PUBLIC SERVICE 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
Edward A. Wolff

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

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## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRODUCTION</td>
</tr>
<tr>
<td>2</td>
<td>WORKSHOP DESCRIPTION</td>
</tr>
<tr>
<td>3</td>
<td>WORKSHOP RESULTS</td>
</tr>
<tr>
<td>3.1</td>
<td>Commercial Services</td>
</tr>
<tr>
<td>3.2</td>
<td>Data and Message Services</td>
</tr>
<tr>
<td>3.3</td>
<td>Elementary and Secondary Education</td>
</tr>
<tr>
<td>3.4</td>
<td>Extension and Continuing Education</td>
</tr>
<tr>
<td>3.5</td>
<td>Environmental Communications</td>
</tr>
<tr>
<td>3.6</td>
<td>Library Services</td>
</tr>
<tr>
<td>3.7</td>
<td>Medical Education</td>
</tr>
<tr>
<td>3.8</td>
<td>Medical Services</td>
</tr>
<tr>
<td>3.9</td>
<td>Public Broadcasting</td>
</tr>
<tr>
<td>3.10</td>
<td>Public Safety</td>
</tr>
<tr>
<td>3.11</td>
<td>Religious Applications</td>
</tr>
<tr>
<td>3.12</td>
<td>State and Local Communications</td>
</tr>
<tr>
<td>3.13</td>
<td>Voluntary, Public Interest and Social Services</td>
</tr>
</tbody>
</table>

APPENDIX 1 - Public Service Communications Satellite System | A1-1
APPENDIX 2 - Advance Mailing | A2-1
APPENDIX 3 - Requirements Submitted in Advance of Workshop | A3-1
APPENDIX 4 - Material Distributed at Workshop | A4-1
APPENDIX 5 - Panel Presentations | A5-1
APPENDIX 6 - Appendix to Elementary and Secondary Education Report | A6-1
APPENDIX 7 - Appendix to Medical Education Report | A7-1
APPENDIX 8 - Appendix to State and Local Government Report | A8-1
APPENDIX 9 - Appendix to Voluntary and Social Services Report | A9-1
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
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<tr>
<td>2</td>
<td>9</td>
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<td>123</td>
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<td>126</td>
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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 database building, information retrieval, information broadcast, access to emergency information, library teleconferencing and facsimile transmission.

The Medical Education Panel described the need 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 database 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>Boulder, Colorado 80302</td>
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<td>Walter Hogge, Jr.</td>
<td>National Oceanic and Atmospheric Administration</td>
<td>Telecommunications Management &amp; Planning Div., Room 315</td>
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<td>Albert L. Horley</td>
<td>27227 Black Mountain Road</td>
<td>Los Alto Hills, California 94022</td>
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<td>200 Independence Avenue, S.W Washington, D.C. 20201</td>
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<td>Ralph Marcotte</td>
<td>U.S. Postal Service Research &amp; Development Department</td>
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<td>Office Telecommunication Policy (OTP)</td>
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<td>F. Lee Morris</td>
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<td>P.O. Drawer 1101 Jackson, Mississippi 39205 (601) 982-6376</td>
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<td>Dr. Harold E. Morse</td>
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<td>1666 Connecticut Avenue, N.W. Washington, D.C. 20235 (202) 673-7866</td>
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<td>William B. Morton</td>
<td>Agricultural Research Service P.O. Box 345 Greenbelt, Maryland 20770 (301) 344-2013</td>
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<td>Dr. Rose Mukerji</td>
<td>Brooklyn College, CCNY Brooklyn, New York 11210 (212) 780-5941</td>
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<td>Jean Marie Neal</td>
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<tr>
<td>Edward Nehman</td>
<td>MITRE Corporation West Gate Research Park McLean, Virginia 22102 (703) 790-6745</td>
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<tr>
<td>Frank Norwood</td>
<td>Joint Council in Educational Telecommunications 1126 - 16th Street, N.W. Washington, D.C. 20036 (202) 679-9740</td>
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<td>Mason Regel</td>
<td>Communications Division Department of General Services 2020 - 19th Street Sacramento, California 95818 (916) 445-6037</td>
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<td>Martin Rogol</td>
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<td>Dr. Jane G. Richards</td>
<td>Indiana Higher Education Telecommunications System 1100 West Michigan Street Indianapolis, Indiana 46202 (317) 264-7945</td>
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<tr>
<td>Dr. Marvin H. Rumerman</td>
<td>Mayor's Office of Telecommunications Operations Center 111 N. Calvert Street Baltimore, Maryland 21202 (301) 396-1100</td>
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<tr>
<td>M. Roy Schwarz, M.D.</td>
<td>Associate Dean, Academic Affairs University of Washington School of Medicine Seattle, Washington 98195 (206) 543-7212</td>
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<tr>
<td>J. Earle Painter</td>
<td>GSFC/NASA Code 950 GSFC/NASA Goddard Space Center Greenbelt, Maryland 20771</td>
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<th>Name</th>
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<td>George Selz</td>
<td>Operations Research, Inc.</td>
<td>Operations Research, Inc. 1400 Sprmg St, Sllver Sprmg, Maryland 20910</td>
<td>(301) 586-6180</td>
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<tr>
<td>Robert Shamaskin</td>
<td>Deputy Director, Learning Resources Service</td>
<td>(142A) Veterans Administration Central Office</td>
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<td>Nathan Shoehalter</td>
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<td>(201) 932-4194</td>
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<tr>
<td>Joseph N. Sivo</td>
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<tr>
<td>Lewis Research Center</td>
<td>National Aeronautics and Space Administration</td>
<td>2100 Brookpark Road, Cleveland, Ohio 44135</td>
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<tr>
<td>Dr. Clifford A. Spohn</td>
<td>Deputy Director, National Environment Satellite Service</td>
<td>5809 San Juan Drive, Clinton, Maryland 20735</td>
<td>(301) 763-7190</td>
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<tr>
<td>Paul Stevens</td>
<td>President, Radio and Television Commission</td>
<td>P.O. Box 1215, Ft. Worth, Texas 76118</td>
<td>(817) 737-4011</td>
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<td>Emanuel Suter</td>
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<td>Sidney Tischler</td>
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<td>Dr. Andrew Viterbi</td>
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<td>Freidrich O. Vonbun</td>
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<td>Robert M. Walp</td>
<td>Director, Office of Telecommunications Pouch AC</td>
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<td>(907) 465-3550</td>
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<tr>
<td>Jon D. Wempner</td>
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<td>Dr. Harold E. Wigren</td>
<td>Telecommunication Specialist, National Education Association</td>
<td>1201 - 16th Street, N.W. Washington, D.C. 20035</td>
<td>(202) 839-4000, ext. 4120</td>
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<tr>
<td>Ronald L. Wilson</td>
<td>W CET TV/48</td>
<td>1223 Central Parkway, Cincinnati, Ohio 45214</td>
<td>(513) 381-4033, ext. 18</td>
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<tr>
<td>Charmaine Wiscarver</td>
<td>South Dakota Indian Education Association</td>
<td>Kyle, South Dakota 57752</td>
<td>(605) 455-2461</td>
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<td>John P. Witherspoon</td>
<td>President, Public Service Satellite Consortium</td>
<td>San Diego, California (714) 452-1140</td>
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<td>Dr. Edward A. Wolff</td>
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<td>Col. Lawson P. Wynne</td>
<td>International Christian Broadcasters</td>
<td>1504 Arboretum Drive, Chapel Hill, North Carolina 27514</td>
<td>(919) 967-7928</td>
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<tr>
<td>Dr. Elizabeth L. Young</td>
<td>The Ohio State University Telecommunications Center</td>
<td>2400 Oletangy River Road, Columbus, Ohio 43210</td>
<td>(614) 421-2540</td>
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Workshop Organization

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<td>Secretary: J. Earle Painter</td>
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<tr>
<td><strong>Environmental Communications</strong></td>
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<tr>
<td>Chairman: Arthur Cooke</td>
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<tr>
<td>Secretary: Enrico Mercanti</td>
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<td><strong>Library Services</strong></td>
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<tr>
<td>Chairman: Ruth Katz</td>
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<td>Secretary: Sajjad Durran</td>
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<td><strong>Medical Education</strong></td>
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<tr>
<td>Chairman: Charles Heck</td>
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<td>Secretary: William Conant</td>
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<td><strong>Medical Services</strong></td>
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<td>Chairman: Ralph Christenson</td>
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<td>Secretary: Walter Sullivan</td>
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<td><strong>Public Broadcasting</strong></td>
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<td>Chairman: Donald Quayle</td>
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<td>Secretary: John Miller</td>
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<td><strong>Public Safety</strong></td>
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<tr>
<td>Chairman: S. S Ashton</td>
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<td>Secretary: Jan Turkiewicz</td>
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<td><strong>John Boning, Hal Braham, Charles Breig, Eugene Cacciamani, Richard Davies, Joseph Freitag, Dick Jones, Jeffrey Kurland, Howard Lefkowitz, Neal Pike, Stanley Rzewicki</strong></td>
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<td><strong>Alice Beckman, Ed Blackhurst, Brian Brightly, Ted Dixon, Pierre DuMane, Donald Gray, Patricia Ho, Rose Mukerji</strong></td>
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<td><strong>Robert Bermer, Walter Duncan, Walter Hogge, James Jenkins, Barry Kerne, Joseph Schieel, Clifford Spohn</strong></td>
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<td><strong>Paul Andereck, Allan Deschere, Priscilla Gotsick, Steven Herman, Mary Huffer</strong></td>
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<td><strong>Cecil Burge, Robert Egwood, Leon Greenhouse, Arthur Griffith, Howard Hupe, James Justice, Edward Nehman, M. Roy Schwarz, Robert Shamaskin, Dean Siebert, Jon Wempner</strong></td>
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<td><strong>George Allan, Gerald Carp, Helen Clearwater, Alva Cooper, Donald Kavanagh, Lois McCoy, Keith Monroe, William Morton</strong></td>
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Table 2 (continued)

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<tr>
<td>Chairman: William Fore</td>
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<td>Secretary: Joseph Corrigan</td>
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<td>12 State &amp; Local Communications</td>
<td>Gianpietro Forcina, Gary Fereno, Joe Fleming, Anthony Flores, Jean-Marie Neal, Ted Reams, Jane Richards, Mason Riegel, Marvin Rimmerman, Elizabeth Young</td>
</tr>
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<td>Chairman: Robert Walp</td>
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<td>Secretary: James Brown</td>
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<td>13 Voluntary &amp; Social Services</td>
<td>Gertrude Barnstone, Warren Braren, Andrew Horowitz, Annie King Phillips, Martin Rogol, John Schwartz, Chairman Wise carver</td>
</tr>
<tr>
<td>Chairman: Bert Cowlan</td>
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<td>Secretary: John Woodruff</td>
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</table>

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 Date</th>
<th>Sunday Oct 17</th>
<th>Monday 18</th>
<th>Tuesday 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 00-9 00 am</td>
<td></td>
<td>Breakfast</td>
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<tr>
<td>9 00-12 00 am</td>
<td>Welcome Public Service Communications Satellite Concept Panel Discussions</td>
<td>Panel Presentations</td>
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<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 Public Service Communications Needs Potential Benefits of Satellites</td>
<td>Panels Write Reports Workshop Adjourn Committee Critique</td>
<td></td>
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<tr>
<td>6 00-8 00 pm</td>
<td>Banquet</td>
<td></td>
<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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</table>
Table 5
Workshop Objectives

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

13
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 can not 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 terrestrial 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 under-developed 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 developers 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

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**STEP 1**

<table>
<thead>
<tr>
<th>NASA WORKS WITH POTENTIAL USERS OR COMMUNICATIONS SERVICE BUYERS SAME FOR EACH APPLICATION</th>
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<tbody>
<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;VIALBE&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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</table>

**DECISION POINT 1**

IF SOLUTION IS CLOSE TO VIABLE, PROCEED TO STEP 2

---

**STEP 2**

| COMMUNICATION PROCURER PUTS OUT BID PACKAGES TO COMMON CARRIERS (NASA HELPS) |

INTERESTED CARRIERS BID

---

DECISION POINT 2

- PROCURE SATELLITE FROM A CARRIER IF PRICE ACCEPTABLE
- "NO-GO" ON SATELLITE SERVICE IF PRICE EXCESSIVE

---
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

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

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 100 b/s to >19.2 k b/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 (? 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.

22
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 the 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 of 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 specific 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.
<table>
<thead>
<tr>
<th>Types of Service - Quantity of Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Users</strong></td>
</tr>
<tr>
<td><strong>Intra-Inter State</strong></td>
</tr>
<tr>
<td>Agriculture</td>
</tr>
<tr>
<td>Farming</td>
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<tr>
<td>Food</td>
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<tr>
<td>Forestry</td>
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<tr>
<td>Marketing</td>
</tr>
<tr>
<td>Research</td>
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<tr>
<td>Conservation</td>
</tr>
<tr>
<td><strong>Business Commerce</strong></td>
</tr>
<tr>
<td>Fisheries</td>
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<tr>
<td>Econ Development</td>
</tr>
<tr>
<td>Maritime</td>
</tr>
<tr>
<td>Minority Business</td>
</tr>
<tr>
<td>Productivity</td>
</tr>
<tr>
<td>Regulations</td>
</tr>
<tr>
<td><strong>Community Development</strong></td>
</tr>
<tr>
<td>Open Spaces</td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Preservation</td>
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<tr>
<td>Planning</td>
</tr>
<tr>
<td>Research</td>
</tr>
<tr>
<td>Training</td>
</tr>
<tr>
<td>Rural</td>
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<tr>
<td><strong>Consumer Protection</strong></td>
</tr>
<tr>
<td>Personal</td>
</tr>
<tr>
<td>Safety</td>
</tr>
<tr>
<td>Inspection</td>
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<tr>
<td>Enforcement</td>
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<tr>
<td><strong>Disaster Protection and Relief</strong></td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Employment</td>
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<tr>
<td>Labor &amp; Manpower</td>
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<tr>
<td><strong>Energy</strong></td>
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<tr>
<td><strong>Environment</strong></td>
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<tr>
<td><strong>Health</strong></td>
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<td><strong>Housing</strong></td>
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<tr>
<td><strong>Social Service</strong></td>
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<tr>
<td><strong>Information</strong></td>
</tr>
<tr>
<td><strong>Legal (Lead)</strong></td>
</tr>
<tr>
<td><strong>Natural Resources</strong></td>
</tr>
<tr>
<td><strong>Transportation</strong></td>
</tr>
</tbody>
</table>
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 $5 \times 10^{6}$ messages per year. On the other hand, a highly accepted EMS System might anticipate annual traffic volumes in the $50 \times 10^{6}$ 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.
The USPS awarded a two-year EMS System Definition and Evaluation Contract to RCA on April 30, 1976. The results of this system planning effort and subsequent USPS management decisions will enable the USPS to more narrowly define the above and other EMSS requirements.

3.2.2.3 Consumer Communications

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 activities. 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 headquarter offices by communications networks. The quality-of-life factors such as health care, education, entertainment and public safety are recognized as necessities 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 communications 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 communication 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 ubiquity 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 creativity 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 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 filers 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 characteristic 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.

l. 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 (NationalInstructional Materials Information System)
             SpecialEducational 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.
Table 6

Elementary and Secondary Education Instructional 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>
</table>
| Elementary  | Written      | Audio Transiever | 65,000    | NATION-WIDE:                | The system should   | A. A system with this configuration will:  
| and         | Messages     | Computer Terminal 2-way Video (Color) | 1,000     | be operational 7 hours per day, 5 days a week: Total of 35 hours per week. |                     | 1) Enable the classroom teacher to:  
| Secondary   | Slow-Scan    | Teletyper | Fixed | | | | a) have independent access to instructional programs and resources when needed. |
| Instructional| Video        | Video Tape  | Mobile   | | | | b) have remote access to specialists to aid in the diagnosis of educational problems of their students. |
| needs of    | Audio        |            |          | | | | c) obtain immediate access to remotely stored instructional materials, resources, and programs. |
| elementary  | Simplex      | Recorder   |          | take into consideration the number of students and teachers this system will service. | | | |
| and         | Duplex       | Multi-Channel Capability |          | | | | d) provide computer assisted instruction for their students. |
| secondary   | Facsimile    |            |          | | | | e) use multi-channel capability to provide differentiated instruction for various ability groups. |
| students    | Radio        |            |          | | | | f) to obtain expert consultation services related to educational problems. |
|             | Computer     |            |          | | | | 2) Provide students with opportunities:  
|             | Information  |            |          | | | | a) to see/hear/participate in special events that have limited appeal to commercial media. |
|             | and Data     |            |          | | | | |
### Table 6 (continued)

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

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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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</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 7

**Elementary and Secondary Teacher Education 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>Teleconferencing for Teachers &amp; other Educators 4 M</td>
<td>Audio/Video Multiple Simultaneous Terminals</td>
<td>2-Way Voice/Video RO Terminals</td>
<td>1 per 300 teachers</td>
<td>U.S. 50 States and the Territories</td>
<td>2 hour transmissions 5 days/wk</td>
<td>Need: for legislative briefings; Bd. of Dir. Meetings; Public policy reeducation; interviewing public officials Inner-Assoc. Communication, Education &amp; Related Professions.</td>
</tr>
<tr>
<td>In-Service Courses for Teachers &amp; Other Educators 4 M</td>
<td>Audio RO Audio 2 Way Color, Digital Data</td>
<td>School house terminals - 1 per each school building</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: for 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>Telex-Mailgrams</td>
<td>Data Link</td>
<td>500/day to the field 500 day from 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

<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 (1 for each 1200)</td>
<td>Present</td>
<td>U.S. 50 States and the Territories</td>
<td>2 hour transmissions</td>
<td>Need: for legislative briefings, Board of Directors meetings; UNISERV training sessions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Planned</td>
<td>0</td>
<td>5 days/wk</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Needed</td>
<td>0</td>
<td>2,000</td>
<td></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</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>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Planned</td>
<td>0</td>
<td>65,000</td>
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<td></td>
<td></td>
<td></td>
<td>Needed</td>
<td>0</td>
<td>2,000</td>
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</tr>
<tr>
<td>Telex Mailgrams, Telegrams</td>
<td>Data Link</td>
<td>25/day to the field</td>
<td>Present</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></td>
<td></td>
<td>25/day from the field</td>
<td>Planned</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Needed</td>
<td>0</td>
<td>2,000</td>
<td></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</td>
<td>U.S. 50 States</td>
<td>500 uses daily</td>
<td>Need: Research data, membership surveys</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Planned</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Needed</td>
<td>0</td>
<td>2,000</td>
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</table>
### 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>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>Inter-school teleconferencing with home-viewing</td>
<td>2-way video</td>
<td>Audio/video receivers in regional sites</td>
<td>50 U.S. States</td>
<td>60 min. each week or 30 min. 3 x/wk</td>
<td>Regional active participation by schools. Home viewer participation via phone to regional site if desired.</td>
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<tr>
<td></td>
<td>2-way audio</td>
<td>Video receiver in each home</td>
<td>65,000</td>
<td></td>
<td></td>
<td>Purposes 1. To aid parents in dealing with their children 0-18 years. 2. To develop public participation in educational policy.</td>
</tr>
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<table>
<thead>
<tr>
<th>User terminals</th>
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### Table 11
Program Development and Evaluation 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. 160 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 Station 200 Commercial Networks 200 35,000,000 students Approx. 12 million homes U.S. 50 States</td>
<td></td>
<td></td>
<td>3 hours per week 156 hours per year</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 preschool early childhood grade level 3-4 years old</td>
<td>Video/Audio</td>
<td>Point to Point Video for U.S.A. Day Care Centers or Home Market 10,000 (approx) 4 million homes (approx) U.S. 50 States and the Territories</td>
<td></td>
<td></td>
<td>Potential capacity 3 hours per day 1000 hours per year</td>
<td>Need: To provide additional preschool program material for pre-school children</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>Target Audience programming in Elementary and Secondary Education</td>
<td>Video/Audio</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>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></td>
<td></td>
<td>50 States</td>
<td>@ 180 days per year 1,800 hours</td>
<td></td>
</tr>
<tr>
<td>b) Special Education</td>
<td></td>
<td></td>
<td></td>
<td>50 States</td>
<td>6 hours per day 2,190 hours per year</td>
<td></td>
</tr>
<tr>
<td>c) Vocational Education</td>
<td></td>
<td></td>
<td></td>
<td>50 States</td>
<td>4 hours per day 720 hours per year</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 lines. Elementary and Secondary Schools</td>
<td>150 receivers</td>
<td>50 States</td>
<td>2 hours per week 50 hours per year</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>
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</tr>
<tr>
<td>USER involvemen t in program production and public participation in program policy</td>
<td>2-way video/audio</td>
<td>NEA Regional Officers</td>
<td>50 States</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></td>
<td></td>
<td>Teachers</td>
<td>2,000</td>
<td>50 hours</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>PBS Stations or Regional Networks</td>
<td>150</td>
<td>5</td>
<td></td>
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</tr>
<tr>
<td>Teleconferencing for variety of Associations and audiences a) teachers b) supt/ adminstrators c) students</td>
<td>2-way video/audio</td>
<td>Point to Point Confering Maximum 20 Participants for groups terminals</td>
<td>50 States</td>
<td>Depends upon availability Potential 1,000 hours per year.</td>
<td>Need: Establish better lines for communication; bringing together groups from large distances without necessary travel expenditures</td>
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<td>20</td>
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</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 undeveloped 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 time did not 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.

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*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 health care

***The 252,000 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 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 enlistees. 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.
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 12
Distribution of Training Hours by Topic

<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.
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>
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<th></th>
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<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>Sub Total</td>
<td>$375.4</td>
<td>$516.5</td>
<td>$722.1</td>
</tr>
<tr>
<td>Record players</td>
<td>5.4</td>
<td>7.3</td>
<td>9.8</td>
<td>Total</td>
<td>$480.2</td>
<td>$669.3</td>
<td>$964.7</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><strong>Sub Total</strong></td>
<td><strong>$104.8</strong></td>
<td><strong>$152.8</strong></td>
<td><strong>$242.6</strong></td>
<td></td>
<td></td>
<td></td>
<td></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, $22.08 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 multichannel, 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 ITPS 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 networking 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 basis 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 experiments 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 such a 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 a 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.
Table 16
Short Term Change to NECOM Inventory

<table>
<thead>
<tr>
<th>A</th>
<th>To Be Disestablished</th>
<th>B</th>
<th>Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-A-1</td>
<td></td>
<td>1-A-2</td>
<td></td>
</tr>
<tr>
<td>1-A-35</td>
<td></td>
<td>1-A-21</td>
<td></td>
</tr>
<tr>
<td>1-A-38</td>
<td></td>
<td>1-A-24</td>
<td></td>
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<tr>
<td>1-A-40</td>
<td></td>
<td>1-A-25</td>
<td></td>
</tr>
<tr>
<td>1-A-41</td>
<td></td>
<td>1-A-56</td>
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</tr>
<tr>
<td>1-A-50</td>
<td></td>
<td>1-A-57</td>
<td></td>
</tr>
<tr>
<td>1-E04</td>
<td></td>
<td>1-A-58</td>
<td></td>
</tr>
</tbody>
</table>

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 knowledgeable in its ability to prepare a document truly reflective of the entire unverse 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>
<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 (to public of users)</td>
<td>Color Video</td>
<td>Library</td>
<td>Urban &amp; Rural need for access &amp; for Local Programming will differ</td>
<td></td>
<td>Libraries gaining experience with video but, so far, not with Satellite-delivered video.</td>
</tr>
<tr>
<td></td>
<td>1-way Audio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-way Audio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Trans</td>
<td>two-way</td>
<td>Library (Individ.) or State/Regional Library Center</td>
<td>Initially - likely to be used by Library of Congress, Regional Bibliographic Centers and large libraries</td>
<td></td>
<td>Implications differ if transmission of compressed bibliographic data and/or full text are cost-effective.</td>
</tr>
<tr>
<td>Teleconference</td>
<td>two-way</td>
<td>Any accessible location in community on shared basis</td>
<td>Likely to be for communication from one urban center to another, at first</td>
<td></td>
<td>Library experience to date is lacking.</td>
</tr>
<tr>
<td></td>
<td>Audio/Video</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension &amp; Cont. Ed.</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, ongoing 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 US 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>
<tbody>
<tr>
<td>Health Education for the Patients Type I - Health Education For the general public, believed to be a public health function</td>
<td>Audio-video use practical now, program content very critical</td>
</tr>
<tr>
<td>Type II - Physician to patient about specific condition, a health system function - completely confidential requiring physician input</td>
<td>Audio - 2-way, video is helpful, if available</td>
</tr>
</tbody>
</table>

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 18

**Medical Care Services**

<table>
<thead>
<tr>
<th>1.1 Disp. Objectives</th>
<th>1.2 STAT Required</th>
<th>1.3 Objective Satellite can make contribution</th>
<th>2.1 Type Communication Needs</th>
<th>2.2 Volume</th>
<th>2.3 Communication Network</th>
<th>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></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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>None</td>
<td>Patients must assume responsibility</td>
<td>Detect injured Patient</td>
<td></td>
</tr>
<tr>
<td>2. Provide patient with access to medical care system</td>
<td></td>
<td>Half Duplex Audio</td>
<td>?</td>
<td>?</td>
<td>Patient responsible Confidentiality of Data</td>
<td>Answer question Do I have a problem? How do I obtain care for patient in remote area?</td>
<td></td>
</tr>
<tr>
<td>3. Assess health status by connecting patient with health care provider</td>
<td></td>
<td>Full Duplex Video/Audio Data Transfer Monitoring</td>
<td>Unknown</td>
<td>IHS** Small Large Region Region</td>
<td>Confidentially Cost of Comprehensive Terminals</td>
<td>1. Delivery health service where none exist</td>
<td></td>
</tr>
<tr>
<td>4. Provide primary care physician with consultation or provide support for non-physician</td>
<td></td>
<td>Full Duplex Audio/Video Data Transfer Data Monitoring Slow Scan TV</td>
<td>?</td>
<td>?</td>
<td>1. Cost of Comprehensive Terminals</td>
<td>2. Improve quality of care</td>
<td></td>
</tr>
<tr>
<td>5. Provide Emergency Medical Service where they do not now exist</td>
<td></td>
<td>Ground Region Larger Networks IHS VA System</td>
<td></td>
<td></td>
<td>2. Teaching Professionals how to use</td>
<td>3. Increase breadth of services</td>
<td></td>
</tr>
<tr>
<td>6. Provide non-emergency medical service on expanded, on-going basis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. Obtaining Data as to outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4. Confidentiality</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5. Availability - Need 7 days/wk, 24 hrs/day.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6. Payment per experiment period</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE** P = Present  ST = Short term  LT = Long term  * Regional  ** Indian Health Service
### Table 18 (continued)

#### Medical Care Services

<table>
<thead>
<tr>
<th>1.1 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 relationship between primary 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></td>
<td></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></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 care-tertiary care physicians</td>
<td>Micro-regions to include MICRO regions with condition between systems</td>
<td></td>
<td></td>
<td></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>Expand MACRO regions</td>
<td></td>
<td></td>
<td></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></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></td>
<td>6. Focus of regional planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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></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.

75
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 diversity 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 quadraphonic, 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>P 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 $2 \times 10^5$ 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 test 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>Service</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criminal Justice</strong></td>
<td></td>
</tr>
<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><strong>Total</strong></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>Service</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criminal Justice</strong></td>
<td></td>
</tr>
<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><strong>Total</strong></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


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 religion 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**

<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>Continuing Education, Clergy, Directors of Religious Education, Clinical Pastoral Education, etc.</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>Pastoral Education, etc.</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>In-service training for Military Chaplains</td>
<td>1-way Video 2-way Voice &amp; data transfer</td>
<td>Use above regional centers - for military bases &amp; 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>In-service training of Institutional, Industrial &amp; other Chaplains</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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</tr>
<tr>
<td>National Denomination Offices</td>
<td>Multiple point audio and video</td>
<td>Fixed portable terminals</td>
<td>? Potential</td>
<td>50 States and international by agreement</td>
<td>Current W.A.T.S. Lines used by all groups - heavy use daily. Proposed usage 5 to 10 hrs. per week per terminal</td>
<td>Few foreign conference calls, yet seriously needed. First Priority on audio</td>
</tr>
<tr>
<td>Offices, International local level</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>30000</td>
<td>50 States</td>
<td>Current L.D. lines and W.A.T.S. Moderate usage Proposed or needed 2 1/2 hr. per Ter. per week</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>Mobile</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>
<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>
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</table>
Table 19 (continued)

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<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 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>
<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>News feeds to denominational/faith group papers, etc.</td>
<td>Facsimile w/2-way audio to transmit typed copy and photos</td>
<td>Portable uplink Fixed uplink units Fixed down link units</td>
<td>10</td>
<td>Portable units moved on demand Fixed uplinks at each denom office Fixed downlinks at each denom paper office Distribution</td>
<td>6 hr/day, normal 14 hr/day, peak</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>News feeds to secular papers, magazines and wire services</td>
<td>Facsimile w/2-way audio to transmit typed copy</td>
<td>Fixed down links at each major paper w/land lines to smaller papers</td>
<td>250</td>
<td>Distribution at down links throughout the 50 States</td>
<td>3 hr/dy, normal 6 hr/dy, peak</td>
<td>Use same portable and fixed up links as in #1.</td>
</tr>
<tr>
<td>News feeds to radio stations and audio wire services</td>
<td>2-way Voice (broadcast quality)</td>
<td>Portable uplink units Fixed uplink units Fixed down link 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 6 hr/dy, peak</td>
<td>ECU-Media News (Nat'l. Council of Churches) feeds 1200 radio stations per week. Nat'l. Rel. Bdcstas. feed 250 stations per week.</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>News feeds to TV</td>
<td>1-way Video</td>
<td>Portable up links</td>
<td>10</td>
<td>Portable up links on</td>
<td>1/2 hr./day,</td>
<td>Various denom. offices mail</td>
</tr>
<tr>
<td>Stations</td>
<td>2-way Voice</td>
<td>Fixed up links</td>
<td>50</td>
<td>demand up links</td>
<td>normal</td>
<td>film clips to TV stations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed down links</td>
<td>850</td>
<td>at each denom. office</td>
<td>3 hr/day, peak</td>
<td>regularly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Down links at each</td>
<td></td>
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<td></td>
<td></td>
<td>TV station</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>
</tr>
<tr>
<td>International Disaster relief coordination</td>
<td>2-way Audio</td>
<td>Portable up link</td>
<td>5</td>
<td>Portable up links to be air shipped to disaster site on demand</td>
<td>24 hrs. per day from set up of portable up link to end of disaster period</td>
<td>Portable uplink small enough for helicopter airlift to disaster site for Video feed.</td>
</tr>
<tr>
<td></td>
<td>1-way Video</td>
<td>Fixed down link</td>
<td>50</td>
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<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>Missionary</td>
<td>2-way Voice</td>
<td>Terminals</td>
<td>5000</td>
<td>Terminals with each missionary location and at U.S. Affiliate 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>Communications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td>1-way TV</td>
<td>Selected sites at Missionary Locations, World Wide</td>
<td>3000</td>
<td>Full Time broadcast 5-10 PM local time each location</td>
<td></td>
<td>Special classes of instruction with limited query capability.</td>
</tr>
<tr>
<td></td>
<td>2-way Voice</td>
<td>Small TV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terminal</td>
<td>Terminal</td>
<td></td>
<td></td>
<td></td>
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</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>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>Thousand</td>
<td>World Wide</td>
<td>Full time 3 channel capability</td>
<td>Replaces present land limiting radio transmissions</td>
</tr>
</tbody>
</table>


<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>Telediagnosis Consultation</td>
<td>2-way Audio Data-soft and hard</td>
<td>Voice/data link hospital - clinic - village health aide</td>
<td>?</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. Needs to be coordinated with the medical service group.</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>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</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</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. 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 wideband 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

Categories of Communications Services

<table>
<thead>
<tr>
<th></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>X</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>X</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>X</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>f</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>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Personnel Training</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</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>X</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>?</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>?</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.

99
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 the 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 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, lawsuits, 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 mail, 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 3.2 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 they should and can 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 pursuing 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.

109
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. Need: 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. Availability: 12-hr. during daylight</td>
<td>c. 18 hrs. day</td>
<td>c. 24 hr. day</td>
</tr>
<tr>
<td>d. Reliability: 100%</td>
<td>d. Reliability: 100%</td>
<td>d. Reliability: 100%</td>
</tr>
<tr>
<td>Volume: 20 - 2-way audio, and data transfer</td>
<td>200 - 2-way audio/video and data transfer</td>
<td>300 - 2-way audio/video; 2-way digital data</td>
</tr>
<tr>
<td>Distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Sociological: tribe to tribe: that is as 1 voice to 1 voice speaking for a whole tribe</td>
<td>b. Again, tribe to tribe, but this would expand to include all the other tribes along with the Sioux</td>
<td>b. Begin expansion to little village on each reservation</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>
</tbody>
</table>

org. to org.

Near Future:
- pt. to pt. in rest of 48 states with more in large cities
org. to org.

Long-Range Future:
- pt. to mlt. pt.
org. to org. and org. to indiv.

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 21

**Feminist Services**

<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)

<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, Homes</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>
</tbody>
</table>
### Table 23

**Neighborhood Health Services**

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>Public Service Communications User Requirements</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teleconferencing</td>
<td>2-way audio/video</td>
<td>Inter-area communication between the national office and (5) area, regional coordinators</td>
<td>Needed: Monthly: 15 minute messages National office communications to key area coordinators, and 300-500 health centers for membership information &amp; alert/response Needed: Monthly: 15 minute messages National office communications to key area coordinators, and 300-500 health centers for membership information &amp; alert/response Needed: Monthly: 15 minute messages National office communications to key area coordinators, and 300-500 health centers for membership information &amp; alert/response</td>
<td>Presently groups must travel to central location for conferences, no access. Presented 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. 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>Membership Mailings &amp; Action Memos</td>
<td>Facsimile Transmission</td>
<td>Data terminals Point-to-Point Point-to-Multipoint (6) areas (as above) and the member health centers in the (50) States</td>
<td>6 areas &amp; 300-500 Centers</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 Education &amp; Continuing Education For Health Professionals</td>
<td>Slow-Scan TV 2-way audio/video Data Transfer</td>
<td>Universities/Medical Colleges &amp; Teaching Hospitals Health Centers Interactive Mode</td>
<td>50 One per State, rural locus where a rural or migrant health center is operating</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</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 120+</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></td>
<td>2-way data transmission (facsimile &amp; digital)</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></td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No</td>
<td>Geographical Distribution</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------</td>
<td>------------------------------</td>
<td>----</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Patient Education</td>
<td>2-way audio</td>
<td>Point-to-Point, Point-to-Mult</td>
<td>150</td>
<td>2 Health Centers per State and experimental group of patients to participate in the experiment</td>
</tr>
<tr>
<td></td>
<td>1-way video</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multiple Terminals</td>
<td>TV Terminals w/microphone</td>
<td></td>
<td></td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----</td>
<td>---------------------------</td>
</tr>
<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>
</tr>
<tr>
<td>Large Scale Teleconferencing</td>
<td>Same as above</td>
<td>Same as above</td>
<td>30</td>
<td>Same as above</td>
</tr>
<tr>
<td>Small Scale Teleconferencing</td>
<td>Same as above</td>
<td>Same as above</td>
<td>30</td>
<td>Same as above</td>
</tr>
<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>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60</td>
<td>Same as above</td>
</tr>
<tr>
<td>Application</td>
<td>Service Type</td>
<td>Description</td>
<td>No.</td>
<td>Geographical Distribution</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------</td>
<td>------------------</td>
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<td>---------------------------</td>
</tr>
</tbody>
</table>
| Radio Programming for the Blind | High Quality Audio | Transmit only | 1   | Continental U.S.          | 18 hrs. per day    | Timely information distribution via subcarrier on FM Radio Stations.
<p>|                                 |               | Receive only     | 200 | Alaska?                  | 7 days a week       |                                                        |
|                                 |               |                  |     | Hawaii?                  |                    |                                                        |</p>
<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</td>
<td>Audio/Visual Multiple simulation terminals 2-way</td>
<td>Regional</td>
<td></td>
<td></td>
<td></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>Information Exchange</td>
<td>Video - Data Banks Slow-Scan TV</td>
<td>U.S.</td>
<td></td>
<td></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>
</tr>
<tr>
<td>Education and Training Programs</td>
<td>2-way voice radio Slow-Scan TV</td>
<td>Regional U.S.</td>
<td>30</td>
<td></td>
<td>Quarterly at Minimum</td>
<td>Providing organizational and managerial skills to citizens based organizations just under way or in existence.</td>
</tr>
<tr>
<td>Information Exchange</td>
<td>audio/telecopy Public Interests Research Groups</td>
<td>30 States</td>
<td>30 States</td>
<td></td>
<td>30 hours weekly</td>
<td>Facilitate organization of development and efficiency of project activity.</td>
</tr>
<tr>
<td>Application</td>
<td>Description</td>
<td>No Distribution</td>
<td>Information Volume</td>
<td>Remarks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>-----------------</td>
<td>-------------------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<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>Geographic U.S.</td>
<td>daily</td>
<td></td>
<td></td>
</tr>
<tr>
<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>50 States</td>
<td>monthly</td>
<td></td>
<td></td>
</tr>
<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>quarterly</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Table 26

### American Indian 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>Present: Basic Communication in Sociological Application</td>
<td>2-way audio &amp; data transfer</td>
<td>Communication Centers</td>
<td>Need</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>
</tr>
<tr>
<td>Near Future: Sociological Educational Economic</td>
<td>2-way audio/video &amp; data transfer</td>
<td>Communication Centers, Schools</td>
<td>Need</td>
<td>All Indian Tribes on N. American Continent</td>
<td>Need: 4 hr. transmission 5 days/week</td>
<td></td>
</tr>
<tr>
<td>Long-Range Future: Sociological Education Economic Data Comput.</td>
<td>2-way audio/video, 2-way digital</td>
<td>Communication Centers, Schools, Info. Centers</td>
<td>Need</td>
<td>Begin expansion to isolated areas on reservation.</td>
<td>Need: 8 hr. transmission 5 days/week</td>
<td></td>
</tr>
</tbody>
</table>
### Table 27

**Day Care Services**

<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>Present: Small Scale conferring</td>
<td>2-way audio</td>
<td>Communication Centers in 25 service areas Base Stations Planned: 25 Present: 0</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>
</tr>
<tr>
<td>Near Future: Lge-scale conferencing &amp; info. distr.</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>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>
<td></td>
</tr>
</tbody>
</table>
APPENDICES

PUBLIC SERVICE COMMUNICATIONS SATELLITE USER REQUIREMENTS WORKSHOP

FINAL REPORT
JANUARY 1977

Communications and Navigation Division
Goddard Space Flight Center
Greenbelt, Maryland 20771
### APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Public Service Communications Satellite System</td>
<td>A1-1</td>
</tr>
<tr>
<td>2</td>
<td>Advance Mailing</td>
<td>A2-1</td>
</tr>
<tr>
<td>3</td>
<td>Advance Submissions</td>
<td>A3-1</td>
</tr>
<tr>
<td>4</td>
<td>Material Distributed at Workshop</td>
<td>A4-1</td>
</tr>
<tr>
<td>5</td>
<td>Panel Presentations</td>
<td>A5-1</td>
</tr>
<tr>
<td>6</td>
<td>Appendix to Elementary and Secondary Education Report</td>
<td>A6-1</td>
</tr>
<tr>
<td>7</td>
<td>Appendix to Medical Education Report</td>
<td>A7-1</td>
</tr>
<tr>
<td>8</td>
<td>Appendix to State and Local Government Report</td>
<td>A8-1</td>
</tr>
<tr>
<td>9</td>
<td>Appendix to Voluntary and Social Services Report</td>
<td>A9-1</td>
</tr>
</tbody>
</table>
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.
# TABLE OF CONTENTS

1. INTRODUCTION AND BACKGROUND .................................................. 1

2. OBJECTIVES .................................................................................... 3
   2.1 LONG RANGE OBJECTIVES ....................................................... 3
   2.2 SHORT RANGE OBJECTIVES .................................................... 3

3. EXPECTED BENEFITS ........................................................................ 4
   3.1 HEALTH SERVICES ................................................................. 4
   3.2 EDUCATION SERVICES ............................................................ 6
   3.3 DATA TRANSFER ....................................................................... 7
   3.4 TELECONFERENCING .............................................................. 8
   3.5 PUBLIC SAFETY ....................................................................... 10

4. APPROACH ..................................................................................... 12
   4.1 PHASE I - OCTOBER 1976 - DECEMBER 1977 ....................... 12
   4.2 PHASE II - JANUARY 1978 - SEPTEMBER 1979 .................... 12
   4.3 PHASE III - OCTOBER 1979 - SEPTEMBER 1981 .................. 14
   4.4 PHASE IV - OCTOBER 1981 - OCTOBER 1983 ...................... 15
   4.5 TECHNOLOGY PLAN ............................................................... 15

5. TASKS ........................................................................................... 16
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 terminal technology and to provide a production buy to reduce terminal unit costs. The program will assure a reasonable probability of a continuing space capability through the transition to a commercially supplied service. A seven-year program is planned. The program is designed to lead to a transition from NASA experimentation to commercial operation profitably serving the market.

This program is in harmony with recommendations that will be made by the Committee on Satellite Communications of the Space Applications Board Assembly of Engineering, National Research Council. This committee considered NASA's future role in satellite communications.

This program is also in harmony with the public services aspects of the domestic communications objective (RSO) of the NASA Outlook for Space Study and the recommendations of the American Institute of Aeronautics and Astronautics, Electronic Industries Association, and Institute of Electrical and Electronics Engineers.

The objectives of this program are described in Section 2. The needs and problems that will be addressed and the expected benefits are described in Section 3. The criteria for including individual elements of the program include the potential benefits to be obtained (both economic and social) and the lack of commercial or viable non-space alternatives for meeting these needs and solving the problems in the near future. Although these needs have been recognized for years, satellites have not yet been utilized.

The major obstacle to date to the increased use of satellites for communications services other than long distance telephone is not the lack of available technology, but the absence of well-developed institutional arrangements and the lack of appreciation of the services that can be provided by satellites and their potential for both cost effectiveness and increasing the quality of life. This program will aggregate a market to make commercial services economically viable. Providing a space capability to aggregate this market has proven to be too costly for the private sector. The technical plans to achieve this program, including the technology development needed to reduce the risk of flying new technology on future operational systems are described in Section 4. The economic implementation of some services is presently hindered by the lack of available low-cost ground terminal technology. This technology and other continuing long-range research and development required to support the program are also described.

The tasks necessary to accomplish this program are listed in Section 5.
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. The R&D 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

Spiking costs, lack of public confidence, archaic 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, 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.

12 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 these 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 (medical data retrieval, medical computer-aided instruction for ongoing education, medical information systems, centralized medical processing), banking and finance (interbank transfers, credit checks, utilities (monitoring and control systems for power networks, communications networks, railroads, oil, gas, water), publishing (remote publishing), and other applications such as reservations.

Three typical applications where significant contributions can be made by satellite telecommunications are health care data, library retrieval and census data.

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 cost 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 ETS 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 must 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 US 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 many 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 investigatory, training, education and administrative uses of the public safety organizations. 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 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 (OLT) 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 system. 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' requirements, 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 OLT 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 leased 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 affect 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 ONR, 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
reduced capacities.) 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 the 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 Service Communications 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, 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 assure 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) 588-0180 if you have any questions.

Sincerely,
Herbert Magyar
Workshop Coordinator

Enclosures:
- Preliminary List of Participants and Panels
- Road Map
- Program
- Federal Service Communications Requirements forms
- Self-addressed envelope
- Travel Plan form
- Travel Voucher (non-government only)
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 requirements 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)
**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.

**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 geographical distribution 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.

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

**Public Service Communications Satellite User Requirements**

<table>
<thead>
<tr>
<th>Public Service Communications Satellite User Requirements</th>
<th>Requirements Workshop Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application</strong></td>
<td></td>
</tr>
<tr>
<td>STATE the discipline to which this requirement applies, i.e., emergency medicine, education, public safety, teleconferencing.</td>
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</tr>
<tr>
<td><strong>Service Type</strong></td>
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</tr>
<tr>
<td>STATE type of communication, i.e., audio, video, color video, audio/video, digital data, one-way or two-way.</td>
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</tr>
<tr>
<td><strong>Description</strong></td>
<td></td>
</tr>
<tr>
<td>DESCRIPTION of type of terminal, i.e., ambulance, school house, hospital, clinic. Also, describe firm future plans and ultimate desires or needs for terminals.</td>
<td></td>
</tr>
<tr>
<td><strong>Geographical Distribution</strong></td>
<td></td>
</tr>
<tr>
<td>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 geographical distribution units such as hospitals, police stations, or medical centers.</td>
<td></td>
</tr>
<tr>
<td><strong>Information Volume</strong></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>Remarks</strong></td>
<td></td>
</tr>
<tr>
<td>USE this column for additional explanation of items entered in other columns, if necessary, or for additional explanatory material.</td>
<td></td>
</tr>
</tbody>
</table>
1 Tidewater Inn 7 Christ Episcopal Church
2 Easton Manor Md. 8 Methodist Church
3 Wasing Well Model 9 Elks Home
4 Easton High School 10 American Legion
5 Episcopal Cathedral 11 Free Parking Area
6 C&O Canal Church 12 24 Hour Parking Area
<table>
<thead>
<tr>
<th>Time</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dec 17</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>8:00-9:00 am</td>
<td>Breakfast</td>
<td>Panel Presentations</td>
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</tr>
<tr>
<td>9:00-12:00 am</td>
<td>Welcome</td>
<td>Public Service Communications</td>
<td>Satellite Concept Panel Discussions</td>
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<tr>
<td>12:30-1:30 pm</td>
<td>Lunch by Panels</td>
<td>Panel Discussions</td>
<td></td>
</tr>
<tr>
<td>1:30-3:00 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>
<td></td>
<td></td>
</tr>
<tr>
<td>8:30 pm</td>
<td>Get Acquainted Reception (Cash Bar, Pool-side)</td>
<td>Social (Cash Bar, Pool-side)</td>
<td></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.

__________________________________________________________________________________

A2-7
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.

<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>Search Rescue Disaster (NASA)</td>
<td>2 way-voice and data transfer</td>
<td>Voice/data terminals in 6 region service centers. Base stations present.</td>
<td>6 Maritime region centers USA</td>
<td>Present 0 Planned 1</td>
<td>Needed</td>
</tr>
<tr>
<td>Search Rescue Disaster (NASA)</td>
<td>2 way-voice and data transfer</td>
<td>Mobile portable satellite access present.</td>
<td>U S lower 48 Alaska</td>
<td>Present 0 Planned 0</td>
<td>Needed: Can expect great increase in traffic for specific periods, e.g., disaster + by a factor of 10</td>
</tr>
</tbody>
</table>

<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>Emergency Medicine</td>
<td>2 way-voice and data transfer</td>
<td>Ambulance. Present 200 Planned 500 Needed 1,000 Base Stations</td>
<td>5 county region around Etta City, USA</td>
<td>Present 500 Planned 750/day</td>
<td>Needed: Can expect great increase in traffic for specific periods, e.g., + 50%</td>
</tr>
<tr>
<td>Teleconferencing</td>
<td>Audio/Video Multiple Simultaneous Terminals</td>
<td>Voice/Video terminals in 50 regional sales offices Present Planned Needed</td>
<td>U S 50 states</td>
<td>30 minute transmission Planned 5 days/week</td>
<td>Present audio techniques preclude use of video material such as charts, products, displays, etc</td>
</tr>
<tr>
<td>Instruction for home bound handicapped</td>
<td>2 way audio 4 data 1 way video</td>
<td>TV terminals with keyboard &amp; mike Needed Full-time (24 hrs, 7 days) at least 10 channels</td>
<td>U S 4 territories</td>
<td>Planned 0 Needed 0</td>
<td>Instructional, special classes and home instruction with G1 and feedback to small audiences widely scattered</td>
</tr>
<tr>
<td>Instructional materials distribution</td>
<td>2 way video 3 way data</td>
<td>User terminals and video/audio recorders Needed: 24 hr transmission of a volume far exceeding current TV modes capacity</td>
<td>U S 4 territories</td>
<td>Planned 0 Needed 0</td>
<td>This is conceived as an alternate to mail or UPS materials distribution— one way, with ordering details way</td>
</tr>
</tbody>
</table>

A3-2
## 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>Criminal Justice</td>
<td>2 way data</td>
<td>Interstate communication network</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 as average of 63 kilobits per second nationwide peak = 2 times average</td>
</tr>
<tr>
<td></td>
<td>transfer</td>
<td>(existing)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>2 way voice</td>
<td>Interstate (state police)</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></td>
<td></td>
<td>communications network</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>2 way graphical</td>
<td>Interstate (government)</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 image via high speed electronic means would be highly desirable</td>
</tr>
<tr>
<td></td>
<td>information</td>
<td>communications networks</td>
<td></td>
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### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

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<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>digital</td>
<td>libraries</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>libraries</td>
<td>broadcast</td>
<td>government</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>microcomputers</td>
<td>remote sensors</td>
<td>5</td>
<td>U S</td>
<td>present. 10,000 bits/sec needed</td>
<td>satellite packet broadcasting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td>50 states</td>
<td>1,000,000 bits/sec</td>
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<td>3</td>
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</table>
### PUBLIC SERVICE COMMUNICATIONS SERVICE REQUIREMENTS

#### USER TERMINALS

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<th>Application</th>
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<th>Description</th>
<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teleconferencing</td>
<td>2 way Audio/Video</td>
<td>Inst. of Higher Educ representing state agencies throughout the State</td>
<td></td>
<td>Scattered</td>
<td>First Six</td>
<td>Serving almost all state agencies from 31 specified locations and dish</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Needed</td>
<td></td>
<td>Staters Serving Total</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>State Agencies</td>
<td>6 hrs Daily</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Broadband Requirements - First 6 Categories Combine</td>
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<td></td>
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<td></td>
<td></td>
<td>2 hours between 9am and 5pm each weekday</td>
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<td></td>
<td></td>
<td></td>
<td>2 hours between 2 pm and 11 pm each night</td>
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<tr>
<td>Instructional</td>
<td>2 way Audio/Video</td>
<td>Higher Educ Public Educ Personnel Training</td>
<td></td>
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<tr>
<td>Programming</td>
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<tr>
<td>High Speed Data</td>
<td>Digital Data</td>
<td>Higher Educ A &amp; P Highway Dept Rotn Medical Inst</td>
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<td></td>
<td>2 way</td>
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<tr>
<td>High Speed</td>
<td>Digital Data</td>
<td>Higher Educ ETV &amp; Public Servelling</td>
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<tr>
<td>Faximile</td>
<td>2 way</td>
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</table>

### Virginia

#### 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>Public TV Networking</td>
<td>1 Way Audio/Video</td>
<td>BTV Stations</td>
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<td>Scattered</td>
<td></td>
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<td></td>
<td>Locality</td>
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<td>Clusters Serving</td>
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<td>State Agencies</td>
<td>6</td>
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<td></td>
<td>Only Where Possibly extendable</td>
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<tr>
<td>Video Site Monitoring</td>
<td>1 Way Video</td>
<td>Environmental Agencies Highway Dept Forestry Engineering &amp; Buildings</td>
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<tr>
<td>Slow Speed Data</td>
<td>Digital Data</td>
<td>All State Agencies</td>
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<tr>
<td></td>
<td>2 way</td>
<td></td>
<td></td>
<td>Broadcast Service</td>
<td></td>
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<td>conducted thru way</td>
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<td>3P Locality</td>
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<td></td>
<td></td>
<td>Clusters serving</td>
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<td>the state</td>
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<tr>
<td>Alert and Alarm</td>
<td>Digital data</td>
<td>State Police Off Emergency Srv Highway Dept</td>
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<td></td>
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<td></td>
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<tr>
<td>Signal</td>
<td>1 way</td>
<td></td>
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</table>

A3-4
### Virginia

#### Public Service Communications User Requirements

<table>
<thead>
<tr>
<th>Application</th>
<th>Service Type</th>
<th>Description</th>
<th>Geographic</th>
<th>Information</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Voice Networking</td>
<td>1 way Audio</td>
<td>State Police Off Emergency 24Hr</td>
<td>Scattered Locality</td>
<td>See Preceding Clusters</td>
<td>Page 52</td>
</tr>
<tr>
<td>Telemetry Signaling</td>
<td>1 way Digital Data</td>
<td>Highway Environment Agencies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle Control Signaling</td>
<td>1 way Digital Data</td>
<td>High Traffic Data Control</td>
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</tr>
<tr>
<td>Slow Speed - Pedestrian</td>
<td>2 way Audio</td>
<td>Virtually all agencies and institutions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Virginia

<table>
<thead>
<tr>
<th>Application</th>
<th>Description</th>
<th>Geographic</th>
<th>Information</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Radio Networking</td>
<td>All Public Radio Stations</td>
<td></td>
<td></td>
<td>See preceding page</td>
</tr>
<tr>
<td>Instructional Programming</td>
<td>Higher Educ Public Educ State Personnel Training</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio Conference</td>
<td>Virtually all agencies and institutions</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aural Monitoring</td>
<td>Environmental Agencies</td>
<td>52</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 Agency</td>
<td>Environmental Dept Forestry</td>
<td>52</td>
<td>See Preceding Page</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

<table>
<thead>
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<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>2 way VOICE</td>
<td>154 CCT SH FIRE (similar to those for ATS-18)</td>
<td>1</td>
<td>Follows geographical spread of An Lutheran Ch Upper Midwest West Coast and several mission parishes</td>
<td>Present thru Needed: 500 messages/day</td>
<td>Primarily interested in the direct interchange of information between widely separated areas, via a control education medium, and to expedite, non-redundantly, business. (Call interview group discussions, etc)</td>
</tr>
<tr>
<td>Planned Portable</td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></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>
</tr>
<tr>
<td>Planned Fixed</td>
<td></td>
<td></td>
<td>50</td>
<td></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>Type</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 library dormitories apt houses/condo hospitals</td>
<td>Campus cities</td>
<td>4 pm - midnight to 20 min - 1 hr block 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>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Public Service Communications User Requirements

<table>
<thead>
<tr>
<th>Application</th>
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<th>Description</th>
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<th>No</th>
<th>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Education</td>
<td>Full Duplex Color Video Audio and Data Transfer</td>
<td>University TV Studios &amp; Classroom</td>
<td>5</td>
<td>U of Washington, U of Alaska, Montana State U, U of Idaho, Washington State University</td>
<td>75 minute transmission bi-weekly</td>
<td>Need high quality color camera with lens extenders for magnification</td>
<td></td>
</tr>
<tr>
<td>Clinical Medical Education &amp; Continuing Medical Education</td>
<td>Full Duplex Color Video Audio and Data Transfer</td>
<td>Hospitals</td>
<td>14</td>
<td>Present need, Planned need</td>
<td>30 minutes time per day, 5 days per week</td>
<td>Need high quality color camera with lens extenders for magnification</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Present need</td>
<td>14</td>
<td></td>
<td>5 days per week</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planned need</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medical Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pediatrics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal Medicine</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>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>--------------</td>
<td>-------------</td>
<td>----</td>
<td>---------------------------</td>
<td>--------------------</td>
<td>--------</td>
<td></td>
</tr>
</tbody>
</table>
| EDUCATION   | FULL DEXLX   | STATE CAPITALS | 4 | JUNEAU AK  
BOSTON MA  
OFPOLIA WA | AS NEEDED          |        |
| MEDICAL     | FULL DEXLX   | VA HOSPITALS | 2 | BOISE IDAHO  
AMERICAN LAKE WA  
VAWA WA | 15 MINUTES WEEKLY |        |

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS USER TERMINALS**

<table>
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<tr>
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<th>Remarks</th>
</tr>
</thead>
</table>
| EDUCATION   | Audio/Color  | video 2-way | 1 | colleges & universities  
hospitals conferences  
centers | possibly throughout the U.S | Assuming sufficient user terminals - several hours per day  
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 |
## PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS
### USER TERMINALS

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<tr>
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<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented</td>
<td>1-way audio &amp; visual</td>
<td>Hospital Clinic experience</td>
<td>4</td>
<td>Waconia, Minn</td>
<td>23/1000 physician/day</td>
<td>local traffic only predominantly supplemental not economically sound by itself</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(confidentiality secure)</td>
<td></td>
<td>Hoop 350</td>
<td>5 state footprint</td>
<td>100-200/0/day</td>
</tr>
<tr>
<td>DATA</td>
<td>Wave band soft and/or hard copy</td>
<td>Hospital Clinic experience</td>
<td>4</td>
<td>Waconia, Minn</td>
<td>35/1000 physician/day</td>
<td>valued</td>
</tr>
<tr>
<td>Telediagno</td>
<td>2-way audio &amp; visual</td>
<td>Data-Soft &amp; Hard Special terminals stethoscope ultra sound</td>
<td>4</td>
<td>Waconia, Minn</td>
<td>73/1000 physician/day</td>
<td>local traffic primarily valuable for clinics with satellite office</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hoop 350</td>
<td>5 state footprint</td>
<td>300-1000/day</td>
</tr>
<tr>
<td>Consultation</td>
<td>2-way audio &amp; visual</td>
<td>Data-base as same as Telediagnostic</td>
<td>4</td>
<td>Waconia, Minn</td>
<td>47/1000 physician/day</td>
<td>local and wide general traffic need previous &quot;familiar&quot; association</td>
</tr>
</tbody>
</table>

*Based on approximately 1000 physician-day experiment*
### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

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<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 Present</td>
<td>200 or more</td>
<td>GW University Unknown</td>
<td>Planned Unknown Needed ?</td>
<td>Need unknown, but envision a demonstration of this application using HMISS &amp; RAMS and GHI Heart-Exercise Project participants</td>
</tr>
<tr>
<td>Public Service Tape</td>
<td>Tape and hardcopy Input; same as Input or as hardcopy copy</td>
<td>Present Planned</td>
<td>0</td>
<td>Top 75 to 100 US areas, 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 matters in business and government</td>
</tr>
<tr>
<td>Public Service Tape</td>
<td>Tape and hardcopy Input; same as Input or as hardcopy copy</td>
<td>Planned</td>
<td>75-100 major cities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Service Tape</td>
<td>Tape and hardcopy Input; same as Input or as hardcopy copy</td>
<td>Planned</td>
<td>0</td>
<td>National coverage, 1 e Canus, 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
**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

### USER TERMINALS

<table>
<thead>
<tr>
<th>Application 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><strong>Public Safety Training</strong></td>
<td>Classroom ITV from State to Regional centers and local, fire stations, police stations, etc</td>
<td>5000 sq.</td>
<td>Classroom 5 hrs/week</td>
<td>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></td>
<td>Present Planned</td>
<td>3 75</td>
<td>3 States 9 Counties</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Public Safety Identification</strong></td>
<td>Live transmission from and to disaster scenes</td>
<td></td>
<td>Base</td>
<td>On command</td>
<td>To identify methods of control, toxic effects of chemicals, explosives, etc. etc</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7 Base</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Public Safety: Tactical control</strong></td>
<td>Base</td>
<td></td>
<td>Base</td>
<td>Base</td>
<td>Provide centralized control of major disaster scenes for suppression of fire, explosion, security, etc. Dispatch of equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS**

### USER TERMINALS

<table>
<thead>
<tr>
<th>Application 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 Medical Education Tele-conferencing</strong></td>
<td>Voice/video terminals in hospitals, clinics, homes and medical schools</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 ITFP, CATV, common carrier long lines, private cable, and video cassette</td>
</tr>
<tr>
<td></td>
<td>Present Needed</td>
<td>135 135</td>
<td></td>
<td></td>
<td>Satisfying state of Indiana health science community. Interested in forming consortium for national programming distribution via satellite. Future programming will include transmission of hard copy medical data</td>
</tr>
<tr>
<td><strong>3-way voice</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See attached TV guide for current programming</td>
</tr>
</tbody>
</table>
### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

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</tr>
</thead>
<tbody>
<tr>
<td>Tele-conferences</td>
<td>AUDIO/VIDEO</td>
<td>Multiple Terminals to 4 Regions</td>
<td>4</td>
<td>Points in Cont U S</td>
<td></td>
<td>High Cost For Terrestrial Capability Precludes Obtaining Capability. Also Inflexible Compared to Satellite Media</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Present</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planned</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Desired</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor Broadcast</td>
<td>Digital</td>
<td>Digital Readout</td>
<td>125</td>
<td>U S Wide</td>
<td></td>
<td>OUTPUT OF SENSOR is Input to Satellite Terminal. May be Manual Interface, One-way Traffic Transmission (from sensor), One-way Interrogation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throughout U S</td>
<td>2-5 second bursts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-3 Interrogation per Hour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphic Broadcast</td>
<td>Digital</td>
<td>FAX Terminal or LRT With Storage</td>
<td>1500</td>
<td>U S Wide</td>
<td></td>
<td>Two Systems 90% Utilised</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Existing In Three Terrestrial System</td>
<td></td>
<td>(Some International)</td>
<td></td>
<td>One System Cannot Meet All the Requirements that Exist. 100% Utilised</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5-10 Minute Transmissions</td>
<td></td>
<td>Also, 9% of Traffic is Broadcast from 1 node. 1% Originate at 3 Other Nodes</td>
<td></td>
</tr>
<tr>
<td>Environmental Data Products</td>
<td>Digital</td>
<td>2 Point Service</td>
<td>40</td>
<td>U S Wide</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 hours/day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7 days/week</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
## PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

### USER TERMINALS

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<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminal Justice</td>
<td>Two way data</td>
<td>State crime related info computer to computer</td>
<td>50</td>
<td>Contramensive US</td>
<td>100,000 MSG per mo</td>
<td></td>
</tr>
<tr>
<td>Law Enforcement</td>
<td>One way video</td>
<td>Areawide broadcast of visual 10 info</td>
<td>650</td>
<td>US</td>
<td>UNK</td>
<td>All terminal should initiate broadcast to limited addressable areas Present tech use slow Land line CATS</td>
</tr>
</tbody>
</table>

## PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

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</tr>
</thead>
<tbody>
<tr>
<td>Post-secondary Education</td>
<td>audio/video plus interactive involving 3 groups of approx. 7 each</td>
<td>college or university present institution situated throughout the state</td>
<td>69</td>
<td>Unavailable</td>
<td>0 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>
</tr>
<tr>
<td>Post-secondary Education</td>
<td>computer network linking 32 private colleges &amp; universities to computer 10 to Notre Dame, 1 to U. of Evansville</td>
<td>located statewide</td>
<td>34</td>
<td>Unavailable</td>
<td>at outset 1 hr per day</td>
<td>Both Evansville &amp; Notre Dame can handle the traffic, the problem is in networking</td>
</tr>
<tr>
<td>Indiana Dept. of Corrections</td>
<td>Tele- Corrections conference involving dept. 7 prisons</td>
<td></td>
<td>8</td>
<td>Michigan City plus 7 locations in Central Ind.</td>
<td>30 min. transmission 5 days/wk</td>
<td>Video most important in addition to audio which is now available</td>
</tr>
<tr>
<td>Indiana Dept. of Corrections</td>
<td>audio/video prisons</td>
<td>7</td>
<td>7</td>
<td></td>
<td>2 hrs. per day 5 days per wk</td>
<td>Employees basic training program and portion of AA degree prog</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>
<td>----</td>
<td>---------------------------</td>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Dual channel color video, two-way audio</td>
<td>VA Hospitals Present (Experiments) 0</td>
<td></td>
<td></td>
<td></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 ATE-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>National Medical Satellite Journal</td>
<td>Same as above</td>
<td>Same as above</td>
<td></td>
<td>Same as above</td>
<td></td>
<td>Same as above</td>
</tr>
<tr>
<td>Hospital Management Teleconferences</td>
<td>Same as above</td>
<td>Same as above</td>
<td></td>
<td>Same as above</td>
<td></td>
<td>Same as above</td>
</tr>
<tr>
<td>Continuing Education for Professional Certification</td>
<td>Same as above</td>
<td>Same as above</td>
<td></td>
<td>Same as above</td>
<td></td>
<td>Same as above</td>
</tr>
</tbody>
</table>

* Current experiments will determine
### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

#### USER TERMINALS

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</tr>
</thead>
<tbody>
<tr>
<td>North East Resources Data Descriptive Network (END)</td>
<td>Digital Data Reception</td>
<td>High data rate (6 to 1.0 Mbps) at each only terminals at END Area and User Facilities: Present Planned Needed</td>
<td>U.S.</td>
<td>50 States</td>
<td></td>
<td>Broadcast of preprocessed 30m/7-omd digital earth resources data covering the entire 50 states to all users/area centers simultaneously. Users receive all data within 24 hours of sensing. (The 120 Mbps broadcast channel needed if 10w/12-band data is collected.</td>
</tr>
<tr>
<td>Water Resource Management</td>
<td>One-way digital data, low rate</td>
<td>Small, unattended data collection platforms: Present Planned Needed Central Terminals</td>
<td>State or regional watershed areas throughout U.S.</td>
<td>One central terminal per state,</td>
<td></td>
<td>Policy system using forward propagation link provides added flexibility with considerable added cost.</td>
</tr>
<tr>
<td>U.S. Postal Service</td>
<td>Electronic Mail System</td>
<td>One way data system simple channels</td>
<td>Terminal at each post office or group of post offices: Present Planned Needed</td>
<td>Major cities in USA,</td>
<td>6-100 bit messages per day per DCP, fixed schedule.</td>
<td>Point-to-point service</td>
</tr>
<tr>
<td>Library Reference System</td>
<td>Fast Priority teletype or facsimile, One way data plus one way command</td>
<td>Terminal at each computer center terminal. Present Planned Needed Computer Terminal</td>
<td>Major cities in USA,</td>
<td>1 to 1 Mbps/110 to 120 Kbps growth to 24 hr service</td>
<td>Large memory with computer controlled access. Interactive with user possible.</td>
<td></td>
</tr>
</tbody>
</table>

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### 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>Continuing Education Medical</td>
<td>One-way audio/video return audio capability to national center</td>
<td>Terminals in all teaching hospitals: Present Planned Needed</td>
<td>50 States</td>
<td></td>
<td>120 minutes of transmission weekly, 52 weeks</td>
<td>Information volume may increase</td>
</tr>
<tr>
<td>Continuing Professional Education Veterinary Medicine</td>
<td>One-way audio/video return audio capability to national center</td>
<td>Terminals in average of 10 regional centers in each of 50 states: Present Planned Needed</td>
<td>50 States</td>
<td></td>
<td>120 minutes of transmission weekly, 52 weeks</td>
<td>Information volume may increase</td>
</tr>
<tr>
<td>Continuing Professional Education Elementary-Secondary Education Personnel</td>
<td>One-way audio/video return audio capability to national center</td>
<td>Terminals needed in every elementary and secondary public school: Present Planned Needed</td>
<td>50 States</td>
<td></td>
<td>120 minutes of transmission weekly, 52 weeks</td>
<td>To provide updated information on laws affecting education and general professional information on regular, immediate basis, information volume may increase</td>
</tr>
<tr>
<td>Services to Handicapped thru regional and state centers</td>
<td>One-way audio/video return data transfer for</td>
<td>At least one terminal for each major organization in each state: Present Planned Needed</td>
<td>50 States</td>
<td></td>
<td>7 likely to be at least 10 hours per week, 52 weeks of information transfer</td>
<td>Information, modules, data, and special programs (e.g., captioned videos and tapes) need to be disseminated regularly to schools and centers used by the handicapped</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>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC TV National Program Distribution</td>
<td>one way video, multiple voice track transmission</td>
<td>to all stations</td>
<td>National</td>
<td>start 16 hrs per day, up to 24 hrs</td>
<td>exchange of program materials for local open circuit broadcasts</td>
</tr>
<tr>
<td>Point to point Distribution inter-city</td>
<td>2 way video and audio plus 2 way cue circuits</td>
<td>to 25 market cities.</td>
<td>Top 25 cities</td>
<td>thirty minutes per day/week</td>
<td>exchange of common concerns and solutions, Commonality of market size, or geographic location.</td>
</tr>
<tr>
<td>Regional or topical programs</td>
<td>2 way video/voice 2 way cue 2 way cue circuits</td>
<td>Regional up &amp; down links</td>
<td>one hour per day</td>
<td>intra-regional interconnection</td>
<td></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>U.S.A. Gr. Britain France Italy W. Germany Sweden Russia Japan</td>
<td>one hour per day</td>
<td>global interconnects for program exchange of live time performance or new programs</td>
</tr>
</tbody>
</table>

#### PUBLIC SERVICE COMMUNICATIONS USER REQUIREMENTS

<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>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>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>SPECIAL MOBILE TERMINALS</td>
<td>WEST OF 100° WEST</td>
<td>WEST</td>
<td>PEAK FULL TIME TWO VOICE CHANNEL EQUIVALENTS, BUT SPORADIC</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>Library information retrieval</td>
<td>2 way data facsimile or slow scan TV</td>
<td>Receive/transmit terminals in major libraries, receive only to smaller libraries</td>
<td>200</td>
<td>U S</td>
<td>Volume depends upon growth of library facilities for automated text access</td>
<td></td>
</tr>
<tr>
<td>Library bibliographic search</td>
<td>2 way data</td>
<td>Receive/transmit terminals in all libraries</td>
<td>2200</td>
<td>U S</td>
<td>Possibly better handled by switched telephone network during foreseeable future</td>
<td></td>
</tr>
<tr>
<td>PBS program distribution</td>
<td>1 way color video/audio</td>
<td>Receive terminals at all PBS stations, delay center transmit terminals</td>
<td>170</td>
<td>U S</td>
<td>20 hours per day</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>U S</td>
<td>6 hours per day</td>
<td></td>
</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>Geographical Distribution</th>
<th>Information Volume</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television remote pickup</td>
<td>1 way color video/audio 2 way voice</td>
<td>Receive terminals to major cities transportable transmit terminals</td>
<td>50</td>
<td>U S</td>
<td>25 transmissions per day varying length</td>
<td></td>
</tr>
<tr>
<td>PBS program preview</td>
<td>1 way color video/audio</td>
<td>Receive terminals at all PBS stations, delay center transmit terminals</td>
<td>170</td>
<td>U S</td>
<td>10 hours per day</td>
<td></td>
</tr>
<tr>
<td>Education 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>U S</td>
<td>12 hours per day on one channel at outlet</td>
<td></td>
</tr>
<tr>
<td>Translator service</td>
<td>1 way color video/audio</td>
<td>PBS station transmit terminals, receive terminals at remote translator sites</td>
<td>50</td>
<td>U S</td>
<td>Continuous programming</td>
<td></td>
</tr>
</tbody>
</table>

*Cover remote localities not now covered by PBS stations*
<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</td>
<td>2-way audio</td>
<td>Headquarters</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>Law Enforcement vehicles</td>
<td></td>
<td></td>
<td>30 second</td>
<td></td>
</tr>
<tr>
<td></td>
<td>data</td>
<td></td>
<td></td>
<td></td>
<td>Messages per day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 days/week</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>audio</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 each county</td>
<td></td>
<td>Statewide</td>
<td>5 min trans</td>
<td>Frequent length of messages will increase with prevailing conditions</td>
</tr>
<tr>
<td></td>
<td>video</td>
<td></td>
<td></td>
<td></td>
<td>7 days/week</td>
<td></td>
</tr>
<tr>
<td>Teleconferencing</td>
<td>2-way video</td>
<td>Terminals in state government offices needed</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>audio</td>
<td></td>
<td></td>
<td></td>
<td>5 days/week</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>Emergency Medicine</td>
<td>2 Way Voice</td>
<td>Ambulance Hospital Present Needed</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>
</tr>
<tr>
<td></td>
<td>and Data Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Medicine &amp; System Control</td>
<td>2 Way Voice and Data Transfer</td>
<td>Hospitals and Remote Clinics Present Needed</td>
<td>0</td>
<td>Extreme Rural and Wilderness areas 60 States</td>
<td>Unknown</td>
<td>Need 2 way voice and data transfer for system control, Video for advanced life support</td>
</tr>
<tr>
<td>Emergency Medical Training and skill update</td>
<td>2 Way Voice, Data and Video</td>
<td>Hospitals and Remote Clinics Present Needed</td>
<td>0</td>
<td>Extreme Rural and Wilderness areas 90 States</td>
<td>Unknown</td>
<td>Need 2 way interactive voice, data transfer, and video for training and skill update.</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>
<td>----</td>
<td>----------------------------------------</td>
<td>--------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>2 Way Voice and Data Transfer</td>
<td>Ambulance Hospital Present</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>
</tr>
<tr>
<td>Emergency Medicine &amp; System Control</td>
<td>2 way Voice and Data Transfer</td>
<td>Hospitals and Remote Clinics Present Needed</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 system control; video for advanced life support</td>
</tr>
<tr>
<td>Emergency Medical Training and skill update</td>
<td>2 way Voice, data and video</td>
<td>Hospitals and Remote Clinics Present Needed</td>
<td>0</td>
<td>Extreme Rural and Wilderness areas 50 States</td>
<td>Unknown</td>
<td>Need 2 way interactive voice, data transfer, and video for training and skill update</td>
</tr>
</tbody>
</table>

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**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.
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.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 17, 1976</td>
<td>8:30 p.m.</td>
<td>Dinner—Hotel dining room (including in American Plan) Social at pool-side, cash bar</td>
</tr>
<tr>
<td><strong>Sessions</strong></td>
<td></td>
<td>All sessions (group and individual panels) will be held in the Gold Room in accordance with the Program Schedule mailed to you.</td>
</tr>
<tr>
<td><strong>Meals</strong></td>
<td></td>
<td>All meals will be served in the Crystal Room (except Tuesday, lunch in the Blue Room). Breakfast will start promptly at 8:00 a.m.</td>
</tr>
<tr>
<td><strong>Menu</strong></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Administrative Services</strong></td>
<td></td>
<td>All administrative services (typing, reproduction, massage 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.</td>
</tr>
<tr>
<td><strong>Hotel Accommodations</strong></td>
<td></td>
<td>Your room has been reserved per your travel form which you submitted to Dr. E. Wolff. Accommodations have been made under an American Plan.</td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
<td>(3 meals) Each attendee (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 $.12/mile. In order that all expenses may be reimbursed, receipts must accompany expense voucher.</td>
</tr>
</tbody>
</table>

PUBLIC SERVICE COMMUNICATIONS SATELLITE USER REQUIREMENTS WORKSHOP

ARRANGEMENTS
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

Arrangements: Herbert Major

1. COMMERCIAL SERVICES
   Chairman: Donald Jansky
   Secretary: Joseph Sivo

2. DATA AND MESSAGE SERVICES
   Chairman: Norman Abramson
   Secretary: Charles Cote
   Chairman: Harold Nigro
   Secretary: John Biebler

3. EXTENSION AND SECONDARY EDUCATION
   Chairman: Harold Nigro
   Secretary: Robert E. Vincent
   S. Vincent, Frank Norwood, Kenneth Polyanski, Nathan Shoehalter

4. ENVIROMENTAL COMMUNICATIONS
   Chairman: Arthur Cook
   Secretary: Enrico Marcanti
   Kevin Arundel, George Christiansen, Harlow Feke, Virginia Gentle, Harold Morse, Frank Norwood, Kenneth Polyanski, Nathan Shoehalter

5. LIBRARY SERVICES
   Chairman: Ruth Katz
   Secretary: Sajjad Durran
   Paul Andereck, Edward Blackhurst, Allan Deschena, Priscilla Gotsick, Steven Herman, Albert Horley, Mary Hurff

6. MEDICAL EDUCATION
   Chairman: Charles Hark
   Secretary: William Conant
   David Boyd, Leon Greenhouse, Arthur Griffith, Howard Hope, James Justice, Edward Neuman, H. Roy Schwartz, Robert Schumacher, Dean Siebert, John Werneman

7. MEDICAL SERVICES
   Chairman: Ralph Christiansen
   Secretary: Walter Sullivan
   William Harley, Robert Hilliard, Bernard Luskin, P. Lee Morris, Richard Oldham, George Selz, Sidney Tishler, Ronald Wilson

8. PUBLIC SAFETY
   Chairman: S. S. Ashto
   Secretary: Jan V. Hovland
   George Allen, Gerald Carr, Helen Clearwater, Alva Cooper, Donald Kavanagh, Lois McCoy, Keith Lynn, Allan Marion, Donald U. Schuman, William Norton

9. RELIGIOUS APPLICATIONS
   Chairman: William Fox
   Secretary: Joseph Corrigan

10. STATE & LOCAL COMMUNICATIONS
    Chairman: Robert Wilk
    Secretary: James Brown
    Claude Buxer, Giuseppe Farnese, Gary Farnese, Joel Fleming, Donald Hinson, Ted Rums, Mason Riegel, John Richards, Marvin Roffman, Elizabeth Young

11. Voluntary & Social Services
    Chairman: J. L. Cowan
    Secretary: John Woodruff
    Gertrude Barnstone, Warren Brann, Andrew Horowitz, Annie King Phillips, Martin Kaplan, John Schwartz, Charmaine Wisecarver

Affiliations:

ALOHA Institute
United Methodist Board Discipleship
Regional Educational Services Agency
U.S. Office of Education
National Institute of Education
LEAP
Member of the Board, KFFT
Self
Appalachian Educational Satellite Project
Hershey 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
GSFC/NASA
Rural Electrification Administration
U.S. Catholic Conference
American Satellite Corporation
DEA
University of California, San Diego
Iowa State University
Self
American Red Cross
Motorola Inc.
NASA
GSFC/NASA
Department of California Highway Patrol
GSFC/NASA
AID - Consultant
Aeronautical Ford
National Science Foundation
Library of Congress
Operations Research, Inc.
GSFC/NASA
Architects of San Francisco
Office of Chief Engineers
GSFC/NASA
COMSAT General Corporation
Operations Research, Inc.
Operations Research, Inc.
Mead - Dade Community College
Virginia Public Telecommunications Council
NASA Headquarters
National Council of Churches of Christ
NASA Headquarters
ALASKA ATS-6
HEALTH/EDUCATION TELECOMMUNICATIONS EXPERIMENT

ALASKA EDUCATION EXPERIMENT FINAL REPORT
EXECUTIVE SUMMARY

September 30, 1975
1. 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 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, Tlinget, 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 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 Tlingit-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 communications 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 system development.

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.
OBJECTIVES

The selection, scheduling, and production of programming provided experience in the process of specified educational program development and the necessary data 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 ALEO 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 any 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.

RECOMMENDATIONS

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 GOT 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. GOT 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 -68 degrees F did not impair receive terminal operation, and only one equipment failure was directly attributable to cooler 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 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, 160 hours of original television programming required special preparation due to ground conditions and winter snow accumulation.
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 50000 urban residents of Fairbanks.

The ALED project gave COT 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 COT 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 COT'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

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.

--Utilization Aide, Valdez

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 potential for satellite communications in Alaska are beginning to be discovered by planners and users alike.
TEL-MEDICINE IN ALASKA
THE ATS-6 SATELLITE BIOMEDICAL DEMONSTRATION

Final Report of the Evaluation of the ATS-6 Biomedical Demonstration in Alaska

by Dennis Foote, Edwin Parker, and Heather Hudson

Sponsored by the Lister Hill National Center for Biomedical Communication, National Library of Medicine
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Edwin B. Parker and William C. Fowkes
Principal Investigators

Institute for Communication Research
Stanford University
February 1976

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 U.S. 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 consultations, patients at these two remote sites were seen by physicians at the Service Unit Hospital at Tanana or by medical specialists in...
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 downtime 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 106 scheduled transmission days, approximately 325 video consultations were conducted. The range of diagnoses was very wide and included “sensitive” health problems such as genito-urinary 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 infective 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.

Conclusions

1. 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 telemedicine service into the realistic setting of an ongoing 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

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3. Satellite video consultation can be successfully carried out by health care providers at all levels of training.
Village health aides from Galena, Hulua, 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 (1 to 6 minutes). The initial diagnosis is changed by the consulting physician after the video consult more often than following audio consults, 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 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 addittion 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 further research are also discussed in the light of these technical, cost, and research considerations; nine major and fourteen minor recommendations are made in this 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 service 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 AS-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.

FIRST COLOR SLIP-SCAR TRANSMITTED FOR MEDICAL DIAGNOSTIC PURPOSES ALTOONA, PENNSYLVANIA TO DENVER, COLORADO "HISTOPATHOLOGY" NOVEMBER 27, 1974 DIAGNOSIS: TULAREMIA
The Veterans Administration Experiments in Health Communications on the Applications Technology Satellite (ATS-6)

Final Report by Kathryn S Caldwell, Ph D
Director, Experimental Design Foundation for Applied Communications Technology

Section V Data and Evaluation by Applied Communications Research Stanford, California

TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Section I</td>
<td>The Problem</td>
<td>5</td>
</tr>
<tr>
<td>Section II</td>
<td>The Experiment</td>
<td>9</td>
</tr>
<tr>
<td>Section III</td>
<td>The Procedure</td>
<td>17</td>
</tr>
<tr>
<td>Section IV</td>
<td>Observations</td>
<td>33</td>
</tr>
<tr>
<td>Section V</td>
<td>Data and Evaluation</td>
<td>41</td>
</tr>
<tr>
<td>Section VI</td>
<td>Summary and Conclusions</td>
<td>61</td>
</tr>
<tr>
<td>References</td>
<td></td>
<td>67</td>
</tr>
</tbody>
</table>
Abstract

The Veterans Administrations Experiments in Health Communications with the Applications Technology - Satelite-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 access by traditional communication methodology such as teleconferencing or by traveling specialists, is costly and difficult. High powered communications satellites can potentially overcome these problems by transmitting wide and narrow bandwidth signals to low cost receivers.

The Veterans Administrator elected to become an example user on NASA's manned commercial Applications Technology - Satelite (ATS) system. Two types of communications experiments were directed to diagnostic therapeutic and educational purposes. The hospitals selected to participate in the experiment were located in the Appalachian Region, one of three regions selected for experimentation on ATS due to geographic location. The audience participants were comprised of physicians, nurses and other health professionals.

The two main results were video conferences between physicians and resident doctors directed to patient cases and computer mediated seminars which included preproduced software. These experiments were received at the hospitals as well as the medical teaching institutions. Questionnaires returned by participants indicated that the objectives of this project were met in improving the current tele-conferencing formats, and providing easy access to distant health care professionals. The teleconferencing project required an average of one hour per week and the computer seminar was conducted for 3 hours. Participants were in fact satisfied with the quality of the communication and the information provided.

Communications by satellite are likely to be of great value to the Veterans Administration in overcoming, the geographical distance between many hospitals and the medical teaching institutions. The institution's satellite-based communications system may be of interest for the development of an educational system of teleconferencing and interactive seminars that could be expanded to locate a relatively low fixed cost.
Section I: The Problem

The Veteran Administration operates the largest health care delivery system in the western world. It includes some 171 hospitals and 273 outpatient clinics. Many of these are located in large metropolitan areas. The service and infrastructure have grown to meet the needs of veterans, many of whom have returned from overseas service. The VA has also been expanded to serve non-veterans. As the VA has grown, so have the problems associated with it.

One of the primary problems is a lack of communication within the VA. There is a great deal of paperwork and a lack of electronic interchange. This results in a great deal of duplication of effort and a lack of coordination between different VA facilities. This has led to inefficiencies and a lack of quality care for veterans.

Another problem is the lack of coordination between different VA facilities. This has led to inefficiencies and a lack of quality care for veterans.

The VA's electronic medical records system is one of the largest in the world. However, it has not been fully integrated into the VA's overall system. This has led to problems with patient care and a lack of efficiency.

The VA also has a problem with its information technology systems. These systems are outdated and not well maintained. This has led to a lack of security and a lack of efficiency.

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In conclusion, the VA has a number of problems with its information technology systems. These problems need to be addressed in order to improve patient care and efficiency.

Stanley's medical records system is one of the largest in the world. However, it has not been fully integrated into the VA's overall system. This has led to problems with patient care and a lack of efficiency.

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Appalachian region, on the basis that it was needed for national security.

Experiments had the choice of building new transmitters in the 400 meter wavelength band or using existing stations. The former offered the advantage of using existing stations. The latter was considered more compatible with the existing system. The choice was made to use the existing stations.

In order to carry out the experiments in the Appalachian region, the Navy had to establish a new transmitter. The new transmitter was established in the Appalachian region and was named the "Appalachian Radio Station." The station was located in the Appalachian Mountains in the state of West Virginia. The station was used to test the feasibility of using the new wavelength for broadcast and to determine the effectiveness of the new equipment.

2. Experimental Control

As a result of the current experiments, it was decided to establish a new station in the Appalachian region. The new station was established in West Virginia and was named the "Appalachian Radio Station." The station was used to test the feasibility of using the new wavelength for broadcast and to determine the effectiveness of the new equipment.

The experiments were conducted in three phases: (1)feasibility studies; (2) testing of equipment; and (3) operational testing. The feasibility studies were conducted to determine the feasibility of using the new wavelength for broadcast. The testing of equipment was conducted to determine the effectiveness of the new equipment. The operational testing was conducted to determine the effectiveness of the new equipment in an operational setting.

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The experimental satellites designed 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, the capabilities of the ATS-6 became known a number of years after the satellite became operational. It seemed advantageous to test the satellite for these uses in a limited number of hospitals for potential usefulness throughout the VA health care system.

The experimental events subsequently designed for the VA's 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 clums were potential however until someone attempted to broadcast real television signals simultaneously.

Testing and validating the ATS-6 was an important conclusion to NASA's Applications Technology Satellite program. The program had resulted in technology that eventually could provide many kinds of communications, including television directly to schools and hospitals, and direct telephone to homes—through microwave ground receivers. Almost anyone could become a broadcaster, and anyone able to afford a ground terminal could become a receiver. The technology had far-reaching potential applications and NASA was offering experiences in opportunity free of charge to those applicants. Then if the satellite was all it was purported to be, it would successfully transmit many types of communications signals as commercial value would result in future manufacture of spacecraft and was used for high-to-low communications for the management of shipping lanes.

ATS-4 launched in 1964 by a Centaur rocket, weighed 100 lb, and carried a large number of scientific experiments. Although the transmission of television pictures was the primary focus of the satellite, it also carried other scientific experiments including a biological experiment and a chemical experiment. The satellite was designed to transmit television pictures to ground receivers located on large areas of the earth. The experiment to be tested was the feasibility of using such a satellite communications system for the VA, which was a significant opportunity.

The VA/ATS-6 Experimental Events

The Veterans Administration experimental events on ATS-6 were to be based upon two general communica tions requirements:

1. The need for access to specific programs and
2. The need for continuing education that incorporates learner participation.

A two-way linkage was involved in both of these requirements.

Practical Experience with the Medical Media Network supplying video and audio programs to VA hospitals, and research evidence support the existence of these two needs. In a study undertaken to identify informational needs of the Appalachian medical community, needs that might be met using the ATS-6, a number of hospitals involved.

One of the major problems with physicians, para-professionals and patients was a lack of information or the availability of this information in medical areas in difficulty in maintaining contact with professionals. There are also problems related to the art of learning as a discipline and the teaching/learning environment needed for the learner to be an effective student. It was not generally affordable to use a rear screen for instructional television.

The report goes on to suggest that even the use of video, audio, and teleconferencing as methodologies for resolving these problems.

Active participation during the presentation of continuing education programs are an essential ingredient to many specialists in the field of medical education. Experience has shown that an average of a week's delay in completing educational questions results from a videotaped program leads to a decreased average of correct answers and therefore the learning interchange between learner and participant.

Based upon the VA's communication requirements, their own experience, and the research evidence, the principles of the Foundation for Applied Communications Technology (FACT) designed low-exposure events or events for small ATS-6.

6. All of them incorporating the two-way linkage as a primary ingredient. These were categorized as "in-person" experiments.

Background

Television in its various forms from live broadcast to videotaped programs has been thought of as a potential substitute for the in-person lecturer. In some cases it was thought television would be even better than live demonstration because it could show up close and edit out unwanted shots that would distract from the instructional message. Furthermore, a well-produced television tape using charts diagrams, perhaps even animated sequences could present the information in a more clear and concise manner, and an instructor would have to prepare his presentation only once for an unlimited number of learners. Based upon these premises television has been used in numerous manners: front and open circuit broadcast to the cycling of videos among institutions with the intent of providing continuing educationPathway from health care . The VA/ATS-6 experiment.

In instances where television had been used unsuccessfully as a medium for continuing medical education some said that the primary reason for failure was poor production Amathuris low budget programs featuring primarily the talking face to deliver didactic information could not hold the attention of sophisticated learners accustomed to commercial television. Well produced programs on the other hand program featuring informative materials, advertisements and art; as grand rounds had resulted in some evidence of changed behavior in the part of medical personnel.

The video seminar. when ATS-6 were intended to do more than present a lecture. The goal was to go as far as possible toward providing an in-person communication for the medical professionals in the Appalachian VA hospital substituting a link via satellite for actually sending consultants to each of the remote locations. Because all of the commercial television will not tell you that they feel they know certain of the patients better than when looking at them in a regular format. If Carl Burnett and Johnny Carson can maintain such a familiar relationship with viewers why couldn't educational medical educators with dynamic personalities?

McManus and others have suggested such an interaction with television instructors as a possible "alternative format. This interaction with two-way interaction with radio and television instructions had never before been done but with the use of the ATS-6 when this was done for these purposes was 101. The video seminars were broadcast for physicians in the Intermountain region. Most physicians only listened rather than asking questions themselves. In two instances the audience was asked to ask questions and the sessions also failed to generate much physician participation in the form of questions and discussion. Two-way open circuit broadcasts were tried in the Intermountain region and closed-circuit
2. GRAND ROUNDS

Background

This program is sponsored by the Department of Continuing Education and is part of a series of educational programs designed to provide continuing medical education for physicians, nurses, and other health care professionals. The program is structured to provide a comprehensive overview of the latest developments in the field of medicine.

Evaluation of Grand Rounds

Grand rounds events were evaluated for content, format, and overall satisfaction by participants. The evaluation form included questions about the relevance of the topic, the clarity of the presentation, and the overall value of the event. Participants were also asked to provide suggestions for future improvements.

3. OUTPATIENT CLINICS

Background

These clinics are designed to provide comprehensive and efficient care for patients with acute and chronic conditions. The clinics are staffed by experienced healthcare professionals who are dedicated to providing high-quality care in a welcoming and supportive environment.

Evaluation of Video Seminars

The study evaluated the effectiveness of different types of video seminars in terms of audience satisfaction, learning outcomes, and cost-effectiveness. Participants were surveyed to determine their level of satisfaction with the seminars, and the results were used to inform future programming decisions.

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unable to detect and transmit small changes in image density in the whole axial of the patient's body. Such small changes could be overlooked with visual assessment but would be highlighted by computer analysis. The study also revealed that the computer decision making algorithm was not able to assess all the image data presented.

The results of the teleconsultation events were then analyzed to determine the factors that contributed to the success or failure of the teleconsultations. The results showed that the success of the teleconsultations was highly dependent on the quality of the video images transmitted. High-quality images allowed the radiologists to make accurate diagnoses, while low-quality images resulted in inaccurate diagnoses. The study also found that the teleconsultation system was well received by both the referring physicians and the radiologists.

Design of the Teleconsultations

For all of the programs that would be approved for use by the state, the teleconsultation system would be required to meet certain criteria. These criteria included the following:

- The teleconsultation system must be able to transmit high-quality images.
- The system must be able to perform real-time analysis of the images.
- The system must be able to provide feedback to the referring physician.
- The system must be able to store and retrieve the images for future reference.

These criteria were met by the teleconsultation system in use during the period of the study. The system was able to transmit high-quality images and perform real-time analysis of the images. The system was also able to provide feedback to the referring physician and store and retrieve the images for future reference.

Evaluation

The teleconsultation system was evaluated by comparing the diagnoses made by the radiologists with those made by the referring physicians. The results showed that the teleconsultation system was able to improve the accuracy of the diagnoses made by the referring physicians.

VADIC

VADIC (Voice-Audio Computed) is a system developed by Westinghouse Electric Company for transmitting and storing audio-visual files on computer hard drives. The system was used to transmit medical images and data between hospitals and medical centers. The system was able to transmit images and data in real-time, allowing medical professionals to communicate and collaborate across distances.

Evaluation

Evaluation of the VADIC system was conducted by comparing the accuracy and efficiency of the teleconsultation system with that of the VADIC system. The results showed that the teleconsultation system was more accurate and efficient than the VADIC system. The teleconsultation system was also able to transmit images and data in real-time, allowing medical professionals to communicate and collaborate across distances.

Psychiatric Social Self Report by Computer

The objective of the research was to determine whether a computer-based self-report measure could be used to assess psychiatric symptoms in children and adolescents. The results showed that the computer-based self-report measure was able to accurately assess the symptoms of psychiatric disorders.
Section III: The Procedure

The principal goal of the VA project on ATS-6 was to conduct an experiment and to establish a service. The Project Director and Coordinator were well aware of similar projects demonstrating and experimenting. This had come to be relied upon as a service so that individuals involved could no longer be objective about the success and failures of what they were doing. The very human tendency on the part of the program producers to want the project to be successful was a factor that had to be recognized and set aside as were the biases in the other direction on the part of the program recipients and listeners against all such electronic intrusion into their professional lives.

Private and negative notes were apparent when the project was initiated. In fact from the time it was first discussed by members of the Veterans Administration Central Office and its advisory group. At that time views against expensive satellite technology were aired and considered along with those in favor of utilizing the opportunity to utilize satellite communications with an eye toward possible future general applications within the VA system. In the end the Administrator Special Medical Advisory Group approved the VA becoming an associate in an experimental agency and the VA/ATS-6 experiment was undertaken by the Office of Academic Affairs of the VA's Department of Medicine and Surgery. The Deputy Director of the Learning Resources Group, Robert B. Shumaker was designated Project Director. The Foundation for Applied Communications Technology was contacted June 1, 1973 to coordinate the experiment and the experiment was conducted in three stages.

Stage I: Organization and Needs Assessment (June 1973—February 1974)

The first step in organizing the experiment was to (1) bring together the resources required for the experiment both within and outside the ten participating VA hospitals and (2) conduct a needs assessment that would be the basis for program subjects during the satellite broadcasts.

Organization of Resources

A great variety of human and technical resources were needed for the VA/ATS-6 Experiment. Organization of the human element came first. Those were formed with several organizations and agencies that would perform some function during the course of the experiment. These included

1. The National Aeronautics and Space Administration (NASA)
2. The National Medical Audiovisual Center (NMAC)
3. Appalachian Regional Commission (ARC)
4. Board of Directors, Foundation for Applied Communications Technology (FACT)
5. Experiment Coordination Committee (ECC)
6. Hospital Coordinators

Subcontracts

In addition to those with the above organizations and agencies, subcontract were made with four other groups to perform functions during the experiments. These were

1. The Federation of Rocky Mountain States (FRMS)
2. Applied Communications Research (ACR)
3. David Greene and Associates

Stage II: Preproduction (February 15—June 30, 1974)

A series of activities were undertaken concurrently during the test of the experiment. Programming decisions were made transforming the list of subjects into scheduled broadcasts divided among four experimental events. The design of several of these events included preproduced didactic material that would be completed prior to the first broadcast.
scheduled for June 1974. Key professional people were to be
hired: hospital coordinators informed of their roles during the
earlier planning phase; an evaluator plan developed to
work with the Stanford group. All of these activities were to be
completed within the designated period and will be described in
the remainder of this paper.

Video seminars would be used to present how to implement
materials already synthesized in a video seminar Pace to be
followed by question and answer sessions.

Group rounds would be devised to clinical case presen-
tations within the broad area of interest to the practitioners in
the ten VA hospitals. Specialists would present their methods of
case diagnosis and management: hospital personnel could
discuss these cases with the presenters.

Out patient clinics would be much like the video seminars
and the audience would include patients and their families. For
these events, film and videotapes would be used for
presenting didactic material.

Teleconferences would provide an opportunity for
physicians and nurses in the hospitals to ask specific
questions of specialists concerning cases they were treating.
The subject matter would therefore be very general to allow
for the specific subject matter that would become pertinent at
the time of broadcast.

Dangers of how to divide the programming also were based
on the formula for the number of times an event was to occur
during the broadcast period. Approximately ten telecon-
sessions (one for each hospital) forty video seminars, twenty
ground rounds, and four patient clinics. A production plan
for video seminars would be used because this methodology
had been most successful in the past for providing continuing
education. Two-way ground rounds and seminars for patients
and their families were unknown quantities. No one was certain
how new programs and new forms of programs would use
the two-way satellite linkages.

Production of Software

Once subject matter had been assigned an event category, production of preproduced software could begin. Deciding how
the software was to be used under what conditions and using
what equipment was based upon another complex activity that
was the object of a separate study. It was accomplished because
maintenance and, in some cases design of technical equipment
required evaluation of these decisions were made with the
assistance of key staff members. The recruitment and hiring of
these people would have been impossible without the pro-
ject and was ongoing into the production phases.

Recruitment of Key Staff Members

The director of the experimental design was the first professional
staff member to be recruited. She participated in the early
planning sessions and the subject matter was broken into
components and an assessment and planning the project coordinator in
designs the topics for each of the ten communities. To
assign the material to the event categories.
The director of event-production who would have to coordinate the responsibilities of the following phases: The main
areas included the preproduced patient, live lectures and two-way exchanges with the hospitals and then direction of the
broadcasts. The director of extension would be important background for this producer-director who was to be an
imposingly important role in a transforming a list of subject matter into informative, attention-getting video programs.

To find an individual with the necessary skills and
resourcefulness to take on this responsibility required nearly
a year. The project coordinator assigned in ABC with the program director and asked for an evaluator plan for
the video sessions for each of the ten hospital sites. The experiment was selected on January 1974 on the basis of the
resulting videotapes.

Once the project director had been retained a search for
program coordinator for a physician and a nurse was begun
Videos of potential candidates in instructional settings
were reviewed at the University of Colorado Medical Center
and a physician-nurse coordinator 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/presenter arrangements with the University of
Colorado which were eventually agreed upon as satisfactory to
all parties. A nurse program moderator was also recruited. One
nurse who had background working in 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 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 preproduced didactic
material. This arrangement did not work well and the engineer
left the project. A second engineer was contracted to work
with the mobile unit during the teleconference events.

Involvement and Training of Hospital Coordinators

The hospital coordinators with their various assignments
from engineering and data collection public information
had the most important function of several members: someone
was to be present to ask the experimental broadcast. Without
them, there would be limited facilities to accept the message
and receive their function of gathering then the audience creation
sessions were essential to the success in the conduct of the experiment. So in-person in hospital training sessions seemed
not only important but necessary.

To accomplish this, a detailed day by day schedule was
implemented to cover all the time periods (remember that the ten hospitals were scattered from
Washington, DC to Barcelona and most of these decisions were made with
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imposingly important role in a transforming a list of subject matter into informative, attention-getting video programs.
The video seminars were to be comprised of didactic material presented on film or videotape, followed by, or interspersed with, two-way discussions between faculty in the studio and participants in the ten VA hospitals.

Preproduction of Video Seminars

The first step was to select a faculty coordinator for the program. The requirements for a faculty coordinator included: recognition by colleagues for expertise in the program subject, ability to instruct and interact with an audience using the television medium, and interest in participating in the experiment. Faculty coordinators were suggested by the Experiment Coordinating Committee, by other specialists in the subject area, and by the continuing program moderators, who were familiar with the abilities of potential candidates. In addition, the program coordinators were asked to participate in the supervision of medical specialists, well recognized in their subject fields throughout the United States, it was an excellent source of faculty. The proximity of these individuals proved convenient in developing program materials and methodologies, and so about 50 percent of the program faculty for the experiment were from the Denver medical community. The other 50 percent of the faculty came from medical centers and other facilities throughout the country.

Once a faculty coordinator had been selected and agreed to work on a program, he was asked to write a three- to four-page paper or essay on the subject area for his program. This paper was then both for the television portion of the program, and for the study guide that would be sent to the home study students. This was a guide that would be of assistance to the program audience. It would also cover the knowledge and objectives that the other faculty coordinator believed to be important to bring the audience up-to-date in the subject. Each week, All of the video seminars were supplemented by study guides, which would include the objectives for the program, a bibliography, relevant articles, and in many instances graphic material that could not be used on the televised program because it was too complicated, or the graphic material was so germane to the topic that printed copies would be useful permanent materials for the audience.

Films and videotapes. The project coordinator set a goal to record as much of the preprogramed program material as possible on videotape rather than on 16mm film. The reason for this was his belief that film sets up a "barrier" between action and the audience while videotape achieves virtually the same feeling of presence as does a live television broadcast. The feeling of presence was a particularly important aspect in all of the experiments. Several hospitals in the participating hospitals had mentioned their concern that they would not be able to relate to a control audience. The video recorder was the same degree of confidence and ease with which they could talk with someone in person. An objective of this experiment was to dissolve the barrier of the television screen as completely as possible. The use of television as opposed to film seemed to be one step toward accomplishing this.

The preproduced didactic inserts for the video seminars were therefore to be recorded on the mobile production unit, which would travel among various field locations to make these preproduced videotapes, to be equipped with a portable television camera and other equipment that would make it possible to record programs on one-inch helical scan tape, in color. The one-inch tape could then be transferred to quadruple tape for editing. The equipment, however, was not available by the time preproduction was scheduled to begin (a year before the satellite was launched), and so for the first part of the production season, films had to be used. Later, an electronic recreation did become available, videotape replaced the films for the preproduced software.

Not all of the films and videotapes used for the didactic portions of the video seminars were produced exclusively for the ATS-6 experiment. In some instances, pre-existing software was used.

Once the preproduced material was ready, including graphs and slides as well as the films and videotapes, and the study guide had the editing, the telephone was made to the hospital, work on the live portion of the broadcast began. The faculty coordinator and other participating traveled to Denver the day before the broadcast. Additional inserts for the program might be videotaped that day, and any charts or graphs that had not been completed and photographed for slides were prepared by an artist while the program was rehearsed and participants informed of when and where to be the next day.

Video Seminar Broadcasts

On the day of the broadcast the faculty coordinator and other participants were expected to arrive an hour before the program went on the air. This hour, the afternoon, was set aside for the program broadcast. The paper would cover the information requested in the "user's objectives" guide and include a description of the participants, who would be viewing the program. This was also the time when the participants would be receiving feedback on the program audience. It would also cover the knowledge and objectives that the other faculty coordinator believed to be important to bring the audience up-to-date in the subject. The program began.

Following a standard opening sequence, the physician or nurse moderator would introduce the subject and faculty for the program, and the preproduced portions were shown. The present was to provide a commonality and a base for initiating live discussions. The two networks, Red and Green, were invited alternately to telephone in with their contributions.

In most instances the video seminar was an hour long and was followed by another event, either a second video seminar, or grand rounds, or an out-patient clinic. After the two-hour broadcast, representatives of the viewing audiences in the hospitals were telephoned for a quick evaluation of the two events. This "telephone survey" was to gather hospital staff opinion regarding technical clarity of the signal, as well as acceptance of the program and the method of presentation.

Most of the 27 video seminars produced during the broadcast season followed the pattern fairly closely. Exceptions were: two remote broadcasts, one from a coronary care unit in a hospital, the second from a rehabilitation center; one variation in which the preproduced videotape was copied and sent to each of the ten hospitals prior to broadcast, so that only live programming was presented during the broadcast period on the satellite, and one instance in which a preproduced program was broken into segments and live two-way discussion invited between each segment.

Some occurrences and reactions to the video seminars will be reported in Section IV: Observations.

2. GRAND ROUNDS

Grand rounds were to be based upon case presentations within a general subject and would not, therefore, be prepared as video seminars. Faculty coordinators were given the program subject, user objectives for the subject, and asked to present a current relevant case, or cases, using visual materials, such as laboratory findings.

The faculty coordinator and other program participants arrived the day before the grand rounds event and went through the material they would present. Last minute work was done on any visuals that might be convened during the rehearsal, and some inserts might be videotaped.

The day of the broadcast, the faculty arrived an hour before time for last minute instruction, make-up and microphone placement. The moderator introduced the faculty participants and presented the slide show. Because Denver had a delayed transmission, the answers followed, and were interspersed with live discussion among the faculty in the studio and more didactic material. Seventeen grand rounds were presented during the experiment.

3. OUT-PATIENT CLINICS

The out-patient clinics were much like the video seminars in format, but they were not supplemented by study guides. The goal of the out-patient clinics was to gather patient information and/or needed for home care or rehabilitation of their particular illness. Faculty coordinators for these events were specialists in their areas and could be called upon to assist in the programs themselves. It was the program coordinator's responsibility to gather the participants, who would be patients and families, and not necessarily professionals, and so they should present their own information, etc. The out-patient clinics followed much the same routine as for video seminars and the same rounds. Three out-patient clinics were presented during the experiment period.

4. TELECONSULTATIONS

The teleconsultation events were to be hospital originated, with the exception of the situation that was so germane to the topic. The major focus would be the presentation of material. A great deal of field production, therefore, was required prior to each hospital's program.

Another special feature of the teleconsultation was the slow scan method of sending visual information from the hospital to the studio on the day of broadcast.

The preproduction of teleconsultations

The Wednesday prior to the teleconsultation, the mobile unit for the day would be on the floor, the originating hospital and would arrive on Thursday. In many instances, production of the case presentations would begin then and continue over the weekend and through Monday, when the finished video cassette case presentations were sent via express from the nearest large airport to Denver. During Tuesday and early Wednesday the still visuals to be sent over the slow scan system would be planned.

Each teleconsultation event was based upon a subject the participating hospitals had listed as an area in which they desired consultation with specialists. The originating hospital for the teleconsultation selected a subject that was considered to be a specialty in that institution, usually owing to the large number of cases treated in the area. The concept was for the hospital participants to present current cases, including related visual images such as roentgenograms, electrocardiograms and various types of scans, and then receive consultations from the specialists in the Denver studio relating to diagnosis or managing the case.

The slow scan process. Throughout the teleconsultation events, the slow scan process selected for the experiment would be tested in many ways.

The particular system used, developed by Colorado Video, Inc., was comprised of a television camera, a slow scan transmitter with a telephone data coupler, a specially ordered telephone line, and a device at the receiving end for reconstructing the "bin" and scanning the information, line by line, to return the still image on a television screen. Also included in the system was a disc storage device that could store 27 black-and-white images and one color image. This meant that 28 still pictures could be sent prior broadcast time to be retransmitted live when needed. In addition to testing whether this system could be used for medical purposes, such as diagnosing X-rays and histograms—evaluations that had been made in previous experiments (described in Section III)—this system would be tested for its ability to transmit usable color visuals, which might be made within a medical context until the VA/ATS-6 experiment.

Broadcast of Teleconsultation Events

On the day of the teleconsultation broadcast, the faculty specialists would arrive about half an hour prior to time for make-up and microphone placement. They were not briefed in any way, in most instances, for what they would be discussing, but were told that their program would be the group's program; that the teleconsultation would be the program's topic. They were also to view the case presentations, made on videotape at the hospital and sent to the Denver studio, as it was shown previously. The originating hospital was to have the satellite. The originating hospital was to have the satellite. They were to contribute any help they could to this case discussion, and the other nine hospitals were invited to contribute if they wished to do so.

Ten teleconsultations were presented during the experimental period. The following table is a listing of all programs broadcast during the experiment on ATS-6.
<table>
<thead>
<tr>
<th>Program Title</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/10 40,000 Country Mile</td>
<td>David E. Caldwell</td>
</tr>
<tr>
<td></td>
<td>John DeHaan M.D.</td>
</tr>
<tr>
<td>7/10 Anemia</td>
<td>Roger Hamura</td>
</tr>
<tr>
<td></td>
<td>Peggy Mathis</td>
</tr>
<tr>
<td>7/12 Problem-Oriented Medical Record</td>
<td>Stephen Walker M.D.</td>
</tr>
<tr>
<td>7/17 Video Seminar—All Disciplines</td>
<td>Roger Hamura</td>
</tr>
<tr>
<td></td>
<td>James Croucher M.D.</td>
</tr>
<tr>
<td>7/24 Acute Upper G.I. Bleeding—M D</td>
<td>Roger Hamura</td>
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<tr>
<td></td>
<td>J. Edward Berk M.D.</td>
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<td></td>
<td>Bursan H. Smith M.D.</td>
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<td></td>
<td>Fred Kara M.D.</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td>Peggy Mathis</td>
</tr>
<tr>
<td>7/31 Changing Role of the Nurse</td>
<td>Nancy Hymson R. N.</td>
</tr>
<tr>
<td>7/31 Video Seminar—R N</td>
<td>Robert Bradley M.D.</td>
</tr>
<tr>
<td>7/15 Acute and Chronic Renal Failure</td>
<td>Roger Hamura</td>
</tr>
<tr>
<td>7/15 Video Seminar—M D</td>
<td>Robert Consigli M.D.</td>
</tr>
<tr>
<td>7/15 The Management of Commonly Occurring Ailments</td>
<td>Melvin Klein M.D.</td>
</tr>
<tr>
<td></td>
<td>John Cooper M.D.</td>
</tr>
<tr>
<td>7/15 Anesthesias</td>
<td>Roger Hamura</td>
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<tr>
<td>7/15 Video Seminar—R N</td>
<td>Paul Walker M.D.</td>
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<tr>
<td>7/15 Maintenance of Venous and Arterial Cannulas</td>
<td>William Nelson M.D.</td>
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<tr>
<td></td>
<td>Hywel Davies M.D.</td>
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<tr>
<td>7/21 Alcoholic Rehabilitation</td>
<td>Roger Hamura</td>
</tr>
<tr>
<td>7/21 Video Seminar—R N</td>
<td>G. M. Oden M.D.</td>
</tr>
<tr>
<td>7/21 Problem Drinker</td>
<td>John Magen M. D.</td>
</tr>
<tr>
<td>7/21 Outpatient Care—Patients/Families</td>
<td>Marcella Fuller M.D.</td>
</tr>
<tr>
<td>7/28 Changing Role of the Nurse</td>
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<td>7/28 Video Seminar—R N</td>
<td>Ian Nager M.D.</td>
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<tr>
<td>7/28 Family Therapy</td>
<td>Kinny LaPierre Ph.D.</td>
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<th>Program Title</th>
<th>Participants</th>
</tr>
</thead>
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<tr>
<td>9/4 Death, Dying and Grief</td>
<td>Roger Hamura</td>
</tr>
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<td>Peggy Mathis</td>
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<td>9/4 Video Seminar—R N</td>
<td>John DeHaan M.D.</td>
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<tr>
<td>9/9 Pulmonary Embolism</td>
<td>Roger Hamura</td>
</tr>
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<td>9/9 Video Seminar—M D</td>
<td>Arthur Sashura M.D.</td>
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<td>9/11 Changing Role of the Nurse</td>
<td>Jean Flamundt M.D.</td>
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<tr>
<td>9/11 Video Seminar—R N</td>
<td>Roger Hamura</td>
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<tr>
<td>9/13 The Diabetic Patient</td>
<td>Peggy Mathis</td>
</tr>
<tr>
<td>9/13 Outpatient Clinic—Patients/Families</td>
<td>L. Rae McPherson M.D.</td>
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<tr>
<td>9/18 Surgical Treatment of Peptic Ulcers</td>
<td>Roger Hamura</td>
</tr>
<tr>
<td>9/18 Grand Rounds—M D</td>
<td>Robert S. Brittan M.D.</td>
</tr>
<tr>
<td>9/18 Grand Rounds—R N</td>
<td>Allan B. Karon M D.</td>
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<tr>
<td>9/18 Behand’s Modification Techniques</td>
<td>Peter H. Baker M.D.</td>
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<tr>
<td>9/25 Two Hour Program</td>
<td>Roger Hamura</td>
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<td>John DeHaan M.D.</td>
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<td>Virginia Longe B.S.N. M.A</td>
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<tr>
<td>10/2 Video Seminar—R N</td>
<td>Barbara Eckert R. N.</td>
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<tr>
<td>10/2 Two Hour Program</td>
<td>Chetel Hicks R. N.</td>
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<td>10/2 Ann Traeger R. N</td>
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<td>10/9 Coronary Arteriography</td>
<td>Roger Hamura</td>
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<tr>
<td>10/9 Video Seminar—M D</td>
<td>Timothy Talarski, M.D.</td>
</tr>
<tr>
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<td>Philip Oliva M.D.</td>
</tr>
<tr>
<td>10/9 Grand Rounds—R N</td>
<td>Roger Hamura</td>
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<tr>
<td>10/9 Grand Rounds—M D</td>
<td>Ann Blocken, B.S.N. A.I.T</td>
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<td>10/9 Richard Masthay, M.D.</td>
<td>James H. Ellis j. P. M.</td>
</tr>
<tr>
<td>10/16 Cardiopulmonary Resuscitation</td>
<td>Shirley Wilier B.S.N</td>
</tr>
<tr>
<td>10/16 Video Seminar—All Disciplines</td>
<td>Roger Hamura</td>
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<tr>
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<td>D. James Lewis M.D.</td>
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<tr>
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<td>Kevin M. McIntyre M.D.</td>
</tr>
<tr>
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<td>Leonard Scherlis M.D.</td>
</tr>
<tr>
<td>10/16 Video Seminar—M D</td>
<td>Roger Hamura</td>
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<td>Marc Laffore M.D.</td>
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<td>10/21 Grand Rounds—M D</td>
<td>Calle Adler B. S. N.</td>
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<td>Roger Hamura</td>
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<tr>
<td>10/21 Video Seminar—All Disciplines</td>
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<tr>
<td>10/26 Coronary Care Unit—Remote</td>
<td>Peggy Mathis</td>
</tr>
<tr>
<td>10/26 Video Seminar—CCU R N</td>
<td>Shirley Hoffman B.S.N.</td>
</tr>
<tr>
<td>10/26 Two Hour Program</td>
<td>Roger Hamura—in studio with</td>
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<tr>
<td>10/26 Family Therapy</td>
<td>Dennis B. B. M.O.</td>
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<td>10/26 Video Seminar—M D R N</td>
<td>Paula Hack B. S. N.</td>
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<td>10/26 Video Seminar—R N</td>
<td>Sidney Smith j. P. M.</td>
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<tr>
<td>1/18</td>
<td>Christmas and New Year's Holidays: Home Tele: Cardiac Rehabilitation</td>
</tr>
<tr>
<td>1/18</td>
<td>Two-Hour Program</td>
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<td>1/15</td>
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<td>and continuation of the Asheville Teleconsultation: Two Hour Program</td>
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<tr>
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</tr>
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<td>Solitary Pulmonary Nodule: Grand Rounds: M.D., R.N.</td>
</tr>
<tr>
<td>2/26</td>
<td>Ambulatory Urology: Urologic Infections: Video Seminar: M.D., R.N.</td>
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</table>
5. COMPUTORIZED EVENTS

Once two programs had been selected to be computer events on the satellite the major activity of establishing interfaces between computer, satellite and hospital was accomplished by the two coordinators for these events. The Bethpage Department of the University of Utah had expressed an interest in having their nurses participate in the computer assisted training. J. P. Jones provided the most interest and was selected to test the program using traditional telephone lines. Finally a day for the program selection period then for two-and-a half hours on Wednesdays during the test period on AT&T. Alphonce was selected to participate via satellite linkage.

Salsbury was selected to participate in the patient-win assessment program (of the Salt Lake City VA Psychiatric Service) because the request for a computer-managed program had come 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 links with traditional telephone connections between computer and CBT. The interface with the terminals 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 to write letters certifying how patient identity would be protected during the exchange between Salt Lake City.
and Salisbury delayed the beginning of all computer experiments for two weeks.

On December 10 it was made at the SALT-Lake Satellite Control Center through ATI-3 and 5. The engineers reported the lines were unclear. It appeared unlikely that both Salisbury and SALT-Lake could communicate signals via AT-3 simultaneously because the satellite was operating on half power only. The December 10th indicated that the signal transmitted through both satellites (3 and 5) was usable by at least one transmitter at a time. however, the decision was made to continue the two experiments as planned until success or failure could be determined.

The Salisbury earth station was the most difficult equipment to balance. The terminal schedule for use at Syntelli was in line with results, which resulted in a second delay of the experiment. The equipment at Salisbury, however, was not usable by both SALT-Lake and Salisbury simultaneously. The situation is not clear.

The Salisbury earth station, which received the signal from the satellite, was not able to learn the signal from the satellite. However, the engineers noted that the AT-3 satellite was in line.
The observations in this section are from the point of view of the ICU nurse who participated in the study. They conclude that the nurse's role is not only to take care of the patient but also to be a source of support and understanding for the patient and their families. The nurse feels that the observations made during the ICU stay are important in understanding the patient's experience and in improving the care they provide.

The observations were made during the last 3 weeks of the ICU stay. The nurse observed the patient's interactions with the staff, the duration of their stay, and the overall atmosphere of the ICU. The nurse also observed the patient's response to the care they received, including their comfort level and their ability to communicate.

The nurse found that the patient's experience in the ICU was complex and multifaceted, involving physical, emotional, and social aspects. The nurse observed that the patient's response to the care they received was influenced by their personal history, their current health status, and their family support. The nurse also observed that the patient's experience in the ICU was not always positive, and that the patient's emotional state was affected by their physical condition and the level of care they received.

The nurse concluded that the observations made during the ICU stay are important in understanding the patient's experience and in improving the care they provide. The nurse feels that the observations made during the ICU stay are important in understanding the patient's experience and in improving the care they provide.
participants had difficulty seeing the small picture and where the staff was often directed due to echoing and other poor acoustics. The curator was not even located and it was also very uncomfortable on warm days.

Other hospitals had sound systems, or other television receivers in the same room so that people could see the picture at closer range and there were few complaints about not being able to see or hear except when questions were asked, a problem that will be discussed in the following subsection. With the exception mentioned previously most of the hospital's apparently provided physical settings where audiences could see and hear well and felt comfortable during the broadcast.

**Technical Problems**

During the course of the experiment the two hospitals usually required receiving a color audio and video signal from the satellite. They frequently complained with it when the signal received on hospital settings saying that the picture from the satellite was superior. Occasionally one of the hospitals on the fringe of the satellite footprint would report poorer reception than usual. Once in a while a hospital reported poor signal caused by a malfunction within their hospital system. Normally, the satellite was reliable in transmitting a clear signal from Denver.

The primary difficulty reported during the entire experiment was that audiences could not hear or understand certain questions asked by participating hospitals. One reason was the problems caused by noise of the push-to-talk telephones described in Section 1. Another was that many of the physicians, the group that asked most of the questions, had to talk over the telephone. Their accents made them difficult to understand. A setting that was poor acoustically in the first place exacerbated the problem. The perceived solution to the problem was to have the physician moderator repeat the question after answering it which he did. This was occasionally criticized because too much time was taken for responses. However, this was preferred over the patients asking people in the hospitals.

**Responding to Feedback from Participants**

Throughout the experiment attempts were made to respond to suggestions and complaints from participants in the ten hospitals. The hospitals were asked during the broadcast if there were any participants that the presenters might include in the program. The hospitals were asked if there were any questions that should be answered. Although the hospitals were not able to come up with a list of questions, they did have comments about the program. The hospitals were asked about the program a few times during the broadcast.

The program producer was concerned primarily with using satellite time wisely. Dead air space where nothing was happening was considered a loss of time. The addition of video tape to the broadcast was considered a waste of time.

One of the hospitals that participated in the broadcast was concerned with the amount of time spent on questions from the audience. One hospital was concerned that the questions were not asked fast enough.

**The Video Seminars**

As the broadcast progressed and attendance lists and reactions came back from the hospital participants, it was evident that video seminars were more popular at least in the first few weeks of the broadcast. The seminars were highly popular and many were attended. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars. The seminars were highly popular and many were attended. However, the seminars were not as popular as the video seminars.
audience on their level of medical sophistication but not speak directly to them. Potentially important to the audience of an out patient clinic is a difficult one. These audiences tended not to use the opportunity to ask questions but rather the usually preventing their participation could be altered for example the audience could be restricted to patients and families only

4. TELECONSULTATIONS

The goal of these events was to provide an opportunity for physicians and others (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 (or nurses) together with the consultants communicating by satellite and television rather than by travel ideally the technology could save much time and expense for such consultations on a routine daily basis

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 participatory in the originating and observing some hospitals where all satellite broadcasts were monitored and in other places there was a feeling of being seen or for showmanship on the part of each hospital preventing a teleconsultation Physicians were reluctant to show lack of current knowledge in the extreme lack of privacy. The goal became to show the expertise of their hospital to most instances the presenters would state how they treated a patient who had died or been treated and discharged from the hospital. The intent was not to gain information in how they might have diagnosed or treated the patient but rather to challenge the specialists in Denver to do it better. Fortunately there were enough exceptions to this pattern so that there were many instances when patients could be better cared for the teleconsultations concept potentially has great viability 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-5 experiments utilized slow scan TV for sending pictorial information to the consultant. Although apprehension was expressed prior to the experiment about the 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. The slide show was not longer than adequate for diagnostic purposes. The slow scan process taken was long time to display a visual image (the fact that most of the black and white visuals had been stored previously so that they could be displayed instantly when needed only the time the answering phone had to be used to display a visual was when the X-ray in color and only then was the second to be used). One color slide could be stored prior to the broadcast. For visual clarity of the X-rays and other visuals the consultant was required of all programs supplied these at the end of the program that the slow scan mediated visuals were adequate. During the teleconsultation on radiology the television camera on location was used to focus to a close up of one portion of a chest x ray the resulting visual was a slow scan was adequate for a panellists specialist of male lobe syndrome to detect a peculiar shadow along the heart in a patient presented at a previous teleconsultation in December 1974. Roger Hamara M.D. moderator of the broadcast documented this and we are certain in which hospital. The teleconsultation events incorporating slow scan allowed diagnosis or treatment of a patient in the consulting hospital.

The teleconsultation events on ATS-5 therefore indicate that satellite and consult technology can successfully and improve patient care in isolated rural hospitals that are to be used to transmit future consultations. However the settings and circumstances should probably be different than the ones they were for the VA experiments on ATS-5.

First the communication between consulting physician and specialist should be discrete. Routines of the method might eliminate some non participating observers but other methods too should be employed to ensure privacy.

Second to be truly effective as a medium of consultations satellite linkage must be available 24 hours a day seven days a week as must the consultant at the other end. Consultation services have been developed in major metropolitan areas so that physicians can call a medical center and be connected with a specialist on duty at the time. Perhaps a satellite interlink could provide contact with a nationwide network of specialists. Each of whom covers a certain time period during which he is available for consultation in person or group practice who will be their colleagues.

Third full duplex video is not really necessary for the teleconsultations. One way video is useful but it should be from the hospital to the consultant because most of the visual information will originate in the consulting hospital. The specialist might have slow scan video available for sending information of when and if it is needed.

If a video-originating capability is not possible slow scan is adequate in most cases for consultations. Slow scan plus audio channel is probably a valuable substitute for full duplex television if the cost of the equipment is considered.

A digital communications equipment was developed for a permanent domestic satellite. Four in further experiments with teleconsultations particularly when video capability is employed all slow scan should be discouraged. Teleconsultations must not be regarded as television productions reflecting on the creative talents of the originating hospitals.

5. COMPUTER MEDIATED EVENTS

For both computer mediated events of the VA/ATS-5 experiments the software provided seemed to be well accepted in the hospitals. The difficulties in providing this satellite were technical and primarily due to the decreasing transmitting power of the ATS-3 (the satellite used to return the signal from hospitals to computers). If computerized events are used in future satellite communications the two-way linkage should be available continuously otherwise the advantages of computer-mediation are lost.

The computer-assisted event was most successful in terms of how it was received at the VA in Baltimore and the in the two weeks when the program was available 24 hours a day. The fact that the program was available by satellite for only two days a day once a week was much to the detriment of the program. The satellite in this instance was not as useful as traditional land lines for providing a connection between user and computer. This was primarily to restricted time some ATS-4 and the fact that ATS-3 was taking rather than inherent problems with the satellite acting as a transponder. Formally the satellite may be a better transmitting device than beacons because beacons use a computer frequently fail or are overloaded with users.

6. VIDAC

During the ten weeks VIDAC programs (20 frame pictures transmitted at high speed) were available at the Dublin VA. 42 individuals viewed selected programs and completed evaluative forms. The results were 30 percent of the possible target population and included primarily nurses doctors and laboratory personnel. Usage was monitored to the day shifts because television facilities were abundant at night for security reasons.

In their report of the VIDAC experiments on ATS-5 which included data from the evaluation forms collected by the Dublin evaluation coordinator and analyzed by the Florida State University evaluators the Westinghouse group said that the small numbers of programs users could be attributed to the lack of support on the part of the hospital administrators.

The results of those who did use the VIDAC programs were improved enthusiastic and generally felt that a program of this type would greatly benefit them as well as the hospital. In the opinion of some the entire VA network. Present features considered desirable by users were the random access concept and a multiple viewing possibility but many is almost familiar in the limited instances when certain motor skills are being taught.

Among other things the reports offers the following conclusions regarding the VIDAC system:

- The time required to download many hours of material was measured in minutes which should permit reduction of the operating costs of television facilities and VIDAC central libraries could serve an area approximately one third the cost of the earth by utilizing a single dedicated satellite channel.

- The evaluation coordinator at the VA hospital in Dublin was able to conduct the experiment on the VIDAC system. He said that he felt the resulting programs were not much different than the slide shows he had seen in the past. VIDAC media would provide information so that required a full time employee available to punch up programs when they were requested on one of the four channels on the hospital's television viewing system if a program was allowed to run continuously. (Some of the evaluations evaluated in the experiment that channel could not be available for any of the other video or films the hospital has available on its informative access system.

The evaluation coordinator said that the programs received via satellite were often unusable because they were unclear. The Westinghouse group elaborated this on one occasion to the satellite having been "amplified" thus dropping 10dB. At another time the difficulty in transmitting the VIDAC programs was said to be caused by a technical malfunction at the Denver studio. The Dublin evaluation coordinator reported that the primary technical difficulty was in the receiving equipment at the hospital it tended to exhibit and distort the image and sound received.

The Dublin coordinator said that more people might have been informed of the VIDAC programs and participated in the experimental if it had been better managed. As it was he given the equipment and program catalog and told to publicize the experiments throughout the hospital operates the system evaluate it and maintain the equipment. This was more than a full time job he said and he did not have time to do it.

SUMMARY

The designers and producers of the events comprising the VA experiment on ATS-5 formed opinions about what was taking place during the program broadcasts how they were received how they might have been better all during the research phase. The basis for these opinions were the telephone calls that came in during the programs the responses given during the telephone surveys immediately after the broadcasts and unaided comments that came in to the VA after the experiment. The evaluation coordinators of the Va and San Francisco groups had opportunities to view the tapes at the San Francisco group went on to conduct retrospective analyses. They made the tapes available to the whole VA network and the year make up the following section. Date and Evaluation.
Section V: Data and Evaluation
(by Applied Communications Research, Palo Alto, California)

INTRODUCTION

The evaluation of the VA/ATS-6 project involved the participation of eight experimental hospitals on several levels. Nearly all of the study's data collection methods were conducted at each site of the hospital staff. Many such as the presentation on G.I. infections had a significant impact on hospital procedures in nearly every hospital where the project was conducted. The following table shows how many data were collected by each of the participating hospitals and how many of the 69 events (including those conducted in the evaluation) were conducted at each setting.

1. Methodology

The three experimental hospital staffs were divided into two groups: those designated to attend a group video seminar, grand rounds, outpatient clinic and teleconsultation; and those designated to attend individual video seminars (CAI and computer-mediated patient management). The teleconsultation seminar should perhaps be considered as an individual delivery method; however the form in which they were used was more that of a hospital-originated round robin than a one-to-one consultation.

The evaluation of the events is based on a variety of data collection techniques. The group events were evaluated using the same techniques that were used for each of the group-oriented seminars. The program evaluation forms were those completed by the participants immediately after each broadcast. The posttest and retrospective questionnaires referred to in the table were the initial prototype questionnaires which were the last two events broadcast. The questionnaires were substantially revised into a more powerful tool (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.

2. VIDEO SEMINAR

The video seminars were the most frequent type of program (81 events) that were also the most popular in terms of program length and audience size. The video seminars were held for all 69 events, with an average attendance of 61 per event. The video seminars were held for all 69 events, with an average attendance of 61 per event. The most heavily attended program was the initial video seminar on the VA/ATS-6 project which had a program attendance of 61 per event.

In addition to being the most well attended of the experimental programs, the video seminars were also the most highly rated. The mean rating of the 81 events covered by the retrospective questionnaires was 1.87, while the mean rating of the 61 events covered by the retrospective questionnaires was 1.96. The mean rating of the 81 events covered by the retrospective questionnaires was 1.87, while the mean rating of the 61 events covered by the retrospective questionnaires was 1.96. The video seminars were conducted immediately after each broadcast.

3. GRAND ROUNDS

The grand rounds were conducted immediately after each broadcast. The mean rating of the 10 events covered by the retrospective questionnaires was 2.8, while the mean rating of the 10 events covered by the retrospective questionnaires was 2.2. The video seminars were conducted immediately after each broadcast.

4. TELPH Network

The TELPH network was used to provide video conferencing between the experimental hospitals and the VA/ATS-6 headquarters. The network was used to provide video conferencing between the experimental hospitals and the VA/ATS-6 headquarters.

5. CONSULTANT EVALUATION

The consultant evaluation was conducted immediately after each broadcast. The mean rating of the 10 events covered by the retrospective questionnaires was 1.96, while the mean rating of the 10 events covered by the retrospective questionnaires was 2.2. The consultant evaluation was conducted immediately after each broadcast.

6. PATIENT EVALUATION

The patient evaluation was conducted immediately after each broadcast. The mean rating of the 10 events covered by the retrospective questionnaires was 2.2, while the mean rating of the 10 events covered by the retrospective questionnaires was 2.2. The patient evaluation was conducted immediately after each broadcast.

7. TELECONSULTATION

The teleconsultation was conducted immediately after each broadcast. The mean rating of the 10 events covered by the retrospective questionnaires was 2.2, while the mean rating of the 10 events covered by the retrospective questionnaires was 2.2. The teleconsultation was conducted immediately after each broadcast.

8. PROGRAM EVALUATION

The program evaluation was conducted immediately after each broadcast. The mean rating of the 10 events covered by the retrospective questionnaires was 2.2, while the mean rating of the 10 events covered by the retrospective questionnaires was 2.2. The program evaluation was conducted immediately after each broadcast.

9. TELECONSULTATION EVALUATION

The teleconsultation evaluation was conducted immediately after each broadcast. The mean rating of the 10 events covered by the retrospective questionnaires was 2.2, while the mean rating of the 10 events covered by the retrospective questionnaires was 2.2. The teleconsultation evaluation was conducted immediately after each broadcast.
4 Teleconsultation

The teleconsultation events were as varied as the patients themselves. The teleconsultation procedure is designed to provide a more efficient and convenient way for patients to receive medical care. It involves the use of a video conferencing system to connect a patient with a doctor or other health care provider. The system allows for real-time consultation and enables the patient to receive the care they need from the comfort of their own home.

The teleconsultation events were conducted in a private room at the hospital. The patients were seated on comfortable chairs and were able to communicate with the doctor via a video conferencing system. The doctor was able to view the patient's facial expressions and body language, which helped to facilitate a more effective consultation.

The doctor was able to quickly assess the patient's condition and provide appropriate treatment recommendations. The patient was also able to ask questions and receive feedback from the doctor.

In conclusion, teleconsultation is a valuable tool that can help to improve access to medical care for patients who live in remote or underserved areas. It allows for real-time consultations, which can help to reduce the need for hospital admissions and improve patient outcomes.
log them describing the nurses' reactions to the programs. In addition, we did not obtain the computer printed descriptions of the programs from the participants. Finally, due to technical problems encountered in running the equipment, the intended representative had only very limited opportunity to observe the event in progress.

What information do we have based primarily on interviews conducted with nurses who did for planned to participate in the experiment?

The following are excerpts from our report describing interviews conducted with nurses about the CAI experiment. FAYETTEVILLE: At Fayetteville towards the CAI program were quite positive although several of the nurses interviewed indicated they had only limited contact with the CAI event because of scheduling problems. Most nurses interviewed expressed dissonance that the program was available only a few 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 did not have enough time. She said the CAI program was the most effective teaching tool she had ever used and was a great deal more valuable to her than the rest of the AT-6 events. She found the equipment easy to use and felt she 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 AT-6 events was that most of the other events were geared more towards physicians, therefore, even though she received 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 refresher of medical knowledge. She also felt it had a great potential for keeping abreast of new techniques within her own specialty and for broadening her knowledge in other areas.

As nursing the psychiatric ward stated that while she had not been able to use the program herself, she felt it was a valuable learning experience. She also stated that the full impact of the program had not been felt.

ALTOONA: Medical problems with the Altoona program again 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 there as well (for example the program frequently failed to record completed exercises).

In addition to technical problems, there appeared to be some local problems in understanding how the equipment worked. This problem was aggravated by the lack 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 aspects of the AT-6 exercise the respondents would like to see repeated should another satellite become available.

We were impressed with the potential of the computer programs that we were unable to use due to technical problems. If they were available on a 24 hour basis, the large group potential for broadening areas of current care knowledge, research, and care is.

It is impossible to make any assessment of the CAI event based on the data available. The equipment on late experience appeared to be quite positive however technical problems made impossible to make any assessment of the satellite mediated link.

In addition to the lack of information available to evaluate the CAI experiment technical advances in the computer industry suggest that these types of programs may be more viable within a few years. The growth of the value added computer industry which provides computer communication channels over long lines) suggests that alternate delivery means (for CAI) may be possible relatively in the near future. As 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 exercise performed in the VATA-56 events was to assess the value of a computer managed program for diagnostic and patient care. This program was provided to the Salisbury N.C. Hospital only.

The nature of the program made it very unsuitable to traditional evaluation measures as a result of the evaluation of the event consisted of views by the field representatives. Some technical problems were encountered and in the first six 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 N.C. is high. As a diagnostic program it involves administration of the MMPI battery which must be sent to Minnesota for diagnosis (this request takes five days). The CAI program has the potential for providing rapid diagnoses although this has not been the case as of April 19.

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. Neither of the two patients encountered any problems with the equipment. The field representatives indicated they felt only about 25 percent of the patients would be able to use this equipment upon admission. But after some initial treatment this figure would stay up 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 unsalable.

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 viability for satellite transmission. However, its use in the CAI programs advances in the computer industry make other forms of transmission or in house computer access more viable.

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 19 video seminars, 11 grand rounds, 10 information seminars and two other clinicals.

The second comparison comes from the post-questionnaire and is based on 302 responses in this questionnaire. The second comparison respondents were asked to indicate which of the four (video seminar, grand rounds, teleconsultation) they found most effective.

<table>
<thead>
<tr>
<th>Respondent N</th>
<th>Video Seminar</th>
<th>Grand Rounds</th>
<th>Teleconsultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>150</td>
<td>150</td>
<td>152</td>
</tr>
<tr>
<td>Nurses</td>
<td>147</td>
<td>152</td>
<td>89</td>
</tr>
<tr>
<td>MD's responded</td>
<td>135</td>
<td>149</td>
<td>63</td>
</tr>
</tbody>
</table>

The third comparison comes from responses to a battery of questions on the retrospective questionnaires asking Which of the programs did you feel...? of these programs you have you discussed with your colleagues? Have you been able to use any of the material presented in these programs in your work? Which programs? Have you tried to obtain additional information on subjects covered by any of these programs? Which programs?

Have you made any changes in the way you perform your job because of information presented in any of these programs? Which programs?

The following table presents an analysis of the responses to these questions tabulated by role and by program type. All respondents (physicians, nurses, administrators, others) responded
As noted earlier in this report, these figures are based upon returned program evaluation forms and represent a significant underestimate of the actual attendance. Several hospitals for example used a number of staff nursing rooms rather than one large one but did not have sufficient personnel to administer the program evaluation forms at each location. Also in many cases a portion of the audience left before the program was concluded and thus did not complete the forms.

9.2 Roles
In addition to differences between hospitals, there were marked differences in the responses of the various role categories used in this evaluation. In general nurses were more much more positive towards the experiment and much more agreeable in seeking information. The nurses were also far more critical of events and offered a disproportionately large share of comments than did any of the other role groups. Throughout the experiment, a large number of nurses attended events designed specifically for physicians and frequently complained because they were not members who were not given the opportunity to understand the programs.

The following table shows the mean attendance by role across all events and across all ten hospitals.

<table>
<thead>
<tr>
<th>Role Type</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.D.</td>
<td>65</td>
<td>292</td>
<td>162</td>
</tr>
<tr>
<td>Nurse</td>
<td>245</td>
<td>760</td>
<td>261</td>
</tr>
<tr>
<td>Social Work</td>
<td>18</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Other</td>
<td>223</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>415</td>
<td>328</td>
<td>188</td>
</tr>
</tbody>
</table>

9.3 Program Ratings
As noted earlier, the most highly rated program was Hypertensive Endoscopy. The lower rated program was Behavior Modification. The table below lists the events with the highest attendance.

<table>
<thead>
<tr>
<th>Program</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>POMR</td>
<td>411</td>
</tr>
<tr>
<td>Alcoholic Rehabilitation</td>
<td>218</td>
</tr>
<tr>
<td>Upper GI Bleeding (Nurse)</td>
<td>210</td>
</tr>
<tr>
<td>POMR Update</td>
<td>207</td>
</tr>
<tr>
<td>Changing Role of the Nurse</td>
<td>205</td>
</tr>
<tr>
<td>Death and Dying</td>
<td>203</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>204</td>
</tr>
<tr>
<td>Problem Solving (Nurse)</td>
<td>205</td>
</tr>
<tr>
<td>Cardiac Rehabilitation (Video Tapes)</td>
<td>205</td>
</tr>
</tbody>
</table>

9.4 Video Tapes
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 later use by staff members who were unable to present for the original broadcast. Some hospitals kept a complete file of programs. Others for economic reasons retained only the most popular programs erasing others to free the tapes for reuse.

Although it was impossible to obtain accurate figures detailing the use of these videotapes, 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 Altoona, one of the hospitals that seemed to make great use of this videotapes. This listing is incomplete but gives some idea of the frequency of use of the tapes and of the number of staff members who were present for showings.

<table>
<thead>
<tr>
<th>Date</th>
<th>Program</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/11/74</td>
<td>Changing Role of the Nurse</td>
<td>22</td>
</tr>
<tr>
<td>8/7/74</td>
<td>Arthritis</td>
<td>22</td>
</tr>
<tr>
<td>9/1/74</td>
<td>Vasculitis and Arterial Anomalies</td>
<td>18</td>
</tr>
<tr>
<td>8/14/74</td>
<td>Changing Role of the Nurse</td>
<td>20</td>
</tr>
<tr>
<td>8/21/74</td>
<td>Alcoholism Rehabsituation</td>
<td>19</td>
</tr>
<tr>
<td>9/21/74</td>
<td>Psychiatric Intruder</td>
<td>19</td>
</tr>
<tr>
<td>8/28/74</td>
<td>Changing Role of the Nurse</td>
<td>25</td>
</tr>
<tr>
<td>9/6/74</td>
<td>Family Therapy</td>
<td>37</td>
</tr>
<tr>
<td>9/6/74</td>
<td>Death and Dying I</td>
<td>44</td>
</tr>
<tr>
<td>9/11/74</td>
<td>Changing Role of the Nurse</td>
<td>37</td>
</tr>
<tr>
<td>9/11/74</td>
<td>Changing Role of the Nurse</td>
<td>12</td>
</tr>
<tr>
<td>10/18/74</td>
<td>Surgical Treatment</td>
<td>14</td>
</tr>
<tr>
<td>9/15/74</td>
<td>Diabetic Patients</td>
<td>11</td>
</tr>
<tr>
<td>9/15/74</td>
<td>Behavior Modification</td>
<td>8</td>
</tr>
<tr>
<td>10/18/74</td>
<td>Changing Role of the Nurse</td>
<td>28</td>
</tr>
<tr>
<td>10/18/74</td>
<td>COPD</td>
<td>4</td>
</tr>
<tr>
<td>10/24/74</td>
<td>Coronary Arteriography</td>
<td>7</td>
</tr>
<tr>
<td>10/25/74</td>
<td>CPR</td>
<td>25</td>
</tr>
<tr>
<td>10/24/74</td>
<td>POMR</td>
<td>13</td>
</tr>
<tr>
<td>11/6/74</td>
<td>Gonadal Urinary Infection</td>
<td>28</td>
</tr>
<tr>
<td>11/21/74</td>
<td>Biologic Back</td>
<td>30</td>
</tr>
<tr>
<td>11/26/74</td>
<td>Coronary Care I</td>
<td>23</td>
</tr>
<tr>
<td>11/26/74</td>
<td>Coronary Care II</td>
<td>18</td>
</tr>
<tr>
<td>11/26/74</td>
<td>Cardiac Rehabilitation I</td>
<td>14</td>
</tr>
<tr>
<td>12/11/74</td>
<td>Hyperkinese I</td>
<td>27</td>
</tr>
<tr>
<td>12/11/74</td>
<td>Hyperkinese II</td>
<td>16</td>
</tr>
<tr>
<td>12/11/74</td>
<td>Tissue Conference</td>
<td>4</td>
</tr>
</tbody>
</table>

The unknown popularity of these videotapes had a major impact on the evaluation in two areas. First, because of the internality of videotape use it was impossible to gather accurate data describing this use. Second, some of the videotapes made their way into other VA hospitals which had been wanted to some as controls for knowledge gain evaluation to the experiment. As a result all the control hospitals were contaminated and were unable to present their control functions.

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 (320) the response to these questions provide significant insights into both the validity of a satellite-mediated communication system for the VA end a possible impact.

To summarize responses to these questions we have cross-tabulated 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 below.

To interpret the table first read the very last column. This gives the number of respondents from each role type who responded to the question. For example, if in the first table 41 people or 13 percent of all respondents answered to the question, now look at one of the cells—row 3 column 4. It shows that 13 nurses answered the question with a slightly positive response. These 13 nurses are 13 percent of all nurses who responded. They represent 42.3 percent of all people who responded, slightly high compared to the rest of the sample. Note that the number in the lower right corner (320) 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 67 percent indicated they felt the events had at least somewhat eased their problems. Problems tended to be slightly more positive towards the experiment than were physicians.

Q. Considering all the problems in medical care that you are familiar with, what events do you feel that the ATS-6 programs solved or eased these problems?
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 (83.5 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 A146 programs you have seen) has the potential to solve or ease these problems?

<table>
<thead>
<tr>
<th>Column</th>
<th>Row</th>
<th>No Reply Very Much</th>
<th>Somewhat</th>
<th>Slightly Not At All</th>
<th>Not At All</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>No Stated</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>1</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>M.D.</td>
<td>2.3</td>
<td>3.3</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Nurse</td>
<td>5.0</td>
<td>3.3</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Admin</td>
<td>7.0</td>
<td>4.5</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Other</td>
<td>9.0</td>
<td>4.5</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Column</td>
<td>3.0</td>
<td>3.0</td>
<td>0.0</td>
<td>0.0</td>
<td>3.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>

A surprising number (35 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.

Q: Did you ask any questions during the broadcasts you attended? 1.0 0.0 0.0 0.0 0.0 0.0 3.0 1.0 0.0 0.0 0.0 0.0 6.0 1.0 0.0 0.0 0.0 0.0 0.0 10.0

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 felt it had little or no value and the remaining 25 percent declined to respond.

Q: How valuable were the real-time interactions?

<table>
<thead>
<tr>
<th>Column</th>
<th>Row</th>
<th>No Reply Very Much</th>
<th>Somewhat</th>
<th>Slightly Not At All</th>
<th>Not At All</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No Stated</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>1</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>M.D.</td>
<td>2.3</td>
<td>3.3</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Nurse</td>
<td>5.0</td>
<td>3.3</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Admin</td>
<td>7.0</td>
<td>4.5</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Other</td>
<td>9.0</td>
<td>4.5</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Column</td>
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<td>3.0</td>
<td>0.0</td>
<td>0.0</td>
<td>3.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>

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 felt it had little or no value and the remaining 25 percent declined to respond.

Q: How valuable were the real-time interactions?
A significant proportion of the respondents did feel that permanent information had been transmitted in the satellite events.

Q To what extent do you feel that pertinent information was transmitted via ATS-6?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>33.3</td>
<td>0.0</td>
<td>66.7</td>
<td>0.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>3.0</td>
<td>0.0</td>
<td>9.7</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0.3</td>
<td>0.0</td>
<td>0.7</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
</tr>
</tbody>
</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 50 percent of the respondents indicated they felt there was some success at creating this interaction. Nurses were more concerned with face to face than physicians.

Q We often get information from colleagues in a face to face situation. To what extent have the ATS-6 programs been able to create a sense of face to face interaction between you and the Denver consultants?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>33.3</td>
<td>0.0</td>
<td>66.7</td>
<td>0.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>3.0</td>
<td>0.0</td>
<td>9.7</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

In general, the respondents felt that viewing the ATS-6 programs was a good use of their time. Nurses were far more positive than physicians.

Q To what extent do you feel that viewing programs (ATS-6) was a good use of your time?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>33.3</td>
<td>0.0</td>
<td>66.7</td>
<td>0.0</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>
In addition to stating that viewing the satellite events was a good use of their own time, respondents also indicated that they felt it was a good way for others to employ their time as well. To what extent do you feel that viewing programs was a good use of others' time?

<table>
<thead>
<tr>
<th>Column</th>
<th>No Reply</th>
<th>Not At All</th>
<th>Slightly</th>
<th>Somewhat</th>
<th>Very Much</th>
<th>Row</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>No Role Stated</td>
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<td>66.7 0.0</td>
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<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>1</td>
</tr>
<tr>
<td>M D</td>
<td>33.3 0.0</td>
<td>66.7 0.0</td>
<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>1</td>
</tr>
<tr>
<td>Nurse</td>
<td>33.3 0.0</td>
<td>66.7 0.0</td>
<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>1</td>
</tr>
<tr>
<td>Admin</td>
<td>33.3 0.0</td>
<td>66.7 0.0</td>
<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>33.3 0.0</td>
<td>66.7 0.0</td>
<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>100.0 0.0</td>
<td>1</td>
</tr>
</tbody>
</table>

The last two questions concern the technical quality of the individual events and the quality of the introductory material presented. When asked if they felt the events were technically adequate, 95 percent of the respondents felt they were at least somewhat adequate and only 1.5 percent felt they were not technically adequate.

Q To what extent do you feel that the ATS-6 programs were presented comprehensively?

When asked whether or not they felt viewing the experimental events increased their competence, nearly 80 percent of the respondents indicated that it had at least somewhat increased their competence. Only 13 percent felt that viewing had not increased their competence at all. Again, nurses (69 percent) tended to be much more positive than physicians (49 percent).

Q To what events do you feel that viewing increased your competence?

When asked if they felt the tapes were covered comprehensively by the events, 16 percent of the respondents indicated that they felt they were covered at least somewhat comprehensively.

Q To what events do you feel that the ATS-6 programs were presented comprehensively?
9.2 Scheduling Problems
There were some scheduling problems, caused primarily by
some accidents and production problems mentioned in
some of the programs. This meant that the original ten month
schedule had to be changed because of monthly updates which
were sent out around the middle of the preceding month.

Another problem was that they had to reorganize their
baseband facilities because of the scheduling changes. As
a result, their workload increased.

9.3 Printed Material

One problem which was mentioned briefly in the discussion
of the various problems is the frequent absence of printed material
from the program material delivered to the station. This
was a serious problem because they realized that
the material was not only an important part of the
program, but also an important part of the
production process.

Some of the printed material was prepared for
the telecasts, and some was prepared for
the printed program. They were both
prepared in different departments, but
without any coordination. As a result,
the printed material was often
not delivered on time, and sometimes
was not delivered at all. This
problem was particularly acute
in the case of the printed
program. They were highly
insensitive to the printed
material, and often
more

9.4 Post-experimental Impressions

A post-experimental questionnaire was distributed
among the three groups of participants at the
end of the project. One of the
questions was: "What was your
overall impression of the project?" The
results were as follows:

- "Excellent" (90% of respondents)
- "Good" (9% of respondents)
- "Fair" (1% of respondents)

The majority of the respondents were very satisfied with the
goals and objectives of the project, and believed that it had
achieved its goals.

9.5 Technical Problems

Technical problems were present throughout the project.

- Communication problems: In at least 30% of the interviews,
problems were encountered with the audio and
video signals. Some of these problems were
caused by technical faults, while others were
caused by poor coordination.

- Equipment failures: In some cases, equipment
failed unexpectedly, causing delays in the
production process.

- Poor training: Some of the staff were poorly
trained in the use of the equipment, which
caused inefficiencies and errors.

These results suggest that more work needs to be done
to improve the technical aspects of the project.

9.6 Conclusion

In conclusion, the project was a success. The goals and
objectives were achieved, and the participants were
very satisfied with the results. However, there are still
many areas for improvement, particularly in the
technical aspects of the project. Further work is
needed in order to ensure that the project continues to
meet the needs of its users.

The authors would like to thank all the participants
who contributed to the project, and to the organizations
who supported it.
Among those who have gained from AT6-5e programming has been to you in performing your job.

The practical approach to treatment of hyperdynamic management of anemia and a better understanding of cellular function and disease progression, it is possible to improve the diagnosis and management of anemia (physicians 30 programs).

Physicians have also seemed to be interested in the use of various techniques for the evaluation and management of anemia, which has been a topic of much discussion in recent years.

In addition, there has been a greater appreciation of the importance of regular follow-up visits and the role of the primary care physician in the management of anemia.

Q. Please list any specific knowledge you have gained from AT6-5e programming that has been useful in your performance of job.

A. As all the knowledge we have gained has posed a great deal of interest and was recollected, as a result of our knowledge and in better care for patients, it is not possible to mention one or two specific knowledge. However, the following are some of the topics that have been covered:

1. The role of the primary care physician in the management of anemia
2. The importance of regular follow-up visits for patients with anemia
3. The use of various techniques for the evaluation and management of anemia

Q. What else do you think the AT6-5e experiment has had on communication patterns within the hospital staff?

A. Several increased participation by staff members in personal interactions that clarified many of the problems. This was due to the increased awareness about the importance of effective communication within the healthcare team. Furthermore, the sharing of experiences and knowledge among the staff members has led to improved communication patterns.

Q. What is the best way you feel there will be any continuing or long-term effects from the AT6-5e experiment?

A. In what ways do you feel there will be any continuing or long-term effects from the AT6-5e experiment is not possible to say. However, it is important to note that the principles of effective communication and the importance of regular follow-up visits for patients with anemia are likely to continue to be emphasized and improved upon in the future.
Sometimes, however, too much information is gathered in a particular experience or situation based on the form of an idea or a question which then inhibits the learning of other information for that particular repair. As a result of application information collected, alternative courses of action are formulated, and one may be selected thereby resulting in behavior change.

Hearts all coronary artery disease patients provide primarily nutrient information. The center can see such information as achieving changes related to the coronary artery repair's current atmosphere on that event.

For example, many respondents reported changes in techniques associated with certain repair. One event of the event breadwork with the repair, you merely reported changing behavior based only on information from the event. A typical comment would be that as a result of the event, people were aware that different techniques were inadequate and they were in the process of evaluating alternative techniques to select a new one. Obviously, the events contributed to the behavior change, but additional information was required before the change was made.

In evaluating the impact of these events on the code we can ask many self-reports units appear to have contributed to specific behavior changes. Many of these units have been described in subsection 9.3. Overall the impact appears to have been significant. A large number of behavior changes were reported both by respondents and direct care workers in areas that were covered by the event material.

Some units were identified by Dr. Roger Hoffman's physical examination for the breakfast in a place experimental test that hospitals in states exist impact. Several examples from his organs are cited below.

One observer studied a point that was missed in the center unit. However, the coroner care program the points with coronary bypass and other patients without coronary bypass. Since many patients were not treated with an anticoagulant the coronary bypass units were evaluated for patients where a patient with a positive injection culture with a significant baseline reaction was not placed on antibiotics.

A more recent is a hospital stay that went as in the presence of a change in treatment management. He had had the different potential of infection. After the units were treated with antibiotics the coronary bypass units were evaluated for patients where a patient with a positive injection culture with a significant baseline reaction was not placed on antibiotics.

A recent study in a hospital stay that went as in the presence of a change in treatment management. He had had the different potential of infection. After the units were treated with antibiotics the coronary bypass units were evaluated for patients where a patient with a positive injection culture with a significant baseline reaction was not placed on antibiotics.

Another recent study in a hospital stay that went as in the presence of a change in treatment management. He had had the different potential of infection. After the units were treated with antibiotics the coronary bypass units were evaluated for patients where a patient with a positive injection culture with a significant baseline reaction was not placed on antibiotics.

Another recent study in a hospital stay that went as in the presence of a change in treatment management. He had had the different potential of infection. After the units were treated with antibiotics the coronary bypass units were evaluated for patients where a patient with a positive injection culture with a significant baseline reaction was not placed on antibiotics.

Summary

1. The experiments were done while the patient's cardiac care program was administered to a patient with a coronary bypass and other patients without a coronary bypass. Since many patients were not treated with an anticoagulant the coronary bypass units were evaluated for patients where a patient with a positive injection culture with a significant baseline reaction was not placed on antibiotics.

A recent study in a hospital stay that went as in the presence of a change in treatment management. He had had the different potential of infection. After the units were treated with antibiotics the coronary bypass units were evaluated for patients where a patient with a positive injection culture with a significant baseline reaction was not placed on antibiotics.

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Another recent study in a hospital stay that went as in the presence of a change in treatment management. He had had the different potential of infection. After the units were treated with antibiotics the coronary bypass units were evaluated for patients where a patient with a positive injection culture with a significant baseline reaction was not placed on antibiotics.
Evidence Provided by the Experiment on ATS-6

Perhaps the most significant indication of the potential use of satellite communications throughout VA hospitals was in the way in which the weekly ATS-6 broadcasts were regarded by medical personnel at the end of the experiment. Although participants had been asked to regard the broadcasts as experimental rather than as a service, by the end of the 44 week period, the irregularly scheduled programs had generally come to be thought of as a useful service. When the last telephone survey was taken at the end of the last broadcast, coordinators asked whether the broadcasts would begin again. Several wanted to know whether their hospital would receive programs on the next satellite.

Over the broadcast period, the programs with the exception of the few consultations continued to attract about the same number of participants in the various hospitals. Professionals continued to try and attract the weekly broadcast long after the novelty factor was no longer in effect possibly an indication that an expectation of a well produced program on a timely subject with an opportunity to ask questions, will always attract an audience.

More than just attendance records there were many reports from the hospitals indicating that programs had met the objectives set for them. They had resulted in knowledge gain, attitude change and even behavioral changes resulting in better patient care outcomes. Patient records given to the physician moderator of the programs during hospital visits after the broadcast period indicated several instances where patient care had been altered following procedures recommended in a VAATS-6 broadcast. And generally speaking the evaluation data indicated a change of climate or growth in the participating hospitals that change resulted in more willingness on the part of medical personnel to accept new information and to change their methods of practice accordingly.

The programs broadcast on ATS-6 for the experiment in which communications were apparently successful in achieving their purpose—and more the question remains—Could those programs be even more successful in a TV system with an improved service.

In a monograph publication by the Rand Corporation "two types of comments are made to justify the use of the broadcast by users: (1) the range of particular events and (2) the omission of two essential components of the broadcast. Both of the latter features were seen as potential improvement areas for the VAATS-6 experiment. All programs, it is noted, incorporated some maneuver, and therefore the total of those two was not an omission. When the evaluation data are examined, it appears that two ways factors were unique to the experiment, and that the program was able to adapt to the needs of its audience. In the last instance the broadcast was seen as a service rather than as an "in person" on the part of the doctor participating hospital.

The Satellite as Mediator

The communication satellite was viewed as a mediator which can do two things: (1) it can act as a link between individual physicians and hospitals which are geographically distant; and (2) it can act as a link between the various hospitals and the VA system as a whole. The former role was intended to facilitate information exchange among the participating hospitals, while the latter could be used to facilitate the transfer of medical information between the VA system and other medical institutions.

The VAATS-6 experiment was not to find out whether a communications satellite could replace traditional communication services, but it was to develop the uses of a satellite in terms of communicating within the VA system. It was possible to show that the communication satellite was able to act as a mediator in the transfer of medical information between hospitals. The experiment showed that the communication satellite was able to act as a mediator in the transfer of medical information between hospitals.

The Communications Linkage

A satellite medium could link all VA hospitals throughout the United States and could serve many users in meeting their needs. Although some of the VA hospitals could not be engaged with a satellite medium, the system was designed to be flexible. The VA hospital network was able to provide a communications service to the hospitals in the same way that it provided a telephone service. The communication satellite was used to provide a service to the hospitals in the same way that it provided a telephone service. The communication satellite was used to provide a service to the hospitals in the same way that it provided a telephone service.

The Communications Center

The communication center acts as a control center for the entire communications network, providing a hub for all communication services. The center receives and relays information to the various hospitals, ensuring the smooth flow of information throughout the network. The center is responsible for managing the communication satellite, ensuring that it is operating efficiently and effectively.

CONCLUSIONS

The unique feature of a communications satellite is its ability to provide a communication medium to many facilities located within a large geographic area. A high powered satellite such as VAATS-6 has the ability to provide the communication services that are needed to improve communications in almost all the other facilities. Based upon the information many individuals have conceived of a number of systems designed for using satellites coupled with other media for communication and education. The following concepts based upon similar knowledge and the experiment derived from the design and operation of the VAATS-6 experiment is an example of how a satellite might be utilized in providing an informational network for the VA hospitals.

The Future A Satellite-Mediated Communications Network for Veterans Administration Health Facilities

Some communications needs of the VA's large system of hospitals, clinics, and other facilities are: (1) an overall system of patient management from system wide, high standards of care to individual utilization of resources; (2) a means of providing two-way voice communications at remote places convenient to the practitioners; (3) a linkage to public service, accessible to all patients and their families; and (4) a mechanism for providing rapid response to specific disaster situations. The satellite media could be used to provide these services.

The VA satellite network could be used as a basis for the development of a new communication system, which could provide a significant improvement in the delivery of medical services.
needed to manage or核实 a claim, consultation and diagnosis. Some possible ways these systems might meet these needs include:

Patient Management

The Problem: Uncovered Medical Record (PMR) has been introduced to the Veteran Administration Health Care System (VAHCS) to assist in the management of patient records and to improve patient care. The system is designed to be secure, efficient, and accessible to authorized individuals. However, some readers have reported difficulties in using the system, particularly with navigating through the medical record and accessing specific patient information.

Methodology

PMR is a computerized system that allows for electronic storage and retrieval of patient information. The system is intended to reduce paperwork and improve the efficiency of patient care. It is accessible to authorized users through a secure network, and it is designed to be user-friendly and intuitive.

Typical use cases for PMR include:

- Accessing patient records for diagnosis and treatment
- Updating patient information in real-time
- Sharing patient information between healthcare providers

However, users have reported challenges with navigating the system and locating specific patient information. Some have also expressed concerns about the security and accessibility of the system.

Summary

PMR is a valuable tool for managing patient records and improving patient care. However, challenges with navigation and accessibility may impact its effectiveness. It is important to continue improving and refining the system to ensure it meets the needs of healthcare providers and patients.

Cost Effectiveness

The cost of the system has been a concern throughout the implementation process. The program is expected to provide significant benefits in terms of increased efficiency and reduced costs, but it is important to carefully evaluate the cost-effectiveness of the program to ensure that it is a worthwhile investment.

By carefully considering the benefits and costs of the program, we can determine whether it is worth the investment and whether it will meet the needs of the healthcare system.
conditions 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.

Naturally, an experiment involving only ten hospitals cannot be particularly cost-effective since all of the production and related activity would have to be directed to only several hundred participating health professionals. The experiment is justifiable, however, despite its high cost per professional-hour, if it can 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 projected cost for satellite time, production and management functions. It is based on a total overall cost of $10,000 per hour divided by 25 health professionals in each of 121 hospitals or 4,000 participating professionals.)

2. What will be the actual hourly hours for a nationwide television satellite linkage involving all VA hospitals? (The maximum project time per hospital day 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 $350 per hour.)

The answers 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 $2.50 per participating professional is a worthwhile investment considering the likely outcome on patient care. The system becomes much more cost-effective when resulting software is distributed and retained on video cassette. Health professionals who are exposed to the materials in a passive or non-interactive viewing situation may be reached for considerably less than $1.00 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 restriction which prohibited actual teleconferences on a one-to-one basis has made it impossible to develop realistic cost projections for such teleconferences. Additional experimentation is needed, with carefully controlled one-to-one teleconferences, 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 avoid utilization patterns, so that cost projections will reflect 6-hour, 12-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 $35,000 per hour plus installation and construction charges. If 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 a clear potential 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 administrative communities surrounding the VA hospitals. The network hospitals could become teaching centers for the physicians, nurses and allied health professionals practicing in the community. 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 video programs developed and produced at the centers 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 unworkable and inadequate 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. Logically, the standard of medicine practiced in the community has until now been the measure for establishing 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, Bruno v. Bellevue, may change that standard. According to the decision in the case, the "locality rule" is unsuited to the non-competitive conditions of the times. Medical practice should no longer be "Balkanized," so that care delivered in small communities distant from teaching centers, is measured by different standards than those for larger metropolitan areas. In Massachusetts the new acceptable measure would be the average qualified practitioners of the specialty, whereas he may practice, "taking into account the changes in his practice." 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 reasons, 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, development and maintenance.

RECOMMENDATIONS

1. A satellite-mediated, VA health network, interconnecting 361 VA facilities and managing medical audio, video educational programs, diagnoses and communications for its own and other facilities, is probably a fair future achievement. Some technological advancements and philosophical changes must first be accomplished. In the meantime, a general recommendation resulting from the VA-ATS-6 experiment should 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:

2. Since it has been demonstrated that satellite communications have an over-all positive impact in terms of seeking and acquiring new knowledge on the medical staff and other health professionals in isolated VA hospitals, the VA should continue experimentation with available satellites (provided that: 1) the expenditure for experimentation is within reason (leading toward a permanent satellite service); and 2) the available satellites are technically capable of providing the proposed linkage to VA hospitals on a dependable basis.

3. 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.

4. 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 as least all of its non-urban hospitals.

5. 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.

6. As part of its outreach program, any future VA satellite communications should be made available to hospitals and practitioners outside the VA system.

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 videotapes for continuing education of health professionals in non-affiliated VA hospitals.
SATELLITE TECHNOLOGY DEMONSTRATION

References

1. A proposal to the Veterans Administration Appalachian Region. Commission for Applied Communication Technology.
2. A proposal for a demonstration of a prisoner telecommunication system. The Department of Psychology, University of Virginia, 1974.
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 expressed in a 1972 statement by Cecil D. Andrus, Governor of Idaho:

"I feel confident that there is a promise of real benefit to mankind in this project. If we can truly provide a system of communications among the people of this region, we could 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 serve people at reduced costs. This Project has brought us full circle.

The initial space experiments were originally to test some of the universe and of our own earth. However, with the advent of the S-70 we are now using space discoveries and space itself to service 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 insurmountable trend which will continue until the expressed needs of the user populations have been satisfied. Our challenge will be to continue development and apply judiciously the use of this capability, mediated by potential human benefits. The technology has been exposed as an aid to the precocious. It is not a bubble-free aid, and it 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 exemplified a basic tenet of our organization—that problems and opportunities are no respecters 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 ST staff for their dedicated efforts, to the personnel in the state sponsoring agencies, and to the teachers and site 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 partner state and local agencies. On a smaller scale, we have been a demonstration of what can occur on a national, even international level given careful planning and incorporating the ideas and concerns of the constituencies participating in the program.

The technical capability has arrived—we eagerly await its broader application.

Sincerely,

Jack M. Campbell
President
In 1956, Giovanni Marconi directed wireless signals from one end of a room to the other. Six years later, powerful transmitters exchanged "marcomgrams" between Poitou, England, and St. Johns, New Foundland.

In 1968, NASA's first Applications Technology Satellite, the ATS 1, 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 most unnoted work of man's civilization. "Now new vistas of telecommunications technology have been explored as federal, state, and local agencies in the fields of health 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 of 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.
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 1965 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), the most complex, versatile, and powerful space craft ever developed. The ATS-6 served as a broadcast station 22,000 miles above the earth 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 Experiment was developed for areas where people are relatively isolated both geographically and culturally.

The Rocky Mountain West is a panorama of striking contrasts covering over 1.2 million square miles but inhabited by only 5 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 the 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 two 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 of the cost of various delivery modes using a variety of materials.

SATELLITE TECHNOLOGY DEMONSTRATION

In the late 60's the Federation played an important role in developing a regional educational television corporation which has now become the twelve-station Rocky Mountain Corporation for Public Broadcasting. These stations, because of their locations in major cities reaching over 70 percent of the mountain states population but don't serve many of the region's citizens who reside in rural isolated areas.

In 1968 the Federation submitted a proposal 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 (for the designation for the ATS-6 prior to launch). 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
- Vocational training
- Communications
- Environmental studies
- College courses
- Public service education

The Office of Education responded to the Federation proposal by making an FY '72 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 was 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, and one-channel audio, four-channel audio computer-assisted instruction, computer-managed instruction, and interactive 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 of terminals, technical capabilities, broadcast schedules and content development. All these changes — related to reduced funding — altered the STD.

The Project evolved into a quasi-research experiment and demonstration with limited objectives. Nevertheless, individuals and organizations involved in planning and implementation activities contributed.

The National Information Center in Denver, Colorado was the hub of the planning, research, planning, scheduling, and controlling HET ground network activities throughout Alaska, the Pacific Northwest, the Appalachian region, and the Rocky Mountain states.
continued to pursue a "service-delivery" system rather than a "limited-experimental" model. 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 consequences 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 organization reason 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 receiver hardware, and the design, bidding, 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 heroic task in addition to designing the low-cost ground transmitters and receivers. The Broadcast and Engineering staff designed and built the Ground 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. Eventually broadcast by satellite, two courseware 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" and 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 schools recorded on videotape for classroom use at their convenience.

The Research component designed and implemented data-gathering and evaluation procedures. The research 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, mayors, 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 orientation. The component assisted the content specialists in determining the levels of greatest educational need and in developing the pilot program design which provided guidance for content development.

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 in state entities involved in the Project. At 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 a part of Project management were geared to develop awareness and acceptance among the many STD constituencies. A flow of accurate information was vital, especially since the Project was new 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 STD project staff were coordinated by the public information office.

The ATS-1, which was used for the health education, communication equipment, volumes of the data collected, required an intensive coordination of the public information activities. The satellite was a precursor for taking by Fairchild Industries engineers at Denver, Colorado.

On May 30, 1974, NASA launched the ATS-F from Cape Canaveral. As it moved into its geosynchronous orbit 22300 miles over the equator, the ATS-F was designated 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 Satellite Technology Demonstration located in Denver, Colorado.

While there were many last-minute adjustments to equipment, some of television material and calls to suppliers who failed to meet delivery schedules, the Project was ready and anxious to become operational.
THE COMMUNICATIONS SYSTEM

Only a few years ago man had to build giant earth stations costing hundreds of thousands of dollars to communicate with the satellites launched into space. However, the ATS-6 introduced a powerful new broadcast capability to the art of satellite telecommunications. Unfolded in space the satellite's parabolic reflector resembles a giant umbrella large enough to cover a house. The communications signals concentrated by the inverted bowl-shaped structure are so powerful and so highly directional that they can be picked up by a low powered receiving system. The STD established that the high gain antenna 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 STD project was planned to test 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 antenna/receivers designed by Denver based STD Engineers. These receivers which cost about $4,000 installed were the lowest priced equipment of their type ever produced. Twenty-four installations at all schools were designated as IT's (Intensive Terminals) and had two-way audio capability. The other 43 installations were called ROT's (Receive-Only Terminals) - the ROT's 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 programming.

The equipment for the satellite which was operational 95-98% of the time was enlarged to maximize convenience of operation and capability.
STD programs. Public television broadcasts added thousands of viewers in 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 impulses 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, enabling 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 98 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 surfaces, 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 late 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. Their 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.

![Diagram of ATS-3 Network](image_url)
CAREER EDUCATION PROGRAMMING

Because national and state priorities which existed prior to the funding of the Project career education were selected as the topic of STD programs. A subsequence, study conducted by the STD revealed two factors that served to define the intended audience for the broadcasts. First it was determined that career education had been a 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 STD career education programs were broadcast to students in both Open and Closed Sites. Closed Sites were those where STD equipment had been installed to receive programming directly from the ATS 6. Open Sites were schools which received the programs from public television stations or via cable and translator systems.

The career education programming entitled "Time Out" was broadcast Monday through Thursday during both the first and second semesters of the 1974-1975 school year. Pre-taped segments of the Monday through Thursday programs lasted 28 minutes 30 seconds 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 films 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 needs 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 12 Friday programs per semester were broadcast live and were produced with a variety of formats. Although extensive modifications were precluded by time and budgetary constraints, second semester programs included revisions based on audience and STD 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.

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 students at the "T" sites who participated in the audio interaction.

By presenting meaningful informational broad casts the STD 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 questions and activities related to the contents of the programming.
questions and activities enabling them to select appropriate materials for their students. The guide included an introductory issue and four subsequent updates. The student magazine was issued four times per semester to each student in the 56 participating sites and contained articles, games, puzzles, and artwork designed to encourage student acceptance and learning. All print materials were available for purchase by Open Sites. The materials were revised for second semester use.

Print support materials were also available for the other STD programs. Footprints Careers and the Classroom and the Materials Distribution Service (MDS). An MDS catalog listed the titles alphabetically 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. The MDS catalog listed the titles of available local state and national resources and suggestions for subsequent activities were available.

AUDIENCE ACCEPTANCE OF TIME OUT

The "Time Out" series utilized a number of different formats to explain career concepts. The 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 to recall film clips, and to smoothly bridge other program formats.

Program formats included the Footprints Career which featured teenagers in a rural setting, film clips of job scenes. Dr. DOT, a cartoon-type character used to explain the Dictionary of Occupational Titles. Nick Frumpy, a comic detective, used puppets 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.

STD STUDENT POPULATION

Analysis of population data indicated that 5,503 students at the 56 STD closed sites viewed "Time Out." and an additional 18,919 students viewed the programs as they were re-broadcast by participating public television stations in the region. These 22,522 students comprised the total confirmed "Time Out" audience. Demographic data on the STO research classes numbering 3,446 students at the 56 sites have been presented in Figure 3.

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The Great Land Raco: Cultural Heritage

Table of Contents

Chapter 1: Cultural Heritage and Educational Development

Chapter 2: Footprints

Chapter 3: Materials Distribution Service

Chapter 4: Case Studies

Appendix

Bibliography
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 all 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 the programs in this series dealt with 18 career related topics. Program titles included in the series were "Careers Education is for Everyone: Continuing Education's Role," "The Dictionary of Occupational Titles," "Honest Self Assessment Values and Strategies in Decision-Making: Organizing and Facilitating Independent Learning," "Career Guidance Resources: Career Education and the Standard Academic Curriculum," "Overcoming Bases in Countering Students: Ecology/Environment — How Do They Impact Upon Careers," "Unions and Career Education," "Job Security Tomorrow's Careers," "Earning a Living Is Not Enough — The Art of Intelligently Spending: Effects of Change on the World of Work and 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 15-30 minutes followed by an interaction session via satellite. Each program was 50 minutes in length.

All sites in the Careers series received identical information about each program. The program reviews contained biographies of the presenters and outlines of the presentations in addition during 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. 254 educators took advantage of this opportunity. In addition 322 teachers who participated in the program received re-certification 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.

In addition to the regularly scheduled program of "Time Out: Careers and Footprints," the STD staff also developed a number of programs for specialized audiences. Eight special satellite feeds were made between July 9, 1974 and May 16, 1975. Each of these further demonstrated the flexibility of a satellite-based broadcasting system.

On July 31, 1974 a special presentation was broadcast from Denver to Washington D.C. giving general information about the STD and showing a portion of the "Villas Alegre" series developed by Bilingual Children's Television. In attendance at this presentation were individuals representing the Congress National Institute of Education the Office of Education NASA, the United States Information Agency, Fairchild Industries and several unaffiliated but interested individuals. This broadcast was one of several made to individuals representing the private sector: the legislative and executive branches of the federal government; and various regulatory agencies.

Special presentations were made to the Space Applications Board of the Academy of Engineering, the Institute of Electronic and Electrical Engineers the Russian Minister of Health, the Space and Missile Systems Organization, the Society of Motion Picture and Television Engineers, the National Association of Educational Broadcasters and the American Association for the Advancement of Science.

Several special news programs were transmitted through the Project's 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 also made from Washington, D.C. to Denver via the Public Broadcasting Service's satellite, Denver to Juneau was provided by the AT&SF.

The leading project scientist for NASA's Viking Project utilized the STD network to make two presentations describing the Viking Mars mission. Science students at Intensive Sites were given the opportunity to question the guest scientists while other participants viewed and listened to his immediate responses.

A program presented before the American Association for the Advancement of Science involved the live broadcast of a ballet performance. This 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 syndicated to the Rocky Mountain Regional Medical Conference in Boise, Idaho, demonstrated the potential use of satellite broadcast systems in the medical field. Such systems 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 the Rocky Mountain Corporation for Public Broadcasting and the Robert Wood Johnson-Foundation. These were the first of a series of seven programs designed to serve as a refresher course for certified emergency medical technicians. This series made "Footprints of Science" 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 six minutes of live programming during which students asked questions and provided comments concerning the broadcast. During the first semester, three six-minute segments entitled "Time Out" 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 aptitude interests and temperament associated with various careers.

There were also 12 half-hour live presentations 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, the 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 an extension of the "Time Out" broadcasts encouraging students to seek information relating to various career alternatives.

During the second semester, "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, "Time Out, Time For You," 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 apprenticeship programs responded to student 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 individual site presentation, the remaining Intensive Sites were given the opportunity to comment on and ask questions about the program.

Interaction Without the Satellite

In the live segments of STD programming which emphasized interaction and involved Intensive Sites directly, every attempt was made to include students at the STD Sites. Program topics were announced as far in advance as possible and questions by mail were solicited. Letters received from students at STD 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, a 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.

The ATS-3 transponder, an unmodulated low noise parametric amplifier and an 11-meter (36-foot) prime focus parabolic antenna.
SUMMARY OF STD SERVICES

The Satellite Technology Demonstration designed, developed, implemented, and tested an elaborate technical communications network that would be capable of providing a wide variety of users with a comprehensive field support system.

Despite the extreme weather conditions, the technical network operated efficiently with a minimum of interruption of services. Signal quality far exceeded minimum design specifications. The STO designed ground receivers proved to be a suitable low-cost network component, complementing the high-powered transponders of the ATS-6.

The STO programs attracted a larger share of the viewing audience than public television broadcasts in general. "Footprints" attracted 3.31 percent of contacted viewers and "Time Out" was viewed by 4.3 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 television. 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 STO. A significant legacy of the STO is the user system that comprised of professional policy makers, managers, teachers, citizens, and students. Citizen boards of advisory panels, parents, and young people in the general audience, viewing PTV television programs, increased the system's acceptance.

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PROJECT COSTS

Telecommunications (DHET) $2,275,530 and the United States Office of Education $4,797,481. The STO was completed in three major phases: planning, development, and operation. The approximate costs were planning $4,000,000 development, $4,000,000 and operation $2,700,000.

The STO component structure was based on functional activities related to the products and services. The costs for each have been shown in Table 3.

TABLE 3

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Broadcast and Engineering</td>
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<td>Communications network design and implementation</td>
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<td>Operations and Support Centers</td>
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<td>Content design and video production</td>
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<td>Utilization and field organization and support services</td>
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<td>Research and data processing and analysis</td>
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<tr>
<td>Administrative management and support costs, salaries, utilities, and supplies</td>
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</table>

Note: Does not include the $170,000 of early childhood programming which was phased out of the Project in July 1973.

STD PROGRAM AND SITE SUPPORT

A major STO activity involved the development and delivery of career education programs to junior high school students. An analysis of the expenses incurred during the development of these programs revealed their cost to be approximately $24,000 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 $20,000 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 $8,500 per hour and the approximate cost per hour for the "Footprints" series was $750.

The estimated cost of an STO site during the 1974-75 operational year (including equipment and human support services) was approximately $9,000 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 and/or technology applications. An implicit long-range goal of the STD was to obtain state and local in-kind support to demonstrate Project's 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>
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<tr>
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<td>317</td>
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<tr>
<td>TOTAL</td>
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</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/center costs would be affected 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 $4,651 (as reflected by 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>
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<th>SITE COSTS INCLUDING IN-KIND SUPPORT</th>
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<tr>
<td>IT</td>
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<td>PROVISED STD SITE COSTS</td>
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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 cost of highly skilled technicians. The equipment was also adaptable to a variety of locations installations, weather factors and user demands.

A remarkable achievement of the STD was the coordination and blending of divergent interests and contributions of many people and organizations at the local, state, national and international levels. Individual efforts reflected the tremendous enthusiasm and interest of participants. One reason for the positive involvement was that the Project design excited local response so that programming could be modified to meet the needs of participating students.

A help support effort was implemented to help tailor the general STD programs to respond to unique local cultural, linguistic and other demographic factors. These 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 satellites. Respondents indicated that more comprehensive services (student programming in-service programming distribution of existing materials, specific skills training for adults, etc.) are needed to justify the expenditure of additional funds. Essentially the respondents seek further movement: expanded technical capability and more diverse services.

The success of the Emergency Medical Technician 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.
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 with technical attributes based on the needs of the user organizations.

There are audiences 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 similar 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. Fitting 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
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CONTENTS

Preface vi
DEVELOPMENT OF SATELLITE TECHNOLOGY 1
Echo in System 1
The ATS Satellites 1
The Health Education Telecommunications Experiment 3
Electronic Communication in Health and Education 3
Target Populations for ATS-6 3
The Utility of ATS-6 3
Organization of the NIH Experiment 4
Transmission Systems 4
The Experiments 5
The Education Satellite Communications Demonstration 5
Veteran Administration Exchange of Information Program 5
ATS-6 Health Experiment 5
Evaluation and Anticipated Outcomes 5
The ATS-6 Spectrum 6
Physical and Functional Development Experiments 6
ATS-6 Health Experiment 9
The Problem of Maneuver Distribution 9
The Potential of Telecommunications 9
Applications for ATS-6 9
ATS-6 Health Experiments 10
The Experiments 10
Organizations Involved 10
Terminal and Peripheral Equipment 11
Network Control 11
The Indian Health Service Experiment 12
The Role of the Indian Health Service in Alaska 12
The Advent of ATS 13
Development of Plans for ATS-6 13
ATS-6 Experiment Sites 13
PHS Alaska Native Health Center, Galena 13
PHS Alaska Native Health Center, Ft. Yukon 17
PHS Alaska Native Hospital, Tanana 17
PHS Alaska Native Health Center, Fairbanks 19
PHS Alaska Native Medical Center, Anchorage 19
The Role of Each Site and Its Terminal Equipment 20
Telecommunication Experiment 21
How the System is Used for Interaction 21
How the System Operates for Teleconsultation 21
Additional Features of the System 24

LIST OF FIGURES

Figure 1 The first Applications Technology Satellite ATS-6 26
Figure 1 ATS-6 vehicle with the most extensive satellite communications experiments 26
done to date 2
Figure 3 The ATS-6 spacecraft 27
Figure 4 The five Indian Health Service sites participating in the Alaska ATS-6 experiment 28
Figure 5 Aerial view of the village of Galena at Galena 29
Figure 6 The Alaska Native Health Center at Galena 30
Figure 7 Aerial view of outposts of Fort Yukon 31
Figure 8 Extent of Alaska Native Health Center at Fort Yukon 31
Figure 9 Alaska Native Hospital at Tanana 31
Figure 10 Donor money along the banks of the Yukon River at Tanana 32
Figure 11 Alaska Native Health Center 32
Fairbanks 18
Figure 12 Fairbanks looking toward the White Mountains 32
Figure 13 Alaska Native Medical Center in Anchorage 33
Figure 14 Radio room equipment 33
Figure 15 Examining room equipment 34
Figure 16 Telecommunication between a village and Tanana with Anchorage and Fairbanks called in 35
Figure 17 A visual TV image on a village monitor 35
Figure 18 Galena floor plan 36
Figure 19 Equipment layout at Galena clinic 36
Figure 20 Galena ATS-6 antenna 36
Figure 21 ATS-6 antenna port installed at the south side of the Fort Yukon clinic 37
Figure 22 Radio room equipment at Tanana 37
Figure 23 ATS-6 and ATS-1 antennas at Tanana 37
Figure 24 Electron gun and TV monitor 38
Figure 25 Anchorage 38
Figure 26 University and Community Clinical Health participating in the WAMI Experiment 39
Figure 27 ATS-6 satellite footprint covering the area involved in the WAMI ATS-6 experiment 39
Figure 28 University of Washington Health Science Center Laurel Washington 39
Figure 29 University of Alaska, Fairbanks, pioneered the University Phase of the WAMI program 39
Figure 30 Family Medicine Center Omak 40
Figure 31 Alaska students view a Seattle lecturer on the TV receiver 40
Figure 32 A lecture set at the Health Sciences Center TV studio 40
Figure 33 The heritage of equipment to which experiment participants must become highly attuned in order to focus on their intended audience 41
Figure 34 Seattle and Fairbanks faculty hold conference while students study via a computer-aided evaluation system 42
Figure 35 University of Washington medical school students from the Department of Family Practice observe student presenting with an ear 43
Figure 36 Equipment set up for a lecture discussion in the Closed Circuit Television studio of the University of Washington Health Sciences Center 44
Figure 37 ATS-1 and ATS-6 antennas atop a wing of the University of Washington Health Sciences Center Building 44
Figure 38 The KUAC Educational Television classroom studio at the University of Alaska 45
Figure 39 Mid-VaHey Hospital Omak 45
Figure 40 Equipment for the ATS-6 experiments at Mid-VaHey Hospital in Omak 45

A-4-70
on may 30, 1954, the national aeroscience and space administration placed a satellite in orbit 22,300 miles over the equator. this most complex and powerful communications spacecraft ever developed from its geostationary position almost directly over the galapagos islands, applications technology satellite 6 will serve as a relay station for the four extensive experiments conducted to date in the field of satellite communications. the most ambitious of the experiments planned for ats-6 are those sponsored by the us department of health, education, and welfare.

using solar radio waves and a variety of data signals, the dhew programs will deliver inflight services to 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 indiana health service in alaska and the wami (washington alaska montana) malath experiment in regionalized medical education. 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.

development of satellite technology

nearly fifteen years have passed since the national aeroscience 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-6.

echo to syncom

the first communications satellites were large spherical craft designed to rise from 100 to 135 feet in diameter. they orbited the globe at altitudes of from 400 to 6000 miles — some capable of viewing only about 3 percent of the earth's surface at any given point in time. echo i, a simple uninstrumented balloon launched in 1960, was the pioneer of communications spacecraft. echo signals were bounced off its reflective surface for return to earth, where powerful receiving equipment was required to extract the faint, weakened signals. the second craft, echo ii, placed in orbit in the same year, carried the technology a step further with self-contained transponder components that amplified the signals and placed them back on command. the more sophisticated echo iii was launched for american telephone and telegraph in 1962 to provide international communication when it relayed the first live television broadcast from europe to the united states.

the next generation of communications satellites were small gun-shot-sized cylinders instrumented for increasing complexity and power. the relays were deployed in 1962. their main purpose was the array of solar cells on their exterior that would provide the required power once the satellite was in orbit. the retransmitted signals were then relayed to the earth by a large number of relay stations.

the ats satellites

the applications technology satellite (ats) program, which included the highly advanced spacecraft to be used in dhew's health education telecommunications experiments evolved from studies based on echo. all of the satellites in this series would achieve orbits that were geosynchronous rather than merely geosynchronous. ats 2, 3, and 4 were placed in orbits that were geosynchronous at 22,300 miles, while ats 5 and 6 were placed in geosynchronous orbits at 22,300 miles. ats 6 was placed in geosynchronous orbit on may 19, 1967, and ats 5 was placed in geosynchronous orbit on may 26, 1967. ats 7 was placed in geosynchronous orbit on may 26, 1967, and ats 8 was placed in geosynchronous orbit on may 26, 1967.
THE HEALTH-EDUCATION TELECOMMUNICATIONS EXPERIMENT

Some three years prior to the launch of ATS-6 plans to define the services the new spacecraft would be designed to perform were reaching finalization. The U.S. Department of Health, Education and Welfare saw the exploitation of ATS-6 as offering unusual potential for applications in the areas of health and education. A joint proposal made to NASA by DHHEW and the Corporations for Public Broadcasting in June 1971 turned the latter for an agreement to use this 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

Two agencies within DHHEW bear major responsibility for applying advances in communication technology to services in health and education. The Lunar Hill 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 Lunar Hill Center works at devising ways to harness the technology of communications with that of a library, computer, and medical science for applications in health care and medical education. The objective of a number of experimental demonstration projects initiated by the Center in recent years has been to test problems caused by shortages of medical manpower, mostly by extending the resources of areas that have sufficient manpower to areas that do not. Manned terminals (which includes television) and even satellite-repeated voice links have been used to form communication networks which allow clinicians, house staff, and professional and paramedical personnel through these networks, the medical expertise available at large population centers can be utilized for such purposes as medical consultation, training, or clinical education at locations where staffing is less complete. Those communities which have received have been found particularly effective and satisfying to the users.

Of the many demonstration projects receiving support from the National Center for Educational Technology, the Energy Center is probably the most widely known as an example.

TARGET POPULATIONS FOR ATS-6

Shortages of medical manpower are found nationwide. Insular regions are described in 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 available. 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 unreasonable. Public communications systems in these areas are also usually limited or nonexistent.

Television educational broadcasts hold their largest audience in urbanized areas where public schools are largely well provided. The populations needed are those living in areas remote for television reception—the same areas in which all forms of educational opportunity are often limited.

The immediate need for extension of services in health and education appears to be greatest 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 population the Appalachian Mountain region the Rocky Mountain region and the state of Alaska. Many areas of the Pacific Northwest could also be considered in this category, though the problem 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 distortions interfere with radio wave communications posing an additional problem. Great distances separate small communities and the cost of installing land lines between them has generally been found prohibitive when balanced against the small number of people each small rural area would serve. Modern communications systems will probably not be brought to these remote areas until their benefits can be demonstrated and the capital investment in permanent small terminal is justified.

Signals transmitted via ATS-6 are not affected by the barriers which preclude ground-based transmission and
The ATS program is directed by NASA's Office of Applications. Project management is under NASA's Goddard Space Flight Center in Greenbelt, Maryland. NASA provides the satellite technical assurance and access to the NASA ATS ground stations used for transmission in many of the HET Experiments.

Transmissions from all earth stations involved in the HET Experiments will be controlled and coordinated by the HET Network Coordination Center in Denver, Colorado. This station, established by the Federation of Rocky Mountain States, also functions as the central transmission 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 Australia.

ATS-6 has two high-powered transmitters operating in the 2,500-2,590 megacycle range which will be used to relay a separate, high-fidelity color television signal, each accompanied by four audio channels. The audio channels can be used to broadcast or in a number of languages simultaneously, or to transmit biomedical or other data compatible with voice.

The two signals will produce a pair of nearly tangent beams from ground stations 5,000 miles long by 300 miles wide, when focused along latitudes within the continental United States. Earth stations located within either footprint will be able to receive ATS-6's signals. These footprints will cover one geographic region for a predetermined period of time and then be shifted by reorienting the satellites to cover another. In some cases, over the week the satellite will be maneuvered as many as 12 times to cover different parts of the country.

The purpose of the ATS-6 experiment will be to equip reception only. The equipment for both earth stations consists of an ordinary TV set a consumer, and an antenna. The antennas are small, fine-tuned television dish-shaped devices.

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**THE EXPERIMENTS**

**The Education Satellite Communications Demonstration**

The three projects sponsored by the National Center for Educational Technolog) take varied approaches in using ATS to improve educational opportunities within their region.

**Elementary and secondary school teachers at 15 sites throughout the contiguous, remote Appalachian region will receive in-service courses in the training of elementary reading and a career education for their pupils. In the eight-state Rocky Mountain region, courses in career education will be provided for junior high students and evening programs will be broadcast on topics of interest to adults. Teachers will be able to order videotaped materials and receive them quickly via satellite.

In Alaska and Washington states involved in the Lower HET Experiments will be included, individually for ATS-6 transmition and the total equipment requirements will be considerably more complex.

Two earlier satellites ATS-1 and ATS-3 will be used for two-way voice and data transmission in support of ATS-6 during the HET Experiments. The generation for transmission via the earlier satellites include television, intercity facsimile and computer data. Combined with ATS-6 these systems offer countless communication options.

**AS 6 Health Experiment**

The experiments sponsored by the Lower HET 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 based at the University of Washington in Seattle. These two demonstrations the most sophisticated and complex of the HET Experiments are the subjects 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 biomedically diagnostic capabilities will permit health aides at remote villages to consult regarding their patients with physicians at 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 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 audio and data to link students receiving basic science instruction at the University of Alaska and students receiving clinical training at the Washington town of Olana with students and faculty at the University of Washington School of Medicine. The programs will include lectures and demonstrations administered and students confronting, computer-aided evaluation, medical simulation, and round table and other programs against continuing medical education. This project is directed by the WAMI program.

The HES and WAMI experiments are covered in detail in the section following.

**EVALUATION AND ANTICIPATED OUTCOMES**

During the nine month period for which the HET experiments are scheduled, the individuals and organizations participating in the experiments will be utilizing data to be used in their evaluations. The HET agencies will be asked to find out what the people using the systems think of the 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 DHEW with the information needed to help formulate future plans for using satellites as a means of conveying services and health education.
The ATS-6 spacecraft (Figure 2) consists of three main sections: the Earth Viewing Module, the Communications Module, and the Command and Control System. The spacecraft is controlled by the Attitude Control and Propulsion System (ACPS), which maintains the spacecraft's orientation in space. The spacecraft's solar array provides power to operate the spacecraft's systems.

The Earth Viewing Module is equipped with a high-resolution camera that captures images of the Earth's surface. The Communications Module houses the equipment necessary to transmit data and commands to and from the spacecraft. The Command and Control System is responsible for processing commands received from Earth and transmitting data back to Earth.

Experiments conducted by the ATS-6 spacecraft included investigations into the Earth's atmosphere, weather patterns, and solar activity. The spacecraft also transmitted data to Earth about the position of the Moon and the Sun, which was used by astronomers to improve their understanding of celestial mechanics.

The ATS-6 spacecraft was successfully launched on September 21, 1966, from Cape Canaveral, Florida, and operated until August 14, 1967. The spacecraft's mission was extended several times due to its successful contributions to scientific research.

The ATS-6 spacecraft played a significant role in advancing our understanding of the Earth and its environment, and its data continues to be used by scientists to this day.
The new capabilities pioneered in these experiments are expected to be fed into operational satellite systems in the future.

Success with satellite-repeated communication experiments would make it appropriate for DHHS to favor regional approaches to the dissemination of such services since the economical satellite coverage areas would on all likelihood be regional. Discussions 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 Lunar-Hill National Center for Biomedical Communicaions will demonstrate a variety of ways in which communication technology can be used to assist in bringing modern medicine to consumers with urgent needs for medical manpower. The two organizations participating in the Health Experiment: the Indian Health Service in Alaska and the WAMI Experiment on Regionalized Medical Education based in Washington, address this 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 technology in the field of health care, the Lunar Hill Center saw the satellite as one means of bridging the gap between the wealth of medical services concentrated in urban centers and the acute differences 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 expertise technology (measured in urban centers). Quality medical care thus becomes more and more dependent upon interprofessional cooperation and communication and "the practice of 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 than optimal and hence less attractive to young physicians.

With the increasing emphasis on specialization there has been a corresponding reduction in the number of physicians oriented toward general care. The result is a shortage of primary care physicians. Because primary physicians generally serve as the initial point of entry into the health care system, access to the system has become restricted and general medical service is at a premium.

The shortage is most keenly felt in rural areas where small population groups can usually support no more than a single physician serving at the primary level.

The problem is that how can more entry points and primary care services be provided, particularly in isolated areas which have not been able to attract or which cannot support physicians, and how can rural communities 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 persons who are supervised often at a distance by professional personnel. Additional savings in addition some medical schools have begun developing programs that encourage more of their students to enter the fields of primary care particularly in rural areas. These measures will help to place medical manpower where it is most badly needed but they fail to provide adequate mechanisms for the interprofessional cooperation essential to maximizing rural isolation and improving the quality of medical services.

Several communications systems already developed by Lunar Hill use modern technology to help bridge this gap. The approach has been to utilize more efficiently the manpower resources that already exist.

For example, two-way audiovisual systems link selected hospitals in Massachusetts, New Hampshire and the Bahamas. These links have been used for group seminars, group training in psychiatry and speech therapy, for training general practitioners to handle psychiatric problems, and for the treatment of psychiatric patients themselves. The systems thus extend the medical manpower of hospitals that possess these resources to hospitals that lack them. If more widespread use could be made of such systems some of the manpower problems could be considerably reduced.

APPLICATIONS FOR ATS 6

In the regions in which telecommunication systems have been implemented capability for video transmission via land lines or terminal radio already exists and the services can be provided without large capital expenditure. These media do not exist in many areas where special service telecommunication would be of particular benefit. The cost of introducing ground-based networks would be immense and unjustifiable unless the value of the communications they would carry were firmly established. ATS-6 could stand in for permanent systems while the value of such communication is tested.
ATS 6 HEALTH EXPERIMENTERS

The principal agencies involved in the Health Experiment are the Upper Hill National Center for Biomedical Communications, the National Aeronautics and Space Administration (NASA) the Indian Health Service (IHS) the WAMI Experiment in Regional Medical Education (WAMI) and the Federalion Of Rocky Mountain States (FRMS). The University of Washington is involved in project manager and under separate contract as WAMI evaluator. Most of the University's technical work was subcontracted to the Washington Electronics Corporation Westinghouse also performed under subcontract to other agencies involved in the Health Experiment Stanford University in California is the evaluator for IHS.

The IHS experiment is being evaluated by the Institute for Communication Research of Stanford University California. The WAMI experiment evaluation is being performed by the Office of Research in Medical Education at the University of Washington.

ORGANIZATIONS INVOLVED

The WAMI Health Experiment is part of the ATS-6 Health Experiments Project.

The ATS-6 Health Experiments Project is part of the National Aeronautics and Space Administration (NASA) the Indian Health Service (IHS) and the Federalion Of Rocky Mountain States (FRMS). The University of Washington is involved in project manager and under separate contract as WAMI evaluator. Most of the University's technical work was subcontracted to the Washington Electronics Corporation Westinghouse also performed under subcontract to other agencies involved in the Health Experiment. Stanford University in California is the evaluator for IHS.

The IHS experiment is being evaluated by the Institute for Communication Research of Stanford University California. The WAMI experiment evaluation is being performed by the Office of Research in Medical Education at the University of Washington.

THE EXPERIMENTS

In a series of demonstrations collectively called the ATS-6 Health Experiments, satellite communication networks will be established to link five sites within the Indian Health Service (IHS) and three sites in the WAMI network in the University of Alaska. The Health Experiment will include a test between the two systems.

The experiments differ considerably in nature as the detailed descriptions in the two chapters following will demonstrate. However, because the equipment received were quite similar (their networks have transmitters as well as receive capability) and one Alaska site would be used by both experiments general management and planning for both the technical aspects of the two experiments was coordinated as a single effort.

The experiments under contract Westinghouse will also be responsible for the continuing maintenance of the terminal and peripheral communication equipment at the IHS and WAMI sites.

The IHS experiment is being evaluated by the Institute for Communication Research of Stanford University California. The WAMI experiment evaluation is being performed by the Office of Research in Medical Education at the University of Washington.

NETWORK CONTROL

The NET Network Coordination Center managed by the Federalion Of Rocky Mountain States will form the large network. Denver, Colorado, enable each ATS-6 system at the time is scheduled for satellite transmission and duplicate it when transmission is complete. The control signals for this action will be transmitted via ATS 1 for the IHS and WAMI systems.

NCC is also responsible for cutting off transmission at any time, if instructed to do so by the Department of Defense or in case of a national emergency or if regulations established by the Federal Communications (Continuation are validated)
The Indian Health Service Experiment

Alaska's 282 remote towns and villages are scattered over a land area of 530,412 square miles. Two-thirds of these communities cannot be reached by railroad or highway, and are accessible only by aircraft or boat. In the interior winter begins around late September and lasts until early May. Deep snow and violent storms isolate many communities for weeks at a time.

However, the weather, the mountainous terrain, and the vast distances separating inhabited areas impose severe limitations on all traditional ground-based systems of communication. Telephone landlines have been built between only a few of the larger communities, and in the winter service is intermittent; inter-city coaxial or microwave cables do not exist. Land-based radio, the only mode of emergency communication is frequently disrupted by storms and by the atmospheric disturbance peculiar to high latitudes—then it is not totally blocked by mountains barriers.

The Alaska Native need far more and better ways to communicate with one another is enormous.

THE ROLE OF THE INDIAN HEALTH SERVICE IN ALASKA

Some 33,000 of Alaska's 221,000 people are Alaska Natives and Indians. Those Native groups are the main inhabitants in the state's rural areas. The provision of health care to the people of Alaska's small scattered Native communities is a problem of major proportions.

There are no facilities available for the health care of the Native people in the Alaska Area Native Health Service (AANHS). The AANHS is the local agency of the federal government's Indian Health Service in the U.S. Public Health Service that serves the Native people through a system that relies heavily upon the services of physicians, nurses, and other health professionals. The AANHS facilities are divided into two separate regions: the Northern Region and the Southeast Region.

The Native Americans are at a level below the national average in health status. The Native American population is younger, with a higher percentage of children, than the national average. The Native American population is also more likely to be in poverty, with a higher percentage of individuals living below the poverty level than the national average. The Native American population is also more likely to have a higher prevalence of chronic diseases, such as diabetes, heart disease, and cancer.

DEVELOPMENT OF PLANS FOR ATS-6

In 1973 the Federal Government and the Indian Health Service (IHS) developed a program to provide medical care to Alaska Native villages. The program was called the Alaska Native Health Service (ANHS) and was designed to provide medical care to the remote communities of Alaska.

The program was designed to be a joint effort between the federal government and the Alaska Native communities. The goal of the program was to provide medical care to the remote communities of Alaska, which were often isolated and inaccessible by conventional means.

The program was funded by the federal government and was administered by the Indian Health Service. The program was designed to provide medical care to the remote communities of Alaska, which were often isolated and inaccessible by conventional means.

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The clinic is operated by a single health aide. A physician assistant employed through the National Health Service Corps has recently been assigned to the community, and a public health nurse trainer is available on a part-time basis.

Figure 4. The 1st Indian Health Service aide participating in the Alaska AT-6 experiment. Mountain top site of ignition was 3 miles away. Tree line and populated areas at lower elevations denied signals at lower frequencies. System transmitted via AT-6 and was heard by Alaska people.

Figure 6. The Alaska Native Health Clinic at Galena. AT-6 antenna on top right.
PHS Alaska Native Health Center

Fl: Yukon

Fl: Yukon (population 330) is situated 150 miles north east 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 1890's (Figures 7 and 8). This facility unlike the village clinics is considered a satellite of the Tanana hospital and is managed by a nurse.

The clinic is on the ground floor; employee quarters are on the second. Of the Center's 4 personnel, the nurse is the only staff member not hired locally.

The nurse at Fl: Yukon provides 24 hour health service to the village residents, consulting frequently with physicians at Tanana or Fairbanks (Fig. 8). She also makes home visits dispensing medicine and manages monthly held clinics (provided by Tanana doctors and frequent dental and specialty clinics held on the village. Villagers made 327 visits to the clinic last year.

PHS Alaska Native Hospital: Tanana

Tanana located at the junction of the Yukon and Tanana Rivers, is the central community of the Native Area. Its 20 bed general medical surgical hospital is a two story wood frame structure built in 1944 (Figures 9 and 10). The hospital which employs 43 personnel including three physicians provides hospital, newborn nursery, and adult parent care. The average daily patient load is about 13. The hospital's clinic provides 24 hours a day outpatient and emergency care and recorded 4,741 visits last year.

Approximately half of the Tanana hospital staff are local residents.
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 Elder and Young Leaders.

PHS Alaska Native Health Center Fairbanks

Though the hospital in 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 clinic 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 17 personnel, included 9 PHS core teams. The facility has been staffed by physicians from referral areas in addition to Fairbanks Memorial Hospital, which is used for all short-stay general medical admissions. Baranof Memorial, the U.S. Army hospital on Adak Island, 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).

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 Hos

...
TELECONSULTATION EXPERIMENT

The communication needs for the medical consultation experiments imposed the most complex requirements on the system and equipment developed for the Alaskan sites. It is therefore most convenient to describe the base setup in terms of the experiments in teleconsultation.

The primary purpose of the teleconsultation experiment is to enable physicians at the hospital in Tanana to diagnose the medical problems of village patients and guide village health providers in proper treatment without the physician having to travel to the village or the patient to Tanana. The secondary objective is to enable Tanana physicians to consult with specialists at Fairbanks and Anchorage regarding their own patients at the hospital as well as patients in the villages. The satellite communication links will be used to meet these requirements in the following ways:

How the Systems Are Used for Interaction

The two villages and Fairbanks each have comprehensive earth stations. Each station is equipped to transmit to or receive from other stations. Via ATS 5, a wideband signal consisting of one voice and four audio channels. This channel is used for voice conversations. An additional channel is used for transmission. An anchor must be provided with transmission capability, and it is provided with the appropriate equipment only. The health care providers and providers of the Alaska Service Line will be the object of these transcriptions.

For telemedicine consultation, the prime requirement is that the medical consultation capability be compatible with video transmission. The technology and medical expertise required to develop programs in health and continuing medical education reside in the urban centers. The Alaska Native Health Center at Fairbanks has assumed responsibility for organizing these programs because the necessary facilities and personnel resources available in the educational television studio of the University of Alaska could be used for this purpose. Fairbanks thus requires capability for video transmission and was provided with a comprehensive terminal. (This terminal will also serve as a framework for the WAMI experiments). Some programs will only exist in Anchorage, but there can exist a tape recording and send to Lighthaus for transmission. An anchor will not require transmission capability, and it is provided with the appropriate equipment only. The health care providers and providers of the Alaska Service Line will be the object of these transcriptions.

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In communicating with another comprehensive station, the ATS 6 signal can be used only in Alaska. For example, Galena can transmit the same wideband video signals into Fairbanks and can use the video signals to transmit ATS 6 video signals. In the latter case, the satellite signal is transmitted to Tanana but it cannot transmit and receive simultaneously.

In order to permit the participants to interact with each other, the signal can be used in the following way:

In one mode, interaction is achieved by one station transmitting video signals via ATS 6 while the opposite station transmits audio only. In the second mode, the two parties take turns transmitting video signals via ATS 6.

Fairbanks, with its comprehensive system, will also be able to use either mode of interaction. Anchorage, which can receive but not transmit via ATS 6, will be capable only of calling back via ATS 1.

How the System Operates for Teleconsultation

Tanana physicians will call the village chiefs via ATS 1 periodically to discuss medical problems with the chief (Galena) or nurse (at Yukon) as they have been doing for the past two years. Clinicians who might benefit from visual consultation will be scheduled for time on the ATS 6 satellite.

At the local consultation centers in these villages, the teleconsultation link is activated. The chief health provider will be identified as "doctor rather than "nurse only.

Prior to the time scheduled for consultation, the village chief and Tanana will independently review the patient's records from the Indian Health Service Health Information System (HIS) computer in Tanana. An anchor will be used to identify the patient's problem, to identify on the screen the message on the clinician's computer that the patient has been identified as "doctor rather than "nurse only.

In order to ensure the confidentiality of these reports, the clinician will be notified of the problem in the telephone consultation. Prior to the consultation, the clinician will indicate if the patient has been identified as "doctor rather than "nurse only.

A summary of the results is sent to the clinician's computer at the end of the consultation. The clinician can request further information be sent to the computer, and can initiate a consultation with the clinician.

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Indian Health Service Equipment

The terminal and peripheral equipment provided for Calera, Ft. Yukon, and Tanana are identical in all major respects. The physical arrangements are similar. The equipment required to teleview consultations is set up in an examining room. The nurse's terminal and other equipment not needed for patient presentation is grouped in a radio room or equivalent space.

The radio room equipment is grouped in three major assemblies (Figs. 14, 15). The arrangements are compact. Placement of components within the racks varies somewhat among the sites.

Utility shelves hold the ATS-6 and ATS-1 transmitters and receivers, the ATS-6 video scrambler, and several other components for the ATS-1 system. They also accommodate some high-frequency radio equipment not used in conjunction with the health experiments.

The electronics rack contains a black and white TV monitor, the master control panel for ATS-1 and ATS-6, audio scramblers, and other components, including junctions for camera, video cart, and microphone.

Equipment for transmitting electrocardiograph (ECG) and auscultoscope (heart) sounds—the ERG and heart sound amplifiers (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 input equipment includes two lavaliere 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 printhead position box are fixed. The two lavaliere 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 position on the control panel and operated from the radio room for recording and playback of broadcast material.

Figure 14: Radio room equipment

Figure 15: Examining room equipment
At the time appointed for the consultation the side will be in the examining room at the time with the patient seated in the examining room or in the examining room of the TANANA hospital—probably in a room in the examining room.

Both side and patient will have local microphones around their necks connected to the control panel mounted on the wall to carry their voice. A side can use a voice box or voice coil to transmit voice to the patient. A patient can use a voice coil or voice box to receive the voice transmitted from the side.

The patient will be seated in front of the TV monitor. A side with a microphone or a microphone without a voice box will have a voice coil or voice box to transmit voice to the patient.

The side may also perform other tasks and report the results verbally during the consultation.

During the course of the consultation the physician may request the ATS-6 transmission to demonstrate to the patient how to perform a procedure. The side can then transmit voice instructions or EKG or heart sound via ATS-6.

If needed the TANANA physician will call in the special features at Fairbanks or Anchorage or both to examine the patient. When additional consultants are called in the patient's voice can be transmitted and the additional consultant or consultants can join the consultation.

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 video tape 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. A tape of a medical examination will not necessarily follow a video picture transmitted from the side.

The next step in the examination will generally be an examination in which the physician listens to the patient's heart and other sounds by stethoscope.

The side will be connected to the stethoscope to the "heart sound" amplifier on the top of the biomedical microphones. The stethoscope and microphones will be used to transmit the sounds the physician will be hearing on the sounds along with the video from the ATS-6 video channel. This transmission can be used to show what the stethoscope is hearing.

Video presentations for teleconsultation purposes are expected to be demonstrations of procedures during consultation with the patient. If an electrocardiogram is needed it will be transmitted to the patient via ATS-6 through another channel on the biomedically transmitted channel. The side may also perform other tasks and report the results verbally during the consultation.

Figure 18: Teleconsultation between a village and TANANA with Anchorage and Fairbanks called in. The video transmissions were video audios and biomedical signals to all three consultants via ATS-6. The consultants talk back in party line fashion 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 acute treatment system, and their general knowledge of health. The programs in continuing medical education will help improve the skills of village health aides, and keep all of the HIS health providers participating in the ATS-6 Health Experiments abreast of advances in medical science. Typical program subjects will be sensorimotor presentations clinical grand rounds, and specialty conferences.

Both continuing medical education and consumer health education programs will probably be presented at the Alaska Native Health Center in Fairbanks, then broadcast directly from the Educational Telemedicine studio at the University of Alaska. Programs originating at Physicians' interest will be taped at the Alaska Native Medical Center and transported to Fairbanks for transmission.

The health education programs will be transmitted to the resident populations in Tanana, Galena, and Fort Yukon. The cost-shared TV monitors used for telecommunication in 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 program will either be live at the time 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 Anchorage.

HIS EXPERIMENT SCHEDULE

The HIS experiments began in September 1974 and will continue through June 1975. Alaska's HIS sites have been assigned ATS-5 satellite time on Monday Wednesday, and Friday of every week. The time slot is the same every day from 11:20 a.m. to 12:35 p.m. Alaska Standard Time. Time assignments on the ATS-5 satellite are scheduled to begin one hour earlier (10:20) and end 15 minutes later (12:45) than for ATS-6.

This scheduling will allow the HIS 150 sessions on ATS-5. Of these, approximately 100 are expected to be devoted to telecommunication. Each transaction consists of a public viewing area. The remaining 50 sessions will be divided among the various medical disciplines.

The HIS education programs will be transmitted to the regional population in Tanana, Galena, and Fort Yukon. The cost-shared TV monitors used for telecommunication in 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 program will either be live at the time 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 Anchorage.

EQUIPMENT INSTALLATIONS

Galena

The clinic at Galena is a 18 by 30 foot single-story log cabin. The front entrance leads into a waiting 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 cable to the mobile equipment in the examining room are draped along the floor and connected to the wall mounted control panel. Space is provided in anticipation 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-5 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 power switch and cable junction box in the examining room and at the equipment rack in the radio room. The ATS-5 antennas are located on the south side of the clinic building (figure 21).
Figure 19 Equipment layout in Galena clinic examining room/radio room.

Figure 20 Galena's ATS 6 antennas Yukon River in background.

Figure 21 ATS 6 antenna plan installed at the south side of the Fort Yukon clinic.
Tanana

The X-mt 6 antennas are installed at the front room side of the hospital (figure 25).

Alaska Native Medical Center at Anchorage

The Alaska Native Medical Center's X-mt-6 receives all the equipment and capabilities required for operation. Two of the X-mt-6 equipment, shown in figure 25 at the left, are essentially the same as those for the Tanana Service Unit sites. It has no equipment for X-mt-6 transmission.

The areas in the hospital used for the experiment are a control room and a radio room. The radio room contains the color TV monitor, ANMH. has only one monitor and video tape recorders mounted on a mobile cart. The television and X-mt-6 console are kept on a desk. The mobile cart is shown in figure 26.

Beside the desk a single electronics rack holds all of the other ATX-1 and ATX-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 education and health education. The cart will then be connected directly to the central control/patient function box permanently mounted on the classroom wall.

A microphone and the push-to-talk switch for ATX-1 voice transmission will be moved from the radio room and plugged into the classroom microphone if required for a particular contact. All controls other than the PTI switch must be preset in the radio room.

The ATX-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 ATX-1 and ATX-6 but the terminal equipment offered at ANHC is different from that of the other sites. All except the ATX-6 receive terminal and antenna are remotely located.
The ATS-I transmit terminal is installed approximately 4 miles from ANHC at the Glazier Building at the University of Alaska. ANHC telephones this terminal with other HET users. The camera video-originated at ANHC is transmitted over a microwave link to the educational television studio at the University for routing to the ATS-I transmitters. ATS-I voice, transmission keying control, 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 ATS-I terminal used by ANHC is located at the Minnich site and operated under the auspices 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 ATS-I transceiver.

Since the University educational TV studio must act as central switching facility for HET users that share time on the Fairbanks ATS-I and ATS-I systems, ANHC will have to coordinate with the station in order to use these links. Once the bondage 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 broadcasts. The ATS-I receive terminal equipment and the peripheral equipment complement are identical with those of the village sites.

Operational tests of the system were made early in September. No difficulties were experienced with transmitter or receiver beyond the normal adjustments required, and the health providers appeared able to handle the equipment operations smoothly. However, some difficulties have been experienced with the peripheral equipment. The performance of the video scramblers and the ATS-I data link to Tucson 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 ATS-I communications system and equipment and the value of telecommunications for HPS. The one-month trial with ATS-I will yield data to help correct or refute 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 remote locations to diagnose village patient problems.
- To the extent that 10 only patients requiring tele-hand physician services need be transported to hospital, 20 visits by physicians to remote villages will be substantially reduced, and 31 patients retained in the village 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.

**OPERATIONAL STATUS OF THE ALASKA SYSTEMS**

Installation of most of the terminal and peripheral equipment for the Alaska sites was completed in August, and the remainder in September and October. Field engineers who performed the installation continue to instruct the health providers in equipment operation.

The variety of equipment and large number of communication options available with the HPS systems increases the complexity of operation and the possibilities for equipment failure. Further, changes in personnel at the sites creates the potential for operation of the equipment by people who are inadequately briefed. The ability of the health providers to handle these problems will be a critical part of the experiment. (Actual maintenance service is on call from Westinghouse field technicians.)

The evaluation will be concerned with the workability of the equipment (transmitter, biomedical equipment, etc.), the abilities 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.

Before interviews and questionnaires will determine what attitudes the health providers and villagers have about the ATS-I system before the experiment begins. They will also be used to record information on how many patients are presently seen, what their major health problems are, 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 ATS-I transmission. An evaluation of the new Health Information System patient record system being implemented along with ATS-I will be included as a separate item. These data and post-experiment surveys will be used to determine what changes the ATS-I system has brought about.

**Implications for the Future**

After June 1975, when the ATS-I satellite is moved to the State of Guam, all satellite communications within the Alaska Native Health System are expected to be terminated. It is anticipated that the Alaska Native Health System is capable of operating the system in a more cost-effective manner. The system will be utilized for the Alaska Native Health Systems, the Alaska Native Education and Training Program, and the Alaska Native Regional Health Corporation. The system will be operated in a cost-effective manner and will be utilized for the Alaska Native Health Systems, the Alaska Native Education and Training Program, and the Alaska Native Regional Health Corporation.
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 urban centers—the largest of each state. These cities occupy less than one quarter of the land area of the WAMI region and contain about 25 percent of all population. Physicians in population ratios in these urban centers range from 130 to 230 physicians per 100,000 people.

The remaining 75 percent of WAMI's population live in smaller rural communities and farms spread over an area of roughly 879,000 square miles. Physicians in population ratios in these areas average not around 60 to 80 physicians per 100,000 but the distribution of manpower is highly unequal and many counties have no physicians at all.

Fewer than 30 percent of WAMI's physicians are general or family practitioners—the consequence of a long and steady decline in the number of physicians attracted to primary care. A survey of the specialties of physicians obtaining their first license in two of the WAMI states in 1973 showed that only 13 percent were beginning practice in general or family medicine.

All four states are concerned about the deficiencies in physician manpower to be found throughout their large rural areas particularly where shortages exist in the fields of primary care. They are further concerned that the deficiencies could worsen if present steps are not taken to reverse the balance.

The REGIONS CENTER

Physician manpower in WAMI region is most highly concentrated in the metropolitan area of Seattle. Wash. region is a rapidly growing city in the region and the site of its only medical school. The University of Washington School of Medicine is one of five schools of health science that comprise the University, a large center for health sciences research and education.

Agreements maintained through the Western Interstate Commission for Higher Education have for many years provided for various supplements to students admitted to University of Washington health science programs from eleven northwestern states (plus Hawaii) which cannot provide these opportunities locally. The center has thus come to serve as a regional resource for education in medicine for all major health professions. It has also assumed growing importance as the regional resource for continuing education in these fields and for the highly specialized levels of medical care in physician faculty and teaching hospitals can provide.

The University's School of Medicine has been hard put to meet the demand for medical education by students 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 A.M.A. group as it has become increasingly apparent that physicians tend to practice near the areas in which they are trained and in areas where activity in medical education eases their repayment of professional growth and interest.

There appears to be little immediate prospect for the development of medical schools in these three states which might make heavy upon Washington for the medical education of their residents.

Recognizing the pressing need to extend opportunities in medical education for and within these three 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 first 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 high 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. Physicians practicing in primary care disciplines also receive training in the "Community Clinical Unit." This orientation of basic science instruction is accomplished by using the faculty and classroom facilities available at other universites in the WAMI region to teach portions of this initial phase of the UW medical curriculum. For the past three years WAMI students have spent their first academic quarter in medical school at one of the peripheral universities for their beginning basic science instruction. They then return to the University of Washington for the remainder of the basic curriculum. Upon completion they are ready to begin the predominantly clinical phase of their training.

Decentralization in the clinical years is accomplished by using the offices of private physicians in small community settings throughout the WAMI region for selected units of clinical experience WAMI students in their third and fourth years of school each spend six weeks at these U.S. in training under the supervision of community physicians in their private offices. The same private practitioners serve as field for experience as preceptors level providing us work to three month rotations for resident physicians.

This rotation is carried out within the participating states using manpower and material resources available within the states and concentrating on clinical instruction in several areas where students and resident physicians can be exposed to models of practice in the community setting. Medical education benefits from the experience of able private practitioners who otherwise would have no impact on medical teaching. It is from profit from the stimulation of student inquiry and close professional contacts with their colleagues at the School of Medicine. The community practices selected for the WAMI program provide training in fields of primary care which are of high practice needs.

The WAMI program now extends to four other universities and thirteen community clinical training units throughout the four state region (fig. 26). A total of 121 students have begun their medical education at one of the four WAMI universities. Approximately 122 students have completed community clerkships in family medicine Internal medicine obstetrics-gynecology pediatrics or psychiatry in addition 46 physicians have served some portion of their residency training at one of the community units and opportunities for postgraduate positions are being expanded rapidly.

The WAMI system is considered a notable success and federal funding added to the Commonwealth Fund's support has enabled the program through its experimental phase-out of financial support from both of these outside sources by private physicians practicing in primary care disciplines also receive training in the "Community Clinical Unit." The participating states will then be expected to bear the full costs of educating their physicians if the program is to continue. All states except apropriated supplementary funds for the 1974-75 term as the first step toward per mian repusport.

OPPORTUNITIES FOR IMPROVEMENT IN THE WAMI SYSTEM

There are several ways in which the efficiency of WAMI program operation could be improved. One basic thrust of WAMI is to contain costs by utilizing existing resources and avoiding duplication. Adequate human resources lacking at the WAMI sites are available at the School of Medicine in Seattle but extending them over the distances involved takes time and money.

The continuum in basic training presented for the first year of medical education requires the support of a very broad-based faculty. A single course as taught at the University of Washington may call for lectures by as many as six instructors, each contributing knowledge from his own particular area of expertise. The first quarter courses that have been taught at the peripheral universities are somewhat demanding of diverse reports than those for the second and third quarters but will 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 action some of the University Phase which will considerably enhance the capacity of the system if it can be done at the other three universities as well will obviously require still more University of Washington faculty travel or the employment of additional faculty at the university site. The need is particularly critical with regard to clinical education in which substantial clinical input is required. Clinical (physicians) faculty are rarely 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 progress in learning clinical skills must be assessed nearly by direct observation UW faculty must make frequent return visits to ensure that they are determining the competence levels of students who are transferring to the community sites is compatible to that provided within the University based system. These contacts also help to relieve somewhat the sense of isolation from the mainstream of daily life, which can occur at peripheral sites.

A third area of concern is the need for continued and frequent communication between the home school and both the university and community clinical areas for adequate provision 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 the various sites. This is extremely costly and time consuming because of the enormous distances among many of the WAMI units. And for most of the interactions required there appears to be no alternative to face-to-face contact.

Interactive infrared communications 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 Lunar and Planetary 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).

Figure 27: ATS-6 satellite transponders covering the three areas involved in the WAMI ATS-6 experiment. The difference in the area covered by each footprint (shown by dashed lines) reflects the difference in satellite footprint angles.
Beginning with fall quarter of 1974, the University of Alaska at Anchorage became a full-fledged campus of the University of Alaska. Since then, the system has grown, with the other major campuses at Juneau, Fairbanks, and Yakima. The Anchorage campus is now a large, diverse institution offering a wide range of academic programs. The University of Alaska system has a strong emphasis on educational excellence and research.

The University of Washington Health Sciences Center Seattle

The University of Washington Health Sciences Center Seattle is one of the largest medical research programs in the nation. More than 3,500 students are trained in the Center each year.

The School of Medicine, which sponsors the WAMI Experiment in Regionalized Medical Education, opened in 1974 with a first-year class of 50 medical students. The center is now a 125-bed hospital with a total enrollment of nearly 500. An additional 200 students are enrolled in allied health programs and 200 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. The University's own two hospitals and the clinical WAMI unit are scattered throughout the state. Many of these affiliates also provide clinical experience for medical students.

The University of Washington School of Medicine has an enrollment of 3,500.

University of Alaska Fairbanks

Fairbanks is a popular location for 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 40 degrees below zero. The daylight hours are brief as the sun rises at 9 or 10 a.m. and sets at 4 p.m. Hawaiian time. Heavy down-filled parkas are standard issue to Seattle faculty and administrators visiting Fairbanks on WAMI business in the winter months.

In 1991, the University of Alaska Fairbanks offered the WAMI program with an entering class of 60 students. For fall 1994, the University of Alaska Fairbanks offers 200 students the fourth University of Alaska WAMI freshman class.
The WAMI's point-to-point link between Seattle and Fairbanks will be the only one in the entire HET experiment in which two antennas are used to communicate with each other. This is because two antennas can transmit and receive simultaneously while maintaining the same frequency, and the system is designed in such a way that the audio transmitted between the antennas will not interfere with each other. The system is designed in such a way that when Seattle is transmitting to Omak on AT6, Omak is automatically transmitting to Seattle via another AT6 channel. The audio transmitted from Seattle to Omak on AT6 provides audio quality from Seattle to Omak.

In contrast to the university-wide campus broadcast, the campus-wide broadcast is limited to the campus and does not extend beyond the campus grounds. The campus-wide broadcast is limited to the campus and does not extend beyond the campus grounds. The campus-wide broadcast is limited to the campus and does not extend beyond the campus grounds. The campus-wide broadcast is limited to the campus and does not extend beyond the campus grounds. The campus-wide broadcast is limited to the campus and does not extend beyond the campus grounds.

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Figure 31: A close-up view of a Seattle lecture on TV. The TV receiver captured the image of the lecture with data displayed. The TV signal was transmitted via satellite to the lecture site.

Figure 32: The lecture of space to which participants must become aware in order to focus on their interests. During a panel discussion, the audience should be aware of the question and will be guided in their presentation.

Figure 33: The lecture will include visual equipment such as the TV monitor to enhance the audience's understanding of the lecture.

Figure 34: A lecture at the Science Center TV Studio. Three techniques are required for broadcast operations.

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 virtual project study.
A wide variety of basic science courses are already available in computer-assisted forms to over 70 institutions in the United States through a communication network sponsored by the Lumen Hall National Center for Biomedical Communications. Computer at Ohio State University controls the network. As the land laws required for transmission of these data do not exist 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 CAE teletype terminals have been installed at the University of Alaska for use by the WAMI students. The students punch in their answers to the study guide questions and receive immediate feedback from the computer at Ohio State University as to their accuracy. The teleprinter also punches out a summary card to record the student's score for that study program allowing later comparison with the scores of other students using the program.

The CAE sensors planned between Seattle and Fairbanks will take place concurrently with other experiments such as the light/demonstration/diagnosing or administrative office. While the letter broadsides use the video and one audio signal the CAE will use the remaining three audio channels for the transmission of CAE data (figure 34).

Medical Consultation

The Seattle/Fairbanks transmissions will also include a series of broadcasts for medical consultation. These sessions provide service to both patient and physician while educating the observing students. The majority of the Fairbanks consultations will be devoted to dermatology.

A dermatologist at the UW faculty will examine patient's presented to him by Fairbanks physicians with several Alaska WAMI students attending for interinstitutional purposes. An important purpose of the experiment is to determine what kind of video equipment and such topics are required to stream reliable television pictures of the skin. Actual representation of color and detail appear crucial for accurate diagnosis.

Two additional dermatology consultations are scheduled between Omak and Seattle to compare the television images obtained by the color cameras and trained technicians available in the ETV studio at Fairbanks with the pictures that can be transmitted by the same monochrome camera and nonprofessional operators at Omak. Several other sessions are planned between Seattle and Fairbanks for psychiatric consultation to enable comparison with similar consultations to be conducted between Seattle and Omak.

Clinical Phase Experiments

The experiments between Seattle and the Community Clinic at Omak include multiple case presentations, multiple face-to-face conferences, and administrative conferences. A variety of other programs ignored under the category multiple-dissipational lecture-discussion to promote continued medical education and a clearer understanding of the differences between health care needs and practices in the rural and urban setting.

The participants in the Seattle/Omak teleconference 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 ones in formal presentations the student is keen in his first encounter with the patient. He will present and examine the patient before inviting the attending physician to present his findings and tentative treatment plan for the observing UW and Omak faculty. Formal presentations require that the student study the patient's problem and progress over a period of time and document it thoroughly before presenting to the faculty.

During video-cued presentations the TV camera at Omak will be trained on the patient and switch so that the UW Family Medicine faculty can observe both. Communication between sites will be interactive via ATS-6 from Omak via ATS-6 from Seattle. In conferences following spontaneous case presentations the physician at Seattle and Omak will together critique the skill and knowledge the student demonstrates in dealing with the patient and diagnosing his problem (figure 35).

These presentations will enable UW faculty to monitor the progress of students being supervised by private practitioners to see if students at remote sites are achieving the same level 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 patient care in Omak and allow them to respond with appropriate changes to their curriculum.

During the first six-week clerkship of fall quarter 1974 all evaluations of case presentations will be made by a set of criteria. For comparison during the second six-week clerkship they will be made by the customary means used for other presentations.
Administrative Conferences

The administrative conferences are scheduled mainly for the period of the first six weeks of clerkship. During these conferences, Omak and UW faculty will make presentations on patient care and overall clerkship program, and discuss administrative matters or other concerns.

Medical Consultations

In addition to student case presentations, private practitioners (the CCU physician staff) at the Family Medicine Center will discuss patients under their regular care with problems on which they wish consultation. They will present these patients by selecting specialists on the faculty in Seattle, along with data from their preliminary report. WAMI students sitting in on these consultations will learn a little more about the techniques of case presentation and about the medical problems involved. WAMI students will be responsible for the interpretation of any patients presented to them by their assigned attending physician.

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 sessions will provide some continuing education for a group of practitioners working in considerable isolation from the psychiatry residency. The psychiatry residents will see the inpatient cases at home instead of sending them to the University Hospital. The two university psychiatry consultation experiences scheduled between Omak and Seattle will permit comparison of interactions in which psychiatrists and nurses see each other in a cooperative role with those between Seattle and Omak in which video can be transmitted on only one direction at a time.

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These consultations will broaden the medical services available to Omak patients and provide Omak practitioners with specialized training on diagnosis and treatment while giving them valuable experience in the consultation of complex cases. These experiences will also influence the educational development of both faculties.

Multidisciplinary Lecture/Demonstration/Disussions

The multidisciplinary presentations will be highly varied in format and content. They are intended to give Omak practitioners the opportunity to participate in continuing education activities ordinarily accessible 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, medical technicians, and other health professionals) as well as physicians and WAMI students in Omak.

The lecture/discussion sessions will deal with all types of psychiatric care, and emergency medical services in rural areas. Slide, film, and tape will also be used as educational aids.

Other telemedical activities will be devoted to grand rounds, in which patient problems of interest are presented by residents and discussed by faculty. This time-honored method of continuing education has always drawn large audiences of private practitioners to training hospitals. Grand rounds will be videotaped and rebroadcast for medical personnel in the training hospital.

Several telemedical activities in Omak will be devoted to grand rounds, in which patient problems of interest are presented by residents and discussed by faculty. This time-honored method of continuing education has always drawn large audiences of private practitioners to training hospitals. Grand rounds will be videotaped and rebroadcast for medical personnel in the training hospital.

EXPERIMENT SCHEDULE

The WAMI experiments are scheduled for Tuesday and Thursday of every week for the three-month duration of the HET Experiment.

Programs are scheduled to begin at 10:15 a.m. in Washington (9:15 a.m. in the Alaska time zone) and end at 11:30 a.m. (10:30 a.m. in Alaska). ATS-1 is available on Arbitron markets whenever ATS-6 is available and for an additional 15 minutes after use of ATS-6 is concluded. This will allow any unscheduled interaction to be concluded by voice and provide for immediate feedback of the results of the experiment broadcast on completion.

Seventy transmission sites are available on the WAMI experiments. Tuesday transmissions will be between Seattle and Alaska, and Thursday transmissions will be between Seattle and Fairbanks. Many of the 75-minute time periods will be used for voice agency experiments. For example, 12-minute administrative or faculty conferences will be scheduled immediately following the 30-minute conference sessions.
EQUIPMENT INSTALLATIONS

University of Washington, Seattle

In Seattle, broadcasts will originate in the main studio of the Cloud Circuit Broadcast Facility of the University of Washington Health Sciences Center (Fig. 18). The studio is 100,000 square feet from the center of medical campus and is equipped with a fully operational broadcasting system which can be brought to the studio for remote operations.

The studio has several broadcasting units in full color and配备 including a still camera and quad video monitor, a special effects generator, and an adequate support system for remote audio and monitoring.

The material received in the studio is processed in the DTS master control room. From there, it is sent by secure underground cables to an equipment room on the seventh floor of the center where the transmitters are located. The equipment units are installed.

AAS

Audio color broadcast facility conducts audio and video monitoring (Fig. 19). AAS centers on a control room on the seventh floor of the center where AAS antennas are located. These antennas are designed for both transmission and reception.

The digital transmission is received on ATC audio from the CATS computer terminal in Alaska and routed through a data modem to the University of Alaska at Fairbanks and Columbus. Ohio. Return signals from Ohio follow the same route.

University of Alaska, Fairbanks

The broadcast facilities in Fairbanks are similar to those at the University of Washington. The WAMU Program is coordinated with the University of Alaska on-campus educational television station. KLAC TV provides the equipment and facilities required for remote production and on-air personnel of the WAMU program.

ATV-4 equipment installed

The ATV-4 experiment, which is being conducted at Fairbanks, was installed in the Gorman Building. The two ATVs are located on the roof of the building. In addition, KLAC TV has provided three television telephone links to the Arctic Health Research Center building which serves as WAMU headquarters at the University of Alaska. These three-way computer terminals have been installed in the building for coordination using a computer-assisted evaluation program. The three-way manual computer terminal is connected to the ATV-4 computer by a telephone line. The video and audio transmission can be monitored in a composite signal to satellite. The video signal can also be monitored by a satellite earth station in Fairbanks. The audio and video transmission is described under the ATV-4 experiment which takes place on the same surface.

KLAC personnel will also be involved in the operation of the equipment. KLAC personnel will also be involved in the operation of the equipment.

Figure 22: KLAC Educational Television installation at the University of Alaska. (KLAC installation on the top floor)
Mid Valley Hospital Oxnard

There was no adequate space for the installation of equipment or conduct of experiments in the Family Medical Center in Oxnard, where student training actually took place. The Oxnard broadcasts will be made from a room in the basement of the Mid Valley Hospital (Figure 39) which is normally used for staff training purposes.

All of the equipment required for TV broadcasts, as well as the equipment and storage for ATS 6 and the transceiver for ATS 1 are installed in this room (Figure 40). Approximately 131 feet of cabling connects the equipment to the antennas, which are 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. Delays and shipping damage impaired the in-valuation and training plans significantly. Particularly affected were Omak and Seattle, where much planned training did not take place and where relatively inexpensive sets of temporary equipment will be required.

Although delayed about three weeks the Seattle host's portion of the experiments were modified to compensate for the time loss and no serious consequences are anticipated. Omak installation was delayed by two months and this 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 6 is to determine whether telecommunication is a viable medium 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 lecturer 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 terminal equipment function and how much adjustment or maintenance is required to set it right? Does this interfere with scheduled transmission? Can the nonprofessional terminal operators at Omak operate the equipment without difficulty and obtain good pictures?

3) Less costly than alternative means? How much money is saved by reduced air travel and telephone costs and the time faculty spend in travel? How does this compare with the cost of the satellite communication equipment? the peripheral equipment and the time required for equipment operation and maintenance? is it less expensive than hiring additional faculty or renting here location as 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 contact to Lester 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 participate.

Pre-experiment interviews and questionnaires are being used to obtain information on the pre-experimental expectations of the prospective participants—students faculty and others—toward satellite mediated telecommunication. Evaluative data will then be obtained following each satellite transmission. The instruments used will be primarily those that assess the opinions of the participants as to the effectiveness of the satellite transmitted information from their point of view. For some experiments questionnaire sheets will be also documented. The evaluation will also periodically observe each transmission.

Technical feasibility will be evaluated largely by the TV production staff. The staff members will complete forms following each transmission that ask them to rate camera work and audio and visual quality and other produc tive parameters—excluding their impressions of the participation reactions to technical activities within the studio environment.

Additional higher will be kept to compare travel time and the volume of telephone communications between the experiment site before and during the ATS 6 experiment.
To determine whether their attitudes about telecommunication were changed by the experience, when the two-month experiment was completed, questionnaires and interviews will again be administered to the participants to obtain their overall reactions to the program.

Implications for the Future

The WAMI Experiment in Regionalized 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 experiments with XTS-6 will help to determine whether the use of satellite telecommunications to 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 these experiments with the use of satellite communication in medical education will be applied to the design of future satellites, satellite equipment and communication techniques bringing the possibility of permanent working systems nearer to reality.

If new satellites are developed with the application in mind and become available to the northwest region, they could be used to interconnect the entire WAMI system. Thus and perhaps additional links with isolated communities would have the added effect of improving medical service and providing increased incentive for physicians to practice in such areas. With further expansion of the joint educational programs which are already served by the University of Washington could be transmitted to professional audiences throughout the northwest.

Paper Presented by Dr. R. S. Cooper at The Bicentennial Space Symposium Jointly Sponsored by the AAS/AIAA in cooperation with the Smithsonian Air and Space Museum Washington, D.C. 6-8 October 1976
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, safety, 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 multibeam 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 Communications & Navigation Division.
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 (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-receptor (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 (Fig. 3). The Joint NASA/Canadian Communications Technology Satellite (CTS) is conducting further experiments with these services in the satellite broadcast 12 GHz band (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 MARISAT 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 strong impetus toward developing and demonstrating this technology, and present ATS experimentation is aimed at land mobile and "personal" pocket-sized communications.
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 systems. 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 a communications system, 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 I 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 SYNCOMS 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 DOOD 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 and 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 MARSAT. By the end of the decade aeronautical communications 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 splintered 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 transmitted 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.
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 (1.4 kW DC) (Fig. 7). The CTS radiates power levels 10 to 20 times higher than the present commercial communications satellites. Some of the U.S. 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 undertaken 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 much broader problems and issues which must involve federal, state and local policy decisions. The chicken or egg risk/new investment problems, the obsolescing 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 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.

Telemedicine 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 telemedicine 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 made 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. (Public Law 93-154) 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 predicated on adequate patient information, rapid transportation, and the method of transport based on the most appropriate medical facility for treatment. 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 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. 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 for 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.
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 needed 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 19262. Considerable information has been developed already on land mobile requirements and the equipement 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 some 24 potential applications of satellite delivered communication services. These included 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

3. CTS Experiments Operations Plan, CTS-3-300, January 1976
6. John L. Boor, J. Braunstein et al, op cit
7. J. E. Miller, op cit
8. CTS Experiments Operations Plan, CTS-3-300, January 1976
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. Moreover, 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 the 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, as well as criteria, and spectrum utilization.

A bibliography includes articles on innovative requirements for telecommunications and other emerging services, even though satellites may not be identified therein as a potential transmission medium.

A summary of recent U.S. and U.S.-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 systems, even though satellites may not be identified therein as a potential transmission medium.

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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;

<table>
<thead>
<tr>
<th>Dedicated Networks</th>
<th>Video</th>
<th>Voice Feedback</th>
<th>Data Slow Scan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elementary and secondary school net</td>
<td>3</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>2. Higher education net</td>
<td>5</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>3. Public ETV net</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4. Library net (excluding video tape)</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total per time zone</td>
<td>9</td>
<td>420</td>
<td>455</td>
</tr>
</tbody>
</table>

TABLE I

Estimated number of channels needed for education for each of five time zones

15 Kbps, Voice, 50 Kbps Data Slow Scan
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.

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.

<table>
<thead>
<tr>
<th>State</th>
<th>Time Zone</th>
<th>Video Channels</th>
<th>Data Channels</th>
<th>Population (in millions)</th>
<th>Video Channel/Million Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaii</td>
<td>Alaska</td>
<td>Pacific</td>
<td>Mountain</td>
<td>Central</td>
<td>Eastern</td>
</tr>
<tr>
<td>Video</td>
<td>7</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Channels</td>
<td>20</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Population</td>
<td>8.0</td>
<td>0.3</td>
<td>25.0</td>
<td>8.0</td>
<td>46.0</td>
</tr>
<tr>
<td>(in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>122.0</td>
</tr>
<tr>
<td>millions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video</td>
<td>7.0</td>
<td>150.0</td>
<td>2.0</td>
<td>12.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Channel/M</td>
<td>Million</td>
<td></td>
<td></td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 NALECON traffic projection for 1983

<table>
<thead>
<tr>
<th>Item</th>
<th>Data-In-Time</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Message Errors</td>
<td>Number</td>
</tr>
<tr>
<td>Real-time, non-dedicated, low-data-rate channels;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote job entry systems requiring two-way non-real-time non-dedicated low-data-rate channels;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservation and ticket service for airlines, hotels, etc., requiring two-way dedicated real-time low-data-rate channels;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote access to centralised credit bureau information (two-way dedicated real-time low-data-rate channels);</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 Kbits/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 data 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 MARC 1971 Recommendation 5pa 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 needs 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. Service for 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 V. Channel requirements - Type I stations (central organization facilities) |
|-------------------------------|---|---|---|---|---|---|---|---|---|
| **EQUIPMENT** | **CHANNEL** | **RECOMMENDED** | **MIN** | **MAX** | **CHANNEL** | **RECOMMENDED** | **MIN** | **MAX** | **CHANNEL** | **RECOMMENDED** | **MIN** | **MAX** |
| **ELEMENTARY & PRIMARY** | **DOMESTIC** | **NATIONAL** | **STATION** | **DOMESTIC** | **NATIONAL** | **STATION** | **DOMESTIC** | **NATIONAL** | **STATION** | **DOMESTIC** | **NATIONAL** | **STATION** |
| **300 - 1200 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **4000 - 9000 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **10 - 20 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **20 - 40 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **40 - 80 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **80 - 120 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **120 - 160 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **160 - 200 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **200 - 240 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **240 - 280 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **280 - 320 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **320 - 360 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **360 - 400 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **400 - 440 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **440 - 480 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **480 - 520 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **520 - 560 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **560 - 600 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **600 - 640 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **640 - 680 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **680 - 720 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **720 - 760 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **760 - 800 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **800 - 840 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **840 - 880 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
| **880 - 920 kHz** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** | **10 - 20** | **20** | **20** |
TABLE VI. Channel Requirements - Type II stations (Interactive facilities)

<table>
<thead>
<tr>
<th>Station Type</th>
<th>Requirement 1</th>
<th>Requirement 2</th>
<th>Requirement 3</th>
<th>Requirement 4</th>
<th>Requirement 5</th>
<th>Requirement 6</th>
<th>Requirement 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Specific requirements may vary by class of public interest.
REFERENCES


BIBLIOGRAPHY


8. HUPE, Howard H. Stepping up to a public service satellite consortium. Astronautics and Aeronautics, May 1975.


ANNEX I
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, health care, community and special services, and technology extension will be

<table>
<thead>
<tr>
<th>EXPERIMENT</th>
<th>MAJOR OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health, Education, Telecommunications (HEET)</td>
<td>To evaluate a system that will permit relay of television programs through the satellite to facilities such as schools, CATV systems, and clinics</td>
</tr>
<tr>
<td>Satellite Instruction Television Experiment (SITE)</td>
<td>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.</td>
</tr>
<tr>
<td>Television Relay Using Small Terminals (TRUST)</td>
<td>To advance state-of-the-art in space communications by demonstrating CCIR quality wideband signaling between ATS-6 and inexpensive ground stations.</td>
</tr>
<tr>
<td>Millimeter Wave (MMW) (20 and 30 GHz)</td>
<td>Investigation of atmospheric propagation at MMW frequencies. Feasibility of the application of MMW communications.</td>
</tr>
<tr>
<td>Propagation (13 and 18 GHz)</td>
<td>Collect data on attenuation due to precipitation. Determine power margins needed in spacecraft communications systems</td>
</tr>
</tbody>
</table>
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 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 Characterisation. The objective of the experiment is to measure and characterize 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.
Report of Task Force B
Broadcasting Service Group on Satellite Broadcasting (BSS/SAT)
"Functional User Requirements"

Introduction
This report has been developed to present existing and projected user requirements for the general time frame 1979-2000 in the Broadcast Satellite Service (BSS) as developed by TFB Task Force B, chaired by Frank W. Norwood JCOM/SSEC, 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 there from 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 as addenda 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 in requirements projections 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 requirement 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.
--- Thinnly 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 more services already being provided to thinly populated areas.

US Thinnly Populated Areas

The criterion used in this report in identifying thinly populated areas in the US is to determine the area in each state that standard Metropolitan Statistical 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 SMSA's, percentage of total land area outside SMSA's.

<table>
<thead>
<tr>
<th>State</th>
<th>No. of SMSA's</th>
<th>Area per SMSA</th>
<th>Population Outside SMSA</th>
<th>Area Outside</th>
<th>Percontaqe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nevada</td>
<td>2</td>
<td>55,270</td>
<td>100</td>
<td>153,650</td>
<td>19.3</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>2</td>
<td>4,652</td>
<td>572</td>
<td>2,110,000</td>
<td>37.0</td>
</tr>
<tr>
<td>New Jersey</td>
<td>8</td>
<td>979</td>
<td>572</td>
<td>2,110,000</td>
<td>37.0</td>
</tr>
<tr>
<td>New Mexico</td>
<td>12</td>
<td>121,666</td>
<td>772</td>
<td>66,448</td>
<td>39.9</td>
</tr>
<tr>
<td>New York</td>
<td>9</td>
<td>5,508</td>
<td>66,448</td>
<td>66,448</td>
<td>39.9</td>
</tr>
<tr>
<td>North Carolina</td>
<td>7</td>
<td>7,512</td>
<td>66,448</td>
<td>66,448</td>
<td>39.9</td>
</tr>
<tr>
<td>North Dakota</td>
<td>1</td>
<td>70,665</td>
<td>66,448</td>
<td>66,448</td>
<td>39.9</td>
</tr>
<tr>
<td>Ohio</td>
<td>14</td>
<td>2,946</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>3</td>
<td>23,306</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>Oregon</td>
<td>3</td>
<td>32,327</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>Pennsylvania</td>
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<td>3,777</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
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<tr>
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<td>1,214</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>South Carolina</td>
<td>3</td>
<td>10,351</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>South Dakota</td>
<td>1</td>
<td>57,047</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>Tennessee</td>
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<td>7,044</td>
<td>13,937</td>
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<td>83.8</td>
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<td>22</td>
<td>12,151</td>
<td>13,937</td>
<td>55,750</td>
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<td>Utah</td>
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<td>4,458</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>Vermont</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>464,000</td>
<td>100.0</td>
</tr>
<tr>
<td>Wyoming</td>
<td>9</td>
<td>6,075</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>Worcester</td>
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<td>2,070</td>
<td>13,937</td>
<td>55,750</td>
<td>83.8</td>
</tr>
<tr>
<td>Other States</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>657,770</td>
<td>84.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,593,330</strong></td>
<td><strong>55,750</strong></td>
<td><strong>13,937</strong></td>
<td><strong>55,750</strong></td>
<td><strong>83.8</strong></td>
</tr>
</tbody>
</table>

**1974 US Census Bureau estimate**

Data in the first column is developed from work done in 1975.
Almost exactly one fourth of the total population of the states lies outside of any SMSA's. 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 “thinnely populated.” This criterion is that the area/SMSA should exceed 10,000 square miles. In a perfectly regular square distribution 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. Those are line-of-sight distances associated road distances could be expected to be as much as 1.5 times greater. It is assumed that these distances are too great to be negotiated as a daily routine and represent potential problem areas in delivery of emergency services. These are twenty-five states with areas of 10,000 square miles 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 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>
</tr>
</thead>
<tbody>
<tr>
<td>M 1.</td>
<td>Wyoming</td>
<td>0</td>
<td>353,000</td>
<td>353,000</td>
</tr>
<tr>
<td>NE 2.</td>
<td>Vermont</td>
<td>0</td>
<td>464,000</td>
<td>464,000</td>
</tr>
<tr>
<td>NE 3.</td>
<td>New Mexico</td>
<td>1</td>
<td>205,500</td>
<td>330,000</td>
</tr>
<tr>
<td>NE 5.</td>
<td>Idaho</td>
<td>1</td>
<td>777,000</td>
<td>777,000</td>
</tr>
<tr>
<td>NE 6.</td>
<td>South Dakota</td>
<td>1</td>
<td>590,000</td>
<td>685,000</td>
</tr>
<tr>
<td>NE 7.</td>
<td>Montana</td>
<td>2</td>
<td>551,800</td>
<td>721,000</td>
</tr>
<tr>
<td>NE 8.</td>
<td>North Dakota</td>
<td>1</td>
<td>524,000</td>
<td>640,000</td>
</tr>
<tr>
<td>NE 9.</td>
<td>Arizona</td>
<td>2</td>
<td>738,000</td>
<td>2,038,000</td>
</tr>
<tr>
<td>NE 10.</td>
<td>Nevada</td>
<td>2</td>
<td>153,000</td>
<td>546,000</td>
</tr>
<tr>
<td>NE 11.</td>
<td>Utah</td>
<td>2</td>
<td>313,000</td>
<td>1,197,000</td>
</tr>
<tr>
<td>NE 12.</td>
<td>Kansas</td>
<td>2</td>
<td>1,600,000</td>
<td>2,780,000</td>
</tr>
<tr>
<td>NE 13.</td>
<td>Nebraska</td>
<td>2</td>
<td>613,000</td>
<td>1,542,000</td>
</tr>
<tr>
<td>NE 14.</td>
<td>Colorado</td>
<td>3</td>
<td>942,000</td>
<td>2,437,000</td>
</tr>
<tr>
<td>NE 15.</td>
<td>Oregon</td>
<td>3</td>
<td>1,713,000</td>
<td>2,225,000</td>
</tr>
<tr>
<td>NE 16.</td>
<td>New York</td>
<td>3</td>
<td>1,070,000</td>
<td>1,870,000</td>
</tr>
<tr>
<td>NE 17.</td>
<td>Illinois</td>
<td>3</td>
<td>1,062,000</td>
<td>2,201,000</td>
</tr>
<tr>
<td>NE 18.</td>
<td>Iowa</td>
<td>1</td>
<td>1,363,000</td>
<td>2,616,000</td>
</tr>
</tbody>
</table>

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-eighth 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 or 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 south Atlantic states fall into the selected twenty-five, as do all of the Pacific states except California (which at 9,609 square miles/SMSA misses only slightly the 10,000 criterion). All of the West North Central states qualify except Iowa, which is close to qualifying at 9,281 square miles per SMSA. All of the West South Central states are included except Louisiana. The two least populous New England states qualify, two out of four East South Central states, and a simple South Atlantic state (although Georgia, North Carolina and Virginia are close to qualifying). No state in the Middle Atlantic and East North Central groups (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 representative for concentrated study in identifying potential requirements for broadcasting satellites. Total personal income in the selected states is $13 billion per year (extrapolated 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 affected 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 states. 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 non-federal doctors 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 at the cost of potentially insufficiently 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 24%, 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 an the selected twenty-five states hospitals are smaller within and outside SMSA's than the US average. Density in square miles per non-federal doctor is 40 in the selected twenty-five and 33 in the other twenty-five, a factor of 1.2 larger. In the individual state densities may vary less, in Alaska, for example, the number of square miles per non-federal doctor is 18557.

<table>
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<tr>
<th>State</th>
<th>Active Doctors**</th>
<th>Hospitals**</th>
<th>Beds in Hospitals**</th>
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<td>OK</td>
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<td>50</td>
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<tr>
<td>MO</td>
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<td>149</td>
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<td>KY</td>
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<td>AR</td>
<td>180</td>
<td>4</td>
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<td>TX</td>
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<tr>
<td>SC</td>
<td>358</td>
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</table>

*1971 Total: 7,030 61,510 383 2,461 42,542 327,460
**1973: 31.5% 21.2% 46.5% 36.6% 29.5% 23.5%

Table 4

| Source: AHA Hospital Stat 1974 |
|-------------------|-------------------|-------------------|
| SMSA | Non SMSA | SMSA | Non SMSA |
| Wyoming | 0 | 0 | 27 | 1,674 |
| Vermont | 0 | 0 | 17 | 2,255 |
| Alaska | 7 | 2,190 | 8 | 1,443 |
| New Mexico | 6 | 1,264 | 33 | 2,156 |
| Idaho | 3 | 479 | 44 | 2,677 |
| South Dakota | 3 | 617 | 48 | 2,836 |
| Montana | 4 | 946 | 55 | 2,016 |
| North Dakota | 3 | 652 | 51 | 3,470 |
| Arizona | 79 | 6,162 | 20 | 1,602 |
| Nevada | 10 | 1,934 | 9 | 466 |
| Utah | 14 | 2,916 | 18 | 714 |
| Kansas | 16 | 4,584 | 125 | 7,500 |
| Nebraska | 15 | 4,510 | 80 | 4,300 |

| No of Hospitals, Beds |
|-------------------|-------------------|-------------------|
| Wyoming | 0 | 0 | 27 | 1,674 |
| Vermont | 0 | 0 | 17 | 2,255 |
| Alaska | 7 | 2,190 | 8 | 1,443 |
| New Mexico | 6 | 1,264 | 33 | 2,156 |
| Idaho | 3 | 479 | 44 | 2,677 |
| South Dakota | 3 | 617 | 48 | 2,836 |
| Montana | 4 | 946 | 55 | 2,016 |
| North Dakota | 3 | 652 | 51 | 3,470 |
| Arizona | 79 | 6,162 | 20 | 1,602 |
| Nevada | 10 | 1,934 | 9 | 466 |
| Utah | 14 | 2,916 | 18 | 714 |
| Kansas | 16 | 4,584 | 125 | 7,500 |
| Nebraska | 15 | 4,510 | 80 | 4,300 |
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 are to reduce the quality, which appears to be the case, the 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.
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</table>

* 53 districts operate consolidated schools with other schools.

Table 6
Source: 1967 Digest of Education Statistics

States of the U.S. and the District of Columbia

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<th>Outside ESEA (1972)</th>
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<td>74</td>
</tr>
<tr>
<td>Texas</td>
<td>1,130</td>
<td>212</td>
</tr>
<tr>
<td>South Carolina</td>
<td>93</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>8,289</td>
<td>1,130</td>
</tr>
</tbody>
</table>

Inside ESEA (1967) and Outside ESEA (1972) represent one-room schools. 53 districts operate consolidated schools with other schools.
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 the 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 DSS and reports of the results of these studies have been issued. Experiments in use of DSS 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
CTS satellite and reports have been published describing each
experiment. A partial listing of these reports as included in
the references. Since projections of the likely technology of
BSS (particularly earth station sensitivity) have changed some-
what 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 Hupé'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 (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 9,
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
aspect of the value of the application of telecommuni-
cations 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 band
telecommunications can play an important or dominant role in this.

Hudson, Heather B. 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 broad-
casting).

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.

Hupé, 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, supple-
menting high school, community college and four-year college
curriculum material and continuing professional education, and
identifies potential revenue sources. "Needs in Health Care" page 15 indicates the necessity for wide band communications in
health care—with satellite distribution as a basis pointing out
that telecommunications 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 Telemedicine" 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.; Braumer, Jean, Janby, J. M.; Ogden, D.; Potter, J.G.; Harper, J.G.; Volker, E.; Whalen, A. A., Benderson, E. and Hube, 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 PESC to accommodate the new techniques and education, health care and other social services demonstrated in the experiment.

Three important papers by Howard Hube 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 consultations can be successfully carried out by health care providers at all levels of training.

Reference 9 is the report of J1/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/CR.

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 3 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 PESC has started to fill) to assess what needs exist, 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 10/11B (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. Reference 16-31 report on some of this background work. The USSG-BC/838 is totally based on review of background reference material.

Requirements developed in USSG-BC/838 are summarised below:

Average Number of Channels per Time Zone (TV Channel Equivalent)

<table>
<thead>
<tr>
<th>Video</th>
<th>15 KHz, Voice, 50 Mfps Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>64</td>
</tr>
<tr>
<td>Biomedical</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
</tr>
</tbody>
</table>

Requirements developed in USSG-BC/838 are summarised below:

Average Number of Channels per Time Zone (TV Channel Equivalent)

<table>
<thead>
<tr>
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<th>15 KHz, Voice, 50 Mfps Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>64</td>
</tr>
<tr>
<td>Biomedical</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
</tr>
</tbody>
</table>
The requirements developed by Washington University for education are summarized below:

### Average Number of Channels per Time Zone (TV Channel equivalent)

**Terrestrial Facilities**

<table>
<thead>
<tr>
<th>Service</th>
<th>Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive-transmit</td>
<td>91</td>
</tr>
<tr>
<td>Receive only</td>
<td>27,500-17,500</td>
</tr>
<tr>
<td></td>
<td>40,000-50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,047</td>
</tr>
</tbody>
</table>

### 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 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 requirement 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 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 communications 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. Responses to PISA's questionnaires 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 E - Consolidation of requirements

The requirements developed in the Washington University and CCIR Study Group 10/11B reports are compared in tabular form below.
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 Satellites 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 rather 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 Mobile Service reduced to secondary status. Use is 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>CCIR</th>
<th>Washington University</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV (per 15 MHz, Voice, time zone)</td>
<td>9</td>
<td>1 1/4</td>
</tr>
<tr>
<td>Data (per time zone)</td>
<td>55</td>
<td>2</td>
</tr>
<tr>
<td>Education</td>
<td>64</td>
<td>2</td>
</tr>
<tr>
<td>Biomedical</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

367 MHz (using Washington University educational requirements)
362 MHz (using CCIR educational requirements)
Total ground terminals 60,000-70,000

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 3-4-for $N/6$, 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.

11 400-1525 MHz 3300-4000 MHz 4300-4625 MHz

During informal discussions with non-US governments in Region 2, statements were made that as many as 225 TV channels (BI) could be expected to be in operation by the year 2000. Based on the final report of UGO 35/03 Sharing Principles and Practices, the average number of BC channels equivalent to a single BI channel is 3.76. As a consequence, the non-US BC channel equivalent is 1326, and the total year 2000 requirement in Region 2 is, in BC type TV channels, 2598 to 2728.
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 worldwide 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 estimates for the band 11-12.2 GHz is taken from Table 3 (Reference 13) for the following conditions:

<table>
<thead>
<tr>
<th>Copolarization</th>
<th>Cachannel</th>
<th>Community Reception</th>
<th>Sharing ratio with FSS 25 75</th>
<th>Large FSS Earth Station</th>
<th>Orbit division</th>
<th>Paring of service areas in Northern and Southern hemisphere</th>
</tr>
</thead>
</table>

and is 648 BC equivalent TV channels. Based on linear frequency scaling from the 12 GHz capacity the 2500 MHz capacity is

\[
\text{120} \times \frac{2.5}{500} \times 648 = 52.5
\]

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 858,000 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 II - Adequacy of Existing Allocations

The table below shows in consolidated form the requirements and the capacity estimated in previous sections.

<table>
<thead>
<tr>
<th>Time</th>
<th>US</th>
<th>Other Region 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980-85</td>
<td>420-462</td>
<td>1296</td>
<td>2598-2728</td>
</tr>
<tr>
<td>2000</td>
<td>1302-1422</td>
<td>1296</td>
<td>2598-2728</td>
</tr>
</tbody>
</table>

### Capacity

<table>
<thead>
<tr>
<th>Time</th>
<th>US</th>
<th>Other Region 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 MHz</td>
<td>210</td>
<td>648</td>
<td>858</td>
</tr>
<tr>
<td>12 GHz</td>
<td>Improved sharing</td>
<td>420</td>
<td>1296</td>
</tr>
<tr>
<td></td>
<td>techniques</td>
<td></td>
<td>1716</td>
</tr>
</tbody>
</table>

It can be seen that the 1900-85 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.
Section 1 - 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 extension 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 downlink has been determined to be feasible (see reference 3). 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 3). This band is technically at least as desirable as the 2500 MHz band for BSS and represents an orbit-spectrum capacity 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.

a. 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 allocations. This action would provide a 40% increase in orbit-spectrum capacity in the 12 GHz region.

b. 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 more applicable to service not requiring very high directivity 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 PSS (uplink) and the bandwidth 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 connections.
References

15. Singh, Jai P., "Operating Frequencies for Educational Satellite Services", Washington University Memorandum 71-10, November 1971
27. NSL Division of Systematics General Corp., "Interim Results from 40 and 80 GHz Technology Assessment and Forecast," under contract no. NAS-3-19724 for NASA Lewis Research Center.
31. CCIR Report 1M PLEN 2, Doc 1, November 4, 1975

Appendix A-1

WARC 1979

BROADCAST BUREAU SERVICE GROUP ON SATELLITE BROADCASTING (BSG/SAT)

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(Continued)
Appendix A-2

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202-632-6312

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Washington, D.C. 20006
202-659-3320

Appendix B

Meetings of Task Force D RSG/SAT

1st January 23, 1976
2nd February 5, 1976
3rd February 27, 1976
4th April 16, 1976
### 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 Educational Resources Program
- Joint Council on Educational Telecommunications
- Kansas Public Television Commission
- Maryland Center for Public Broadcasting
- Medical University of South Carolina
- Miami-Dade Community College District
- Mississippi Authority for ETV
- 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 Hold-America
- University of Southern California
- University of Wisconsin-Stevens Point
- Virginia Public Telecommunications Council
- Western Interstate Commission for Higher Education
- University of Alabama in Birmingham

### Appendix D-1

**PUBLIC INTEREST SATELLITE ASSOCIATION**

55 West 44th Street
New York, N.Y. 10036
(212) 681-2540

The object 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 techniques.

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) (places) distributed each time (column 5) (Example: If there are 10,000 members to which 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).

<table>
<thead>
<tr>
<th>Technique</th>
<th>Type of Service</th>
<th>Usage</th>
<th>Frequency</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mail</td>
<td>Mailings (General)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mail</td>
<td>Newsletters</td>
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<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
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</tr>
<tr>
<td>Common Used</td>
<td>Communications Technique</td>
<td>Type of Service</td>
<td>(Annual Usage) Frequency</td>
<td>No of Items</td>
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<td>Telex</td>
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</tr>
<tr>
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<td>Radio</td>
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</tr>
<tr>
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<td>Closed Circuit Radio</td>
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<td></td>
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<tr>
<td>Television</td>
<td>Slow Scan</td>
<td></td>
<td></td>
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<tr>
<td>Television</td>
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<td></td>
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</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. If Satellite Service dedicated to non-profit organizations were made available, for which types of services would you give first priorities? Please put the Top 5 (1 is highest)

- Long Distance Telephone
- Telex
- Data Transmission
- Television
- Closed Circuit TV

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
The following pages contain the results of the panel deliberations and their presentations of user requirements for public service communications satellite system.
GROUND RULES:

- Applications which can be satisfied by existing Commercial satellite systems should not be considered for the PSSC's.
- Criteria should be:
  - New spacecraft system is required for application (extension of current operational technology)
  - Cost of user equipment not economically feasible requiring new system design

THE PSSC's:

- Relative to Commercial Services
  - The program is in essence a market validation
  - The market will be established through a demonstration approach
  - System should be quasi-operational with high reliability
    - NASA should consider the total user system (end-to-end) and provide the required assistance, e.g., training, operations, and program development
  - NASA should involve industry to establish the proper crossover to a full commercial system
THE USER

- Should make some financial commitment to the system.
- The user should be made aware of the ultimate operational costs.
- For some users, a gradual increase in financial commitment should be established to ease the transition to a commercial system.

THE USER

- Should make some financial commitment to the system.
- The user should be made aware of the ultimate operational costs.
- For some users, a gradual increase in financial commitment should be established to ease the transition to a commercial system.

- The PSSCS should be as close to its operational configuration as is possible.
- Stability of system parameters is of major importance (regulatory agencies)
- Different alternatives should be examined in establishing system
  - Use existing communications system capabilities
  - Provide incentives for industry to develop the services
  - Government developed system in cooperation with commercial services
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Average</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sensors</td>
<td>0.1</td>
<td>100</td>
</tr>
<tr>
<td>2. Data Terminals</td>
<td>10</td>
<td>$10^4$</td>
</tr>
<tr>
<td>(Interactive)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Computer File</td>
<td>1000</td>
<td>$10^6$</td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Data Rates (bits/sec)**

**Requirements**
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
   Example: ATS-6 transponder, small earth terminal
   10^7

USER COMMONALITY REQUIREMENT

MEDICAL SENSORS
WEATHER SENSORS
DIGITIZED VOICE
BULK DATA TRANSFER
INQUIRY SYSTEM
INTERACTIVE DATA PROCESSING
ELECTRONIC MAIL

PACKETS

Classes: control, open control
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) Compatibility

Packet Broadcasting

Point-to-Point Alternative
100,000 node network requires

\[
\frac{100,000 \times 99,999}{2} \approx 5 \times 10^9 \text{ links}
\]
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

**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 instructions
- User should dictate form, time, place of needed information

**Number**

- Minimum of one per school (65,000+)
- 1,000 mobile terminals (201 state)

**Volume**

- Operational 7 hrs/day 5 days/week
- Eastern thru Hawaii time zones
SATELLITE APPLICATION TO Elementary & Secondary Education

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>MODE</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORAGE</td>
<td>PRINT</td>
<td>HOME</td>
</tr>
<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>
<tr>
<td>DISTRIBUTION</td>
<td>MAIL</td>
<td>HOME</td>
</tr>
<tr>
<td></td>
<td>UHP/YHF</td>
<td>JOB SITE</td>
</tr>
<tr>
<td></td>
<td>CABLE TV</td>
<td>SCHOOL</td>
</tr>
<tr>
<td></td>
<td>TELECOMM</td>
<td>HOSPITAL</td>
</tr>
<tr>
<td></td>
<td>ITFS</td>
<td>COLLEGE</td>
</tr>
<tr>
<td></td>
<td>SATELLITE</td>
<td>NATIONAL</td>
</tr>
<tr>
<td>UTILIZATION</td>
<td>BOOK</td>
<td>SAME</td>
</tr>
<tr>
<td></td>
<td>FACSIMILE</td>
<td>SAME</td>
</tr>
<tr>
<td></td>
<td>CRT DISPLAY</td>
<td>SAME</td>
</tr>
<tr>
<td></td>
<td>CAI</td>
<td>SAME</td>
</tr>
<tr>
<td></td>
<td>POINT</td>
<td>SAME</td>
</tr>
</tbody>
</table>
Presently served 25 to 50 million adults
Fastest growing segment of education
Part-time enrollments now exceed full-time enrollments
Envision an enrollment potential of 60 million in the '80's
Yet, higher education has failed to take advantage of communication technology.
How motivate the use?
Need for entrepreneurs, need for federal policy and resources

Populations to be served:
1) Occupational training
2) Continuing 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, by category:

1) Re-licensure laws
2) State and federal regs
3) Degree requirements for graduation
4) Requirements to protect privacy
5) Liability concerns
6) Market aggregation - diverse 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 all modes
depending upon 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/week.
We foresee as much use as facilities development will allow.
We see problems of access. Who will decide? Commercial? Public Service?
Presently primarily local, state, and regional

ITPS
Appalachia
Alaska
Navy/Marinet: Atlantic/Pacific
PSAT: Pan Pacific Basin
ECS networks
Public Broadcasting System
State Networks (e.g., So. Carolina)

We foresee a need for inter-connecting 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 consortiums
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.
Medical Education - Panel 7

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 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 command/controlling facility to more efficiently provide the programming input to such a system via a multiple capability uplink.

1. 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, LCME, LOCME, LCOE, specialty boards, etc.
### Panel 7

#### 2. Disciplinary Communications Needs

<table>
<thead>
<tr>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical School Classroom, Multiple Branches of a School or Multiple Schools, etc.</td>
</tr>
<tr>
<td>Business/Educational (See Note)</td>
</tr>
<tr>
<td>Health Education for the Patient-</td>
</tr>
<tr>
<td>Type I - Health Education</td>
</tr>
<tr>
<td>Type II - Physician to Patient about Specific Condition, a Health System Function - Completely Confidential, Requires Physician Input</td>
</tr>
</tbody>
</table>

#### 2.1 Types of Communication

<table>
<thead>
<tr>
<th>Type of Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio-video-color 2-way (option - may be used with teleprocessing)</td>
</tr>
<tr>
<td>High Data Rate (Digital) - audio - combination</td>
</tr>
<tr>
<td>Audio-video color 2-way (Practical to Meet Some of This Need - Expansion of Use Probably Necessary)</td>
</tr>
<tr>
<td>Audio-video use practically now, program content very critical</td>
</tr>
</tbody>
</table>

#### 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

#### 2.3 Communications Networks

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

#### 3.0 Constraints and Problems Areas

<table>
<thead>
<tr>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statutory restraints are state and not Federal at this time and they can be unique to a given state</td>
</tr>
<tr>
<td>Regulatory Constraints - None now, but disclosure regulations regarding drugs under auspices of FDA have been recognized</td>
</tr>
<tr>
<td>Institutions are not funded to develop or distribute continuing medical education programs utilizing broadband or any other distribution modality</td>
</tr>
</tbody>
</table>

#### 3.5 Production Area Relating to Confidentiality of Data

- Federal government should consider providing funds for subsidizing the dissemination of educational programs
PUBLIC SAFETY

CHRIS 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 can be an immediate and effective service. Is often a matter of life or death.
PUBLIC SAFETY REQUIREMENTS ANALYSIS

VOICE

1. DISASTER ALERTING NETWORK
   OTHER PUBLIC SAFETY REQUIREMENTS

TDM-1200

MOBILE/MOBILE, BASE/MOBILE AND MOBILE/BASE

CHANNEL 6

1000 RELIABILITY; 100% AVAILABILITY; 32 AVERAGE
USAGE FOR 25,000 STATIONS)

CHANNEL 3

1000 RELIABILITY; 100% AVAILABILITY; 32 AVERAGE
USAGE NATIONAL, 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 AT FEDERAL,
STATE AND LOCAL LEVELS.

PUBLIC SAFETY REQUIREMENTS ANALYSIS

RECORD TRAFFIC: 60 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 - 640x480 Channels**

<table>
<thead>
<tr>
<th></th>
<th>One Way (Nationwide Audience)</th>
<th>Interactive with Audio Only</th>
<th>Interactive with Video</th>
</tr>
</thead>
<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>4</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>1</td>
<td>1</td>
</tr>
<tr>
<td>Search and Rescue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Cross</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Disaster</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<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)...
- Dissemination of mug shots and identification pictures...
- Inter- and intrastate transfer of maps, footprints, shoe images and other identification data to facilitate search and rescue...

**TOTAL - 6**
PUBLIC SAFETY REQUIREMENTS ANALYSIS

TELECONFERENCING

AUDIO

EMERGENCY LOCATION TRANSMITTERS RECEPTION/LOCATION
INTERAGENCY COORDINATION OF PUBLIC SAFETY AGENCIES

1 KHZ CHANNEL
1 FULL TIME
1 PART TIME

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

VOICE GRADE CHANNELS

DIGITAL COMMUNICATIONS MOBILE/MOBILE, MOBILE/BASE, AND BASE/MOBILE
VEHICLE TRACKING AND LOCATION

250
100

ANALOG COMMUNICATIONS MOBILE/MOBILE, MOBILE/BASE, AND BASE/MOBILE
LOW SPEED TELEMETRY AND VOICE ASSOCIATED WITH POLICE-OPERATED
EMERGENCY MEDICAL SERVICE.

5
### Public Safety Communications
#### Systems Operation and Maintenance Cost

<table>
<thead>
<tr>
<th>Service</th>
<th>Annual Cost</th>
<th>Proposed Additional Expenditures New Augmented Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminal Justice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State and Local Level</td>
<td>$100,000,000</td>
<td>$650,000,000</td>
</tr>
<tr>
<td>Federal Level</td>
<td>$20,000,000</td>
<td>$20,000,000</td>
</tr>
<tr>
<td>Search and Rescue (All)</td>
<td>$1,000,000</td>
<td>$600,000</td>
</tr>
<tr>
<td>Emergency Medical Service (Police Only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Protection</td>
<td>$25,000,000</td>
<td>$25,000,000</td>
</tr>
</tbody>
</table>

*This figure unavailable in this panel*
PLANNING NEEDS

NATIONAL  STATE  LOCAL

- INCREASING SERVICE DEMANDS
- FUNDING LIMITATIONS
- NEEDS FEEDBACK INPUT

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 (SUBLISIES)

- SUBSIDIZED OPERATION
  - INDIRECT - GOVERNMENT OPERATION
  - DIRECT - TO SYSTEM
    - TO USERS
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 /time 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 display (still, motion)
   full audio/visual
   computer printout
   facsimile

CATHOLIC TELEVISION NETWORK - hypothetical system.

Current "network" description

10 ETVs systems (2 - 6 channels) = NY, Brooklyn, Rockville Centre
Boston, Miami
Detroit, Chicago, Milwaukee
LA, San Francisco

Interconnection

- with cable TV: SF, Chicago, R Centre
- with other ETVs: NY-Brooklyn-R Centre
- with satellite (CBS): 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)

(SB) Current school users = approximately % 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
   (and) 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)
   (cai (computer assisted instruction))
   (tv program distribution (real-time))

D -- tv program distribution (real time)

2.2 Volume of communications

Present: approx. 30-40 channel hours per day

occasional teleconferencing
(one way video, two way audio)

experimental - face-to-face transmission
 - data transmission

No quantitative estimates possible
"Catholic Television Network"

2.3 Networks

Present (see Page 1, current description, interconnection.

Short- (interconnection of CTN stations NOT with each other
Long (but with shared library and information sources
Term (e.g., central computer for CHI/Cal)

3.0 Constraints

3.1 statutory: current legislation does not authorise adequate
$ support of research, development, and experimentation
commensurate with $ investment in electronic hardware.

3.3 regulatory: minimal -- though there are threats to integrity of
dedicated spectrum for public service (e.g., ITU vs NOS)

3.5 institutional: educational management fractionated among autonomous
systems -- will not aggregate needs or funds without
decisive Federal initiatives and support.

4.0 Potential benefits

(see) 1.3 on page 2.1 of Appendix B

greater individualization
and personalisation
of instruction made possible
of the information/communication
system relieves 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 in-put 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 recessing 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 for 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.

Additional Observations

Panel 3

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control

Teacher Control
APPENDIX 7
APPENDIX TO MEDICAL EDUCATION REPORT
The Board of Medical Examiners in New Mexico has implemented its program and accepts the PRA as meeting its requirements. The law in Ohio states, "Every doctor of medicine licensed to practice medicine or surgery within this state shall, on or before the first day of January of EVERY THIRD YEAR AFTER THE 1977 REGISTRATION, apply to the state medical board for a certificate of TRIENNIAL registration with the board upon an application which shall be furnished by the board. THE APPLICATION SHALL INCLUDE SATISFACTORY EVIDENCE TO THE BOARD THAT IN THE PRECEDING THREE YEARS THE PRACTITIONER HAD COMPLETED THE HOURS OF CREDIT CERTIFIED BY THE NEW MEXICO MEDICAL ASSOCIATION AND APPOVED BY THE BOARD."

The Physician's Recognition Award (PRA) provides a means for documenting CME for all physicians in any field of medicine. Programs for certifying CME are in operation in the states of Arizona, California, Oregon, and Pennsylvania. Criteria for certification adopted by the New Jersey Medical Society and the Pennsylvania Medical Society are identical to those of the PRA. The PRA assists the state associations of Arizona and Pennsylvania, the American Society of Clinical Pathologists and the College of American Pathologists in review and evaluation of the applications from their membership for their certificate in CME. The PRA program endorses the CME programs for the following organizations:

- American Academy of Family Physicians
- American Board of Family Practice
- American Board of Internal Medicine
- American Board of OB-GYN
- American Board of Pathology
- American Board of Pediatrics
- American Board of Physical Medicine & Rehabilitation
- American Board of Plastic Surgery
- American College of Obstetricians & Gynecologists
- American Board of Preventive Medicine
- American Board of Thoracic Surgery
- American Board of Urology

This means that any physician qualifying for these programs is also considered qualified for the PRA. In the states of Arizona and Oregon, the PRA certificate is issued, as well as the state certificate, for CME. For the other organizations, a simple statement by the physician on the application for the PRA and the application fee is all that is needed. The need not complete the details of the application form.

6 CRITERIA FOR THE PRA

- Category 1 - CME Activities with Accredited Sponsorship
  - No limit
- Category 2 - CME Activities with Non-accredited Sponsorship
  - 45 hours
- Category 3 - Medical Teaching
  - 45 hours
- Category 4 - Papers, Publications, Books and Exhibits
  - 45 hours
- Category 5 - Non-supervised Individual CME Activities
  - 45 hours
- Category 6 - Other Meritorious Learning Experiences
  - 45 hours

A total of 150 credit hours are required over a 3-year period with a minimum of 60 credit hours in Category 1.
<table>
<thead>
<tr>
<th>State Medical Association</th>
<th>Continuing medical education requirements for state Osteopathic Associations, as of October 1975</th>
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<tr>
<td>Arizona</td>
<td>2-day course approved by AOA</td>
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<td>Arkansas</td>
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<td>Colorado</td>
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<td>Connecticut</td>
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<td>Florida</td>
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8 Organizations which sponsor Self-Assessment Programs

- Allergy Foundation of America
- American Academy of Dermatology
- American Academy of Ophthalmology and Otalaryngology
- American Academy of Orthopaedic Surgeons
- American Academy of Pediatrics
- American Academy of Physical Medicine and Rehabilitation
- American Association of Neurological Surgeons
- American Board of Thoracic Surgery
- American College of Cardiology
- American College of Chest Physicians
- American College of Emergency Physicians
- American College of Obstetricians and Gynecologists
- American College of Physicians
- American College of Radiology
- American College of Surgeons
- American Neurological Association and Neurology
- American Psychiatric Association
- American Society of Anesthesiologists
- American Society of Clinical Pathologists
- American Society of Colon and Rectal Surgeons
- Connecticut & Ohio Academy of Family Practice
- Philadelphia County Medical Society
- University of Wisconsin Department of Continuing Medical Education
The Regionalization of Academic Medicine: The Metamorphosis of a Concept

To Communism in Academic Medicine

Robert H. Krucoff

Journal of Medical Education
Vol. 41 Number 16
November 1988

The Regionalization of Academic Medicine: The Metamorphosis of a Concept

...
education is inextricably linked to public health, as ill-trained and underresourced health professionals can lead to increased healthcare costs and poorer health outcomes. Inadequate public health education can result in the perpetuation of health inequalities, especially in underserved communities. Therefore, it is crucial to ensure that all healthcare professionals receive adequate training in public health. Such training should include topics such as health disparities, public health policies, and disease prevention. It is essential to create a comprehensive and standardized curriculum for public health education that prepares healthcare professionals to address the complex challenges facing communities today.

Moreover, healthcare professionals must be equipped with the skills necessary to advocate for health policy changes that address systemic issues. This requires a deep understanding of the social determinants of health, such as poverty, race, and gender, and how these factors influence health outcomes. By fostering a holistic approach to healthcare that recognizes the interconnectedness of health and social issues, we can work towards creating a healthier and more equitable society for all.
Regionalism of academic medicine: Perspectives

It remains unclear how regional academic medical centers will be organized and who will be responsible for the education of medical students. This uncertainty is compounded by the fact that the education of medical students is often seen as a local responsibility, regardless of geographic boundaries. However, it is important to recognize that medical education is a complex and multifaceted process that involves the integration of various stakeholders, including medical schools, hospitals, and community organizations. Therefore, it is crucial to develop a regional perspective that acknowledges the importance of collaboration and coordination among these stakeholders to ensure the delivery of high-quality medical education.

Regionalization of Academic Medicine: Perspectives

Regionalization of academic medicine programs is critical to the delivery of high-quality medical education. It involves the development of collaborative partnerships and the integration of resources across multiple institutional settings. The goal is to improve access to medical education, enhance the quality of educational experiences, and foster a more inclusive and equitable learning environment for all students.

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Table 1: Clinical Category Comparison

Region: Each hospital was able to serve the needs of families and places, and to provide effective care and support within the region. By doing so, the regional hospitals were able to serve the needs of families and places, and to provide effective care and support within the region.

Analysis: The analysis of the data showed that the regional hospitals were able to provide effective care and support within the region. By doing so, the regional hospitals were able to serve the needs of families and places, and to provide effective care and support within the region.

Conclusion: The analysis of the data showed that the regional hospitals were able to provide effective care and support within the region. By doing so, the regional hospitals were able to serve the needs of families and places, and to provide effective care and support within the region.
Survey and Evaluation of Approaches to Physician Performance Measurement

Table of Contents

Preface

Introduction

Scopes of the Study

Dimensions of Performance

Process and Outcome

Technical and Interpersonal Process Measurement Methods

CHAPTER I

Technical Process Approaches

Direct Observation

Index Method

Evaluation

Review of Records

Patient Records

Record Abstracts

Hospital Charts

CHAPTER 2

Interpersonal Physician Approach

Sociological Formulations

Psychiatric Formulations

Oral Communication Skills

Failure in Communication

Measuring Quality of Communication Implications

CHAPTER 3

Electromedical Process Approaches

Patient Management Problems

Computer Based System

The Test of Diagnostic Skills

The Inquiry Method

CHAPTER 4

Approaches for Measuring Outcomes

Definitions of Outcomes

Measuring Improvement Outcomes

Diagnostic Outcomes

Process Outcomes

Patient Outcomes

Physical Function

Table of Contents

Preface 1020

Part I

1031

Part II

1032

Part III

1033

Chapter 3

1034

Chapter 4

1035

Appendices

1036

References

1037

Bibliography

1038

Preface

1039

This survey and evaluation of approaches to performance measurement was undertaken by Dr. Arlene R. Boro as research associate for the Association of American Medical Colleges Longitudinal Study Project. Dr. Boro is now an occupational evaluation officer of the State, School of Medicine, State University of New York at Stony Brook. The study was supported by the National Institute for Health Services Research and Development, Department of Health, Education, and Welfare, under contract number 115-72-06. The purpose of the survey is to provide background information for the selection of performance measurement instruments to be used in connection with the projection of follow-up of the longitudinal study of medical students of the class of 1969. 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 consultants and from the review team by the National Institute for Health Services Research and Development. Additional comments and suggestions will be welcomed by Dr. Boro at SUNY, Stony Brook, and by the Division of Educational Measurement and Research of the Association of American Medical Colleges.

Avery O. DiCotta, Ph.D.
Academic 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 innovation" (1) the performance of a medical system, is of particular concern because it is the major factor in the health care costs. In an era of limited health care resources, the primary responsibility for delivering quality care rests on the medical community. Thus, if the quality of physicians' performance is raised, the general level of medical care can improve.

A strong desire to improve the quality of physicians is evident. Efforts to develop better physicians are reflected in changes in education and admission procedures in medical schools, as changes in content and presentation of medical school curricula. The demand for physicians is increasing, and in new approaches to evaluation of medical training. Physicians are being encouraged to achieve a high level of performance in practicing physicians and to establish a relationship with the physician's patient in self-assessment programs, in continuing medical education programs, and in the development of explicit criteria by which their performance can be evaluated.

Scope of the Study

The purpose of this study in to investigate the dimensions of physician performance, and how these dimensions have been measured. A variety of approaches that have been used to study physician performance have been reviewed and evaluated in the context of current research with respect to specific assessment programs.

The focus is on (a) the individual physician and his patient, not on medical care systems, and (b) the qualitative as well as the quantitative aspects of individual physician performance, practice, and patient care. Thus, a number of topics are outside the scope of this study, including the role of the physician in the health care system, the effects of staff, physical facilities, and formal or contractual arrangements on physicians, and the effects that personal characteristics have on physician performance. The focus of this study is on physician performance, and whether or not specific characteristics affect the physician's performance in a particular task. The conclusions of these studies should not be interpreted as a lack of recognition of their important.

Dimensions of Performance

Two major approaches to the evaluation of performance are the assessment of outcomes as defined by Donaldson (2) and "satisfaction" (2) as defined by Sheats (3) or "satisfaction" as defined by Delbanco (4).

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Study has shown that the physician's concepts with many problems that are not on the same axis and that are not on the same axis that are not on the same axis. Thus, it is necessary to define the terms "basis" and "satisfaction" in terms of those concepts.

Expressed in the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance. Expressions of patient performance can be defined as the range of the patient's performance.
In Canada, Christ (18) applied Peter's methodology for the study of general practitioners in which two physicians shared the responsibility of observing 313 patients. For three days, Chute, however, modified Peter's approach in two respects. First, he allowed the weighting scheme giving equal weight to history taking and physical examination (each record of 30 patients by one nurse) to be used and the second that the number of observations per patient increased.
Chapter 2

Interpersonal Process Approaches

Many workers have described the interaction between the doctor and the patient. Although certain themes have been advanced about what kind of relationship is good in obtaining desired results, few empirical efforts have been made to clarify the nature partiliculalrly of the aspects of the patient-physician (33). In this discussion a brief review of the continuum of sociodiagnostics and psychoanalyses to the understanding of the doctor-patient relationship is followed by examination of what types of emotional barriers or skills are relevant in the relationship and how they have been treated.

Sociodiagnostics

Much of the sociodiagnostic theory has been traced to Hilsch's description of the doctor-patient (D-P) relationship as a social system (34). The sociodiagnostics of interactions between two individuals have been done by Pincus (37) and Brown (38). Following Hilsch's description, the social roles of physician and patient. Pincus specifies the key conditions of the relationship and the rules and studies of the patient derived from her contact of the social role. The more apparent outcome of the physician toward the physician is an "effective security" whereby he is supposed to reflect on this "security" and the patient is supposed as would be the case in the patient-same or a same. In the second model, guidance-confrontation of the doctor guides the patient's behavior and he is supposed to reflect on the same or a same. Differences in the mutual perspectives of the physician and the patient are the treatment; for example, mutual analysis of the emotional climate. Field and his colleagues (39) show that the factor of the D-P relationship may be a significant problem of the D-P relationship and that a physician's abilities to treat the patient change.
A number of devices have been used to estimate the physician–patient encounter in order to assess, train, or teach technical skills. They include patient management problems (PMP) computers, card decks, and audio. The PMP approach is more widely used and developed than the others.

**Patient Management Problems**

A patient management problem concerns a brief clinical description of a patient and his problems. The physician is supposed to study the available information and make diagnostic and therapeutic decisions. As such, it provides the physician with the patient encounter. The Behavioral Analysis of Medical Examinations (BAIME) introduced the PMP approach to test aspects of clinical competence dealing with the ability to identify symptoms and to manage patient problems (24). The test has used a variety of methods, including medical cases, interviews, and learnable skills. Documentation with these methods led to the development of the patient management problems. Prior to the development of the patient management problems, the board, with the assistance of the American Board of Research, used the clinical encounter technique developed by Passages (25) to obtain a definition of clinical competence and skill at the level of the interaction, as the youth physician with his M.D. degree begins to assume independent responsibility for the care of patients (26). Thirty three hundred students of "good" and "poor" were evaluated grouped, and classified into the following three areas: (a) memory (b) physical examination, (c) oral and physical examination, (d) diagnostic reasoning, (e) management, (f) judgment and skill in management. For example, "physician–patient relationship" included "nucciIing rapport with the patient, referring symptoms and improving patient comprehension. The role seen and their understanding became the National Board's definition of clinical competence and "maintained a low-dimensional overview in the question of what to say" (24). Thus, the PMP problems were developed to assess these areas of competence. The following is an example of how the National Board assesses a patient simulation problem (24).

**Patient A**

**General Information**

A 47-year-old man is admitted to the hospital because of pain in his right leg and joint, especially when walking. He has had 20 pounds in weight to the past year during which time he did not feel well. His condition prior to admission he developed

**Physician Performance Evaluation**

The author has proposed a more elaborate method for categorizing the doctor's patient interactions based on the concept of the diagnostic interview. The author has proposed a more elaborate method for categorizing the doctor's patient interactions based on the concept of the diagnostic interview. The author has proposed a more elaborate method for categorizing the doctor's patient interactions based on the concept of the diagnostic interview.
1070 Simulated Process Approaches

The process of developing a computer-based prototype for simulating the National Board's current examination process involves several key steps. First, an extensive literature review is conducted to identify relevant research and best practices in the field of computer-based simulation. This step involves consulting with experts in the field, reviewing existing simulation models, and collecting empirical data to inform the design process.

Next, a detailed analysis of the National Board's current examination process is conducted. This involves interviewing current and former test-takers, as well as examining test materials and performance data. The goal is to gain a thorough understanding of the process and identify areas where improvement is needed.

Based on this analysis, a prototype simulation model is developed. This model is designed to mimic the key features of the National Board's examination process, including the types of questions, the format of the test, and the scoring system. The prototype is then tested with a small group of volunteers to ensure that it accurately reflects the current process.

After further refinement, the prototype simulation model is ready for testing with a broader population of users. This involves gathering feedback from test-takers to identify areas where the model can be improved. The results of this testing are then used to refine the simulation model until it accurately reflects the National Board's current examination process.

Finally, the simulation model is validated using a rigorous validation process. This involves comparing the performance of test-takers on the simulation model with their performance on the actual examination. The results of this validation process are then used to ensure the accuracy and validity of the simulation model.

By following this process, the simulation model can accurately reflect the National Board's examination process and provide valuable insights into areas where improvement is needed. This process also allows for the identification of potential solutions that can be implemented in the future to enhance the effectiveness of the examination process.

Additional research remains to be done in this area.

1070.1 The Test of Diagnostic Skills

Buckley (5) developed the Test of Diagnostic Skills (TDS) to assess clinical reasoning and diagnostic skills in medical students. The TDS consists of multiple choice questions which evaluate the student's ability to diagnose a clinical problem. The test is designed to assess the student's ability to identify the correct diagnosis and to choose the appropriate treatment plan.

The TDS is composed of two parts: Part A consists of 20 multiple choice questions, and Part B consists of 10 clinical vignettes. The students are asked to identify the correct diagnosis for each vignette, as well as the appropriate treatment plan. The test is scored on a 100-point scale, with a score of 70 or above considered to be a passing score.

The TDS is designed to assess clinical reasoning and diagnostic skills in medical students. It is a valuable tool for evaluating the student's ability to diagnose and treat clinical problems, and it can be used to identify areas where improvement is needed. The TDS is also useful for identifying students who may require additional training or remediation in the area of clinical reasoning and diagnostic skills.

However, the TDS has some limitations. It is a multiple choice test, and it may not accurately reflect the complexity of clinical problems. Additionally, the test is designed for use in medical schools, and it may not be applicable to other healthcare professionals.

In conclusion, the Test of Diagnostic Skills is a valuable tool for assessing clinical reasoning and diagnostic skills in medical students. It is an important step in identifying areas where improvement is needed and in preparing students to effectively diagnose and treat clinical problems.

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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 care for his patients. Process measures that focus on the steps or inputs to care are valuable only to the extent that good process care correlates with desired outcomes. Recognizing this, a number of researchers have attempted despite the formidable conceptual and practical difficulties, to extract and use direct measures based on physicians' performance.

Physician Performance Measures

Outcomes based assessment methods have been often focused on inputs and intermediate steps in care, such as prescription or laboratory tests. Such methods can be insensitive to the quality of care because they do not capture the care process. One approach to measurement of patient outcomes is to study the relationship between the physicians' performance and the outcomes of care. In this chapter, we describe a study in which one measure of the physician's technique was used to predict patient outcomes. On the basis of the model, 12 parameters were developed. The task was to divide into two types of outcomes: patient-related and non-patient outcomes. Patient results were not specifically assessed but changes in the patient's status were also significant. Finally, we propose a general model of performance that predicts the outcomes of specific factors, such as physician's knowledge, patient's compliance, and the interactions between the two.

Physician Performance Measures

Outcomes are generally classified into two categories: patient-related and non-patient-related. Patient-related outcomes are those that directly affect the patient's health status, while non-patient-related outcomes are those that are indirectly related to the patient's health. In this study, we have developed a general model of performance that predicts the outcomes of specific factors, such as physician's knowledge, patient's compliance, and the interactions between the two.

Physician Performance Measures

In summary, a general approach to measuring physician performance is presented in this chapter. The approach involves the use of a model to predict patient outcomes based on the physician's performance. The model is developed using a combination of inputs and outputs that are related to the patient's health status. The model is then used to predict the outcomes of specific factors, such as physician's knowledge, patient's compliance, and the interactions between the two.
Medical and laboratory findings have been used to evaluate the problems of premature births and the effects of treatment. The methods that have been employed include x-rays, ultrasonography, and laboratory tests. These methods have been designed to help the clinician determine the cause of the premature birth and to assess the progress of the pregnancy. The methods have also been used to evaluate the effects of treatment on the mother and the baby.

The patient's medical history is reviewed to determine the presence of any known risk factors for premature birth. This may include a history of premature births in the family, maternal smoking, and maternal illness. The patient's current medical status is also assessed to determine if there are any medical conditions that may increase the risk of premature birth.

Laboratory tests are used to evaluate the patient's general health and to assess the maturity of the fetus. These tests may include a complete blood count, a urinalysis, and a serum electrolyte panel. The results of these tests are used to determine if the patient is at risk for premature birth and to assess the effectiveness of treatment.

The patient's diet is reviewed to determine if it is adequate for the needs of the fetus. The patient is also asked about any substances that may be harmful to the fetus, such as alcohol and tobacco.

The patient's mental and emotional status is also assessed to determine if they are at risk for premature birth. This may include a history of depression, anxiety, or stress.

The patient's social history is reviewed to determine if there are any factors that may increase the risk of premature birth. This may include a history of drug or alcohol abuse, and a history of smoking.

The patient's obstetric history is reviewed to determine if there are any factors that may increase the risk of premature birth. This may include a history of previous premature births, and a history of miscarriage.

The patient's physical examination is used to assess the progress of the pregnancy. This may include a vaginal examination, a rectal examination, and a breast examination.

The patient's ω-3 supplement therapy is used to assess the growth and development of the fetus. This may include a measurement of the fetal head circumference, and a measurement of the femur length.

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Chapter 5

Qualities Approach

Pron and his associates at the University of Utah have developed an approach to measure physician performance which focuses on discovering the qualities or attributes of a good physician. Prone (10) explains that many different aspects of quality are associated with a superior physician, including: traditional, social, some related to personality and character, some having to do with training or education, some related to achievements, some related to other people or actual performance.

In order to examine the qualities of superior physicians, pron's studies were done initially, about 600,000 samples of physician and objective information. The physician was tested for nearly 80 qualities. (11) Factor analysis was used to reduce the mass of variables to 80 criteria. The approach provided the basis for ranking the qualities.

In the third study (8), more than 300 physicians were tested and asked to respond to the questions, "With regard to your field of specialty, what do you consider to be the basic features of an expert?" The list of qualities associated with the physician was given to a large group of heterogeneous people to modify. The purpose of the fourth study (8) was to determine to what degree the "qualities"

Mold (8) has all used some type of structured interview to ask members from top and middle-level staff to express expectations and dissatisfaction with their work. One problem with these studies is that they do not provide information on top-level physician performance. In order to

It is too difficult to test the many variables associated with physician performance. The approach described above is a product of the combination of objective analysis of the composition of actual people with the overall methods to establish a complete presentation of the qualities of people who work in the same hospital. The approach described above is a product of the combination of objective analysis of the composition of actual people with the overall methods to establish a complete presentation of the qualities of people who work in the same hospital. The approach described above is a product of the combination of objective analysis of the composition of actual people with the overall methods to establish a complete presentation of the qualities of people who work in the same hospital. 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The approach described above is a product of the combination of客观评估的上乘的分析。
Physical Performance Measurements

There appears to be a definite inverse relationship between the quality of a measurement method and the ease of ensuring its adoption. The methods that are most practical to use on a large scale, such as questionnaires and the taking of an x-ray, are generally much less accurate and may involve serious errors. Monitoring methods that are most practical for the use of a large population, such as questionnaires and the taking of an x-ray, are generally more accurate and may involve less errors. Monitoring the methods that are most practical for the use of a large scale, such as questionnaires and the taking of an x-ray, are generally more accurate and may involve less errors.

References

Individual Physician Profile Continuing Education Related to Medical Practice

Bassett & Swanson, M.D., Thomas C. Meyer, M.D., Richard Husman, and Adele Schoenberger

Abstract—Planning for continuing medical education involves many variables. The Individual Physician Profile is a method of bringing these variables into focus. Problems patients bring to a physician are modified; the physician is amused at those problems and, with additional personal information, concludes them in a tailor-made educational program. To exploit this method, it was necessary to develop computerized techniques for storage and retrieval of patient data, relevant test questions, and learning resources. The Individual Physician Profile permits better presentation of a busy physician's load and energy for education in most needs of his practice. It points to the need for a new area in continuing medical education: an educational counseling service (consultants) for the physician.

A major problem for a physician is the need for planning continuing medical education as the need for the knowledge and skills necessary to meet the needs of the patient evolves. The facility of the United States Department of Post-graduate Medical Education identified the following factors as being significant in dealing with this dilemma: problems patients bring to their physicians, generation of the same community setting, and the patient's personal likes and dislikes relating to his practice and his education.

The research reported here was supported by National Institute of Health contract number 50-44-5 and by the W. A. Stickney Foundation. The authors acknowledge the assistance of the research assistant, the research nurse, and the research technician in the study. The data collection was performed by the author and his associates in the continuing medical education program in the Office of the Division of Continuing Medical Education. All work is the responsibility of the author.

Physician Profile

The Individual Physician Profile is a three-step process: patient profile, consultation, and educational consultation and design of a continuing medical education program.

Profile—The profile is obtained by allowing the physician a small tape recorder on which he records, one difference each week for four weeks, the age and sex of every patient encountered in the office, in a hospital on the surgical ward and at home, presenting complaints, significant findings, major diagnoses (patient problems), contraindicating diagnoses (other patient problems), tests, and disposition. The tape is then transcribed and the diagnosis recorded in the categories of the International Classification of Diseases, Adapted (ICDA). The classification contains 17 categories and a supplementary classification called "Special Conditions and Examination without Procedure" which is arbitrarily called category "C." The numbers of diagnoses in the categories form a practice profile, that is, a histogram such as that shown in Figure 1, which is a "typical profile of a family practitioner in Wisconsin." That practice profile varies in shape in Figure 2, which reflects another family practice profile.

Consultation—The physician is issued with 123 questions obtained from a large number of questionnaires used in the computer. These questions have been cross-classified in the ICDA. For example, if he sees a large number of diabetes problems, he will receive a greater number of questions on diabetes. The complexity of the questions, however, varies with the number of questions. The test takes approximately two hours to complete.

Evaluation—In order to design an appropriate educational program an educational consultant who is a member of the medical school faculty meets with the physician and together they study the practice profile and the test results and other information obtained by asking the participant questions of a general and personal nature. The general questions refer to his age, practice setting, previous education, hospital affiliation, special facilities available, etc., in the hospital system educational programs available and used, and amount of time he can have his practice for continuing medical education. The personal questions refer to how he feels about characteristics of the people and community he serves, delegation of tasks to support personnel education of his present patients' patient problems and practice problems among him personal choices, and the part of his practice he is open to.

Resources necessary for implementation of this method were a computerized test bank and a computerized educational resource index. Computerization techniques were necessary to commit storage of a large number of questionnaires and educational programs, rapid retrieval of specific questions, and administration of the relevant content educational program which would be recommended for each participant.

Test Bank

In the initial stages of the program, a large number of questionnaires were obtained from a variety of sources, including U.S. government files, the medical school, the Ohio Academy of General Practice and the Commonwealth academy various self-assessment tests, and the Professional Examiners Service of New York City. Initially it was suspected that practicing physicians would would the appropriate relationship of many questions to their practice. This was soon confirmed by asking the resident physicians to state whether in their opinion, each question in his examination was relevant or not relevant to his practice. The result was that an average of 33 percent of the questions in each examination were judged to be unacceptable. It was neces-
The testing procedure, as described in the original text, involved asking identification numbers and questions to patients who were seated in a room and then asking them to recall and report their answers. This task was conducted in a manner similar to that described in a previous study. The results of this study are consistent with those of the previous study and suggest that the procedure is an effective method of eliciting responses. The authors concluded that the procedure is a reliable and valid method of assessing recall and memory. The results are consistent with those of previous studies and support the use of this procedure in clinical settings.
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 allegiance, I should add, occurred during a transient period of platonizations unexpectedly engendered by the distensions of some old and treasured friends who were responsible for the program. Once we had parted company my strength of spirit and firmness of mind were restored and I retracted into my sprightly sanctuary of fruitchasing negativism 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 this otherwise but valuable opportunity to give an overview of where we seem 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

The paper was prepared for delivery at the November 4, 1972, annual meeting of the A.A.M.C. Annual Meeting in Miami Beach, Florida. Dr. Bennett is director of the New York University Medical Center.
The Continuum of Medical Education

In the same vein, recent years have seen a notable increase in the number of medical schools computerized programs, which offer a variety of educational options and opportunities. These programs allow students to tailor their educational experiences to their individual needs and interests, thereby enhancing the flexibility and adaptability of medical education. In this context, the emphasis is on fostering a personalized educational experience that empowers students to achieve their full potential.

In conclusion, the evolution of medical education has been marked by a continuous process of adaptation and innovation. As the field continues to evolve, it is essential that medical educators remain vigilant in identifying and addressing the challenges that arise in the ever-changing landscape of medical education. This will ensure that the next generation of physicians is well-equipped to meet the demands of the future.
past experience gives evidence of a moderate emotional ability to some how be used by exposure to the medical school curriculum. A third quality is the empathy for hard work including physical contact and sometimes emotional labor. To be a doctor means to have some form of system for diagnosing and approaching the illness. It is not unusual for this role to become the defining feature of who one is. A fourth is the ability to remember the procedures and to recall the names of specific diseases. To be a doctor means to have a compromise between the emotional and the practical aspect of medicine. To be successful in this role one must have a balance between the two.

In his essay on the qualities of medical education, Benner argues that the goal of medical education is to create doctors who are able to make ethical decisions and to live up to the expectations of the public. The goals of medical education include the development of critical thinking skills, the ability to communicate effectively, and the capacity to work in a team. The essay is written in a conversational style and is intended to be a guide for medical students. The essay also includes a discussion of the role of the medical student in the community and the importance of community service.

In the essay, Benner argues that medical education is a complex and dynamic process. He suggests that medical students need to develop a sense of responsibility and a commitment to the needs of the community. He also argues that medical education should be a continuous process, and that medical students should be encouraged to continue their learning throughout their careers.

The essay is written in a clear and concise style, and is suitable for medical students, medical educators, and the general public. The essay is a valuable resource for those interested in the future of medical education and the role of the doctor in society.

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Toward a Continuum in Medical Education

Thomas L. Meyer, M.D.

Medical education is a continuum beginning with prenatal training and ending with death. One portion of the continuum that is of particular interest is the period during which the continuity of flow of medical information is most uncertain. This is when the essentials of the care of the newborn are learned and when the need for a greater understanding of these essentials begins. The challenge is to provide medical education that is meaningful and relevant to the needs of the future physician.

During the world wars and the threat of nuclear war, medical schools made a significant effort to improve the quality of medical education. One of the major changes was the introduction of new curricula that focused on the needs of the patient rather than on the needs of the teacher. But even today, medical education is still in the process of being restructured. The goal is to provide a curriculum that is relevant to the needs of the patient and that prepares the physician to provide the best possible care.
ILLUSTRATION

Figure 3

Figure 4

Discussion

These data indicate that a continuing education program based on formalized courses of instruction can influence medical practice. Although some of the effects may appear to only the acceleration of pre-existing trends seen in the composite data, it appears that physicians who attend formalized lectures and clinical conferences can be effective learning methods.

The utilization of formalized courses has made it possible to incorporate those educational techniques related to the interpretation, correlation, and integration of information. The strengthening of the Mids Memorial Hospital staff and the enthusiasm and the teaching skills of the standard faculty undoubtedly have been several factors in the program's progress. The Bank of Medical School plant program is ongoing experience. During the

Further prototypes were performed per month in the hospital laboratory before and after a lecture which emphasized the importance of this test.

Figure 5

Figure 6

During lectures given on September 4 and 11, 1970, the importance of obtaining a lung scan was emphasized at the end of the lecture for pulmonary embolism. During the previous 18 months, the average number of lung scans per month was 14.4 (S.D. ± 4.7), this number increased during the subsequent 18 months to 36 (S.D. ± 3.9), p < .001 (Figure 7). A unique opportunity permitted itself in February 1971 when an article by Scoville and his colleagues (2) appeared in the Anaesthesia, and Medicine, showing the extreme diagnostic accuracy of combining the results of lung scan with arterial oxygen tension in excluding the presence of pulmonary embolism. This report made it possible to see the influence of a journal report on clinical practice at Mids Memorial Hospital and also the effect of lectures on a similar group of the medical staff. From November 1 to 3, 1971, 11 physicians from Mids Memorial Hospital attended a one-week refresher course on the latest modifications of innovative techniques in the sense of the results of the Scoville's paper on equlmination.

During the eight months between the appearance of the refresher course in the literature and the same period of time, there were only three instances in which patients at Mids Memorial Hospital had a lung scan and arterial oxygen measurement done on the same day. 1971, the number of serum creatinine determinations as a normal test of renal function was decreased. The average number of serum creatinine determinations done per month, during the nine months prior to this lecture was 114 (S.D. ± 19.8). This number increased during the lecture.
Section IV

Continuing Medical Education

Contributors: Anne F. Crowley, Ph.D., Charlotte Hartman Betz, M.D., Howard MD, Leroy L. Lowne, M.D., Clark W. Nguyen

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 in 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. Among 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 recognizing the need and desirability of documenting physician participation in continuing medical education programs in their particular specialty.

5. Medical specialty societies are continuing to expand the availability and scope of their self-assessment 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 Section. It was noted that 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. These state associations that now have adopted these kinds of resolutions are:

- Alabama
- New Jersey
- Arizona
- North Carolina
- Florida
- Oregon
- Kansas
- Pennsylvania
- Massachusetts
- Vermont
- Minnesota

Additional indicate state associations that have adopted resolutions since 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 participation in continuing medical education as a condition of membership. These specialty societies are the American Academy of Family Physicians and the American 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 indicated that all 1972 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 renewal of the license to practice medicine in their state. These 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 Qualifying for PRA</th>
<th>No. Physicians Holding PRA</th>
<th>Approval Year</th>
<th>PRA Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>15,000</td>
<td>25,000</td>
<td>1972</td>
<td>PRA Status</td>
</tr>
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<td>11,000</td>
<td>20,000</td>
<td>1971</td>
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<td>15,000</td>
<td>1970</td>
<td>PRA Status</td>
</tr>
<tr>
<td>1972</td>
<td>9,000</td>
<td>10,000</td>
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Medical Education 63

PRA Status: A summary of the 1972 survey on continuing medical education was reported in last year’s Education Section. It was noted that 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. These state associations that now have adopted these kinds of resolutions are:

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</tr>
<tr>
<td>1972</td>
<td>9,000</td>
<td>10,000</td>
<td>1969</td>
<td>PRA Status</td>
</tr>
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</table>
Physician, "published as a supplement to JAMA in August, September, and October, 1974, for accredited organizations and the planned program is accepted on an hour-for-hour basis by the AMA-PIA in Category 1.

Many fine, planned programs are not accredited by the AMA and yet these are included in the planning development, administration, and evaluation of the program must meet the same standards. The advantage of these programs is that they are not under the restrictive guidelines and are not required to be submitted to the AMA for approval.

New Programs Are Accepted for Credit Toward the PIA

It is important to recognize that in Category 1, these programs are not accredited by the American Medical Association, nor do they have to be submitted to the AMA for approval. The only requirement is that the program must meet the standards set forth in the Planning Development, Administration, and Evaluation of the Program, and must not have any specific requirements that are not met.

How Continuing Medical Education Activities Are Reported

Educational organizations, either accredited or nonaccredited, are required to report physician participation in their continuing medical education activities to the AMA. The statement of the physician on his application form for PIAs is accepted as certification of the validity of the program and the physician's participation in the program. For this reason, it is important to record the number of hours, location, and dates for the program accurately. It is important that the physician identify the accredited sponsor or co-sponsor in the application for PIA.

The Physician's Recognition Award Computer-Tabulated Information Service (PRACS)

It is becoming apparent that the new data system to automate the performance of continuing medical education activities is the AMA. This system, called the Physician's Recognition Award (PRACS), is designed to facilitate the reporting of physician participation in continuing medical education activities. The PRACS system is designed to provide a means for physicians to participate in continuing medical education activities and to receive credit for their participation. The system is based on the philosophy that physicians should be responsible for their own professional development and should be encouraged to participate in continuing medical education activities.

Organizations concerned with the production and distribution of audiovisual materials are encouraged to participate in continuing medical education activities. The Audiovisual Education Council has established a list of approved programs, which are reviewed periodically by the AMA. These programs must meet the standards set forth in the Planning Development, Administration, and Evaluation of the Program.

The Continuing Medical Education activity is acceptable for credit toward the AMA-PIA if it is approved by the AMA Council on the basis of its educational value and appropriateness for its audience.

Table 2: Gradable Continuing Medical Education Programs

<table>
<thead>
<tr>
<th>Category</th>
<th>Date of Accreditation</th>
<th>Number of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>July 1, 1971</td>
<td>150 credits</td>
</tr>
<tr>
<td>Category 2</td>
<td>January 1, 1974</td>
<td>45 credits</td>
</tr>
<tr>
<td>Category 3</td>
<td>February 1, 1974</td>
<td>30 credits</td>
</tr>
</tbody>
</table>

The Continuing Medical Education activity is acceptable for credit toward the AMA-PIA if it is approved by the AMA Council on the basis of its educational value and appropriateness for its audience. The program must meet the standards set forth in the Planning Development, Administration, and Evaluation of the Program.

The Continuing Medical Education activity is acceptable for credit toward the AMA-PIA if it is approved by the AMA Council on the basis of its educational value and appropriateness for its audience.
The supplement comprised information supplied voluntarily by the interested institutions, on questionnaires provided for the purpose. In June 1973, the recommendation of the Advisory Committee on Continuing Medical Education took action whereby, beginning with the 1973 course listing, the only courses listed were those offered by institutions and organizations that have been surveyed and accredited for their continuing medical education programs. The Council took the action in response to a request made by all institutions and organizations with national or regional membership which were offering courses in continuing medical education that have had an opportunity to seek accreditation.

The single annual list has several advantages. It permits the individual physician to plan his personal course of study for an entire year in advance, giving him the time and place to plan a full program to practice. In addition, it encourages all institutions that offer continuing medical education courses to publicize their courses, making them known to those interested in attending them. There is also the likelihood that by arranging the courses in one list in a meaningful way, interest can be shared, and greater emphasis can be given to those courses which might be of particular interest to the practicing physician.

As was noted before, this list is based on courses which have been surveyed and accredited for their continuing medical education programs. It does not include courses which have not yet been surveyed and accredited. The number of accredited courses is expected to continue to increase steadily in the future.

Type and Duration of Courses

For many years, courses have been classified according to their number of contact hours. Occasionally, the courses are of such length that they cannot be conveniently classified in terms of hours. In these cases, the courses are presented in the list of accredited courses by the type of continuing medical education approved by the Council on Medical Education of the American Medical Association. The type of continuing medical education approved by the Council on Medical Education includes courses of the following types:

1. Group Study
2. Individual Study
3. Conferences

For the present, courses are listed in the following categories:

1. Group Study
2. Individual Study
3. Conferences

In addition, courses are listed according to the number of contact hours. The number of contact hours is determined by multiplying the number of hours of instruction by the number of hours of attendance. The total number of contact hours is divided by 4, which gives the number of contact hours per week. The number of contact hours per week is multiplied by the number of weeks of instruction to give the total number of contact hours. The total number of contact hours is then divided by 100 to give the number of contact hours per day. The number of contact hours per day is then divided by the number of days of instruction to give the number of contact hours per hour.

Table 3 - Continuing Medical Education Courses Listed 1961-1962 to 1973-1974

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Courses</th>
<th>No. of Courses Accredited</th>
<th>No. of Courses Surveyed</th>
<th>No. of Courses Offered</th>
<th>No. of Courses Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961-1962</td>
<td>3,061</td>
<td>2,996</td>
<td>2,995</td>
<td>2,995</td>
<td>2,995</td>
</tr>
<tr>
<td>1968-1969</td>
<td>3,791</td>
<td>3,733</td>
<td>3,733</td>
<td>3,733</td>
<td>3,733</td>
</tr>
<tr>
<td>1971-1972</td>
<td>4,093</td>
<td>4,036</td>
<td>4,036</td>
<td>4,036</td>
<td>4,036</td>
</tr>
<tr>
<td>1972-1973</td>
<td>4,187</td>
<td>4,130</td>
<td>4,130</td>
<td>4,130</td>
<td>4,130</td>
</tr>
<tr>
<td>1973-1974</td>
<td>4,281</td>
<td>4,225</td>
<td>4,225</td>
<td>4,225</td>
<td>4,225</td>
</tr>
</tbody>
</table>

Table 3 includes only those courses which were reported in the JAMA Supplement, January 1975, Vol. 231. Medical Education.

Table 4 - Number of Continuing Medical Education Courses Offered by Year and Type

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Courses Offered</th>
<th>Medical Education</th>
<th>Non-Medical Education</th>
<th>Other Than Medical Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961-1962</td>
<td>2,996</td>
<td>2,996</td>
<td>2,996</td>
<td>2,996</td>
</tr>
<tr>
<td>1963-1964</td>
<td>3,261</td>
<td>3,261</td>
<td>3,261</td>
<td>3,261</td>
</tr>
<tr>
<td>1967-1968</td>
<td>3,639</td>
<td>3,639</td>
<td>3,639</td>
<td>3,639</td>
</tr>
<tr>
<td>1968-1969</td>
<td>3,733</td>
<td>3,733</td>
<td>3,733</td>
<td>3,733</td>
</tr>
<tr>
<td>1971-1972</td>
<td>4,036</td>
<td>4,036</td>
<td>4,036</td>
<td>4,036</td>
</tr>
<tr>
<td>1972-1973</td>
<td>4,130</td>
<td>4,130</td>
<td>4,130</td>
<td>4,130</td>
</tr>
<tr>
<td>1973-1974</td>
<td>4,225</td>
<td>4,225</td>
<td>4,225</td>
<td>4,225</td>
</tr>
</tbody>
</table>

Table 4 includes only those courses which were reported in the JAMA Supplement, January 1975, Vol. 231. 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, 45% of all courses listed are open to both specialists and generalists, compared with 44% in 1973-1974 and the same percent in 1971-1972. In 1971-1972, 16% of all courses were open to both specialists and generalists, compared with 19% in 1970-1971 and 17% in 1969-1970. For 1968-1969 and only 11%, in 1966-1967, the percentage is even higher for courses offered by medical schools, with 63% of medical schools’ courses designed for both specialists and generalists in general or partial specialty practice.

Examination of the principle most of course be made for the technical courses that require that physician participants already have competence in a specialty to benefit from the course offerings. Only 5% of all courses offered are listed in specialty categories and only 20% of courses offered by medical schools are so classified.

The second noted last year toward smaller class size in continuing education courses is also noted for the courses listed for 1974-1975. Twenty-five percent of the courses offered are listed as having restricted class enrollments of 15 students or less, as compared with 16% in 1973-1974, 14% in 1972-1973, 13% in 1971-1972, and 2% in 1969-1970. Continuous limitation was not stipulated for 45% of the courses, as compared with 41% last year. Psychology is again the exception with 51% of the psychology courses are limited to enrollments of 10 or more students or less whereas 26% of the other courses are limited in enrollment to 10 or more students or less.

Review of Continuing Education Activity for 1973-1974

Institutions that provided information for the 1974-1975 course list were asked at the same time to report their activities for the year 1973-1974 and to provide figures for the actual number of registrations, number of courses, and total number of instruction offered. The data described in the tables from the survey were requested in an attempt to reflect the actual performance during the fiscal year 1973-1974 to the course offerings that were projected for that year in advance of the actual course being taught. The results are shown in Table 8 for those institutions that returned the information sheet. It will be noted that more institutions actually projected 1974 courses during that year whereas the actual number listed in the annual course listing indicated that this information sheet may not have full validity because of the relatively low number of respondents who reported courses.

Physician registrations for the year 1973-1974 for the eight-year time period from 1966 to 1974 of continuing education courses reported by American Medical Schools 1966-1974 are shown in Table 9. It is to be noted that the accuracy of these figures is open to question. The number of institutions that actually reported registrations for continuing education courses has been very uneven over the years. Registrations for radio and television courses are included in the total figure, whereas other courses have separate such registrations. In order to present relatively comparable figures the registration for radio and television courses is included in the total figure for each year as seen in Table 9.

Prevalently most cancellations were due to insufficient registrations, although this is possible that other administrative or faculty problems contributed to the cancellations.

There is an error in the number of voluntary health agencies responding, and the total number of courses they estimated they offered was slightly lower. The total number of physician registrations is higher than that reported in 1971-1972. Registrations for the category “other” also increased.

Attendance figures for 1976-1977

Reports from the medical schools in the annual Board of Education Quinquennial show an increase in attendance figures during 1976-1977. Fifty medical schools reported a total of 554,829 registrations in all continuing education courses for physicians.

It should be noted that the participation and accuracy of reporting on registrations for continuing education courses has been very uneven over the years. Registrations for radio and television courses are excluded in the total figure, whereas other courses have separate such registrations. In order to present relatively comparable figures the registration for radio and television courses is included in the total figure for each year as seen in Table 9.

Table 9 — Registrations for Continuing Education Courses by American Medical Schools 1966-1974

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Enrollments</th>
<th>No. Schools Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>50,102</td>
<td>143</td>
</tr>
<tr>
<td>1967</td>
<td>48,984</td>
<td>156</td>
</tr>
<tr>
<td>1968</td>
<td>44,591</td>
<td>150</td>
</tr>
<tr>
<td>1969</td>
<td>47,234</td>
<td>154</td>
</tr>
<tr>
<td>1970</td>
<td>54,479</td>
<td>156</td>
</tr>
<tr>
<td>1971</td>
<td>55,355</td>
<td>156</td>
</tr>
<tr>
<td>1972</td>
<td>57,109</td>
<td>156</td>
</tr>
<tr>
<td>1973</td>
<td>59,368</td>
<td>156</td>
</tr>
</tbody>
</table>

All recent cancellations were due to insufficient registrations, although it is possible that other administrative or faculty problems contributed to the cancellations.

Table 8 — Report of Activity in Continuing Medical Education for the Year 1972-1973

<table>
<thead>
<tr>
<th>Type of Activity</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>30,000</td>
<td>30%</td>
</tr>
<tr>
<td>Seminars</td>
<td>10,000</td>
<td>10%</td>
</tr>
<tr>
<td>Workshops</td>
<td>5,000</td>
<td>5%</td>
</tr>
<tr>
<td>Refresher Courses</td>
<td>2,000</td>
<td>2%</td>
</tr>
<tr>
<td>Specialized Courses</td>
<td>1,000</td>
<td>1%</td>
</tr>
</tbody>
</table>

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 rather striking that only 1% of a total of 58,417 reported courses were actually canceled after origination scheduling. This is about 5% of the total number of courses, and the number of courses canceled was small. Although 2% of the total courses were canceled, the number of courses that were canceled was relatively small, as might be expected with the large number of physicians who are more interested in planning a course at least a year in advance of its offering.
To obtain some estimate of potential need for channel time for one area of medical education, a hypothetical scenario for a continuing medical education system was developed. This scenario assumes that all organizations representing specialties, medical education and hospitals agreed that a unified national system would be acceptable and effective. This system is described schematically in the following figure and narrative. The system as described is hypothetical in nature, while specific organizations are practicing in operation.

Appendix 4
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. Joseph, M.D., Professor and Chairman of Surgery

The Indiana University School of Medicine Library 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. Gelassen, 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 Lemke, 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 Cocks, M.D.
Chief, Plastic Surgery
Wieland Memorial Hospital Indianapolis and Associate Professor Surgery, IU School of Medicine

WAT 21 MEDICAL TELEVISION

Program Schedule
For Sept. 13 — Oct. 8 1976

Panel 7 - Appendix

WAT 21 Statiion Manager, University Hospital A118 IU School of Medicine, 1100 W Michigan St Indianapolis 48202

Grand Rounds in Surgery is a television presentation of the Medical Educational Resources Program of the Indiana University School of Medicine.
INDEX

Hours of operation and program information ................................................................. 3
Postgraduate credit for viewing CME programs ............................................................... 4-5
Program listings .................................................................................................................... 6-13
List of network hospitals ...................................................................................................... 14
Upcoming programs .............................................................................................................. 15
WAT 21 viewing areas .......................................................................................................... 16

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 South Bend and Kokomo
       hospitals from 8-10 p.m
       Bloomington Lafayette, Muncie and Vincennes hospitals
       from 9-10 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

A7-37
Continuing Medical Education for Indiana's

MEDICAL TELEVISION

WEEK OF SEPTEMBER 20
MONDAY—WEDNESDAY—FRIDAY
12:00 a.m. LEADERS IN AMERICAN MEDICINE JOSPEH T WEISKRIG M.D.
6:00 p.m. BLOOD ADMINISTRATION (C)
10:52 a.m. ACUTE EXTREMITY ARTERIAL OCCLUSION WITH DELAYED THROMBECTOMY (C)
5:52 p.m. ENDOGRAPHY (C)
11:22 a.m. ENTERIC PERITONEAL DISEASES (C)
7:22 p.m. TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLI CATION (C)
12 Noon THE RIGHT TO LET DIE (C)
4:00 p.m. BLOOD ADMINISTRATION (C)
12:10 p.m. WHO SHOULD SURVIVE? (C)
5:10 p.m. SMALL AIRWAY DISEASE (C)
10:09 p.m. BACCHUS (GENERAL) (Patient Education) (C)

11:00 p.m. BACCHUS (GENERAL) (Patient Education) (C)

WEEK OF SEPTEMBER 21
TUESDAY—THURSDAY
10:00 a.m. LEADERS IN AMERICAN MEDICINE MARY NORMAN (C)
6:00 p.m. BLOOD ADMINISTRATION (C)
10:52 a.m. ACUTE EXTREMITY ARTERIAL OCCLUSION WITH DELAYED THROMBECTOMY (C)
5:52 p.m. ENDOGRAPHY (C)
11:22 a.m. ENTERIC PERITONEAL DISEASES (C)
7:22 p.m. TOTAL PARENTERAL NUTRITION CURRENT CLINICAL APPLI CATION (C)
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11:00 p.m. BACCHUS (GENERAL) (Patient Education) (C)

Continuing Medical Education for Indiana's
WAT 21

VIEWING AREA

WEEK OF OCTOBER 4
MONDAY — WEDNESDAY — FRIDAY

10:00 a.m. 10:15 a.m. 10:30 a.m.
LEADERS IN AMERICAN MEDICINE, KARL F. MEYER (C)

12:15 p.m. 12:30 p.m.
TECHNIQUES OF ARTERIAL BLOOD SAMPLING IN THE NEWS (C)

12:45 p.m. 1:00 p.m.
THE ARGINIA PATIENT MAINTAINING OPTIMAL FUNCTION

1:15 p.m. 1:30 p.m.
KIDNEYS IN SICKLED SCIENCE (C)

1:45 p.m. 2:00 p.m.
THE ARGINTA PATIENT MAINTAINING OPTIMAL FUNCTION

2:15 p.m. 2:30 p.m.
ACUTE HEART FAILURE (C)

2:45 p.m. 3:00 p.m.
BONE MARROW DISEASE (C)

3:15 p.m. 3:30 p.m.
ACUTE HEART FAILURE (C)

3:45 p.m. 4:00 p.m.
ADVANCED MEDICAL CARE (C)

4:15 p.m. 4:30 p.m.
ACUTE HEART FAILURE (C)

4:45 p.m. 5:00 p.m.
BONE MARROW DISEASE (C)

5:15 p.m. 5:30 p.m.
ACUTE HEART FAILURE (C)

5:45 p.m. 6:00 p.m.
ADVANCED MEDICAL CARE (C)

6:15 p.m. 6:30 p.m.
ACUTE HEART FAILURE (C)

6:45 p.m. 7:00 p.m.
BONE MARROW DISEASE (C)

7:15 p.m. 7:30 p.m.
ACUTE HEART FAILURE (C)

7:45 p.m. 8:00 p.m.
ADVANCED MEDICAL CARE (C)

Continuing Medical Education for Indiana's

Physicians and Allied Health Professionals

WAT 21

VIEWING AREA

WEEK OF SEPTEMBER 27
MONDAY — WEDNESDAY — FRIDAY

10:00 a.m. 10:15 a.m. 10:30 a.m.
LEADERS IN AMERICAN MEDICINE, MARTIN B. CUMMINGS, M.D.

12:15 p.m. 12:30 p.m.
TECHNIQUES OF ARTERIAL BLOOD SAMPLING IN THE NEWS (C)

12:45 p.m. 1:00 p.m.
THE ARGINTA PATIENT MAINTAINING OPTIMAL FUNCTION

1:15 p.m. 1:30 p.m.
KIDNEYS IN SICKLED SCIENCE (C)

1:45 p.m. 2:00 p.m.
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4:45 p.m. 5:00 p.m.
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ACUTE HEART FAILURE (C)

5:45 p.m. 6:00 p.m.
ADVANCED MEDICAL CARE (C)

6:15 p.m. 6:30 p.m.
ACUTE HEART FAILURE (C)

6:45 p.m. 7:00 p.m.
BONE MARROW DISEASE (C)

7:15 p.m. 7:30 p.m.
ACUTE HEART FAILURE (C)

7:45 p.m. 8:00 p.m.
ADVANCED MEDICAL CARE (C)

Continuing Medical Education for Indiana's

Physicians and Allied Health Professionals

MEDICAL TELEVISION

WEEK OF SEPTEMBER 27
TUESDAY — THURSDAY

10:00 a.m. 10:15 a.m. 10:30 a.m.
LEADERS IN AMERICAN MEDICINE, KARL F. MEYER (C)

12:15 p.m. 12:30 p.m.
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Continuing Medical Education for Indiana's

Physicians and Allied Health Professionals

MEDICAL TELEVISION

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ACUTE HEART FAILURE (C)

7:45 p.m. 8:00 p.m.
ADVANCED MEDICAL CARE (C)

Continuing Medical Education for Indiana's

Physicians and Allied Health Professionals

A7-39
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 free 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 F. Doi, 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 10 Retinal Detachment
Eugene Helveston, M.D.
Professor of Ophthalmology
Indiana University School of Medicine

Reprints of articles related to the topics presented on both “Grand Rounds” and “Today’s Medicine” are available at no cost, as a courtesy of the IU School of Medicine Library. Requests for articles and the year’s complete schedule of programs should be addressed to the WAT 21 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.
PANEL 7

**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 (KG)

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. HRD- CBP
7. Communications for Social Needs: Technological Opportunities. NASA, Dr. Richard B. Marsten, Study Manager
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:

VPTC
4/12/86
Public Television Networking

All RTV Entities (3-6 sites)

Video Site Monitoring (Only where feasibly extendible)

Environmental Agencies (Smoke Abatement, etc.)
Highway Department (Traffic Flow)
Forestry (Fire Monitoring)
Engineering and Buildings (Construction status compilations on VTR)

Slow-Speed Data

Virtually all agencies and institutions having field offices, installations or activities

ABP (Acting for other agencies and institutions)

Alert and Alarm Signaling (Separate from CCO System)

State Police
Office of Emergency Services (Civil Defense)
Highway Department (Traffic Interruptions)

Emergency Voice Networking (Separate from CCO System)

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 detectors, etc)

Highway Department (Traffic Flow)

Forestry (Fire Monitoring)

Virtually all "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 facility, Employment Office, Public Telecommunications Entity*, public radio station**, 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, broadcast 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 52 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 facility, 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 facility could be employed to receive, send and relay duplicated video (intermitted), 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 equipment could be employed to receive, send and relay duplicated 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

**NTP 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 Teletype writers)
- Alarm Mechanisms
- Telemeters and/or signal recorders
- Servo Control Mechanisms

**Consulting Origination Systems would include**

- Video Cameras and Mics
- Audio-video recorders/playback machines
- Microphones and Audio Processors/Atvs
- Audio recorder/playback machines and Tape Change Devices
- Facsimile Encoders (Micro-form and other)
- Teletype writers
- Keypunchers and Readers
- Cathode-ray writers and similar electro-optical device systems
- Data recorders/playback machines
- Environmental Sensors and Meters (Heat, Light, Chemical, etc.)
- Stress and pressure monitors 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 workday.

(b) 2 hours of broadband single-channel service between 5 p.m. and 11 p.m. each weeknight.

(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 telemetryed 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, to the extent that, CCO-supplied circuits or conventional microwave or radio links are unavailable, more expensive, significantly less reliable, or technically inferior.

---

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 service 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 effected by having the entities incorporate with the VPIC (acting on behalf of the Commonwealth government) as in AVNO 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.
Possible additional **Highway 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 - Coochland 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 expeditious 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) VTP at Richmond interconnected through satellite to comparable State BTAs elsewhere (but especially in the East) and BTAs at Norfolk, Roanoke and Fairfax (4 BTAs)

(b) BTAs at Harrisonburg and Wise (2 BTAs)

(c) BTAs at Danville, Fredericksburg, Wallops Island, Williamsburg, Farmville, Abingdon, and Charlottesville (7 BTAs)

(d) BTAs at Franklin, Warsaw, Petersburg, Albemarle, Middlesex, Lexington, and Wytheville (7 BTAs)

(e) BTAs at Clifton Forge, Lynchburg, Richlands, Martinsville, Blacksburg, Newport News, and Lassburg (4-7 BTAs)

(f) BTAs at Keysville*, Waynes Cave*, Dublin* and Edina* (up to 4 BTAs)

(g) BTAs at Greensville County, Halifax County, Lee County, Highland County, Louisa County, Culpeper County, Crayson County, Lancaster-Northumberland Counties (6 BTAs)

(h) Other BTAs as required (up to 44 BTAs)

*Engineering studies might obviate need for these BTAs 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

University of Virginia

University of Virginia Hospital

Central Virginia ETV Corporation

Shenandoah Valley ETV Corporation

Blue Ridge ETV Association, Incorporated

Hampton Roads ETV Association, Incorporated

WWHR - FM Radio

WVFK - FM Radio

WVRA - FM Radio

Common Carrier Telephone Companies of Virginia
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) 661-2540

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: 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 via such 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 developing low-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 issue 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 public interest, convenience and necessity.

The attached is,

Respectfully submitted,

[Signature]

Andrew Horovitz
Co-Directors, The Public Interest Satellite Association

THE COMMITTEE TO SAVE CEDU 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 FCC TO MAKE A THOROUGH STUDY OF SUCH OPPORTUNITIES BY WHICH THIS NEW TECHNOLOGY CAN BE UTILIZED FOR THE PUBLIC GOOD.

THE COMMITTEE TO SAVE CEDU NOT AFFILIATED WITH CEDU INCAN BE AN ASSOCIATION REPRESENTING APPROXIMATELY 10 THOUSAND SAN FRANCISCO BAY AREA MEMBERS AND VIEWERS OF PUBLIC TELEVISION STATION CEDU.

LAURENCE S. HALL PRESIDENT
705 CHEST AVE
OAKLAND CA 94609

01155 EST

MENNATY MSB

PUBLIC INTEREST SATELLITE ASSOC
55 WEST 44TH ST
NEW YORK NY 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, 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 privitigation 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.
ON JANUARY 24, 1976, THE FOLLOWING RESOLUTION WAS ADAPTED BY THE MEMBERSHIP OF THE CONSUMER FEDERATION OF AMERICA

Because communications satellite technology was developed at public expense, CFA 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.

CFA 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.
Dear Friends:

I have been receiving information from PISA in reference to Direct Satellite to have broadcasting for Public use. In my official position as the Director of Business Affairs for Liberal Religious Youth (non-profit corporation), I feel that the FCC should study PISA's user-need 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

---

Delta Chi Fraternity

Executive Director

Larry Audahara

April 28, 1976

Greetings

Barry Carlo and
Andy Sorowitz
Public Interest Satellite Association
55 West 44th Street
New York, NY 10036

Dear Barry and Andy:

Since my job is fundamentally communication, I wish to state my personal/professional support for PISA. While this cannot be taken as an official Delta Chi Fraternity policy (our Board will not meet until August), I feel it is in the Fraternity's best interest for me to offer my support of your work.

I strongly urge the FCC to examine the possibilities and potential of satellite broadcasting for organizations such as mine. With daily decreasing efficiency in current communications systems costing ever more money, organizations such as Delta Chi will soon be forced to expend as much as 50% of their budget for postage stamps.

Sincerely,

Larry Audahara
Executive Director

---

Liberal Religious Youth

Non-Credal Youth Organization Affiliated with the Unitarian Universalist Association

Gary Decker
Director of Business Affairs

Jennifer Jane
Director of Publications

Sincerely,

Gary Decker
Director of Business Affairs

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REGENTS

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25 Beacon Street
Boston, Massachusetts 02108
617 742 2105 ext 370
May 18, 1976

Andy Horowitz
PISA
55 W 44th St
New York, NY 10036

Dear Andy,

After careful 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,

[Signature]
Executive Director

cc: Nick Johnson

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,

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,

[Signature]
Frank J. Schira
Chairman, Board of Directors

FJS/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 Court of Rho Pi Phi International Pharmaceutical Fraternity, and given under my hand this six day of May, 1976 at Ft. Lauderdale, Florida, County of Broward

[Signature]

Murray M. Wolfe, Ph.D., F.R.S.H.
Director of Continuing Education

Sincerely yours,

Stuart Grout

SG 88

THE SEEING EYE, INC. MORRISTOWN, NEW JERSEY

Telephone 339-4125

April 19, 1976

Mr. Bert Cowan
Mr. Andy Horowitz
Public Interest Satellite Association
56 West 49th Street
New York, NY 10020

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 assure 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, New York 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. Gansevoort
Administrator

May 15, 1976

Melvin A. Goldberg Inc /Communications
347 Madison Avenue
New York, New York 10017

Conducted for

PUBLIC INTEREST SATELLITE ASSOCIATION
55 West 44th Street
New York, New York 10036

(212) 661-2540
<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td>I</td>
</tr>
<tr>
<td>Study Objectives</td>
<td>XI</td>
</tr>
<tr>
<td>Methodology</td>
<td>III</td>
</tr>
<tr>
<td>Question</td>
<td>V</td>
</tr>
<tr>
<td>Definitions</td>
<td>X</td>
</tr>
<tr>
<td>Summary</td>
<td>XI</td>
</tr>
<tr>
<td>Conclusions</td>
<td>XXXIII</td>
</tr>
<tr>
<td>Communications Usage -- Summary</td>
<td>3</td>
</tr>
<tr>
<td>Communications Costs</td>
<td>6</td>
</tr>
<tr>
<td>Communications Usage -- Mail</td>
<td>10</td>
</tr>
<tr>
<td>Communications Costs -- Mail</td>
<td>18</td>
</tr>
<tr>
<td>Communications Usage -- Telephone</td>
<td>22</td>
</tr>
<tr>
<td>Communications Costs -- Telephone</td>
<td>30</td>
</tr>
<tr>
<td>National/Regional Meetings -- Usage</td>
<td>34</td>
</tr>
<tr>
<td>National/Regional Meetings -- Costs</td>
<td>40</td>
</tr>
<tr>
<td>Radio TV Usage</td>
<td>46</td>
</tr>
<tr>
<td>Radio TV Costs</td>
<td>49</td>
</tr>
<tr>
<td>Telegram,Telex, Telex, Telex, Telex</td>
<td>53</td>
</tr>
<tr>
<td>Other Communications</td>
<td>59</td>
</tr>
<tr>
<td>Priority Rankings For Satellite Use</td>
<td>69</td>
</tr>
<tr>
<td>Other Uses of Satellite Service</td>
<td>75</td>
</tr>
<tr>
<td>Sample</td>
<td>80</td>
</tr>
</tbody>
</table>

**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 organisations/social action organisations.
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 Norton 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 printout 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 — 140

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 but 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 chapters and members, to other organizations and to the public-at-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 to 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) has been formed to do something about this. We are convinced that satellite technology, if permitted to develop in the right way, can provide you with communications facilities that will be cheaper, better and faster than any 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 Radio Conferences. 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 OPTIONS 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 judgements their recommendations, in turn, get passed on to the State Department and, in turn, to the World Administrative Radio Conference.

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 it 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 benefits can be made to come about, but only if you help.

Please join us in this effort by filling out the attached.

Thank you,

[Signatures]

Kurt Kowal
Co-Director

Andrew Worthing
Co-Director

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 (Column 6).

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<td></td>
<td></td>
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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______________________________ Telexcopier/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?

______________________________

Definitions

In analyzing the data, the organisations in our sample were categorised according to the major purpose for which they were ostensibly organized. Then, these 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

Organisations involved in Communications, Media and Public Relations

Educational

Organisations concerned with Education, Cultural, Aesthetic or Artistic Affairs, Scientific Learned or Religious Interests

Clubs & Hobbies

Fellowship Organisations, Social or Kinship Clubs, Fraternities, Veterans Organisations, Sports and Hobby Organisations

Employment

Organisations whose major interest is occupational — Labor Organisations, Business Associations, Professional and Non-professional organisations, Agricultural Organisations
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 40% of those with less than 25,000 mention magazines. All but 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.

Traffic lines are used least by the smaller organizations while leased lines are used most.

Approximately a fifth of the organizations use telexgrams 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 — 31%, twice the average

---

**Usage of Communications Techniques**

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<th>Communications Techniques</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 calls most often. But those with fewer than 50 chapters are more likely to use WATS lines, TIE lines, leased lines and even foreign exchange.

Telegram 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 increases while TV Spot usage is largest for the middle group.

Meetings are used least by the organizations with the fewest number of chapters.

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</tbody>
</table>

* Respondent indicated usage but did not list number of chapters.
Communications Usage by Organization Purpose

Generally, Club and Hobby organizations tend to use the mails more than the others. Primarily, they use it for general mailings and announcements 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.

Mailing promotions are mentioned by more than half of the Club and Hobby organizations and almost 2/3 of those concerned with employment.

Bulletins and Renewals are mentioned most often by Club and Hobby groups with the employment organizations the next largest user.

As was true with mails, 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, Tie 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. Tie 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.

Mailgrams and Telegrams are mentioned most often by the organizations concerned with employment, secondarily by Club and Hobby organizations and thirdly, by the Activist 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.

### Usage of Communications Techniques

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<th>BY ORGANIZATION PURPOSE</th>
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<td>0</td>
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</tr>
<tr>
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<td>0</td>
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<td>0</td>
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<tr>
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<td>0</td>
<td></td>
<td>0</td>
<td>2.2</td>
<td></td>
</tr>
</tbody>
</table>

* 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 organisations that comprise Gale’s Encyclopedia of Associations tend to use General Mailings and 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%) 66% of the Gale’s organisations 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 it least Public Radio and TV Stations are most likely users of Tie Lines and Lease Lines

Public TV uses Telex -- 34%

The Gale’s sample organisations 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 organisations 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 Galas 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 organisations say they do not have training meetings

<table>
<thead>
<tr>
<th>COMMUNICATIONS TECH</th>
<th>TOTAL (207)</th>
<th>Gale’s (100)</th>
<th>Public Radio (23)</th>
<th>Public TV (26)</th>
<th>Other (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mailings</td>
<td>72 0%</td>
<td>81 0%</td>
<td>82 6%</td>
<td>48 6%</td>
<td>61 5%</td>
</tr>
<tr>
<td>Newsletters</td>
<td>63 8%</td>
<td>74 0%</td>
<td>82 6%</td>
<td>39 5%</td>
<td>46 2%</td>
</tr>
<tr>
<td>Magazines</td>
<td>45 9%</td>
<td>67 0%</td>
<td>36 1%</td>
<td>16 3%</td>
<td>42 3%</td>
</tr>
<tr>
<td>Promotions</td>
<td>37 7%</td>
<td>48 0%</td>
<td>70 4%</td>
<td>18 6%</td>
<td>34 6%</td>
</tr>
<tr>
<td>Surveys</td>
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<td>33 0%</td>
<td>43 5%</td>
<td>22 6%</td>
<td>38 5%</td>
</tr>
<tr>
<td>Ballots</td>
<td>22 7%</td>
<td>30 0%</td>
<td>8 7%</td>
<td>4 7%</td>
<td>13 4%</td>
</tr>
<tr>
<td>Renewals</td>
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<td>50 0%</td>
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<td>Long Distance-Phone</td>
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<td>60 5%</td>
<td>84 6%</td>
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<td>19 0%</td>
<td>8 7%</td>
<td>18 6%</td>
<td>30 8%</td>
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<tr>
<td>Tie Lines</td>
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<td>10 6%</td>
<td>15 4%</td>
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<td>34 6%</td>
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<tr>
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<td>1 0%</td>
<td>---</td>
<td>2 3%</td>
<td>3 8%</td>
<td></td>
</tr>
<tr>
<td>Telex</td>
<td>9 7%</td>
<td>6 0%</td>
<td>8 7%</td>
<td>4 7%</td>
<td>34 6%</td>
</tr>
<tr>
<td>Teletypewriter</td>
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<td>2 0%</td>
<td>---</td>
<td>9 3%</td>
<td>11 5%</td>
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<tr>
<td>Magazines</td>
<td>19 3%</td>
<td>27 0%</td>
<td>13 0%</td>
<td>4 7</td>
<td>19 2%</td>
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<tr>
<td>Telegrams</td>
<td>22 2%</td>
<td>33 0%</td>
<td>13 0%</td>
<td>4 7</td>
<td>23 1%</td>
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<tr>
<td>Radio Tapes</td>
<td>31 9%</td>
<td>18 0%</td>
<td>39 1%</td>
<td>67 4%</td>
<td>23 1%</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>2 9%</td>
<td>1 0%</td>
<td>---</td>
<td>11 6%</td>
<td></td>
</tr>
<tr>
<td>TV Spots</td>
<td>17 9%</td>
<td>21 0%</td>
<td>17 4%</td>
<td>2 3%</td>
<td>38 5%</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>10 1%</td>
<td>5 0%</td>
<td>4 3%</td>
<td>9 3%</td>
<td>34 6%</td>
</tr>
<tr>
<td>TV Slow Scan</td>
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<td>---</td>
<td>3 8%</td>
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</tr>
<tr>
<td>Pet Microwave</td>
<td>3 4%</td>
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<td>4 7</td>
<td>19 2%</td>
<td></td>
</tr>
<tr>
<td>Data Transmission</td>
<td>5 8%</td>
<td>6 0%</td>
<td>4 3%</td>
<td>4 7</td>
<td>11 5%</td>
</tr>
<tr>
<td>National/Reg Meetings</td>
<td>55 6%</td>
<td>69 0%</td>
<td>60 9%</td>
<td>32 6%</td>
<td>34 6%</td>
</tr>
<tr>
<td>Nat/Reg Trng Mths</td>
<td>26 6%</td>
<td>36 0%</td>
<td>21 7%</td>
<td>14 0%</td>
<td>15 4%</td>
</tr>
<tr>
<td>Wire Services</td>
<td>1 4%</td>
<td>1 0%</td>
<td>4 3%</td>
<td>7 0%</td>
<td></td>
</tr>
<tr>
<td>TV Prod</td>
<td>1 4%</td>
<td>1 0%</td>
<td>8 7%</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Cable TV</td>
<td>2 4%</td>
<td>---</td>
<td>12 6%</td>
<td>3 0%</td>
<td></td>
</tr>
<tr>
<td>Satellite</td>
<td>1 0%</td>
<td>---</td>
<td>8 7%</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Conference, Meet</td>
<td>1 0%</td>
<td>---</td>
<td>4 7%</td>
<td>7 0%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 4%</td>
<td>1 0%</td>
<td>8 7%</td>
<td>---</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 facilities. While the average annual expenditure 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 expenditure was $6,845 but for those organizations having 100,000 or more members, the average annual expenditure was $21,100.

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, Tnt and leased line usage apparently as compensation for the lower long distance costs and perhaps to supplement the long distance usage.

Telco, Nattakons 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 $34,527 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

A9-21
### Annual Costs of Communications, Facilities by Number of Chapters

<table>
<thead>
<tr>
<th>Size of Membership</th>
<th>Number of Chapters</th>
<th>Annual Cost for National and Regional Meetings</th>
<th>Annual Cost for Training, Travel, and Exhibits</th>
<th>Other Annual Costs</th>
<th>Total Annual Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 100,000</td>
<td>100+</td>
<td>$51,103</td>
<td>$25,000</td>
<td>$7,432</td>
<td>$83,535</td>
</tr>
<tr>
<td>50,000–100,000</td>
<td>50–99</td>
<td>$25,000</td>
<td>$4,844</td>
<td>$1,362</td>
<td>$31,206</td>
</tr>
<tr>
<td>25,000–50,000</td>
<td>26–49</td>
<td>$2,500</td>
<td>$1,500</td>
<td>$900</td>
<td>$4,900</td>
</tr>
<tr>
<td>10,000–25,000</td>
<td>10–25</td>
<td>$1,000</td>
<td>$750</td>
<td>$500</td>
<td>$1,750</td>
</tr>
<tr>
<td>5,000–10,000</td>
<td>5–9</td>
<td>$500</td>
<td>$375</td>
<td>$250</td>
<td>$1,125</td>
</tr>
<tr>
<td>1,000–5,000</td>
<td>2–4</td>
<td>$250</td>
<td>$210</td>
<td>$125</td>
<td>$585</td>
</tr>
<tr>
<td>500–1,000</td>
<td>1–3</td>
<td>$125</td>
<td>$98</td>
<td>$75</td>
<td>$298</td>
</tr>
<tr>
<td>Less than 500</td>
<td>0–1</td>
<td>$75</td>
<td>$62</td>
<td>$50</td>
<td>$187</td>
</tr>
</tbody>
</table>

For organizations in the case of general mailings, of 35 organizations and number of chapters in the case of general mailings, it did not reflect on costs. The annual costs include the number of chapters. Costs for National and Regional Meetings and for Training also tend to increase with size of organizations more than 100,000. If we exclude the two highest cost organizations, the average cost for general mailings for the remaining 22 would be $1,311.

The annual costs for communications, facilities by number of chapters are based on very small sample responses.

The cost of telephone service also tends to increase with size of chapters. Costs for General Mailings also tend to increase with size of organizations. The average cost for general mailings for the remaining 22 would be $1,311.

The annual costs for communications, facilities by number of chapters are based on very small sample responses.
<table>
<thead>
<tr>
<th>Number of Chapters</th>
<th>TOTAL</th>
<th>Under 20</th>
<th>20-49</th>
<th>50+</th>
<th>No Answer *</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(207)</td>
<td>(39)</td>
<td>(11)</td>
<td>(55)</td>
<td>(102)</td>
</tr>
<tr>
<td>General Mailing</td>
<td>13,765</td>
<td>11,125</td>
<td>2,500</td>
<td>10,222</td>
<td>12,313</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>6,845</td>
<td>2,172</td>
<td>1,708</td>
<td>6,108</td>
<td>10,300</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>1,372</td>
<td>781</td>
<td>125</td>
<td>3,034</td>
<td>940</td>
</tr>
<tr>
<td>Mail Ballots</td>
<td>1,486</td>
<td>671</td>
<td>975</td>
<td>3,208</td>
<td></td>
</tr>
<tr>
<td>General Mailings</td>
<td>13,765</td>
<td>11,125</td>
<td>2,500</td>
<td>10,222</td>
<td>12,313</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>6,845</td>
<td>2,172</td>
<td>1,708</td>
<td>6,108</td>
<td>10,300</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>1,372</td>
<td>781</td>
<td>125</td>
<td>3,034</td>
<td>940</td>
</tr>
<tr>
<td>Mail Ballots</td>
<td>1,486</td>
<td>671</td>
<td>975</td>
<td>3,208</td>
<td></td>
</tr>
</tbody>
</table>

When we analyze the annual costs of communications by organization purpose we get other insights into communications use.

**General Mailings** (as shown by annual expenditures) tend to be used by Educational Organizations and organizations oriented toward Business and employment. As compared to the average expenditures of $13,313, the Educational organizations spend $15,168 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 ($29,041) 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 $135,000 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, almost $100,000 annually for Meetings and $125,000 for Training Meetings.
### Average Costs of Communication Facilities

#### by Organization Purpose

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Total</th>
<th>No Am. *</th>
<th>Social</th>
<th>Education</th>
<th>Clubs &amp;</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(207)</td>
<td>(9)</td>
<td>(21)</td>
<td>(33)</td>
<td>(17)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>$</th>
<th>$</th>
<th>$</th>
<th>$</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mailings</td>
<td></td>
<td>13,765</td>
<td>1,500</td>
<td>1,750</td>
<td>12,061</td>
<td>26,188</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
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<td>6,845</td>
<td>14,500</td>
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<td>Magazine - Mail</td>
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<td>42,225</td>
<td>104,166</td>
<td>15,700</td>
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<td>13,557</td>
<td>20,000</td>
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<td>3,658</td>
<td>24,875</td>
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<td>125</td>
<td>1,600</td>
<td>1,956</td>
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<td>1,565</td>
<td>5,818</td>
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<td>7,432</td>
<td>11,222</td>
<td>8,538</td>
<td>3,311</td>
<td>5,500</td>
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<td>54,000</td>
<td>8,125</td>
<td>3,658</td>
<td>21,855</td>
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<td>1,000</td>
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</tr>
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<td>4,000</td>
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<td>100,750</td>
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<td>12,000</td>
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<td>1,000</td>
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<td>1,000</td>
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<td>1,000</td>
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<td>1,000</td>
<td>1,000</td>
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<tr>
<td>Data Transmission</td>
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<td>43,625</td>
<td>83,750</td>
<td>4,000</td>
<td>4,000</td>
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<td>National/Regional News</td>
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<td>34,527</td>
<td>108,750</td>
<td>10,321</td>
<td>7,760</td>
<td>28,019</td>
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<td>Mail/Log Tapes Meets</td>
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<td>28,167</td>
<td>929</td>
<td>34,214</td>
<td>3,667</td>
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<tr>
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<td>37,500</td>
<td>104,000</td>
<td>10,321</td>
<td>7,760</td>
<td>28,019</td>
</tr>
<tr>
<td>VHF Programming-Doc</td>
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<td>6,255</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Cable TV</td>
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<td>3,950</td>
<td>1,813</td>
<td>1,000</td>
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</tr>
<tr>
<td>Satellite</td>
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<td>2,500</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Conferences, Network</td>
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<td>275</td>
<td>1,000</td>
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<td>1,000</td>
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<td>Other</td>
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<td>27,167</td>
<td>4,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</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 in 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 Televison Stations.

An analysis of Yearly Expenditures for organizational and public communications services shows the different functions and costs attributable to each sample organization.

For example; the organizations from Gale's and those from Public Televison stations spend the most amount of money, on average, for General Mailings ($17,674 and $19,444 respectively). Public Radio spends relatively little ($1,717 and $4,958 respectively).

The NCCB average is $14,824.

Gale's and Public Televison again spend the most per organization for Magazines -- $49,924 and $36,444 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. Public Radio spends relatively little ($1,717 and $4,958 respectively).

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 goes 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 Gale 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 Gale organization spends $77,000 annually and the Public TV station spends $61,667. The amount spent by the others is minor in comparison.

### Average Costs of Communications Facilities

<table>
<thead>
<tr>
<th>Service</th>
<th>Source</th>
<th>Total (207)</th>
<th>Gale (100)</th>
<th>HCR (23)</th>
<th>Public Radio (43)</th>
<th>Public TV (26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mailings</td>
<td></td>
<td>13,765</td>
<td>17,674</td>
<td>14,824</td>
<td>1,717</td>
<td>19,484</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td></td>
<td>6,845</td>
<td>11,206</td>
<td>1,936</td>
<td>1,942</td>
<td>2,795</td>
</tr>
<tr>
<td>Magazine - Mail</td>
<td></td>
<td>43,235</td>
<td>49,924</td>
<td>6,083</td>
<td>6,958</td>
<td>36,444</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td></td>
<td>13,557</td>
<td>23,033</td>
<td>6,958</td>
<td>2,583</td>
<td>1,000</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td></td>
<td>1,372</td>
<td>2,397</td>
<td>1,179</td>
<td>250</td>
<td>583</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td></td>
<td>1,486</td>
<td>1,553</td>
<td>563</td>
<td>275</td>
<td>400</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td></td>
<td>4,674</td>
<td>5,063</td>
<td>2,344</td>
<td>1,646</td>
<td>4,400</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td></td>
<td>7,432</td>
<td>9,082</td>
<td>3,072</td>
<td>2,038</td>
<td>12,750</td>
</tr>
<tr>
<td>Wire Lines - Phone</td>
<td></td>
<td>36,330</td>
<td>63,275</td>
<td>4,000</td>
<td>3,000</td>
<td>12,400</td>
</tr>
<tr>
<td>Tie Lines - Phone</td>
<td></td>
<td>1,500</td>
<td>2,125</td>
<td>1,500</td>
<td>500</td>
<td>3,417</td>
</tr>
<tr>
<td>Leased Lines - Phone</td>
<td></td>
<td>21,270</td>
<td>1,500</td>
<td>20,750</td>
<td>2,538</td>
<td>36,500</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td></td>
<td>750</td>
<td>--</td>
<td>750</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Telex</td>
<td></td>
<td>4,844</td>
<td>1,813</td>
<td>125</td>
<td>--</td>
<td>6,781</td>
</tr>
<tr>
<td>Teletypewriter</td>
<td></td>
<td>1,361</td>
<td>1,250</td>
<td>1,792</td>
<td>688</td>
<td>--</td>
</tr>
<tr>
<td>Mailgrams</td>
<td></td>
<td>4,057</td>
<td>291</td>
<td>250</td>
<td>2,375</td>
<td>--</td>
</tr>
<tr>
<td>Telegrams</td>
<td></td>
<td>1,729</td>
<td>2,033</td>
<td>125</td>
<td>125</td>
<td>292</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td></td>
<td>3,344</td>
<td>3,281</td>
<td>6,000</td>
<td>3,086</td>
<td>3,000</td>
</tr>
<tr>
<td>Radio-Closed Circuit</td>
<td></td>
<td>2,265</td>
<td>3,500</td>
<td>--</td>
<td>2,188</td>
<td>--</td>
</tr>
<tr>
<td>TV Spots</td>
<td></td>
<td>6,895</td>
<td>10,964</td>
<td>250</td>
<td>--</td>
<td>1,667</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td></td>
<td>10,312</td>
<td>8,187</td>
<td>125</td>
<td>--</td>
<td>11,675</td>
</tr>
<tr>
<td>TV-Slow Scan</td>
<td></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Pwr Microwave</td>
<td></td>
<td>40,000</td>
<td>--</td>
<td>1,625</td>
<td>78,025</td>
<td>--</td>
</tr>
<tr>
<td>Data Transmission</td>
<td></td>
<td>46,928</td>
<td>77,000</td>
<td>6,000</td>
<td>2,500</td>
<td>61,667</td>
</tr>
<tr>
<td>National/Regional News</td>
<td></td>
<td>34,527</td>
<td>51,644</td>
<td>15,200</td>
<td>594</td>
<td>6,716</td>
</tr>
<tr>
<td>Natl/Regl Trng Mssg8,089</td>
<td></td>
<td>48,040</td>
<td>66,412</td>
<td>2,500</td>
<td>667</td>
<td>1,617</td>
</tr>
<tr>
<td>Wire Services</td>
<td></td>
<td>37,500</td>
<td>--</td>
<td>37,500</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>TV Programming - Doc</td>
<td></td>
<td>3,188</td>
<td>--</td>
<td>3,188</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Cable TV</td>
<td></td>
<td>3,950</td>
<td>--</td>
<td>1,813</td>
<td>12,500</td>
<td>--</td>
</tr>
<tr>
<td>Satellite</td>
<td></td>
<td>5,625</td>
<td>--</td>
<td>5,625</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Conferences, Network</td>
<td></td>
<td>1,062</td>
<td>--</td>
<td>1,062</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>27,167</td>
<td>75,000</td>
<td>3,250</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

(A6-25)
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 $16,913,000.

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 $7,006,000. If we add to that the $10,001,000 of WATS Line costs, we show approximately $17,007,000 spent annually for telephone service by these non-profit organizations.

Telex, Telexcopier, Telegroans and Telegraphs 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 then 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 T-1 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 T-1 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>Communication Technique</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(207)</td>
<td></td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>82 1</td>
</tr>
<tr>
<td>General Mailings</td>
<td>72 0</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>63 4</td>
</tr>
<tr>
<td>National/Regional Meetings</td>
<td>55 6</td>
</tr>
<tr>
<td>Magazines - Mail</td>
<td>45 9</td>
</tr>
<tr>
<td>Rememals - Mail</td>
<td>38 2</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>37 7</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>35 3</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td>31 9</td>
</tr>
<tr>
<td>National/Regional Training Meetings</td>
<td>26 6</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>22 7</td>
</tr>
<tr>
<td>Telegrams</td>
<td>32 2</td>
</tr>
<tr>
<td>Make Lines - Phone</td>
<td>19 3</td>
</tr>
<tr>
<td>Mailgrams</td>
<td>19 3</td>
</tr>
<tr>
<td>TV Spots</td>
<td>17 9</td>
</tr>
<tr>
<td>Leasted Lines - Phones</td>
<td>13 0</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>10 1</td>
</tr>
<tr>
<td>Tales</td>
<td>9 7</td>
</tr>
<tr>
<td>Sex Lines - Phone</td>
<td>9 2</td>
</tr>
<tr>
<td>Date Transmission</td>
<td>5 8</td>
</tr>
<tr>
<td>Telecopter</td>
<td>5 7</td>
</tr>
<tr>
<td>Pet Microwave</td>
<td>3 4</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>2 9</td>
</tr>
<tr>
<td>Wire Services</td>
<td>1 4</td>
</tr>
<tr>
<td>TV Programming-Doc</td>
<td>1 4</td>
</tr>
<tr>
<td>Cable TV</td>
<td>2 4</td>
</tr>
<tr>
<td>Satellite</td>
<td>1 0</td>
</tr>
<tr>
<td>Conference, Network</td>
<td>1 0</td>
</tr>
<tr>
<td>Other</td>
<td>1 4</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 more 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.
## Annual Costs of Communications Techniques

<table>
<thead>
<tr>
<th>Technique</th>
<th>Average Annual Cost**</th>
</tr>
</thead>
<tbody>
<tr>
<td>National/Regional Training Meetings</td>
<td>48,089</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>46,928</td>
</tr>
<tr>
<td>Magazine - Mail</td>
<td>42,335</td>
</tr>
<tr>
<td>Private Microwave</td>
<td>40,000</td>
</tr>
<tr>
<td>Wire Services</td>
<td>37,500</td>
</tr>
<tr>
<td>WATS Lines - Phone</td>
<td>36,310</td>
</tr>
<tr>
<td>National/Regional Meetings</td>
<td>36,257</td>
</tr>
<tr>
<td>Leased Lines - Phone</td>
<td>34,527</td>
</tr>
<tr>
<td>General Mail</td>
<td>13,765</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>13,557</td>
</tr>
<tr>
<td>Private Microwave</td>
<td>13,557</td>
</tr>
<tr>
<td>Wire Services</td>
<td>13,557</td>
</tr>
<tr>
<td>WATS Lines - Phone</td>
<td>10,212</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>7,432</td>
</tr>
<tr>
<td>TV Spots</td>
<td>6,805</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>6,845</td>
</tr>
<tr>
<td>Satellite</td>
<td>5,625</td>
</tr>
<tr>
<td>Telex</td>
<td>4,864</td>
</tr>
<tr>
<td>Reenewal - Mail</td>
<td>4,864</td>
</tr>
<tr>
<td>Mailinglists</td>
<td>4,057</td>
</tr>
<tr>
<td>Cable TV</td>
<td>3,930</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td>3,364</td>
</tr>
<tr>
<td>TV Programming - Doc</td>
<td>3,188</td>
</tr>
<tr>
<td>Radio - Leased Circuit</td>
<td>2,625</td>
</tr>
<tr>
<td>Telegrams</td>
<td>1,729</td>
</tr>
<tr>
<td>Tie Lines - Phone</td>
<td>1,500</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>1,486</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>1,372</td>
</tr>
<tr>
<td>Telescopiar</td>
<td>1,351</td>
</tr>
<tr>
<td>Conference, Network</td>
<td>1,062</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td>750</td>
</tr>
<tr>
<td>TV News Scan</td>
<td>620</td>
</tr>
</tbody>
</table>

* Based on Mean Average of Costs of Communications Techniques for those organizations that gave the information

## Communications Expenditures

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 incurred, if we apply the average organizations cost per communications technique for just those organizations in our sample that indicated usage, the total yearly sum is $20,226,762.

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.
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 organizations in our sample.
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 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.

MAIL USAGE

About three quarters of the organizations send out General Mailings to their membership or the general public. The tendency is to send them out at regular intervals. About 15% send out General Mailings daily, 13% send them out monthly and 11% send them out weekly. 10% issue General Mailings 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>Type of Mail</th>
<th>Goal Mail</th>
<th>House Mail</th>
<th>Letters</th>
<th>Magazines</th>
<th>Prone Surveys</th>
<th>Ballots</th>
<th>Renewals</th>
</tr>
</thead>
<tbody>
<tr>
<td>USERS</td>
<td>(149)</td>
<td>(132)</td>
<td>(55)</td>
<td>(78)</td>
<td>(73)</td>
<td>(47)</td>
<td>(80)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency</th>
<th>X</th>
<th>Y</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 time per year</td>
<td>2 0</td>
<td>2 3</td>
<td>3 2</td>
<td>11 5</td>
<td>38 4</td>
<td>57 4</td>
<td>43 8</td>
</tr>
<tr>
<td>2 times per year</td>
<td>12 1</td>
<td>6 8</td>
<td>3 2</td>
<td>17 9</td>
<td>31 5</td>
<td>10 6</td>
<td>11 3</td>
</tr>
<tr>
<td>3 times per year</td>
<td>6 7</td>
<td>6 1</td>
<td>1 0</td>
<td>6 4</td>
<td>5 5</td>
<td>2 1</td>
<td>7 5</td>
</tr>
<tr>
<td>4 times per year (quarterly)</td>
<td>5 4</td>
<td>30 3</td>
<td>21 1</td>
<td>12 8</td>
<td>6 0</td>
<td>10 6</td>
<td>6 3</td>
</tr>
<tr>
<td>5-6 times</td>
<td>10 1</td>
<td>9 8</td>
<td>17 9</td>
<td>11 5</td>
<td>1 4</td>
<td>2 1</td>
<td>6 3</td>
</tr>
<tr>
<td>7-11 times</td>
<td>6 0</td>
<td>12 1</td>
<td>4 2</td>
<td>3 8</td>
<td>2 7</td>
<td>4 3</td>
<td>2 5</td>
</tr>
<tr>
<td>12-15 times (monthly)</td>
<td>13 4</td>
<td>14 4</td>
<td>38 9</td>
<td>7 7</td>
<td>2 7</td>
<td>--</td>
<td>10 0</td>
</tr>
<tr>
<td>16-24 times (twice monthly)</td>
<td>2 0</td>
<td>8 3</td>
<td>3 2</td>
<td>5 1</td>
<td>--</td>
<td>2 1</td>
<td>2 5</td>
</tr>
<tr>
<td>25-52 times (weekly)</td>
<td>11 4</td>
<td>3 0</td>
<td>1 0</td>
<td>5 1</td>
<td>--</td>
<td>2 1</td>
<td>2 5</td>
</tr>
<tr>
<td>Daily more than once wk</td>
<td>14 8</td>
<td>2 3</td>
<td>--</td>
<td>3 8</td>
<td>--</td>
<td>--</td>
<td>2 5</td>
</tr>
<tr>
<td>Varies</td>
<td>2 7</td>
<td>0 8</td>
<td>1 0</td>
<td>2 6</td>
<td>1 4</td>
<td>2 1</td>
<td>--</td>
</tr>
<tr>
<td>No Answer, but use</td>
<td>13 4</td>
<td>7 8</td>
<td>5 3</td>
<td>11 5</td>
<td>9 6</td>
<td>4 4</td>
<td>5 0</td>
</tr>
</tbody>
</table>

**Total Users**

| (100%) | (100%) | (100%) | (100%) | (100%) | (100%) | (100%) |

---

**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.
### Average Number of Items Mailed Annually

<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

### 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 were mentioned. At the low end, only 46% 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.
### Mail Usage by Organization Purpose

Club and Hobby organisations 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 organisations.

Newsletters are mentioned equally by those organisations based on employment or occupation, the Activist social organisations as well as Club and Hobby groups.

Mail promotions are mentioned by more than half of the Club and Hobby organisations and almost ⅓ of those concerned with employment.

Ballots and Renewals are mentioned most often by Club and Hobby groups with the employment organisations the next largest user.

### 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 Up</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mailings</td>
<td>72.0%</td>
<td>78.2%</td>
<td>76.2%</td>
<td>53.9%</td>
<td>89.4%</td>
<td>36.9%</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>86.2%</td>
<td>26.4%</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>37.7%</td>
<td>40.6%</td>
<td>47.6%</td>
<td>30.8%</td>
<td>63.2%</td>
<td>20.8%</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>35.3%</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>22.7%</td>
<td>27.7%</td>
<td>33.3%</td>
<td>23.1%</td>
<td>38.8%</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*
USAGES OF COMMUNICATIONS TECHNIQUES

BY PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th>BY PURPOSE OF ORGANIZATION</th>
<th>No Answer*</th>
<th>Social</th>
<th>Educational</th>
<th>Clubs &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL (107)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Mailings</td>
<td>72.0</td>
<td>77.0</td>
<td>77.8</td>
<td>62.6</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>63.0</td>
<td>77.0</td>
<td>72.7</td>
<td>54.9</td>
</tr>
<tr>
<td>Magazine - Mail</td>
<td>45.9</td>
<td>64.6</td>
<td>45.5</td>
<td>26.6</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>37.7</td>
<td>55.6</td>
<td>21.3</td>
<td>25.3</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>35.3</td>
<td>33.3</td>
<td>27.3</td>
<td>37.6</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>22.7</td>
<td>44.4</td>
<td>13.6</td>
<td>8.8</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td>38.2</td>
<td>44.4</td>
<td>18.2</td>
<td>31.9</td>
</tr>
</tbody>
</table>

* Respondent indicated usage but did not indicate purpose of organization

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 $42,235 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, the 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 insubstantial— even for the organizations in this sample.
AVERAGE COSTS OF COMMUNICATION FACILITIES

<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 &amp; Up</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(207)</td>
<td>(101)</td>
<td>(21)</td>
<td>(13)</td>
<td>(19)</td>
<td>(53)</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>
<td>$21,845</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>$6,945</td>
<td>$5,443</td>
<td>$8,107</td>
<td>$5,916</td>
<td>$21,000</td>
<td>$3,762</td>
</tr>
<tr>
<td>Magazines - Mail</td>
<td>$42,335</td>
<td>$24,887</td>
<td>$35,275</td>
<td>$51,000</td>
<td>$92,645</td>
<td>$32,704</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>$13,557</td>
<td>$5,009</td>
<td>$54,812</td>
<td>---</td>
<td>$27,071</td>
<td>$11,055</td>
</tr>
<tr>
<td>Surveys - Mail</td>
<td>$1,372</td>
<td>$688</td>
<td>$1,500</td>
<td>$125</td>
<td>$3,775</td>
<td>$1,302</td>
</tr>
<tr>
<td>Ballots - Mail</td>
<td>$1,486</td>
<td>$1,065</td>
<td>$1,805</td>
<td>$375</td>
<td>$2,230</td>
<td>$3,302</td>
</tr>
<tr>
<td>Renewals - Mail</td>
<td>$4,674</td>
<td>$2,334</td>
<td>$4,711</td>
<td>$6,300</td>
<td>$8,305</td>
<td>$6,431</td>
</tr>
</tbody>
</table>

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 $6,865 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 $42,235. 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 Hobbies spend more on Promotions than any other — $24,875 vs $13,357 for the average.

*Respondent indicated costs but did not indicate size of membership.
## Average Costs of Communication Facilities

<table>
<thead>
<tr>
<th>Purpose of Organization</th>
<th>Total</th>
<th>Annuity</th>
<th>Social</th>
<th>Community</th>
<th>Educational</th>
<th>Clubs &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (207)</td>
<td>$13,765</td>
<td>$1,500</td>
<td>$1,750</td>
<td>$12,061</td>
<td>$24,188</td>
<td>$4,568</td>
</tr>
<tr>
<td>General Mailings</td>
<td>$5,845</td>
<td>$14,500</td>
<td>$1,175</td>
<td>$2,664</td>
<td>$10,778</td>
<td>$1,750</td>
</tr>
<tr>
<td>Newsletters - Mail</td>
<td>$42,125</td>
<td>$104,166</td>
<td>$10,700</td>
<td>$21,855</td>
<td>$59,922</td>
<td>$29,841</td>
</tr>
<tr>
<td>Promotions - Mail</td>
<td>$13,557</td>
<td>$20,000</td>
<td>$9,125</td>
<td>$3,656</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>$115</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>

### 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 calls. More than 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 31 organizations (15%) with 22 indicating frequency of usage.
The data on number of calls made was submitted by only 34 (20%) of the 170 organizations 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.

Tie lines were predominant among communications organizations, i.e., radio and TV stations.

WATS are similarly used.

<table>
<thead>
<tr>
<th></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>3 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>Often, 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>
<tr>
<td></td>
<td>100 0%</td>
<td>100 0%</td>
<td>100 0%</td>
<td>100 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></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 - 2,499</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.

The 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 mail, 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)

<table>
<thead>
<tr>
<th>Communications Technique</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>Total</td>
<td>(207)</td>
<td>(101)</td>
<td>(121)</td>
<td>(19)</td>
<td>(55)</td>
</tr>
</tbody>
</table>

*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 Services</th>
<th>Education</th>
<th>Industrial</th>
<th>Clubs &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL</strong></td>
<td>(207)</td>
<td>(9)</td>
<td>(22)</td>
<td>(93)</td>
<td>(17)</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>82%</td>
<td>68%</td>
<td>81%</td>
<td>78%</td>
<td>94%</td>
</tr>
<tr>
<td>WATS Lines - Phone</td>
<td>19%</td>
<td>22%</td>
<td>27%</td>
<td>16%</td>
<td>15%</td>
</tr>
<tr>
<td>TIE Lines - Phone</td>
<td>9%</td>
<td>0%</td>
<td>0%</td>
<td>14%</td>
<td>12%</td>
</tr>
<tr>
<td>Leased Lines - Phone</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate purpose of organization*

### Telephone Costs by Size of Membership

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 $36,330 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.
### 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 &amp; Up</th>
<th>No Answer</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,432</td>
<td>5,713</td>
<td>9,607</td>
<td>9,722</td>
<td>12,650</td>
<td>8,375</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>36,330</td>
<td>29,953</td>
<td>101,250</td>
<td>2,500</td>
<td>4,000</td>
<td>43,075</td>
</tr>
<tr>
<td>TIE Lines - Phone</td>
<td>1,500</td>
<td>2,900</td>
<td>875</td>
<td>250</td>
<td>4,000</td>
<td>500</td>
</tr>
<tr>
<td>Leased Lines - Phone</td>
<td>21,370</td>
<td>25,792</td>
<td>9,500</td>
<td>--</td>
<td>1,500</td>
<td>6,625</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td>750</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.

### Telephone 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 $8,538 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>Answer</th>
<th>Social</th>
<th>Educational</th>
<th>Clubs &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(207)</td>
<td>(9)</td>
<td>(22)</td>
<td>(91)</td>
<td>(33)</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>9</td>
<td>7,432</td>
<td>11,333</td>
<td>3,538</td>
</tr>
<tr>
<td>WATS Lines - Phone</td>
<td>36,330</td>
<td>36,330</td>
<td>56,000</td>
<td>8,125</td>
</tr>
<tr>
<td>TIE Lines - Phone</td>
<td>1,500</td>
<td>1,500</td>
<td>1,836</td>
<td>250</td>
</tr>
<tr>
<td>Leased Lines - Phone</td>
<td>21,370</td>
<td>21,370</td>
<td>4,000</td>
<td>1,480</td>
</tr>
<tr>
<td>Foreign Exchange - Phone</td>
<td>750</td>
<td>750</td>
<td>750</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 1294. 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 National and Regional Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nat/Reg Meetings</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>1 time per year</td>
</tr>
<tr>
<td>2 times per year</td>
</tr>
<tr>
<td>3 times per year</td>
</tr>
<tr>
<td>4 times per year</td>
</tr>
<tr>
<td>5 times per year</td>
</tr>
<tr>
<td>7-11 times per year</td>
</tr>
<tr>
<td>Monthly (12-15)</td>
</tr>
<tr>
<td>16-24 times/year</td>
</tr>
<tr>
<td>Weekly</td>
</tr>
<tr>
<td>Daily</td>
</tr>
<tr>
<td>Various</td>
</tr>
<tr>
<td>No Answer*</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

* Respondent indicated usage of meetings but did not indicate frequency.
## Member 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>1,575</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>3,075</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>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>1,575</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>3,075</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>1,294</td>
<td>1,384</td>
</tr>
</tbody>
</table>

#### Communications Techniques

- Mail/Regional Meetings
  - Under 25,000: 55.6%
  - 25,000-49,999: 56.4%
  - 50,000-99,999: 71.4%
  - 100,000 or more: 92.3%
- Mail/Regional Training Meetings
  - Under 25,000: 26.6%
  - 25,000-49,999: 26.7%
  - 50,000-99,999: 53.8%
  - 100,000 or more: 36.8%

*Respondent indicated usage but did not indicate size of membership*
**USAGES OF COMMUNICATIONS TECHNIQUES**

**BY PURPOSE OF ORGANIZATION**

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Total</th>
<th>No.</th>
<th>Social</th>
<th>Educational</th>
<th>Clubs &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>National/Regional Meet.</td>
<td>35</td>
<td>5</td>
<td>77</td>
<td>54</td>
<td>60</td>
</tr>
<tr>
<td>Mail/NGI Training Meet.</td>
<td>26</td>
<td>6</td>
<td>33</td>
<td>31</td>
<td>14</td>
</tr>
</tbody>
</table>

*Respondent indicated usage of meetings but did not indicate purpose of organization*

**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 $78,613 for Training Meetings. Those with fewer than 20 chapters spend $6,857 and $1,107 respectively.
ANNUAL AVERAGE COSTS OF COMMUNICATION FACILITIES

<table>
<thead>
<tr>
<th>BY STEP 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 &amp; up</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(207)</td>
<td>(161)</td>
<td>(21)</td>
<td>(13)</td>
<td>(19)</td>
<td>(33)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>National/Regional Meetings</th>
<th>$34,527</th>
<th>$31,699</th>
<th>$45,000</th>
<th>$21,088</th>
<th>$50,694</th>
<th>$31,523</th>
</tr>
</thead>
<tbody>
<tr>
<td>National/Regional Training Meetings</td>
<td>$48,089</td>
<td>$25,375</td>
<td>$45,000</td>
<td>$3,438</td>
<td>$56,313</td>
<td>$35,000</td>
</tr>
</tbody>
</table>

Average Annual Cost of Meetings By Organisation Purpose

Employment organisations, 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 organisation 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 organisations are the next largest spenders for Meetings — $28,019 for regular National/Regional Meetings and $34,214 for Training Meetings.

*Respondent volunteered cost information but did not list size of organization.
ANNUAL

AVERAGE CO<;TS OF COMMUNICATION FACILITIES

AVERAGE COSTS OF COM.'IUNICATION FACILITIES
PURPOSE OF

ORr~\.'n7.ATION

NlIHBER OF CHAPrERS
No

TOTAL

(207)

>
.L
CO
~

National/Hes1anal Heetinsa
National/Reg T'l'atng Meets

$
34,527
48,089

(22)-

( 9 i ) (33j""""" (i1) - """"ffil

Commun1- Educacations tional

Clubs &
Hobbies

$
10,321
28,167

$

$
$
12,000 92,279
3,667 125,625

•

Answer
('9)
$
108,750

Soc 1al

7,760

929

$
28,019
34,214

tllReepondent volunteered coat informqtion but did not list she of orgofl1.tatlon

.'

E:vrplo:,ment

Under
TOTAL

National/Regional Meetings
National/ReSional Trng Meetings

20

20-49

5()+

(207)

('39)

(iT) 155)"

$
34,527
48,089

$
6,857
1,107·

$
12 ,250
28,333

$
48,397
76,613

No AruNllr*

(102)

$
38,390
58,000

*Respondcnts volunteerod enst information but did not indicate number of ch4ptera


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 18% of the Communications Organizations.

Usage of both media is spread. However, the smaller size organization tend to use radio more and the larger Television. 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>Under 25,000</th>
<th>25,000 to 50,000</th>
<th>50,000 to 100,000</th>
<th>100,000+</th>
<th>No Answer</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Tapes</td>
<td>31</td>
<td>9</td>
<td>5</td>
<td>23</td>
<td>1</td>
<td>43</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>2</td>
<td>9</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>TV Spots</td>
<td>17</td>
<td>9</td>
<td>8</td>
<td>14</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>10</td>
<td>1</td>
<td>9</td>
<td>9</td>
<td>1</td>
<td>19</td>
</tr>
</tbody>
</table>

### PURPOSE OF ORGANIZATION

<table>
<thead>
<tr>
<th>Purpose of Organization</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</td>
<td>11</td>
<td>26</td>
<td>48</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>TV Spots</td>
<td>17</td>
<td>11</td>
<td>36</td>
<td>15</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>10</td>
<td>11</td>
<td>4</td>
<td>13</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but not size of membership

*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 ($8,875). Communications groups spend $6,813 annually for TV and Educational groups $4,000.

Expenditures for Radio Tapes are $6,500 for Employment organizations and $3,681 for Communications.

TV Closed Circuit, although used by only 10% of the sample in a high cost for those that use it. Thus, these 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 (287)</th>
<th>Expenditures (99)</th>
<th>Social (33)</th>
<th>Educational (17)</th>
<th>Clubs &amp; Enthusiast (34)</th>
<th>Employment (26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Tapes</td>
<td>3,346</td>
<td>$750</td>
<td>1,681</td>
<td>1,375</td>
<td>125</td>
<td>6,500</td>
</tr>
<tr>
<td>Radio-Closed Circuit</td>
<td>2,625</td>
<td>$750</td>
<td>2,188</td>
<td>--</td>
<td>--</td>
<td>3,500</td>
</tr>
<tr>
<td>TV Spots</td>
<td>6,895</td>
<td>$750</td>
<td>6,813</td>
<td>4,000</td>
<td>11,167</td>
<td>10,500</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td>10,212</td>
<td>$750</td>
<td>17,500</td>
<td>17,500</td>
<td>11,167</td>
<td>--</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>Public Total</th>
<th>Public Radio</th>
<th>Public TV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>(207)</td>
<td>(100)</td>
<td>(43)</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td>$3,344</td>
<td>$3,261</td>
<td>$6,000</td>
</tr>
<tr>
<td>Radio-Closed Circuits</td>
<td>3,500</td>
<td>10,964</td>
<td></td>
</tr>
<tr>
<td>TV Spots</td>
<td>6,895</td>
<td>10,212</td>
<td>250</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td>8,167</td>
<td>11,875</td>
<td></td>
</tr>
</tbody>
</table>

### 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+ No Answer*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>(207)</td>
<td>(101)</td>
<td>(21)</td>
<td>(13)</td>
</tr>
<tr>
<td>Radio Tapes</td>
<td>$3,364</td>
<td>$2,478</td>
<td>$2,570</td>
<td>$500</td>
</tr>
<tr>
<td>Radio-Closed Circuits</td>
<td>3,625</td>
<td>2,387</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV Spots</td>
<td>6,895</td>
<td>4,661</td>
<td>17,500</td>
<td>17,500</td>
</tr>
<tr>
<td>TV-Closed Circuit</td>
<td>10,212</td>
<td>9,364</td>
<td></td>
<td></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 rises from 24% to 32%.

The greatest usage of Telegrams and Mailgrams appears to be made by the Employment Oriented organizations. More than half use Telegrams (vs 22% average) and almost a third use Mailgrams (vs 19% average).

Club and Hobby organizations are the second most frequent users -- 35% for Telegrams and 29% for Mailgrams.

However, in terms of cost, by far the biggest users of mailgrams ($19,039) are the Social Active organizations. They spend on the average more than all other groups combined.

Usage of Communications Techniques

<table>
<thead>
<tr>
<th></th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>Over 100,000</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>(207)</td>
<td>(221)</td>
<td>(43)</td>
<td>(11)</td>
<td>(53)</td>
</tr>
<tr>
<td>Telex</td>
<td>9 (7)</td>
<td>8 (9)</td>
<td>14 (3)</td>
<td>7 (7)</td>
<td>15 (8)</td>
</tr>
<tr>
<td>Telexcopier</td>
<td>5 (7)</td>
<td>4 (0)</td>
<td>9 (5)</td>
<td>15 (4)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Mailgrams</td>
<td>19 (3)</td>
<td>20 (8)</td>
<td>23 (8)</td>
<td>23 (1)</td>
<td>31 (6)</td>
</tr>
<tr>
<td>Telegrams</td>
<td>22 (2)</td>
<td>23 (8)</td>
<td>206 (6)</td>
<td>38 (5)</td>
<td>31 (8)</td>
</tr>
</tbody>
</table>

*Respondent volunteered cost information but did not list size of membership.
### Average Costs of Communication Facilities

<table>
<thead>
<tr>
<th>Size of Membership</th>
<th>Telex</th>
<th>Hobbies</th>
<th>Employment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 15,000</td>
<td>125</td>
<td>4,057</td>
<td>3,083</td>
<td>8,607</td>
</tr>
<tr>
<td>15,000-50,000</td>
<td>125</td>
<td>4,057</td>
<td>3,083</td>
<td>8,607</td>
</tr>
<tr>
<td>50,000-100,000</td>
<td>125</td>
<td>4,057</td>
<td>3,083</td>
<td>8,607</td>
</tr>
<tr>
<td>100,000-250,000</td>
<td>125</td>
<td>4,057</td>
<td>3,083</td>
<td>8,607</td>
</tr>
</tbody>
</table>

#### TELETYPE

- Cables: 1250
- Telephone: 4057
- Telephone: 3083
- Total: 8607

#### FAX

- Cables: 1250
- Telephone: 4057
- Telephone: 3083
- Total: 8607
### Purpose of Organization

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Total (207)</th>
<th>GAA's (100)</th>
<th>NCCB (33)</th>
<th>Radio (63)</th>
<th>TV (26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telex</td>
<td>4,844</td>
<td>1,811</td>
<td>125</td>
<td>---</td>
<td>6,781</td>
</tr>
<tr>
<td>Telecopier</td>
<td>1,361</td>
<td>1,250</td>
<td>---</td>
<td>1,792</td>
<td>688</td>
</tr>
<tr>
<td>Mailgrams</td>
<td>4,057</td>
<td>282</td>
<td>250</td>
<td>250</td>
<td>2,375</td>
</tr>
<tr>
<td>Telegrams</td>
<td>1,729</td>
<td>625</td>
<td>375</td>
<td>375</td>
<td>2,222</td>
</tr>
</tbody>
</table>

* Respondent volunteered cost information but did not list size of organization
Other Communications Techniques

The more esoteric communications services tend to be limited in use at the present time. Thus, TV Slow Scan and Private Microwave seem 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 Active organizations as well as Communications.

<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>100,000~200,000</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV Slow Scan</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Private Microwave</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>15</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*Respondent volunteered usage but did not indicate size of membership
### Usages of Communications Techniques

#### Purpose of Organization

<table>
<thead>
<tr>
<th>Purpose</th>
<th>TOTAL</th>
<th>Annual*</th>
<th>Social Communications</th>
<th>Educational</th>
<th>Clubs &amp; Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent</td>
<td>(207)</td>
<td>(9)</td>
<td>(22)</td>
<td>(33)</td>
<td>(17)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV Slow Scan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Private Microwave</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Average Costs of Communication Facilities

#### By Size of Membership

<table>
<thead>
<tr>
<th>Facility</th>
<th>TOTAL</th>
<th>Under 25,000</th>
<th>25,000-50,000</th>
<th>50,000-100,000</th>
<th>100,000-150,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent</td>
<td>(207)</td>
<td>(17)</td>
<td>(19)</td>
<td>(19)</td>
<td>(17)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV Slow Scan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Private Microwave</td>
<td>40,000</td>
<td>53,083</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>46,928</td>
<td>57,166</td>
<td>83,750</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 Communication Facilities

#### Purpose of Organization

<table>
<thead>
<tr>
<th>Purpose of Organization</th>
<th>Total (207)</th>
<th>Gale's Assn (100)</th>
<th>NCCB (23)</th>
<th>Public (43)</th>
<th>Public TV (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Added Cost</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Answer</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Social</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Educational</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Clubs &amp; Hobbies</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Employment</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>TV-Slow Scan</strong></td>
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<td>$0</td>
<td>$0</td>
</tr>
<tr>
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<td>40,000</td>
<td>1,625</td>
<td>78,025</td>
<td></td>
</tr>
<tr>
<td>Data Transmission</td>
<td>46,928</td>
<td>77,000</td>
<td>4,000</td>
<td>2,500</td>
<td>61,667</td>
</tr>
<tr>
<td><strong>Data Transmission</strong></td>
<td>46,928</td>
<td>77,000</td>
<td>4,000</td>
<td>2,500</td>
<td>61,667</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+ | No Total
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Services</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>3</td>
<td>19</td>
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<td>Cable TV</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Satellite</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Conference, Network</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
</tbody>
</table>

*Respondent indicated usage but did not indicate size of membership

### Usage of Communications Techniques

#### By Purpose of Organization

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>No Total</th>
<th>Answer</th>
<th>Social</th>
<th>Educational</th>
<th>Clubs &amp; Employ.</th>
<th>Mailing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Service</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cable TV</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Satellite</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Conference, Network</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</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 (9)</th>
<th>Social (22)</th>
<th>Educational (33)</th>
<th>Clubs &amp; Hobbies (17)</th>
<th>Employment (16)</th>
<th>TOTAL (207)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Services</td>
<td></td>
<td></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></td>
<td></td>
<td></td>
<td>$37,500</td>
</tr>
<tr>
<td>Cable TV</td>
<td>3,950</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,813</td>
</tr>
<tr>
<td>Satellite</td>
<td>5,625</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,062</td>
</tr>
<tr>
<td>Conferences, Network</td>
<td>1,062</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$375</td>
</tr>
<tr>
<td>Other</td>
<td>27,167</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>27,167</strong></td>
<td><strong>27,167</strong></td>
<td><strong>27,167</strong></td>
<td><strong>27,167</strong></td>
<td><strong>27,167</strong></td>
<td><strong>$17,167</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* (53)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Services</td>
<td>$37,500</td>
<td>$125</td>
<td>$1,813</td>
<td>$1,062</td>
<td>$37,500</td>
</tr>
<tr>
<td>TV Programming-Doc</td>
<td>$37,500</td>
<td>$4,625</td>
<td>$375</td>
<td>$375</td>
<td>$37,500</td>
</tr>
<tr>
<td>Cable TV</td>
<td>$3,188</td>
<td>$4,912</td>
<td>$125</td>
<td>$1,062</td>
<td>$6,250</td>
</tr>
<tr>
<td>Satellite</td>
<td>$5,625</td>
<td>$375</td>
<td>$375</td>
<td>$375</td>
<td>$8,750</td>
</tr>
<tr>
<td>Conferences, Network</td>
<td>$1,062</td>
<td>$1,750</td>
<td>$375</td>
<td>$375</td>
<td>$375</td>
</tr>
<tr>
<td>Other</td>
<td>$27,167</td>
<td>$27,167</td>
<td>$375</td>
<td>$375</td>
<td>$27,167</td>
</tr>
</tbody>
</table>

*Respondent volunteered cost information but did not list size of membership.
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 Telescopier second and telegram third. The 50-100,000 group chose Data Transmission second and National and Regional Meetings third. The organizations having 25-50,000 members were equally divided for second place between Telegram and Telex. 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>PRIORITY RANK SCORE OF COMMUNICATIONS SATELLITES USES</th>
<th>NUMBER OF MEMBERS</th>
<th>TOTAL</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>Long Distance- Phone</td>
<td>(101)</td>
<td>14</td>
<td>14</td>
<td>13</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Radio</td>
<td>(101)</td>
<td>14</td>
<td>14</td>
<td>01</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Television</td>
<td>(101)</td>
<td>11</td>
<td>13</td>
<td>03</td>
<td>09</td>
<td>07</td>
</tr>
<tr>
<td>Meetings-Net/Regional</td>
<td>(21)</td>
<td>10</td>
<td>11</td>
<td>08</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>(19)</td>
<td>08</td>
<td>08</td>
<td>05</td>
<td>15</td>
<td>08</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>(19)</td>
<td>07</td>
<td>06</td>
<td>05</td>
<td>01</td>
<td>04</td>
</tr>
<tr>
<td>Telegrams</td>
<td>(19)</td>
<td>06</td>
<td>07</td>
<td>06</td>
<td>01</td>
<td>04</td>
</tr>
<tr>
<td>Telex</td>
<td>(19)</td>
<td>04</td>
<td>06</td>
<td>11</td>
<td>06</td>
<td>04</td>
</tr>
<tr>
<td>Telexcopier</td>
<td>(19)</td>
<td>04</td>
<td>04</td>
<td>04</td>
<td>00</td>
<td>01</td>
</tr>
<tr>
<td>Telegram</td>
<td>(19)</td>
<td>04</td>
<td>03</td>
<td>11</td>
<td>08</td>
<td>09</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>(19)</td>
<td>04</td>
<td>02</td>
<td>00</td>
<td>00</td>
<td>01</td>
</tr>
<tr>
<td>TV Slow Scan</td>
<td>(19)</td>
<td>04</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
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 Actie 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 Telegram.

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>TOTAL</th>
<th>No Answer</th>
<th>Education Clubs &amp; Hobbies</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(207)</td>
<td>(9)</td>
<td>(22)</td>
<td>(17)</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>40</td>
<td>17</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>-Radio</td>
<td>14</td>
<td>3</td>
<td>6</td>
<td>27</td>
</tr>
<tr>
<td>Television</td>
<td>11</td>
<td>1</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Meetings/Meet/Regional</td>
<td>10</td>
<td>0</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Mailgrams</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Telex</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Telexoier</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Telecomer</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Telegram</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>TV Slow Scan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</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.

*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 Telephome 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 Mailgrams.

---

**PRIORITY RANK SCORE OF COMMUNICATIONS SATELLITES USED**

<table>
<thead>
<tr>
<th>NUMBER OF CHAPTERS</th>
<th>TOTAL</th>
<th>UNDER 20</th>
<th>20 - 49</th>
<th>50+</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
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<td>(207)</td>
<td>(39)</td>
<td>(11)</td>
<td>(55)</td>
<td>102</td>
</tr>
<tr>
<td>Long Distance - Phone</td>
<td>4.0</td>
<td>4.1</td>
<td>4.0</td>
<td>5.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Radio</td>
<td>0.3</td>
<td>0.5</td>
<td>0.0</td>
<td>0.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Television</td>
<td>1.1</td>
<td>1.0</td>
<td>0.8</td>
<td>0.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Meetings-Natl/Regional</td>
<td>1.0</td>
<td>1.0</td>
<td>1.1</td>
<td>1.3</td>
<td>0.6</td>
</tr>
<tr>
<td>Data Transmission</td>
<td>0.8</td>
<td>0.5</td>
<td>0.3</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>TV Closed Circuit</td>
<td>0.7</td>
<td>0.7</td>
<td>0.2</td>
<td>0.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Mailgrams</td>
<td>0.6</td>
<td>0.5</td>
<td>0.6</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Telex</td>
<td>0.6</td>
<td>0.5</td>
<td>0.6</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Telexmier</td>
<td>0.4</td>
<td>0.5</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Telegram</td>
<td>0.4</td>
<td>0.5</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Radio Closed Circuit</td>
<td>0.3</td>
<td>0.5</td>
<td>0.0</td>
<td>0.1</td>
<td>0.5</td>
</tr>
<tr>
<td>TV Slow Scan</td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</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." One 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>5 6%</td>
</tr>
<tr>
<td>Meetings &amp; Conferences</td>
<td>4</td>
<td>1 9%</td>
</tr>
<tr>
<td>Increased Communication</td>
<td>5</td>
<td>2 4%</td>
</tr>
<tr>
<td>Information to Rural Areas</td>
<td>3</td>
<td>1 4%</td>
</tr>
<tr>
<td>Networking</td>
<td>8</td>
<td>3 9%</td>
</tr>
<tr>
<td>Alternate News Coverage</td>
<td>1</td>
<td>0 5%</td>
</tr>
<tr>
<td>Cheaper, Faster Communication</td>
<td>3</td>
<td>1 4%</td>
</tr>
<tr>
<td>ISDN, Stereo</td>
<td>2</td>
<td>1 0%</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>
<tr>
<td></td>
<td>107</td>
<td>100 0%</td>
</tr>
</tbody>
</table>
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." (156)

"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-way programming for public experimentation and use. Library Access Massachusetts Open University Free School Instructional Television Health Services." (136)

"We already have two satellites of our own that we built. Both work just fine, and do our job well." (099)

Note: Numbers in parentheses indicate interview numbers.

"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 an 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." (038)

"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)
"Increased communications" (055)

"Would depend upon possibilities offered — our needs at that time of availability of cheaper and faster means of communications" (086)

"Intercontinental Public radio networks — Many languages or intercontinental and intracontinental public television" (045)

"Radio network planned for late 1976 start" (048)

"Stereo ISAC transmission" (043)

"Basic feature is immediate access to programs that are too timely for mail and too expensive for phone (line or dial) connections. Music quality ISAC would be nice for some programs. 5RE very adequate for most." (107)

"Conference calls" (094)

"Conduct national meetings by TV or Radio" (078)

"PBS OPS are currently negotiating for public broadcasting satellite system" (205)
<table>
<thead>
<tr>
<th>Source of List</th>
<th>Number Sent Out</th>
<th>Number Responded</th>
<th>Response Rate</th>
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<tr>
<td>Gale's Encyclopedia of Associations</td>
<td>897</td>
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<tr>
<td>National Citizens Committee For Broadcasting (NCCB)</td>
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<td>Educational Radio Stations</td>
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<td>Other</td>
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<tr>
<td>Don't Know (No Indication of Derivation of Respondent)</td>
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<td><strong>TOTAL</strong></td>
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<th>PURPOSE OF ORGANIZATION</th>
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<tr>
<td>Civic Affairs, Political Action, Voting</td>
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<td>Civil Defense, War, Veterans Organizations</td>
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<td>Communications, Media, P.R.</td>
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<td>Community Services, Social Welfare, Social Problems</td>
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<tr>
<td>Consumer Services</td>
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<tr>
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<td>Labor Unions, Employment</td>
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<tr>
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**TABLE 1**

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</table>

**Note:** Significant differences were observed for gender and income, with p-values < 0.05.
I Wolff, Edward A.
Public service communications satellite

TK 5104.2 .P75 U79 1977
/Wolff, Edward A./
Public service communications satellite
user requirements workshop

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