th>
<th>25,000-50,000 (13)</th>
<th>50,000-100,000 (19)</th>
<th>100,000+ NO</th>
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*Respondent indicated usage but did not list number of members in organisation.
Communications Usage by Number of Chapters in Organization

Those organizations with fewer than 20 chapters are less likely to mention magazines or ballots in terms of mail usage. Other than that, there are few differences in mail usage by size of chapter, as represented by number of chapters.

With regard to use of phones, the number of chapters in an organization do seem to have a substantial influence. Those with 50 or more chapters mention long distance most often. But those with fewer than 50 chapters are more likely to use WATS lines, Tie lines, Leased lines and even Foreign exchange.

Telegrams and Mailgrams are mentioned most often by those organizations with 20-50 chapters. This might be used as a supplement to the long distance calls.

Radio tape use declines as the number of chapters increase while TV Spots usage is largest for the middle group.

Meetings are used least by the organizations with the fewest number of chapters.

### Usage of Communications Techniques

#### By Chapters

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* Respondent indicated usage but did not list number of chapters.
Communications Usage by Organization Purpose

Generally, Club and Hobby organizations tend to use the malls more than the others. Primarily, they use it for general mailings and magazines and to a much greater degree than the other organizations.

Newsletters are mentioned equally by those organizations based on employment or occupation, the Active Social organizations as well as Club and Hobby groups.

Mail promotions are mentioned by more than half of the Club and Hobby organizations and almost 2/3 of those concerned with employment.

Ballots and Renewals are mentioned most often by Club and Hobby groups with the employment organizations the next largest user.

As was true with malls, the Club and Hobby organizations and those concerned with employment mention Long Distance phone calls most often -- 94.1%

However, even for the group with the lowest mention of usage -- the educational group -- 3/4 mention long distance phone calls as one of the means by which they communicate with their members and other organizations.

In effect, almost all organizations use long distance phone service.

In addition, substitute services for long distance, such as WATS lines, Toll lines, Leased lines and foreign exchange lines are used.

WATS Lines are mentioned most often (about 25%) by the Social Active, Clubs and Hobbies and Employment oriented groups. Toll Lines by the Communications, Educational and Clubs and Hobbies organizations.

Leased lines by Communications Organizations (primarily Radio and TV Stations)

Telex, although mentioned less frequently, is listed primarily by Employment and Communications oriented organizations, but at a level of 17.6% and 13.2% respectively.

Mailsgrams and Telegrams are mentioned most often by the organizations concerned with employment, secondarily by Club and Hobby organizations and thirdly, by the Active Social groups.

As expected, Radio Tapes are mentioned most often by the Communications group (Radio Stations). However, they are still mentioned by more than a quarter of the Active Social organizations and more than a fifth of the Educational organizations.
Television spots, generally to the public, is mentioned by more than 1/3 of the Active Social organizations and almost a quarter of the employment oriented organizations.

The other major communications techniques used are National and Regional Meetings. This technique is mentioned most often by the Employment organizations.

Fully 81% of this group uses National or Regional Meetings and half of them mention using meetings for Training.

All groups use meetings, with the Communications organizations with 40% showing the lowest usage.

The same pattern is true of Training meetings with Communications lowest and Employment highest.

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* Respondent indicated usage but did not indicate purpose of organization
Communications Usage by Source of Sample

General Mailings are utilized by all groups, but the Public Radio group tends to use it least (48%). The organizations that comprise Gale’s Encyclopedia of Associations tend to use General Mailings and Magazines most. Newsletters are used by the National Citizens Committee for Broadcasting (NCCB).

Public Radio uses Long Distance Telephone least (60%) while the NCCB group uses it the most (95%). 86% of the Gale’s organizations use Long Distance Telephone. WATS Lines are used mostly by the Public TV stations and secondarily by the Gale’s and Public Radio group. NCCB uses Long Distance Telephone most (95%).

86% of the Gale’s organizations use Leased Lines and Tie Lines least. Public Radio and TV stations are most likely users of Leased Lines and Tie Lines.

Public TV uses Telex — 34%.

The Gale’s sample organizations use Mailgrams (27%) and Telegrams (33%).

As expected, Radio Stations use Radio Tapes more than the others, and TV Stations use the Television spots. However, 18% of the Gale’s sample of non-profit organizations say they use Radio tapes and 21% say they use TV spots — ostensibly to reach the public and their own members.

National and Regional Meetings are used most by the Galae and NCCB groups, least by Public Radio and TV. The former by 69% and 61% respectively. The latter 33% and 35% respectively.

36% of the Gale’s organizations say they do have training meetings.

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<th>Public TV</th>
<th>NCCB Radio</th>
<th>Other</th>
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</thead>
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<td>72 oz</td>
<td>61 ox</td>
<td>82 ox</td>
<td>48 ox</td>
<td>61 ox</td>
<td>80 ox</td>
<td></td>
</tr>
<tr>
<td>Newsletters</td>
<td>63 oz</td>
<td>74 oz</td>
<td>82 oz</td>
<td>39 oz</td>
<td>46 oz</td>
<td>90 oz</td>
<td></td>
</tr>
<tr>
<td>Magazines</td>
<td>45 oz</td>
<td>67 oz</td>
<td>26 oz</td>
<td>18 oz</td>
<td>42 oz</td>
<td>20 oz</td>
<td></td>
</tr>
<tr>
<td>Promotions</td>
<td>37 oz</td>
<td>48 oz</td>
<td>30 oz</td>
<td>16 oz</td>
<td>34 oz</td>
<td>40 oz</td>
<td></td>
</tr>
<tr>
<td>Surveys</td>
<td>25 oz</td>
<td>33 oz</td>
<td>43 oz</td>
<td>32 oz</td>
<td>38 oz</td>
<td>20 oz</td>
<td></td>
</tr>
<tr>
<td>Ballots</td>
<td>22 oz</td>
<td>30 oz</td>
<td>8 oz</td>
<td>4 oz</td>
<td>15 oz</td>
<td>15 oz</td>
<td></td>
</tr>
<tr>
<td>Renewals</td>
<td>38 oz</td>
<td>49 oz</td>
<td>30 oz</td>
<td>16 oz</td>
<td>50 oz</td>
<td>10 oz</td>
<td></td>
</tr>
<tr>
<td>Long Distance-Phone</td>
<td>82 oz</td>
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<td>95 oz</td>
<td>60 oz</td>
<td>84 oz</td>
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</tr>
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<td>WATS Lines</td>
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<td>19 oz</td>
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<td>30 oz</td>
<td>3 oz</td>
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<tr>
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<td>5 oz</td>
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<td>15 oz</td>
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</tr>
<tr>
<td>Leased Lines</td>
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<td>13 oz</td>
<td>37 oz</td>
<td>34 oz</td>
<td>10 oz</td>
<td></td>
</tr>
<tr>
<td>Foreign Exchange</td>
<td>1 oz</td>
<td>1 oz</td>
<td>2 oz</td>
<td>3 oz</td>
<td>3 oz</td>
<td>2 oz</td>
<td></td>
</tr>
<tr>
<td>Telex</td>
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<td>8 oz</td>
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<td>34 oz</td>
<td>10 oz</td>
<td></td>
</tr>
<tr>
<td>Telescopier</td>
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<td>2 oz</td>
<td>4 oz</td>
<td>9 oz</td>
<td>11 oz</td>
<td>30 oz</td>
<td></td>
</tr>
<tr>
<td>Mailgrams</td>
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<td>27 oz</td>
<td>13 oz</td>
<td>4 oz</td>
<td>19 oz</td>
<td>30 oz</td>
<td></td>
</tr>
<tr>
<td>Telegrams</td>
<td>22 oz</td>
<td>3 oz</td>
<td>13 oz</td>
<td>4 oz</td>
<td>23 oz</td>
<td>30 oz</td>
<td></td>
</tr>
<tr>
<td>Radio Tapes</td>
<td>31 oz</td>
<td>18 oz</td>
<td>39 oz</td>
<td>67 oz</td>
<td>23 oz</td>
<td>30 oz</td>
<td></td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>2 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td>2 oz</td>
<td>1 oz</td>
<td></td>
</tr>
<tr>
<td>TV Spots</td>
<td>17 oz</td>
<td>21 oz</td>
<td>17 oz</td>
<td>2 oz</td>
<td>38 oz</td>
<td>10 oz</td>
<td></td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>10 oz</td>
<td>5 oz</td>
<td>4 oz</td>
<td>9 oz</td>
<td>36 oz</td>
<td>20 oz</td>
<td></td>
</tr>
<tr>
<td>TV Slow Scan</td>
<td>0 oz</td>
<td>0 oz</td>
<td>0 oz</td>
<td>0 oz</td>
<td>3 oz</td>
<td>2 oz</td>
<td></td>
</tr>
<tr>
<td>Pub. Microwave</td>
<td>3 oz</td>
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<td>4 oz</td>
<td>3 oz</td>
<td>10 oz</td>
<td>2 oz</td>
<td></td>
</tr>
<tr>
<td>Data Transmission</td>
<td>5 oz</td>
<td>6 oz</td>
<td>4 oz</td>
<td>4 oz</td>
<td>11 oz</td>
<td>2 oz</td>
<td></td>
</tr>
<tr>
<td>National/Reg. Meetings</td>
<td>56 oz</td>
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<td>60 oz</td>
<td>32 oz</td>
<td>34 oz</td>
<td>50 oz</td>
<td></td>
</tr>
<tr>
<td>Nat. Reg. Trns. Mte</td>
<td>26 oz</td>
<td>36 oz</td>
<td>21 oz</td>
<td>14 oz</td>
<td>15 oz</td>
<td>20 oz</td>
<td></td>
</tr>
<tr>
<td>Wire Services</td>
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<td>1 oz</td>
<td>4 oz</td>
<td>7 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td></td>
</tr>
<tr>
<td>TV Program</td>
<td>1 oz</td>
<td>1 oz</td>
<td>8 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td></td>
</tr>
<tr>
<td>Cable TV</td>
<td>2 oz</td>
<td>0 oz</td>
<td>17 oz</td>
<td>3 oz</td>
<td>2 oz</td>
<td>2 oz</td>
<td></td>
</tr>
<tr>
<td>Satellite</td>
<td>1 oz</td>
<td>1 oz</td>
<td>8 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td></td>
</tr>
<tr>
<td>Conference, Meet.</td>
<td>1 oz</td>
<td>1 oz</td>
<td>4 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 oz</td>
<td>1 oz</td>
<td>8 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td>1 oz</td>
<td></td>
</tr>
</tbody>
</table>
Average Annual Costs of Communications Facilities by Size of Membership

As expected, the organizations with the largest membership will have the largest costs for most communications use. While the average annual expenditures for all organizations was $13,765 for general mailings for those with 100,000 or more members, the average was $40,772 for Newsletters. The average expenditures were $6,845 but for those organizations having 100,000 or more members, the average annual expenditure was $21,000.

In mail promotions, the larger average expenditure for organizations with 25-50,000 membership may be due to a sample fluke, since only four organizations in that group gave cost figures and one listed promotional costs of more than $100,000.

With regard to telephone costs, generally the larger the organization the greater the expenditure. The average expenditure for long distance phone calls was $7,432 but for those organizations with 100,000 or more members, the average was $12,650. With regard to WATS lines costs, the small number of replies from organizations with 25-50,000 members may be responsible for the large expenditure shown and it may just be a sample distortion.

However, for the small groups generally, there seems to be an increase in WATS, TIs, and leased line usage apparently as compensation for the lower long distance costs and perhaps to supplement the long distance usage.

Telos, Matigrams and Telegrams tend to be used more by larger organizations. More money is spent on Data Transmission by the smaller organizations (fewer than 50,000 members) than the others.

With regard to National/Regional Regular Meetings and Training Meetings, the annual expenditures increase with the size of organizations with the exception of those with 50-100,000 members. They indicate the lowest expenditures for such meetings as compared to an average of $34,127 and $48,089 for all organizations for Regular Meetings and Training Meetings respectively, for the associations with 50-100,000 members, the average expenditure is $21,083 and $3,438 respectively.

Other communications techniques were volunteered by a few organizations and are shown in the table.
### Average Annual Costs of Communications Facilities by Number of Chapters

<table>
<thead>
<tr>
<th>Category</th>
<th>Under 20 Chrs</th>
<th>21-50 Chrs</th>
<th>51-100 Chrs</th>
<th>More than 100 Chrs</th>
<th>No. of Orgs</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mailings</td>
<td>$34,527</td>
<td>$37,500</td>
<td>$43,875</td>
<td>$56,313</td>
<td>23</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>$4,485</td>
<td>$5,453</td>
<td>$6,107</td>
<td>$7,167</td>
<td>24</td>
</tr>
<tr>
<td>Magazines - Mail</td>
<td>$42,235</td>
<td>$56,087</td>
<td>$65,275</td>
<td>$75,000</td>
<td>34</td>
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<td>Promotions - Mail</td>
<td>$3,537</td>
<td>$5,009</td>
<td>$6,812</td>
<td>$9,053</td>
<td>30</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>$1,372</td>
<td>$1,500</td>
<td>$2,125</td>
<td>$2,78</td>
<td>19</td>
</tr>
<tr>
<td>Ballots - Mail</td>
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<td>$1,045</td>
<td>$1,093</td>
<td>$2,320</td>
<td>19</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td>$4,672</td>
<td>$2,536</td>
<td>$4,911</td>
<td>$8,305</td>
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</tr>
<tr>
<td>Long Distance - Phone</td>
<td>$7,432</td>
<td>$5,713</td>
<td>$9,607</td>
<td>$12,650</td>
<td>19</td>
</tr>
<tr>
<td>Wire Lines - Phone</td>
<td>$36,330</td>
<td>$29,363</td>
<td>$101,250</td>
<td>$29,363</td>
<td>20</td>
</tr>
<tr>
<td>Lease Lines - Phone</td>
<td>$1,500</td>
<td>$2,000</td>
<td>$875</td>
<td>$4,000</td>
<td>20</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td>$21,270</td>
<td>$31,322</td>
<td>$9,500</td>
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<tr>
<td>Telex</td>
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<td>$1,350</td>
<td>$2,625</td>
<td>$12,500</td>
<td>20</td>
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<td>$1,308</td>
<td>$125</td>
<td>$1,250</td>
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<td>$250</td>
<td>$250</td>
<td>$500</td>
<td>19</td>
</tr>
<tr>
<td>Telexcopiers</td>
<td>$1,361</td>
<td>$1,308</td>
<td>$125</td>
<td>$1,250</td>
<td>19</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td>$2,946</td>
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<td>$1,250</td>
<td>$5,665</td>
<td>20</td>
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<tr>
<td>Radio-Closed Circuit</td>
<td>$2,625</td>
<td>$2,187</td>
<td>$2,187</td>
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<td>$6,000</td>
<td>$17,500</td>
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<tr>
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<td>$10,500</td>
<td>$11,875</td>
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<tr>
<td>TV-Sleep Scan</td>
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<td>$3,083</td>
<td>$3,083</td>
<td>$3,083</td>
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<td>Fax</td>
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<td>$57,166</td>
<td>$83,750</td>
<td>$3,500</td>
<td>19</td>
</tr>
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<td>National/Regional Meetings</td>
<td>$34,227</td>
<td>$31,699</td>
<td>$45,000</td>
<td>$50,694</td>
<td>20</td>
</tr>
<tr>
<td>Mail/Reg. Ting Meetings</td>
<td>$48,089</td>
<td>$35,375</td>
<td>$45,450</td>
<td>$56,313</td>
<td>20</td>
</tr>
<tr>
<td>Wire Services</td>
<td>$37,500</td>
<td>$37,500</td>
<td>$37,500</td>
<td>$37,500</td>
<td>20</td>
</tr>
<tr>
<td>TV Programming - Doc</td>
<td>$3,188</td>
<td>$1,250</td>
<td>$1,250</td>
<td>$1,250</td>
<td>20</td>
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<td>Cable TV</td>
<td>$3,950</td>
<td>$4,062</td>
<td>$4,062</td>
<td>$4,500</td>
<td>20</td>
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<tr>
<td>Satellite</td>
<td>$5,625</td>
<td>$2,500</td>
<td>$2,500</td>
<td>$2,500</td>
<td>20</td>
</tr>
<tr>
<td>Conferences, Network</td>
<td>$1,092</td>
<td>$1,750</td>
<td>$1,750</td>
<td>$1,750</td>
<td>20</td>
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<tr>
<td>Other</td>
<td>$21,167</td>
<td>$27,167</td>
<td>$27,167</td>
<td>$27,167</td>
<td>20</td>
</tr>
</tbody>
</table>

* Respondent volunteered cost information but did not list size of organization.

Generally, mail costs increase with size of organization and number of chapters. In the case of general mailings, of 39 organizations with fewer than 20 chapters, 15 did not respond on costs, one indicated expenditures of more than $100,000. If we exclude the two highest cost organizations, the average expenditure for general mailings for the remaining 22 would be $34,527 annually.

The cost of telephone service also tends to increase with size. However, leased lines expenditures are much higher for smaller organizations based on extraordinary expenditures by two organizations.

Costs for Mailgrams and Telegrams also tend to increase as the number of chapters increase.

Radio Tape costs and television costs are based on very small sample responses.

The annual expenditures for National and Regional Meetings and for Training Meetings also tends to increase with size or organizations as indicated by the number of chapters.

Expenditures for each of the 55 organizations in our sample that use National and Regional Meetings average $34,227 annually. Those with 50 or more chapters average $48,397 annually for such meetings.

Training Meetings expenditures range from an annual average of $1,107 for those with 20 or less chapters to $76,613 for those with 50 or more chapters. The average for the sample is $48,089 annually.
When we analyze the annual costs of communications by organization purpose we get other insights into communications use.

General Mailings (as shown by average annual expenditures) tend to be used by Educational Organizations and organizations oriented toward Business and Employment. As compared to the average expenditure of $13,765, the Educational organizations spend $24,188 and the Employment oriented organizations spend $19,446.

Magazines are major costs of "Employment" and Educational organizations — $59,732 and $58,992 respectively vs $42,235 annual expenditure for the average.

Clubs and Hobby organizations spend their money on magazines ($29,841) and Promotions ($14,875).

Long distance telephone and WATS lines are major annual expenditures of the Business and labor oriented associations as well as the social active organizations, equaling $335,000 and $85,000 respectively as compared to $44,000 for long distance and WATS combined for the average organizations.

For National and Regional Meetings as well as Training Meetings the "Employment" Association spend by far the most, — averaging almost $100,000 annually for Meetings and $125,000 for Training Meetings.
AVERAGE COSTS OF COMMUNICATION FACILITIES

BY ORGANIZATION PURPOSE

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>No. Am.</th>
<th>Social</th>
<th>Communi-</th>
<th>Educa-</th>
<th>Clubs &amp;</th>
<th>Employ-</th>
</tr>
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<tr>
<td></td>
<td></td>
<td></td>
<td>tional</td>
<td>Mental</td>
<td>Hobbles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(207)</td>
<td>(9)</td>
<td>(22)</td>
<td>(33)</td>
<td>(17)</td>
<td>(36)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>$</th>
<th>$</th>
<th>$</th>
<th>$</th>
<th>$</th>
<th>$</th>
</tr>
</thead>
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<td>General Mailings</td>
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<tr>
<td>Newsletters - Mail</td>
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<td>2,061</td>
<td>10,778</td>
<td>1,750</td>
</tr>
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</tr>
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<td>3,658</td>
<td>9,018</td>
<td>24,875</td>
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<td>125</td>
<td>1,606</td>
<td>1,196</td>
<td>100</td>
</tr>
<tr>
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<td>50</td>
<td>3,568</td>
<td>250</td>
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</tr>
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<td>4,813</td>
<td>4,050</td>
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</tr>
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</tr>
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<td>750</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telco</td>
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<td>6,154</td>
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<td>1,813</td>
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<td>250</td>
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<td>375</td>
<td>125</td>
<td>375</td>
<td>208</td>
</tr>
<tr>
<td>Radio Tapes</td>
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<td>--</td>
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<td>3,681</td>
<td>1,375</td>
<td>125</td>
</tr>
<tr>
<td>Radio-Closed Circuit</td>
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<td>2,189</td>
<td>--</td>
<td>--</td>
<td>2,500</td>
</tr>
<tr>
<td>TV Spots</td>
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<td>--</td>
<td>6,875</td>
<td>6,812</td>
<td>4,000</td>
<td>12,467</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
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<td>17,500</td>
<td>17,500</td>
<td>4,208</td>
<td>11,167</td>
<td>--</td>
</tr>
<tr>
<td>TV-Slow Scan</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>PTT Microwave</td>
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<td>150,000</td>
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<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>46,928</td>
<td>--</td>
<td>43,625</td>
<td>83,750</td>
<td>--</td>
<td>4,000</td>
</tr>
<tr>
<td>National/Regional Mail</td>
<td>34,527</td>
<td>108,750</td>
<td>10,321</td>
<td>7,760</td>
<td>--</td>
<td>28,019</td>
</tr>
<tr>
<td>Mail/Reg Test Mail</td>
<td>48,089</td>
<td>--</td>
<td>28,167</td>
<td>929</td>
<td>34,214</td>
<td>3,667</td>
</tr>
<tr>
<td>Wire Services</td>
<td>37,000</td>
<td>--</td>
<td>37,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>TV Programming-Doc</td>
<td>3,180</td>
<td>--</td>
<td>6,250</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Cable TV</td>
<td>6,950</td>
<td>--</td>
<td>6,950</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Satellite</td>
<td>8,625</td>
<td>--</td>
<td>8,625</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Conferences, Network</td>
<td>10,063</td>
<td>--</td>
<td>375</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Other</td>
<td>37,167</td>
<td>--</td>
<td>4,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

* Respondent volunteered cost information but did not indicate purpose of organization

Communications Costs by Source of Sample

The Sample we used is basically composed of four different lists, Gale's Encyclopedia of Associations (non-profit organizations having 10,000 or more members), National Citizens Committee for Broadcasting, Public Radio Stations and Public Television Stations.

An analysis of Yearly Expenditures for organizational and public communications services shows the different functions and costs attributable to each sample group. For example: the organizations from Gale's and those from Public Television stations spend the most amount of money, on average, for General Mailings ($11,874 and $15,732 respectively). Public Radio also spends relatively little ($1,717 and $19,444 respectively).

The NCCB average is $14,824.

Gale's and Public Radio again spend the most per organization for Magazines -- $9,924 and $38,444 respectively. NCCB and Public Radio spend $6,063 and $4,958 respectively.

For Promotions, the average Gale organization spends $23,033 annually, by far the largest of all.

Long Distance telephone expenditures are highest for Public TV stations with $12,750. Gale's is next with $9,082. However, expenditures for WATS lines go up drastically for the average Gale's organization -- $63,375, as compared to $12,900 for Public TV, $4,000 for NCCB and $3,800 for Public Radio.
It is surprising to note that the average non-profit organization taken from our Case sample spends $10,964 annually for TV spots, even more than the Public TV station for this purpose and $3,261 for Radio Tapes.

In addition, for Data Transmission, the Case organization spends $77,000 annually and the Public TV station spends $61,667. The amount spent by the others is minor in comparison.
CONCLUSION

One thing the study makes absolutely clear -- A considerable amount of money is spent by Non-profit organizations on communications services to their members, other organizations and the public at large.

Just taking those organizations in our sample that were derived from Gale's Encyclopedia of Associations, the annual communications expenses for the average non-profit organization is $160,000.

For all hundred "Gale" organizations in our sample, weighting for usage and cost, the average yearly communications expenditure comes to $16,013,000.

Projecting these figures to the 897 non-profit organizations having 10,000 or more members to whom the questionnaire was sent, the total annual expenditures for communications is $143,632,360.

The costs for Long Distance telephone calls for these 897 organizations come to $7,006,040. If we add to that the $10,801,000 of WATS line costs, we show approximately $17,807,000 spent annually for telephone service by these non-profit organizations.

Telex, Telexprinter, Mailgrams and Telegrams add another $800,000 to the communications costs annually.

With this kind of expenditure faced annually by the non-profit organizations, we can understand why the Long Distance Telephone Service was given the highest priority by our respondents in the event that Satellite Service is made available to non-profit organizations.
Communications Usage

In terms of this study, we attempted to find out the degree to which various communications facilities are used by these non-profit organizations. We provided our respondents with a check list of various techniques to indicate those they used. They were asked to write in the actual or best estimates of frequency and amount of usage. (In some cases, the technique was checked off, but the figures were omitted. In others, some figures were inserted, and others left out.)

For the 207 organizations that replied, the degree to which a communications facility is utilized, depends upon several factors:

- The size of the membership of the organization
- The number of chapters
- The purpose or function of the organizations
- The cost of the communications facility
- The function for which the facility or technique is being used

We tried to relate these elements as much as possible in order to allow for projections of present costs to future needs. Overall, in terms of communications facility usage, the long distance telephone ranks as the most widely used. 82% of those responding say they use long distance telephone to communicate with members and other organizations. (Regular daily mail and local telephone calls were excluded.)

Since the questions related to communications techniques used to reach members, other organizations and the general public, the diversity of communications techniques used is not surprising. After long distance phone calls, the mails were mentioned next most often. General mailings by 72%, and newsletters by 64%. National and Regional Meetings were mentioned fourth (56%) followed by magazines (46%). The alternatives to long distance telephone calls, WATS lines, leased lines and Tie lines were mentioned by 19%, 15%, and 9% respectively.

It would seem that for some organizations, the cost of long distance phone calls make the services of WATS lines, leased lines and Tie lines a necessary supplement.

Overall, with the exception of long distance telephone, the mails are the major form of communications technique used.

Almost a third of these non-profit organizations use Radio Tapes while 27% say they hold National or Regional Training Meetings.
**Usage of Communications Technique**

<table>
<thead>
<tr>
<th>Communications Technique</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(207)</td>
<td></td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>82</td>
</tr>
<tr>
<td>General Mailings</td>
<td>72</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>63</td>
</tr>
<tr>
<td>National/Regional Meetings</td>
<td>55</td>
</tr>
<tr>
<td>Magazines - Mail</td>
<td>45</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td>38</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>37</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>35</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td>31</td>
</tr>
<tr>
<td>National/Regional Training Meetings</td>
<td>26</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>22</td>
</tr>
<tr>
<td>Telegrams</td>
<td>13</td>
</tr>
<tr>
<td>Rate Lines - Phone</td>
<td>19</td>
</tr>
<tr>
<td>Railgrams</td>
<td>19</td>
</tr>
<tr>
<td>TV Spots</td>
<td>17</td>
</tr>
<tr>
<td>Broadcast Lines - Phones</td>
<td>13</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>10</td>
</tr>
<tr>
<td>Sales</td>
<td>9</td>
</tr>
<tr>
<td>Teles Lines - Phone</td>
<td>9</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>5</td>
</tr>
<tr>
<td>Telex</td>
<td>5</td>
</tr>
<tr>
<td>Att - Microwave</td>
<td>2</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>2</td>
</tr>
<tr>
<td>Wire Services</td>
<td>1</td>
</tr>
<tr>
<td>TV Programming-Doc</td>
<td>1</td>
</tr>
<tr>
<td>Cable TV</td>
<td>2</td>
</tr>
<tr>
<td>Satellite</td>
<td>1</td>
</tr>
<tr>
<td>Conference, Network</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
</tbody>
</table>

**Communications Costs**

The greatest amount of money spent annually for a communications technique is for National or Regional Training Meetings, $48,089.

Data Transmission is next most costly at $46,928.

Magazine mailings are third at $42,135 annually.

The most unique communications techniques such as Private Microwaves and Wire Services are next most costly at $40,000 and $37,500 respectively.

General Mailings are ninth most costly at $13,765 annually for the average organisations. Long Distance phone calls are twelfth at $7,432 annual expenditure for the average non-profit organisations.
Although Long Distance Telephone calls are utilized by more organizations than any other facility for communicating with their own members and other organizations, the greatest expense on the average, for those replying is National and Regional Training Meetings, followed by Data Transmission, Magazines, Private Microwave, Wire Services and WATS Lines. However, we must keep in mind the fact that these figures represent the average expenditures only of those organizations who use the facility and submitted the cost figures on the questionnaire.

To give some feeling for the costs involved, if we apply the average organizations cost per communications technique for just those organizations in our sample that indicated usage and the total yearly sum is $207,730,769.

When we weight these costs and usage data, we find that magazine mailings represent almost a fifth of all communications expenditures. National and Regional Meetings represent almost the same proportions of costs, with Training Meetings representing about an eighth of all communications expenditures by these non-profit organizations.

* Based on Mean Average of Costs of Communications Techniques for those organizations that gave the information.
General Mailings to members and the general public represent 10%, while total phone costs for long distance and the various special lines represent one-sixth of all communications costs of the organisations in our sample.

### TOTAL COMMUNICATIONS EXPENDITURE FOR THE ORGANIZATIONS IN THIS SAMPLE

<table>
<thead>
<tr>
<th>Item</th>
<th>TOTAL EXPENDITURES</th>
<th>% OF TOTAL EXPENDITURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mailings</td>
<td>2,051,356</td>
<td>9.9</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>203,192</td>
<td>4.4</td>
</tr>
<tr>
<td>Magazine - Mail</td>
<td>4,012,874</td>
<td>19.4</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>1,057,975</td>
<td>5.1</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>100,253</td>
<td>0.5</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>69,026</td>
<td>0.3</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td>369,192</td>
<td>1.8</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>1,263,046</td>
<td>6.1</td>
</tr>
<tr>
<td>Wire Lines - Phone</td>
<td>1,451,420</td>
<td>7.0</td>
</tr>
<tr>
<td>Tie Lines - Phone</td>
<td>28,166</td>
<td>0.1</td>
</tr>
<tr>
<td>Leased Lines - Phone</td>
<td>660,436</td>
<td>3.3</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td>1,553</td>
<td></td>
</tr>
<tr>
<td>Telex</td>
<td>97,263</td>
<td>0.5</td>
</tr>
<tr>
<td>Teletypewriter</td>
<td>16,058</td>
<td>0.1</td>
</tr>
<tr>
<td>Mailgram</td>
<td>162,081</td>
<td>0.8</td>
</tr>
<tr>
<td>Telegram</td>
<td>79,454</td>
<td>0.4</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td>220,816</td>
<td>1.1</td>
</tr>
<tr>
<td>Radio-Closed Circuit</td>
<td>15,758</td>
<td>0.1</td>
</tr>
<tr>
<td>TV Spots</td>
<td>255,480</td>
<td>1.2</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td>213,502</td>
<td>1.0</td>
</tr>
<tr>
<td>TV-Slow Scan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short Wave</td>
<td>281,520</td>
<td>1.4</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>563,410</td>
<td>2.7</td>
</tr>
<tr>
<td>National/Regional Meetings</td>
<td>1,973,781</td>
<td>9.2</td>
</tr>
<tr>
<td>National/Regional Training Meetings</td>
<td>2,647,877</td>
<td>12.8</td>
</tr>
<tr>
<td>Wire Services</td>
<td>112,500</td>
<td>0.5</td>
</tr>
<tr>
<td>TV Programming - Doc</td>
<td>9,364</td>
<td></td>
</tr>
<tr>
<td>Cable TV</td>
<td>19,750</td>
<td>0.1</td>
</tr>
<tr>
<td>Satellite</td>
<td>11,250</td>
<td>0.1</td>
</tr>
<tr>
<td>Conferences, Network</td>
<td>2,124</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>81,503</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$ 20,736,162</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>
Ranking of Communications Satellite Use

After listing their present uses and costs of present communications services and techniques, respondents were asked to rank the top five from a list of twelve, for which they would give priorities if Satellite Service dedicated to non-profit organizations was made available to their organizations.

In our analysis, we assigned a point value to the top three rankings. The service with the highest score would be first choice. Second highest score would be second choice etc. We arbitrarily assigned a value of 7 points to 1st choice, 5 points to 2nd choice, 3 points to third choice and 2 points to those people who just indicated check marks despite the instructions to give a numerical choice.

On this basis, Long Distance Telephone service would be given first priority by all organizations, large and small, and regardless of purpose for which organization exists. The second choice varies with organization purpose and size.

MAIL USAGE

About three quarters of the organizations send out General Mailing to their membership or the general public. The tendency is to send them out at regular intervals. About 15% send out General Mailing daily. 12% send them out monthly and 11% send them out weekly. 10% issue General Mailing every other month, while 13% send them out twice a year.

Newsletters are not as evenly dispersed throughout the year. Almost a third of those send out newsletters, do so quarterly. 14% issue them monthly and 22% issue newsletters every other month or more frequently, but less than once a month.

Magazines tend to be issued either monthly (39%), bi-monthly (18%) or quarterly (21%).

Promotions tend to be issued bi-monthly or even less frequently. Thus 12% issue promotions every other month, 13% send them out quarterly, 18% semi-annually and 12% annually.

More than two-thirds of all surveys are sent out annually or semi-annually. Ballots are most likely to be sent out annually -- (57%).

44% of all organizations mailing out renewals do so only once a year. 11% mail them out twice a year.
### Frequency of Mail Usage

#### Other Than Daily Regular Mail

<table>
<thead>
<tr>
<th>USERS</th>
<th>Goal Mail</th>
<th>Newsletters</th>
<th>Magazines</th>
<th>Phone Surveys</th>
<th>Ballots</th>
<th>Renewals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(149)</td>
<td>(132)</td>
<td>(95)</td>
<td>(75)</td>
<td>(47)</td>
<td>(40)</td>
</tr>
<tr>
<td>FREQUENCY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 time per year</td>
<td>20</td>
<td>23</td>
<td>32</td>
<td>115</td>
<td>384</td>
<td>574</td>
</tr>
<tr>
<td>2 times per yr</td>
<td>121</td>
<td>68</td>
<td>32</td>
<td>179</td>
<td>315</td>
<td>106</td>
</tr>
<tr>
<td>3 times per yr</td>
<td>67</td>
<td>61</td>
<td>10</td>
<td>64</td>
<td>33</td>
<td>21</td>
</tr>
<tr>
<td>4 times per yr (quarterly)</td>
<td>54</td>
<td>303</td>
<td>211</td>
<td>128</td>
<td>68</td>
<td>106</td>
</tr>
<tr>
<td>5-6 times</td>
<td>101</td>
<td>98</td>
<td>179</td>
<td>115</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>7-11 times</td>
<td>60</td>
<td>121</td>
<td>42</td>
<td>38</td>
<td>27</td>
<td>43</td>
</tr>
<tr>
<td>12-15 times (monthly)</td>
<td>134</td>
<td>144</td>
<td>389</td>
<td>77</td>
<td>27</td>
<td>--</td>
</tr>
<tr>
<td>16-24 times (twice monthly)</td>
<td>20</td>
<td>83</td>
<td>32</td>
<td>51</td>
<td>--</td>
<td>21</td>
</tr>
<tr>
<td>25-52 times (weekly)</td>
<td>114</td>
<td>30</td>
<td>10</td>
<td>51</td>
<td>--</td>
<td>21</td>
</tr>
<tr>
<td>Daily/more than once wk</td>
<td>148</td>
<td>23</td>
<td>--</td>
<td>38</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Varies</td>
<td>27</td>
<td>08</td>
<td>10</td>
<td>26</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>No Answer, but use</td>
<td>134</td>
<td>78</td>
<td>53</td>
<td>115</td>
<td>96</td>
<td>64</td>
</tr>
<tr>
<td>TOTAL USERS</td>
<td>100 %</td>
<td>100 %</td>
<td>100 %</td>
<td>100 %</td>
<td>100 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

### Average Number of Items Mailed Annually

The number of items mailed annually varies with type of mailing and obviously the size of membership, etc. However, the average organization in our sample mails out more than 30,000 pieces in general mailings, and more than 50,000 promotion pieces.

Magazines, however, represent the largest numbers of all mailings — 67,333.
Mail Usage by Size of Membership

The degree to which the communications facilities and techniques are used will vary according to size and type of organization.

While most larger organizations are more likely to have general mailings, magazines, promotions, ballots and renewals, smaller organizations are as likely to use the mails for surveys as are the very large ones. Those organizations having 50-100,000 members mention the mails least, but at a level of better than 50% for general mailings. For Newsletters, 62% of the 25-50,000 member organizations was mentioned. At the low end, only 40% of those with less than 25,000 mention magazines. Almost 2/3 of the largest organizations mention Promotions as compared to almost 1/3 of those with memberships of 50-100,000.

<table>
<thead>
<tr>
<th>Communications Technique</th>
<th>Average Number of Items Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mailings</td>
<td>31,291</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>25,788</td>
</tr>
<tr>
<td>Magazines - Mail</td>
<td>67,333</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>52,392</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>15,273</td>
</tr>
<tr>
<td>Ballots</td>
<td>16,470</td>
</tr>
<tr>
<td>Renewals</td>
<td>41,017</td>
</tr>
</tbody>
</table>

* Mean Average
Usage of Communications Techniques

By Size of Membership

<table>
<thead>
<tr>
<th>Communications Techniques</th>
<th>TOTAL</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000+</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mailings</td>
<td>22.0</td>
<td>78.2</td>
<td>76.2</td>
<td>53.9</td>
<td>89.4</td>
<td>36.6</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>63.8</td>
<td>71.3</td>
<td>61.9</td>
<td>76.9</td>
<td>68.4</td>
<td>45.3</td>
</tr>
<tr>
<td>Magazines - Mail</td>
<td>45.9</td>
<td>41.6</td>
<td>61.9</td>
<td>76.9</td>
<td>84.2</td>
<td>26.4</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>37.7</td>
<td>46.6</td>
<td>67.6</td>
<td>30.8</td>
<td>63.2</td>
<td>20.8</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>35.5</td>
<td>41.6</td>
<td>29.0</td>
<td>30.8</td>
<td>42.1</td>
<td>28.3</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>23.7</td>
<td>27.7</td>
<td>33.2</td>
<td>23.3</td>
<td>38.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td>30.2</td>
<td>39.6</td>
<td>47.6</td>
<td>46.2</td>
<td>63.2</td>
<td>20.8</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate size of membership

Mail Usage by Organization Purpose

Club and Hobby organizations tend to use the mails more than the others. Primarily, they use it for general mailings and magazines and to a much greater degree than the other organizations.

Newsletters are mentioned equally by those organizations based on employment or occupation, the Activist social organizations as well as Club and Hobby groups.

Mail promotions are mentioned by more than half of the Club and Hobby organizations and almost 2/3 of those concerned with employment.

Ballots and Renewals are mentioned most often by Club and Hobby groups with the employment organizations the next largest user.
USAGES OF COMMUNICATIONS TECHNIQUES

<table>
<thead>
<tr>
<th>BY PURPOSE OF ORGANIZATION</th>
<th>No Answer</th>
<th>Social</th>
<th>Educational</th>
<th>Clubs</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL (207)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Mailings</td>
<td>72.0</td>
<td>77.8</td>
<td>77.8</td>
<td>62.6</td>
<td>75.8</td>
</tr>
<tr>
<td>Newsletter - Mail</td>
<td>63.8</td>
<td>77.8</td>
<td>72.7</td>
<td>54.9</td>
<td>63.6</td>
</tr>
<tr>
<td>Magazine - Mail</td>
<td>43.9</td>
<td>64.4</td>
<td>45.5</td>
<td>26.6</td>
<td>57.6</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>37.7</td>
<td>55.6</td>
<td>21.3</td>
<td>25.3</td>
<td>42.6</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>35.3</td>
<td>33.3</td>
<td>27.3</td>
<td>37.6</td>
<td>77.3</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>22.7</td>
<td>44.4</td>
<td>13.6</td>
<td>38.8</td>
<td>30.3</td>
</tr>
<tr>
<td>Raffle - Mail</td>
<td>38.2</td>
<td>44.4</td>
<td>18.2</td>
<td>31.9</td>
<td>42.4</td>
</tr>
</tbody>
</table>

Mail Costs

The greatest amount of money spent annually by these non-profit organizations is on Magazines. As expected, this expenditure tends to increase with size of membership. Obviously, the more members an organization has, the more magazines it must distribute. The higher the cost.

Overall, the average non-profit organization in our survey reports spending $62,235 annually on magazines. However, those organizations with 100,000 or more members spend $92,645 annually on magazines. (We must add a word of caution. Some organizations may have listed mail charges alone. In any event these data represent only those organizations that volunteered the information in this questionnaire.)

With regard to mailings generally, costs will vary with size of membership, number of times a mailing is made annually, the size of the mailing, postal costs, etc. Nevertheless, the amount of dollars involved is not inestimable — even for the organizations in this sample.

* Respondent indicated usage but did not indicate purpose of organization.
AVERAGE COSTS OF COMMUNICATION FACILITIES

<table>
<thead>
<tr>
<th></th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000+</th>
<th>Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>(207)</td>
<td>(101)</td>
<td>(21)</td>
<td>(13)</td>
<td>(19)</td>
</tr>
<tr>
<td>General Mailings</td>
<td>$13,365</td>
<td>$6,943</td>
<td>$3,950</td>
<td>$6,250</td>
<td>$40,772</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>$6,845</td>
<td>$5,453</td>
<td>$8,107</td>
<td>$5,916</td>
<td>$21,000</td>
</tr>
<tr>
<td>Magazines - Mail</td>
<td>$41,235</td>
<td>$26,887</td>
<td>$35,275</td>
<td>$54,812</td>
<td>$92,645</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>$13,557</td>
<td>$5,809</td>
<td>$54,812</td>
<td>—</td>
<td>$27,071</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>$1,372</td>
<td>$666</td>
<td>$1,500</td>
<td>$125</td>
<td>$5,375</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>$1,486</td>
<td>$1,065</td>
<td>$1,895</td>
<td>$375</td>
<td>$2,230</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td>$4,674</td>
<td>$2,536</td>
<td>$4,911</td>
<td>$6,500</td>
<td>$8,305</td>
</tr>
</tbody>
</table>

*Respondent indicated costs but did not indicate size of membership

Overall, Educationally oriented organizations spend more money on the average for general mailings than others — $24,188 annually versus $13,765 for the average.

Newsletters expenditures annually average $6,845 for all organizations which mail them. But organizations conceived with employment or occupations spend an average of $16,433 annually. Educational groups are the next highest spenders for newsletters — $10,778.

Magazines are the major expenditure of all groups, averaging $46,235.

But the Employment and Educational organizations spend the most money on the average — $59,732 and $58,922 respectively.

The organizations conceived with Clubs and Bottles spend more on Promotions than any other — $24,875 vs $13,557 for the average.
AVERAGE COSTS OF COMMUNICATION FACILITIES

BY PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th>Purpose</th>
<th>TOTAL</th>
<th>Letters</th>
<th>Social</th>
<th>Educational</th>
<th>Clubs</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(207)</td>
<td>(9)</td>
<td>(22)</td>
<td>(33)</td>
<td>(17)</td>
<td>(36)</td>
</tr>
<tr>
<td>General Mailings</td>
<td>$13,765</td>
<td>$1,300</td>
<td>$1,750</td>
<td>$12,061</td>
<td>$24,188</td>
<td>$5,568</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>$8,865</td>
<td>$4,500</td>
<td>$2,175</td>
<td>$2,641</td>
<td>$10,778</td>
<td>$1,750</td>
</tr>
<tr>
<td>Magazine - Mail</td>
<td>$42,235</td>
<td>$104,466</td>
<td>$10,700</td>
<td>$21,855</td>
<td>$58,922</td>
<td>$29,841</td>
</tr>
<tr>
<td>Pamphlets - Mail</td>
<td>$13,557</td>
<td>$20,000</td>
<td>$9,125</td>
<td>$3,658</td>
<td>$9,018</td>
<td>$24,835</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>$1,372</td>
<td>$6,250</td>
<td>$125</td>
<td>$1,606</td>
<td>$1,196</td>
<td>$188</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>$1,486</td>
<td>$4,375</td>
<td>$50</td>
<td>$1,568</td>
<td>$250</td>
<td>$15</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td>$4,674</td>
<td>$20,000</td>
<td>$---</td>
<td>$3,693</td>
<td>$5,721</td>
<td>$4,813</td>
</tr>
</tbody>
</table>

*Respondent indicated costs but did not indicate purpose of organization.

TELEPHONE

Long distance telephone calls are the primary means of communication between the organization's headquarters and its membership or with other organizations.

As we noted previously, 82% say they use long distance telephone.

Note that half of those responding on the question of frequency of usage, say they make long distance calls daily, with another fifth using it at least once a week but not daily.

WATS lines. Tie lines and leased lines when available, also tend to be used on a daily basis. (It would seem that if the service is available there will be daily use.) However, only 40 of the 207 organizations (19%) say they have WATS lines, and only 19 indicated the degree of usage.

Leased lines are used by 51 organizations (15%) with 22 indicating frequency of usage.
The data on number of calls made was submitted by only 34 (20%) of the 170 organisations that responded affirmatively to the question of long distance telephone usage. Of these, more than 2/3 (24) indicated they make less than 500 calls per year.

WATS are similarly used.

### Telephone Usage

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Long Dist (170)</th>
<th>WATS Line (40)</th>
<th>Tie Line (19)</th>
<th>Leased Line (31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 time per week</td>
<td>2.9%</td>
<td>2.5%</td>
<td>--</td>
<td>6.5%</td>
</tr>
<tr>
<td>2 times per week</td>
<td>4.1%</td>
<td>7.5%</td>
<td>--</td>
<td>9.7%</td>
</tr>
<tr>
<td>3 times per week</td>
<td>2.9%</td>
<td>5.0%</td>
<td>5.3%</td>
<td>3.2%</td>
</tr>
<tr>
<td>4 times per week</td>
<td>2.4%</td>
<td>2.5%</td>
<td>--</td>
<td>3.2%</td>
</tr>
<tr>
<td>Daily</td>
<td>34.1%</td>
<td>30.0%</td>
<td>52.6%</td>
<td>29.0%</td>
</tr>
<tr>
<td>12-40 time/year</td>
<td>4.7%</td>
<td>--</td>
<td>5.3%</td>
<td>6.5%</td>
</tr>
<tr>
<td>12 times or less/year</td>
<td>3.5%</td>
<td>--</td>
<td>--</td>
<td>3.2%</td>
</tr>
<tr>
<td>Oftem, Frequently</td>
<td>1.2%</td>
<td>--</td>
<td>--</td>
<td>3.2%</td>
</tr>
<tr>
<td>Network</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>6.5%</td>
</tr>
<tr>
<td>No Answer</td>
<td>44.1%</td>
<td>52.3%</td>
<td>36.8%</td>
<td>29.0%</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate frequency*
LONG DISTANCE PHONE CALL USAGE

<table>
<thead>
<tr>
<th>Number of Calls Annually</th>
<th>(170)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 500</td>
<td>14 IX</td>
</tr>
<tr>
<td>500-999</td>
<td>1 8</td>
</tr>
<tr>
<td>1,000 - 1,499</td>
<td>1 8</td>
</tr>
<tr>
<td>2,500 - 4,999</td>
<td>1 2</td>
</tr>
<tr>
<td>5,000 - 9,999</td>
<td>0 6</td>
</tr>
<tr>
<td>10,000 - 24,999</td>
<td>0 6</td>
</tr>
<tr>
<td>No Answer*</td>
<td>80 0</td>
</tr>
</tbody>
</table>

Telephone Usage by Size of Membership

While 82% of the respondent organizations indicate they use long distance telephone service to communicate with members and other organizations, the degree of usage seems to vary. For example, all of the organizations in our sample with 25,000-50,000 members, say they use long distance as compared to 73% of those with 100,000 or more members. WATS lines are used almost equally by these two groups, while only 7% of those with 50,000-100,000 members say they use WATS lines.

Tie lines are used least by the smaller organizations while leased lines are used most.

*Respondent indicated usage but did not indicate volume of usage
Telephone Usage by Organization Purpose

As was true with mails, the Club and Hobby organizations and those concerned with employment mention Long Distance phone calls most often -- 94%. 

However, even for the group with the lowest mention of usage -- the educational group -- 3/4 mention long distance phone calls as one of the means by which they communicate with their members and other organizations.

In effect, almost all organizations use long distance phone service.

In addition, substitute services for long distance, such as WATS lines, Tie lines, Leased lines and Foreign Exchange lines are used.

WATS lines are mentioned most often (about 25%) by the Social Active, Club and Hobbies and Employment oriented groups. Tie Lines by the Communications, Educational and Clubs and Hobbies organizations.

Leased Lines by Communications Organizations (primarily Radio and TV stations)

USAGE OF COMMUNICATIONS TECHNIQUES

BY SIZE OF MEMBERSHIP

<table>
<thead>
<tr>
<th></th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>More than 100,000</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (N)</td>
<td>(25)</td>
<td>(101)</td>
<td>(21)</td>
<td>(15)</td>
<td>(19)</td>
</tr>
</tbody>
</table>

COMMUNICATIONS TECHNIQUE

- Long Distance - Phone
- WATS Lines - Phone
- Tie Lines - Phone
- Leased Lines - Phone
- Foreign Exchange - Phone

*Respondent indicated usage but did not indicate size of membership.*
USAGES OF COMMUNICATIONS TECHNIQUES

PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th></th>
<th>No Answer</th>
<th>Social</th>
<th>Education</th>
<th>Club &amp; Employee</th>
<th>总计</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL</strong></td>
<td>(207)</td>
<td>(9)</td>
<td>(22)</td>
<td>(33)</td>
<td>(107)</td>
</tr>
<tr>
<td><strong>Long Distance - Phone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>82</td>
</tr>
<tr>
<td><strong>WATS Lines - Phone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>87</td>
</tr>
<tr>
<td><strong>Tie Lines - Phone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td><strong>Leased Lines - Phone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td><strong>Foreign Exchange - Phone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Telephone Costs By Size of Membership</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With regard to Telephone costs, generally the larger the organization, the greater the expenditure. The average expenditure for long distance phone calls was $7,432 but for those organizations with 100,000 or more members, the average was $12,650. With regard to WATS lines costs, the small number of replies from organizations with 25,000-50,000 members may be responsible for the large expenditure shown and it may just be a sample distortion. Nevertheless, the average WATS line expenditure is $36,930 per year, with the 25,000-50,000 member organizations spending $101,250 annually.

However, for the small groups generally, there seems to be an increase in WATS, Tie and Leased line usage apparently as compensation for the lower long distance costs and perhaps to supplement the long distance usage.

*Respondent indicated usage but did not indicate purpose of organization.
AVERAGE COSTS OF COMMUNICATION FACILITIES

<table>
<thead>
<tr>
<th>BY SIZE OF MEMBERSHIP</th>
<th>TOTAL (207)</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000 &amp; Up</th>
<th>No</th>
<th>AVERAGE * (53)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Distance - Phone</td>
<td>$7,432</td>
<td>$5,713</td>
<td>$9,607</td>
<td>$9,722</td>
<td>$12,650</td>
<td>$8,375</td>
<td>$6,070</td>
</tr>
<tr>
<td>Vata Lines - Phone</td>
<td>$36,330</td>
<td>$29,363</td>
<td>$101,250</td>
<td>$2,500</td>
<td>$4,000</td>
<td>$43,875</td>
<td>$13,100</td>
</tr>
<tr>
<td>Tie Lines - Phone</td>
<td>$1,500</td>
<td>$2,500</td>
<td>$875</td>
<td>$250</td>
<td>$4,000</td>
<td>$500</td>
<td>$9,625</td>
</tr>
<tr>
<td>Leased Lines - Phone</td>
<td>$21,270</td>
<td>$21,572</td>
<td>$9,500</td>
<td>---</td>
<td>---</td>
<td>$1,500</td>
<td>$6,425</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td>$750</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>$750</td>
</tr>
</tbody>
</table>

* Respondent volunteered cost information but did not list size of organization

**Telegram Costs by Organization Purpose**

Although Long Distance telephone usage ranks highest with all organizations, the costs vary. Those organizations oriented toward Employment spend the most on the average — $13,888. The Social Active organizations spend $8,530 on the average annually.

WATS lines, also used by fewer organizations, averages out at a much higher cost — $36,330. The Employment oriented organizations spend considerably more than all the others, averaging $119,750. The Social Active average $56,000 annually.
AVERAGE COSTS OF COMMUNICATION FACILITIES

BY PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>No Answer</th>
<th>Social</th>
<th>Communication</th>
<th>Educational</th>
<th>Clubs &amp; Employment</th>
<th>National and Regional Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>207</td>
<td>9</td>
<td>2</td>
<td>101</td>
<td>223</td>
<td>333</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>$5</td>
<td>$2</td>
<td>$5</td>
<td>$2</td>
<td>$5</td>
<td>$2</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>7,432</td>
<td>11,353</td>
<td>8,538</td>
<td>3,311</td>
<td>5,500</td>
<td>5,312</td>
</tr>
<tr>
<td>WATS Lines - Phone</td>
<td>36,330</td>
<td>--</td>
<td>56,000</td>
<td>8,125</td>
<td>3,666</td>
<td>4,000</td>
</tr>
<tr>
<td>Toll Lines - Phone</td>
<td>1,500</td>
<td>--</td>
<td>--</td>
<td>1,836</td>
<td>275</td>
<td>4,000</td>
</tr>
<tr>
<td>Leased Lines - Phone</td>
<td>21,370</td>
<td>--</td>
<td>4,000</td>
<td>1,483</td>
<td>100,750</td>
<td>--</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td>750</td>
<td>00</td>
<td>--</td>
<td>750</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

* Respondent volunteered cost information but did not indicate purpose of organization.

NATIONAL AND REGIONAL MEETINGS

More than half of the organizations in our survey have National and Regional Meetings. The average number of attendees annually is 1994. Organizations with 20 or more chapters and 25,000-100,000 members are more likely to have such meetings than the others. Business and Labor groups are more likely to have such meetings (85%) as compared to 70% of the Club and Hobby organizations and half of the socially oriented and educational groups. At the low end, fully 40% of the Communications oriented groups also utilize National and Regional Meetings.

For Training Meetings, slightly more than a quarter of the non-profit organizations report usage with the average number of attendees annually 1384. Organizations with 50,000-100,000 members and 20 to 50 chapters are more likely to use them. Also, organizations oriented to business and labor are most likely to have training meetings, followed by those with interest in hobbies and fraternal activities.

However, as the degree of usage indicated, the responses show a disparity in the number of attendees to these meetings. For National/Regional Meetings the greatest attendance is derived from those organizations with fewer than 50,000 members. On the other hand, for training meetings, those organizations with fewer than 25,000 members and 100,000 or more members show the greatest attendance.
These meetings are more likely to be held once or twice a year. In the questionnaire we did not differentiate between National and Regional, and therefore, we must expect some overlap in the answers. We might expect Regional meetings to be held more frequently than one or two times per year, although perhaps not that often for any one region.

It is therefore, conceivable that some of the frequency responses apply to Regional meetings, while others apply to National.

Thus, the range of frequency is from once a year to daily.

<table>
<thead>
<tr>
<th>Frequency of Meetings</th>
<th>Nat/Reg Meetings</th>
<th>Nat/Reg Training Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 time per year</td>
<td>22 63%</td>
<td>16 44%</td>
</tr>
<tr>
<td>2 times per year</td>
<td>16 57%</td>
<td>14 44%</td>
</tr>
<tr>
<td>3 times per year</td>
<td>8 7%</td>
<td>5 11%</td>
</tr>
<tr>
<td>4 times per year</td>
<td>10 63%</td>
<td>7 37%</td>
</tr>
<tr>
<td>5 times per year</td>
<td>8 7%</td>
<td>5 11%</td>
</tr>
<tr>
<td>7-11 times per year</td>
<td>7 57%</td>
<td>14 44%</td>
</tr>
<tr>
<td>Monthly (12-15)</td>
<td>7 57%</td>
<td>--</td>
</tr>
<tr>
<td>16-26 times/year</td>
<td>1 7%</td>
<td>1 8%</td>
</tr>
<tr>
<td>Weekly</td>
<td>4 3%</td>
<td>10 9%</td>
</tr>
<tr>
<td>Daily</td>
<td>1 7%</td>
<td>7 37%</td>
</tr>
<tr>
<td>Various</td>
<td>--</td>
<td>3 4%</td>
</tr>
<tr>
<td>No Answer*</td>
<td>9 2%</td>
<td>12 7%</td>
</tr>
</tbody>
</table>

100 % 100 %

* Respondent indicated usage of meetings but did not indicate frequency.
### NUMBER OF ATTENDEES

#### NATIONAL REGIONAL MEETINGS

<table>
<thead>
<tr>
<th>Size of Membership</th>
<th>National/Regional Meetings</th>
<th>National/Regional Training Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25,000</td>
<td>1,668</td>
<td>2,118</td>
</tr>
<tr>
<td>25,000-49,999</td>
<td>1,325</td>
<td>719</td>
</tr>
<tr>
<td>50,000-99,999</td>
<td>238</td>
<td>238</td>
</tr>
<tr>
<td>100,000 or more</td>
<td>231</td>
<td>2,075</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>1,294</td>
<td>1,384</td>
</tr>
</tbody>
</table>

### USAGE OF COMMUNICATIONS TECHNIQUES

#### BY SIZE OF MEMBERSHIP

<table>
<thead>
<tr>
<th>Size of Membership</th>
<th>TOTAL</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000 or more</th>
<th>Mo. Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Answer</strong></td>
<td>(207)</td>
<td></td>
<td>(101)</td>
<td>(21)</td>
<td>(13)</td>
<td>(19)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communications Techniques</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000 or more</th>
<th>Mo. Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post/Regional Meetings</td>
<td>56.4%</td>
<td>36.4%</td>
<td>71.4%</td>
<td>92.3%</td>
<td>57.9%</td>
</tr>
<tr>
<td>Post/Reg. Training Meetings</td>
<td>26.6%</td>
<td>26.7%</td>
<td>28.6%</td>
<td>53.8%</td>
<td>36.8%</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate size of membership.*
USAGES OF COMMUNICATIONS TECHNIQUES

BY PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>No Answer</th>
<th>Social</th>
<th>Educational</th>
<th>Clubs &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(207)</td>
<td>(9)</td>
<td>(22)</td>
<td>(33)</td>
<td>(34)</td>
</tr>
<tr>
<td>National/Regional Meetings</td>
<td>55 6</td>
<td>77 8</td>
<td>54 5</td>
<td>60 7</td>
<td>31 5</td>
</tr>
<tr>
<td>Mail/Ingl Training Meetings</td>
<td>26 6</td>
<td>33 3</td>
<td>31 8</td>
<td>14 3</td>
<td>24 2</td>
</tr>
</tbody>
</table>

Average Annual Cost for Meetings By Size of Organization

Expenditures for National and Regional Meetings, both the regular and for Training purposes, tend to increase with the size of the organization, with the exception of those organizations having 50-100,000 members. The responses from organizations of that size show the lowest annual expenditures for such meetings. Compared with the average organizational expenditure of $34,527 for regular meetings, and $48,089 for training meetings, the 50-100,000 member group averages $21,083 and $3,438 respectively.

The largest expenditures for meetings is made by those with 100,000 or more members, averaging $50,694 annually for Regular National/Regional Meetings and $56,313 for Training Meetings.

The trend for expenditures is even more evident when we compare meeting costs by number of chapters within the organization. Thus, organizations with 50 or more chapters spend $48,397 for regular meetings and $78,813 for Training Meetings. Those with fewer than 20 chapters spend $6,857 and $1,107 respectively.

*Respondent indicated usage of meetings but did not indicate purpose of organization.*
### Average Annual Cost of Meetings By Organization Purpose

Employment organizations, that is, those concerned with Business, Labor and the Professions, spend the most money on National and Regional Meetings and Training Meetings. Whereas the average non-profit organization spends $34,527 annually for Regular Meetings, the Employment oriented groups spend $92,279. On Training Meetings, the Employment organization spends $125,625 compared with the average of $48,089.

Educational Organizations are the next largest spenders for Meetings — $28,019 for regular National/Regional Meetings and $34,214 for Training Meetings.

---

### Average Costs of Communication Facilities

#### By Size of Membership

<table>
<thead>
<tr>
<th></th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000 &amp; up</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL (207)</td>
<td>(197)</td>
<td>(17)</td>
<td>(13)</td>
<td>(9)</td>
<td>(3)</td>
<td>(207)</td>
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<tr>
<td>National/Regional Meetings</td>
<td>$34,527</td>
<td>$31,699</td>
<td>$21,088</td>
<td>$50,694</td>
<td>$31,523</td>
<td>$139,257</td>
</tr>
<tr>
<td>National/Regional Training Meetings</td>
<td>$48,089</td>
<td>$25,375</td>
<td>$3,438</td>
<td>$56,313</td>
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*Respondent volunteered cost information but did not list size of organization.*
### AVERAGE COSTS OF COMMUNICATION FACILITIES

#### PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th>Total (207)</th>
<th>Answer (9)</th>
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<th>Communal- Educational (33)</th>
<th>Clube &amp; Employment (17)</th>
<th>No Answer (32)</th>
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</thead>
<tbody>
<tr>
<td>National/Regional Meetings</td>
<td>$34,527</td>
<td>$108,750</td>
<td>$10,321</td>
<td>$28,167</td>
<td>$7,760</td>
</tr>
<tr>
<td>National/Regional Travel Meetings</td>
<td>$48,089</td>
<td>--</td>
<td>$929</td>
<td>$34,214</td>
<td>$28,019</td>
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<tr>
<td>National/Regional Trng Meetings</td>
<td>$48,089</td>
<td>--</td>
<td>$28,333</td>
<td>$28,333</td>
<td>$76,613</td>
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#### NUMBER OF CHAPTERS

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<td>$10,321</td>
<td>$28,167</td>
<td>$7,760</td>
</tr>
<tr>
<td>National/Regional Travel Meetings</td>
<td>$48,089</td>
<td>$28,333</td>
<td>$76,613</td>
<td>$58,000</td>
</tr>
<tr>
<td>National/Regional Trng Meetings</td>
<td>$48,089</td>
<td>$28,333</td>
<td>$76,613</td>
<td>$58,000</td>
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</table>

*Respondent volunteered cost information but did not list size of organization

*Respondents volunteered cost information but did not indicate number of chapters
### Average Costs of Communications Facilities

<table>
<thead>
<tr>
<th></th>
<th>NCCD Radio</th>
<th>NCCD TV</th>
<th>NCCD Radio</th>
<th>NCCD TV</th>
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<td>(63)</td>
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<tr>
<td></td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
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<td>Total</td>
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<td>51,844</td>
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<tr>
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<td>48,089</td>
<td>66,412</td>
<td>3,500</td>
<td>667</td>
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</table>

### Radio and TV Usage

Radio Tapes are mentioned by almost half of the Communications organizations (Public Radio Stations), but fully one quarter of the social active groups and more than a fifth of the educational also use radio tapes.

TV Spots are mentioned by more than a third of the Social Active and almost a quarter of the Employment-oriented organizations. 18% of the Educational group mention TV Spot and 11% of the Communications Organizations.

Usage of both media is spread, however, the smaller size organizations tend to use radio more and the larger Televisions. Thus, a third of the organizations with fewer than 25,000 members use radio tapes, but 20% use TV.

At the high end, 26% of those with 100,000 or more members use Radio and 31% use TV.
### USAGE OF COMMUNICATIONS TECHNIQUES

#### BY SIZE OF MEMBERSHIP

<table>
<thead>
<tr>
<th>COMMUNICATIONS TECHNIQUES</th>
<th>TOTAL</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000+</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Tapes</td>
<td>31.9</td>
<td>32.7</td>
<td>9.5</td>
<td>23.1</td>
<td>26.3</td>
<td>43.4</td>
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<tr>
<td>Radio-Closed Circuit</td>
<td>2.9</td>
<td>4.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>3.8</td>
</tr>
<tr>
<td>TV Spots</td>
<td>17.9</td>
<td>19.8</td>
<td>14.3</td>
<td>23.1</td>
<td>31.6</td>
<td>9.4</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td>10.1</td>
<td>9.9</td>
<td>14.3</td>
<td>0.0</td>
<td>10.5</td>
<td>11.3</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but not size of membership

### USAGES OF COMMUNICATIONS TECHNIQUES

#### PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th>COMMUNICATIONS TECHNIQUES</th>
<th>TOTAL</th>
<th>No Answer</th>
<th>Social</th>
<th>Educational</th>
<th>Clubs &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Tapes</td>
<td>31.9</td>
<td>11.1</td>
<td>26.4</td>
<td>48.4</td>
<td>21.2</td>
</tr>
<tr>
<td>Radio-Closed Circuit</td>
<td>2.9</td>
<td>0.0</td>
<td>0.0</td>
<td>5.5</td>
<td>9.0</td>
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<tr>
<td>TV Spots</td>
<td>17.9</td>
<td>11.1</td>
<td>36.4</td>
<td>16.6</td>
<td>18.2</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td>10.1</td>
<td>11.1</td>
<td>4.5</td>
<td>13.2</td>
<td>9.1</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate purpose of organization
Radio and TV Costs

Television Spots are used primarily by non-profit organizations involved with Employment ($12,667) and those socially active ($8,075). Communications groups spend $6,813 annually for TV and Educational groups $4,000.

Expenditures for Radio Tapes are $6,500 for Employment organizations and $1,681 for Communications.

TV Closed Circuit, although used by only 10% of the sample in a high cost for those that use it. Thus, those socially active organizations using TV Closed Circuit spend $17,500 a year for the service. Educational organizations spend $11,167 and Employment $10,500.

Average Costs of Communication Facilities

<table>
<thead>
<tr>
<th>PURPOSE OF ORGANIZATION</th>
<th>TOTAL (237)</th>
<th>No Answer* (5)</th>
<th>Social (22)</th>
<th>Communications (11)</th>
<th>Educational (32)</th>
<th>Clubs &amp; Hobbies (13)</th>
<th>Employment (34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Tapes</td>
<td>3,344</td>
<td>1,750</td>
<td>3,681</td>
<td>1,375</td>
<td>125</td>
<td>4,500</td>
<td></td>
</tr>
<tr>
<td>Radio-Closed Circuit</td>
<td>2,625</td>
<td></td>
<td>2,188</td>
<td></td>
<td></td>
<td>3,500</td>
<td></td>
</tr>
<tr>
<td>TV Spots</td>
<td>6,813</td>
<td></td>
<td>8,075</td>
<td>6,813</td>
<td>4,000</td>
<td>12,667</td>
<td></td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td>10,212</td>
<td>17,500</td>
<td>17,500</td>
<td>17,500</td>
<td>4,208</td>
<td>11,167</td>
<td>10,500</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate purpose of organization.
### AVERAGE COSTS OF COMMUNICATIONS FACILITIES

<table>
<thead>
<tr>
<th></th>
<th>Gale's Association (100)</th>
<th>RCCB (23)</th>
<th>Public Radio (43)</th>
<th>Public TV (23)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio Tapes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$3,244</td>
<td></td>
<td>$3,261</td>
<td>$6,000</td>
<td>$3,066</td>
</tr>
<tr>
<td>Radio-Closed Circuit</td>
<td></td>
<td>$3,500</td>
<td>$2,188</td>
<td>$2,188</td>
</tr>
<tr>
<td>TV Spots</td>
<td></td>
<td>$10,964</td>
<td>$250</td>
<td>$1,667</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td></td>
<td>$10,212</td>
<td>$17,500</td>
<td>$11,875</td>
</tr>
</tbody>
</table>

### AVERAGE COSTS OF COMMUNICATIONS FACILITIES BY SIZE OF MEMBERSHIP

<table>
<thead>
<tr>
<th></th>
<th>Under 25,000 (101)</th>
<th>25,000-50,000 (21)</th>
<th>50,000-100,000 (13)</th>
<th>100,000+ (19)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL</strong></td>
<td>$5,564</td>
<td>$5,478</td>
<td>$5,150</td>
<td>$5,291</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$5,364</td>
<td></td>
<td></td>
<td></td>
<td>$5,291</td>
</tr>
<tr>
<td>Radio-Closed Circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$2,625</td>
<td></td>
<td></td>
<td></td>
<td>$2,666</td>
</tr>
<tr>
<td>TV Spots</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$6,895</td>
<td></td>
<td>$4,661</td>
<td></td>
<td>$17,500</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td></td>
<td>$10,212</td>
<td>$9,342</td>
<td>$11,875</td>
</tr>
</tbody>
</table>

*Respondent volunteered cost information but did not list size of membership*
Telegram, Mailgram, Telex, Telexcopier

Telegram and Mailgram usage tends generally to increase with the size of the organizations. Thus, 21% of the smaller organizations use Mailgrams as compared to 32% of those with 100,000 or more members. Telegram use rise from 24% to 26%.

The greatest usage of Telexgrams and Mailgrams appears to be made by the Employment oriented organizations. More than half use Telexgrams (vs 22% average) and almost a third use Mailgrams (vs 19% average).

Club and Hobby organizations are the second most frequent users -- 35% for Telexgrams and 29% for Mailgrams.

However, in terms of cost, by far the biggest users of mailgrams ($19,938) are the Social Active organizations. They spend on the average more than all other groups combined.

---

**Usage of Communications Techniques**

<table>
<thead>
<tr>
<th>COMMUNICATIONS TECHNIQUES</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000 UP</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (207)</td>
<td>(101)</td>
<td>(21)</td>
<td>(13)</td>
<td>(19)</td>
<td>(53)</td>
</tr>
<tr>
<td>Telex</td>
<td>97</td>
<td>143</td>
<td>77</td>
<td>153</td>
<td>75</td>
</tr>
<tr>
<td>Telexcopier</td>
<td>77</td>
<td>143</td>
<td>77</td>
<td>153</td>
<td>75</td>
</tr>
<tr>
<td>Mailgrams</td>
<td>193</td>
<td>238</td>
<td>233</td>
<td>316</td>
<td>94</td>
</tr>
<tr>
<td>Telegrams</td>
<td>222</td>
<td>238</td>
<td>258</td>
<td>338</td>
<td>94</td>
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</tbody>
</table>

*Respondent volunteered cost information but did not list size of membership*
### Usages of Communications Techniques

#### Purpose of Organization

<table>
<thead>
<tr>
<th>Total</th>
<th>Answer</th>
<th>Social</th>
<th>Educational</th>
<th>Club &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(207)</td>
<td>(5)</td>
<td>(11)</td>
<td>(33)</td>
<td>(13)</td>
</tr>
</tbody>
</table>

- Telex: 97 0 13 6 0 6 17 6
- Teletype: 57 11 6 6 9 2 9
- Telephone: 9 5 27 13 15 29 4 32 4
- Telegram: 22 2 22 2 12 1 35 3 55 9

*Respondent indicated usage but did not indicate purpose of organization*

### Average Costs of Communication Facilities

#### By Size of Membership

<table>
<thead>
<tr>
<th>Total</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>Above 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>(207)</td>
<td>(107)</td>
<td>(101)</td>
<td>(21)</td>
<td>(13)</td>
</tr>
</tbody>
</table>

- Telex: $4,844, $1,350, $2,625, $12,500, $10,500, $6,312
- Teletype: $1,961, $1,250, $2,375, $1,250
- Telephone: $4,057, $250, $125, $2,375
- Telegram: $1,729, $712, $1,094, $125, $5,893

*Respondent indicated usage but did not indicate size of membership*
### AVERAGE COSTS OF COMMUNICATIONS FACILITIES

#### PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th>TOTAL (207)</th>
<th>No Answer</th>
<th>Social Communications</th>
<th>Educational Clubs &amp; Hobbies</th>
<th>Employ-</th>
<th>Telex</th>
<th>Telexcopier</th>
<th>Teleg.</th>
<th>Public TV</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(9)</td>
<td>(32)</td>
<td>(33)</td>
<td>(15)</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
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<tr>
<td>A9-55</td>
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<td>(33)</td>
<td>(15)</td>
<td>(207)</td>
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<td>250</td>
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<td>375</td>
<td>375</td>
<td>1,250</td>
<td>1,250</td>
<td>1,250</td>
</tr>
<tr>
<td>Telemgrams</td>
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<td>19,938</td>
<td>1,194</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
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<td>Telegates</td>
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<td>375</td>
<td>125</td>
<td>208</td>
<td>3,222</td>
<td>3,222</td>
<td>3,222</td>
</tr>
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</table>

* Respondent volunteered cost information but did not list size of organization
Other Communication Techniques

The more esoteric communications services tend to be limited in use at the present time. Thus, TV Slow Scan and Private Microwave appear to be mentioned only by Broadcast stations. The same seems to be true of Cable TV, Satellite, Conferencing, etc.

Data Transmission seems to get some use for Educational and Social Activity as well as Communications

<table>
<thead>
<tr>
<th>USAGE OF COMMUNICATIONS TECHNIQUES</th>
<th>BY SIZE OF MEMBERSHIP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOTAL</td>
</tr>
<tr>
<td></td>
<td>(207)</td>
</tr>
<tr>
<td>COMMUNICATIONS TECHNIQUES</td>
<td></td>
</tr>
<tr>
<td>TV Slow Scan</td>
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</tr>
<tr>
<td>Pvt. Microwave</td>
<td>3.4</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>5.8</td>
</tr>
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</table>

*Respondent volunteered usage but did not indicate size of membership*
### Usages of Communications Techniques

<table>
<thead>
<tr>
<th>Purpose of Organization</th>
<th>TV Slow Scan</th>
<th>Private Microwave</th>
<th>Data Transmission</th>
</tr>
</thead>
<tbody>
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<td>1</td>
</tr>
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</tr>
<tr>
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</tr>
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<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Club</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Employment</td>
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<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Average Costs of Communication Facilities

<table>
<thead>
<tr>
<th>Type of Communication</th>
<th>TOTAL</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV Slow Scan</td>
<td>$46,928</td>
<td>$57,166</td>
<td>$83,750</td>
<td>$750</td>
<td></td>
</tr>
<tr>
<td>Private Microwave</td>
<td>$40,000</td>
<td>$53,083</td>
<td>$3,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Transmission</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate purpose of organization

*Respondent volunteered cost information but did not list size of membership
### Average Costs of Communications Facilities

#### Purpose of Organization

<table>
<thead>
<tr>
<th>Purpose of Organization</th>
<th>TOTAL (207)</th>
<th>Gale's Assn (100)</th>
<th>NCCB (33)</th>
<th>Public Radio (43)</th>
<th>TV (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Answer</td>
<td>$40,000</td>
<td>$46,928</td>
<td>$77,000</td>
<td>$4,000</td>
<td></td>
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<tr>
<td>Social Communications</td>
<td>$1,625</td>
<td>$1,625</td>
<td>$3,333</td>
<td>$1,625</td>
<td></td>
</tr>
<tr>
<td>Educational</td>
<td>$4,000</td>
<td>$4,000</td>
<td>$83,750</td>
<td>$4,000</td>
<td></td>
</tr>
<tr>
<td>Clubs &amp; Rotary</td>
<td>$3,333</td>
<td>$3,333</td>
<td>$83,750</td>
<td>$4,000</td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>$2,500</td>
<td>$2,500</td>
<td>$51,667</td>
<td>$2,500</td>
<td></td>
</tr>
</tbody>
</table>

* Respondent indicated usage but did not indicate purpose of organization.
### Usage of Communications Techniques

#### By Size of Membership

|                | TOTAL | Under 25,000 | 25,000–50,000 | 50,000–100,000 | 100,000–150,000 | 150,000–200,000 | 200,000–250,000 | 250,000–300,000 | 300,000–350,000 | 350,000–400,000 | 400,000–450,000 | 450,000–500,000 | 500,000–550,000 | 550,000–600,000 | 600,000–650,000 | 650,000–700,000 | 700,000–750,000 | 750,000–800,000 | 800,000–850,000 | 850,000–900,000 | 900,000–950,000 | 950,000–1,000,000 | 1,000,000–1,250,000 | 1,250,000–1,500,000 | 1,500,000–1,750,000 | 1,750,000–2,000,000 | 2,000,000–2,250,000 | 2,250,000–2,500,000 | 2,500,000–2,750,000 | 2,750,000–3,000,000 | 3,000,000–3,250,000 | 3,250,000–3,500,000 | 3,500,000–3,750,000 | 3,750,000–4,000,000 | 4,000,000–4,250,000 | 4,250,000–4,500,000 | 4,500,000–4,750,000 | 4,750,000–5,000,000 | 5,000,000–5,250,000 | 5,250,000–5,500,000 | 5,500,000–5,750,000 | 5,750,000–6,000,000 | 6,000,000–6,250,000 | 6,250,000–6,500,000 | 6,500,000–6,750,000 | 6,750,000–7,000,000 | 7,000,000–7,250,000 | 7,250,000–7,500,000 | 7,500,000–7,750,000 | 7,750,000–8,000,000 | 8,000,000–8,250,000 | 8,250,000–8,500,000 | 8,500,000–8,750,000 | 8,750,000–9,000,000 | 9,000,000–9,250,000 | 9,250,000–9,500,000 | 9,500,000–9,750,000 | 9,750,000–10,000,000 |
|----------------|-------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Wire Services  | 1     | 1            | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             |
| TV Programming | 1     | 1            | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             |
| Cable TV       | 2     | 4            | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             |
| Satellite      | 1     | 0            | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             |
| Conference, Network | 1 | 0         | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             |
| Other          | 1     | 0            | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             | 0             |

*Respondent indicated usage but did not indicate size of membership

### Usage of Communications Techniques

#### By Purpose of Organization

<table>
<thead>
<tr>
<th>Purpose of Organization</th>
<th>TOTAL</th>
<th>Communi-</th>
<th>Educa-</th>
<th>Clubs &amp; Employ-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(207)</td>
<td>tional</td>
<td>tional</td>
<td>ment</td>
</tr>
<tr>
<td>Wire Service</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>TV Programming-Doc</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Cable TV</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Satellite</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Conference, Network</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate purpose of organization
### Average Costs of Communication Facilities

#### Purpose of Organization

<table>
<thead>
<tr>
<th>Purpose of Organization</th>
<th>No Answer</th>
<th>Social (22)</th>
<th>Communications (91)</th>
<th>Educational (33)</th>
<th>Clubs &amp; Organizations (17)</th>
<th>Employment (34)</th>
<th>Total (207)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Services</td>
<td>$37,500</td>
<td>--</td>
<td>$37,500</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$37,500</td>
</tr>
<tr>
<td>TV Programming-Doc</td>
<td>3,188</td>
<td>--</td>
<td>6,250</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$37,500</td>
</tr>
<tr>
<td>Cable TV</td>
<td>3,950</td>
<td>--</td>
<td>1,813</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$37,500</td>
</tr>
<tr>
<td>Satellite</td>
<td>5,625</td>
<td>--</td>
<td>2,500</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$37,500</td>
</tr>
<tr>
<td>Conferences, Network</td>
<td>1,062</td>
<td>--</td>
<td>375</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$37,500</td>
</tr>
<tr>
<td>Other</td>
<td>27,167</td>
<td>--</td>
<td>4,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$37,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44,219</strong></td>
<td><strong>11,027</strong></td>
<td><strong>14,153</strong></td>
<td><strong>--</strong></td>
<td><strong>--</strong></td>
<td><strong>--</strong></td>
<td><strong>$85,971</strong></td>
</tr>
</tbody>
</table>

#### By Size of Membership

<table>
<thead>
<tr>
<th>Size of Membership</th>
<th>Under 25,000 (101)</th>
<th>25,000-50,000 (21)</th>
<th>50,000-100,000 (13)</th>
<th>100,000 &amp; Up (19)</th>
<th>No Answer (33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Services</td>
<td>$37,500</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>TV Programming-Doc</td>
<td>3,188</td>
<td>$125</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Cable TV</td>
<td>3,950</td>
<td>4,962</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Satellite</td>
<td>5,625</td>
<td>2,500</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Conferences, Network</td>
<td>1,062</td>
<td>1,750</td>
<td>375</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Other</td>
<td>27,167</td>
<td>27,167</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*Respondent volunteered cost information but did not list size of membership*
Ranking of Communications Satellite Uses

After listing their present use and costs of present communications services and techniques respondents were asked to rank the top five from a list of twelve, for which they would give first priorities if Satellite Service dedicated to non-profit organizations was made available to their organizations.

In our analysis we assigned a point value to the top three rankings. The service with the highest score would be first choice. Second highest score would be second choice etc. We arbitrarily assigned a value of 7 points to 1st choice, 5 points to 2nd choice, 3 points to 3rd choice and 2 points to those people who just indicated check marks despite the instructions to give a numerical choice.

On this basis, Long Distance telephone service would be given first priority by all organizations, large and small, and regardless of purpose for which organization exists.

The second choice varies with organization purpose and size. Thus, those organizations with 100,000 or more members selected telex and second and telegram third. The 50,000-100,000 group chose Data Transmission second and National and Regional Meetings third. The organizations having 25,000-50,000 members were equally divided for second place between telex and telegram. Those with fewer than 25,000 selected radio and television, but this is probably due to the weighting of the sample for Public Radio and TV Stations.

<table>
<thead>
<tr>
<th>Number of Members</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>Above 100,000</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Distance Phone</td>
<td>40</td>
<td>41</td>
<td>61</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Radio</td>
<td>14</td>
<td>14</td>
<td>00</td>
<td>08</td>
<td>26</td>
</tr>
<tr>
<td>Television</td>
<td>11</td>
<td>13</td>
<td>03</td>
<td>09</td>
<td>13</td>
</tr>
<tr>
<td>Meetings-Natl/Regional</td>
<td>10</td>
<td>11</td>
<td>08</td>
<td>14</td>
<td>04</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>08</td>
<td>08</td>
<td>05</td>
<td>15</td>
<td>06</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>07</td>
<td>08</td>
<td>08</td>
<td>00</td>
<td>04</td>
</tr>
<tr>
<td>Satellite</td>
<td>06</td>
<td>07</td>
<td>06</td>
<td>11</td>
<td>01</td>
</tr>
<tr>
<td>Telex</td>
<td>04</td>
<td>04</td>
<td>11</td>
<td>0</td>
<td>04</td>
</tr>
<tr>
<td>Telex</td>
<td>04</td>
<td>04</td>
<td>04</td>
<td>00</td>
<td>03</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>04</td>
<td>03</td>
<td>11</td>
<td>08</td>
<td>09</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>03</td>
<td>02</td>
<td>00</td>
<td>00</td>
<td>02</td>
</tr>
<tr>
<td>TV Slow Scan</td>
<td>00</td>
<td>01</td>
<td>00</td>
<td>00</td>
<td>00</td>
</tr>
</tbody>
</table>

Note: Respondents were asked to rank the first five communications techniques for satellite use from among those listed.

A point value was assigned to the top three rankings to yield an overall priority ranking for the study. 1st place was assigned 7 points, 2nd place was assigned 5 points and 3rd place was assigned 3 points.

Some respondents did not give a numerical ranking. They just checked techniques. Checks were given a value of two points.

*Respondents indicated priority rankings but did not indicate size of organization.
After Long Distance Telephone use, the Social Active organizations would utilize Satellite Service for National and Regional Meetings as second choice and Television as third choice.

Communications organizations as expected would select Radio and Television after Long Distance Telephone Service.

Educational Groups would utilize Satellite Service for Long Distance Telephone service and then would select Data Transmission.

Third choice was a tie between Meetings and Telegrams.

The organizations involved with Clubs and Hobbies chose Meetings second and Telegrams third, after Long Distance Telephone Service.

The Employment oriented organizations selected Long Distance Telephone Service first, Telex second, Mailgrams third and National and Regional Meetings fourth as their Satellite Service priorities.

### Priority Rank Score of Communications Satellites Uses

<table>
<thead>
<tr>
<th>Purpose of Organization</th>
<th>No Answer</th>
<th>Social Communications</th>
<th>Educational Clubs &amp; Hobbies</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV Slow Scan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Telephone</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mailgrams</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Telex</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Teletypewriter</td>
<td>0</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Telephone</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>-Radio</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Television</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Meetings/Net/Regional</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
| Note: Respondents were asked to rank the first five communications techniques for satellite use from among those listed. A point value was assigned to the top three rankings to yield an overall priority ranking for the study. 1st place was assigned 7 points, 2nd place was assigned 5 points, and 3rd place was assigned 3 points. Some respondents did not give a numerical ranking. They just checked techniques. Checks were given a value of two points. Respondents indicated priority rankings but did not indicate purpose of organization.
When rankings are analyzed by number of chapters in the organization, National and Regional Meetings are second to Long Distance Telephone at each level. Third choice is Television for those with fewer than 20 chapters and those with 20 - 49 chapters. However, for those organizations with 50 or more chapters, third choice is Mailgram.

<table>
<thead>
<tr>
<th>NUMBER OF CHAPTERS</th>
<th>TOTAL</th>
<th>Under 20</th>
<th>20 - 49</th>
<th>50+</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>207</td>
<td>40</td>
<td>40</td>
<td>55</td>
<td>33</td>
</tr>
<tr>
<td>20 - 49</td>
<td>39</td>
<td>03</td>
<td>00</td>
<td>01</td>
<td>05</td>
</tr>
<tr>
<td>50+</td>
<td>11</td>
<td>01</td>
<td>03</td>
<td>09</td>
<td>08</td>
</tr>
<tr>
<td>Mailgram</td>
<td>10</td>
<td>07</td>
<td>02</td>
<td>03</td>
<td>09</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>08</td>
<td>07</td>
<td>02</td>
<td>09</td>
<td>08</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>07</td>
<td>07</td>
<td>02</td>
<td>12</td>
<td>02</td>
</tr>
<tr>
<td>Telex</td>
<td>06</td>
<td>05</td>
<td>06</td>
<td>05</td>
<td>05</td>
</tr>
<tr>
<td>Teletype</td>
<td>06</td>
<td>05</td>
<td>06</td>
<td>05</td>
<td>05</td>
</tr>
<tr>
<td>Closed Circuit</td>
<td>05</td>
<td>05</td>
<td>05</td>
<td>09</td>
<td>02</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>04</td>
<td>03</td>
<td>05</td>
<td>09</td>
<td>02</td>
</tr>
<tr>
<td>Closed Circuit</td>
<td>03</td>
<td>05</td>
<td>00</td>
<td>01</td>
<td>05</td>
</tr>
<tr>
<td>TV Slow Scan</td>
<td>00</td>
<td>01</td>
<td>00</td>
<td>01</td>
<td>05</td>
</tr>
</tbody>
</table>

**Note:** Respondents were asked to rank the first five communications techniques for satellite use from among those listed.

A point value was assigned to the top three rankings to yield an overall priority ranking for the study:

1st place was assigned 7 points
2nd place was assigned 5 points
3rd place was assigned 3 points.

Some respondents did not give a numerical ranking. They just checked techniques. Checks were given a value of two points.

*Respondent indicated priority ranking but did not indicate number of chapters.*
Other Uses of Satellite Service

After ranking the kinds of services they would give first priorities to if Satellite Service dedicated to non-profit organizations were made available, our respondents were asked, "To what other uses, if any, would you put the satellite service, if it were made available to your organization?"

39 respondents (19%) offered suggestions. The use of the Satellite Service for Training and Education was, by far, the most frequent mention (38%). Networking was mentioned next most often by 39% increased communications by 24% and use for meetings and conferences by 19%.

The use to which these respondents would put a satellite service is seen more clearly by looking at what they say, rather than just looking at the numbers. For example, one looks at satellite service as a means of offering "at-home training to professionals in our field." This same individual thought "it might provide a system for the delivery of care to the isolated elderly."

One thought of satellite service as an "education, health and community development resource sharing on an international basis."

Still another thought it might be useful for "research in rural areas -- health and education."

Other Uses of Satellite Service

<table>
<thead>
<tr>
<th>Suggested Uses of Satellite Service</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training and Education</td>
<td>12</td>
<td>62%</td>
</tr>
<tr>
<td>Meetings &amp; Conferences</td>
<td>4</td>
<td>19%</td>
</tr>
<tr>
<td>Increased Communication</td>
<td>5</td>
<td>24%</td>
</tr>
<tr>
<td>Information to Rural Areas</td>
<td>3</td>
<td>14%</td>
</tr>
<tr>
<td>Networking</td>
<td>8</td>
<td>39%</td>
</tr>
<tr>
<td>Alternate News Coverage</td>
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<td>0.5%</td>
</tr>
<tr>
<td>Cheaper, Faster Communication</td>
<td>3</td>
<td>14%</td>
</tr>
<tr>
<td>ISDN, Stereo</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Library Access</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>No Answer</td>
<td>168</td>
<td>81.1%</td>
</tr>
</tbody>
</table>

Total: 207 (100%)
Responses to Question on "Other Uses of Satellite Service"

"Basic information transmission such as transferring mailing lists, shipping information, etc — computer input." (007)

"We are in need of satellite services for international communications primarily for example, to tie together affiliated project groups in the USA, Germany, Canada, Australia and Japan, where telephone and HF amateur radio are primarily now used" (136)

"It would permit us to offer at-home training to professionals in our field. It might also provide a system for the delivery of care to the isolated elderly" (011)

"Education, health and community development resource sharing on an international basis" (144)

"Networking (syndicating) non-commercial radio programming (also TV)" (110)

"To better carry out the mission of channel in responsible public television broadcasting of educational, community affairs, and cultural programs — including broadcast of college-credit TV courses" (115)

"International and National Public Access Cable Television -- Two ways for public experimentation and use Library Access Massachusetts Open University Free School Instructional Television Health Services" (134)

"We already have two satellites of our own that we built. Both work just fine, and do our job well" (109)

"All Home Communications are on RCA Satcom I. We currently lease two lines. One for our national network service, one for A-F teletype. Can't see any other immediate use, though we'd sure like to see a reduction of charges" (153)

"Public education programs via radio/television" (027)

"Unknown. However, we are looking for a way to extend superior faculty output to more people" (019)

"One of our long range plans is to cooperate in a international information exchange utilizing our computer capabilities" (018)

"Electronic mail services" (017)

"Continuing education programs and in-service programs for union careers, and inter-regional services by specialists on various fields and a demonstration center and tie in with non-commercial use of community cable" (013)

"Radio, meetings" (051)

"Two-way seminars or review sessions -- TV or phone" (044)

"Invitations to congressional and military leaders to address thousands of Reserve officers via TV" (013)

"Research in rural areas -- health and education" (035)

"Conference calls across the U S /Canada for needed input to programs" (032)

"For video links between schools, media groups, and cable systems. Perhaps for alternative news coverage by hooking cable systems in cities together" (062)

Note: Numbers in parentheses indicate interview numbers.
Increased communications

Would depend upon possibilities offered — our needs at that time of availability of cheaper and faster means of communications

Intercontinental Public radio networks—Many languages or intercontinental and intracontinental public television

Radio network planned for late 1976 start

Stereo ISRC transmission

Basic feature is immediate access to programs that are too timely for mail and too expensive for phone (line or dial) connections. Music quality ISRC would be nice for some programs. ISRC very adequate for most

Conference calls

Conduct national meetings by TV or Radio

PBS GPS are currently negotiating for public broadcasting satellite system
### Source of List

<table>
<thead>
<tr>
<th>Source of List</th>
<th>Number Sent Out</th>
<th>Number Responded</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gale's Encyclopedia of Associations</td>
<td>897</td>
<td>100</td>
<td>11.1%</td>
</tr>
<tr>
<td>National Citizens Committee For Broadcasting (NCCB)</td>
<td>139</td>
<td>23</td>
<td>16.5%</td>
</tr>
<tr>
<td>Educational Radio Stations</td>
<td>640</td>
<td>43</td>
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<tr>
<td>Educational Television Stations</td>
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<td>26</td>
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<tr>
<td>Other</td>
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<td>7.1%</td>
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<tr>
<td>Don't Know (No Indication of Derivation of Respondent)</td>
<td>__</td>
<td>__</td>
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</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,031</strong></td>
<td><strong>207</strong></td>
<td><strong>10.2%</strong></td>
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</tbody>
</table>

### Purpose of Organization

<table>
<thead>
<tr>
<th>Purpose of Organization</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civic Affairs, Political Action, Voting</td>
<td>4</td>
<td>1.9%</td>
</tr>
<tr>
<td>Civil Defense, War, Veterans Organizations</td>
<td>7</td>
<td>3.4%</td>
</tr>
<tr>
<td>Communications, Media, P R</td>
<td>2</td>
<td>1.0%</td>
</tr>
<tr>
<td>Community Services, Social Welfare Social Problems</td>
<td>91</td>
<td>44.0%</td>
</tr>
<tr>
<td>Consumer Services</td>
<td>9</td>
<td>4.5%</td>
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<tr>
<td>Cultural, Aesthetic, Artistic</td>
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<tr>
<td>Education</td>
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<td>Labor Unions, Employment</td>
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<tr>
<td>Business Associations-Non-professional</td>
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<td>1.0%</td>
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<tr>
<td>Professional Organizations</td>
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<tr>
<td>Family-Youth</td>
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<tr>
<td>Health</td>
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<tr>
<td>Fellowship, Social Clubs, Kinship</td>
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<tr>
<td>Racial, Ethnic</td>
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<tr>
<td>Conservation, Ecology</td>
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<tr>
<td>Scientific, Learned</td>
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<tr>
<td>Religious</td>
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<td>1.4%</td>
</tr>
<tr>
<td>Agricultural</td>
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<td>Sports &amp; Hobbies</td>
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<tr>
<td>Fraternal</td>
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<tr>
<td>Law Enforcement</td>
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<tr>
<td>Philanthropic</td>
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<td>0.5%</td>
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<tr>
<td>Miscellaneous</td>
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<tr>
<td>No Answer, Don't Know</td>
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<tr>
<td>Variable:</td>
<td>COUNT</td>
<td>HISP</td>
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<td>-----------</td>
<td>-------</td>
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<tr>
<td>UNTALED</td>
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<tr>
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<td>57.0</td>
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<tr>
<td>UNTALED</td>
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<tr>
<td>TOTAL</td>
<td>6.6</td>
<td>138.0</td>
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</tbody>
</table>

**Note:**
- The table above represents a statistical analysis of the population distribution across different age groups (15-64 and 65+) for a specific variable (UNTAWL). The counts are provided for each age group and the total across all groups.
- This analysis is likely used for demographic studies or planning purposes.

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**Source:**
From the US Government Printing Office, 1977, with references to various statistical methods and significance tests.

**Additional Information:**
- The data seems to be part of a larger study or report, possibly related to public health or social demographics.
- The specific context or purpose of the data collection is not provided in the image.