INTERCONNECTIONS
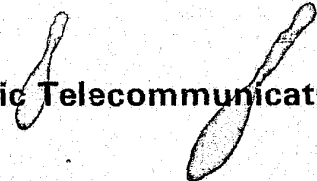
FOR NORTH CAROLINA AND BEYOND

The Report of the North Carolina Task Force on Public Telecommunications
To
Governor James B. Hunt, Jr.

INTERCONNECTIONS
For North Carolina And Beyond

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NORTH CAROLINA TASK FORCE
ON PUBLIC TELECOMMUNICATIONS

April 4, 1979

The Honorable James B. Hunt, Jr.
Governor of North Carolina
Raleigh, North Carolina

Dear Governor Hunt:

I am pleased to present to you INTERCONNECTIONS FOR NORTH
CAROLINA AND BEYOND, the report of the North Carolina Task Force
on Public Telecommunications.

In your Executive Order establishing this Task Force, you charged
it to recommend ways of harnessing modern telecommunications for
the benefit of all North Carolinians. From the beginning, it was
clear that assessing a state's entire telecommunications posture
is an impossible job, far too complex for a year's work. Yet,
unless such an assessment were begun, North Carolina would be ill-
prepared to take advantage of burgeoning new communications
technologies.

Fortunately, your vision of the necessity for such a study was
shared by two private foundations. The Mary Reynolds Babcock
Foundation awarded start-up funds, and major support followed
from the John and Mary R. Markle Foundation. The total of $84,052
was enhanced by a very strong commitment of time and energy from
public officials and concerned citizens across North Carolina.

Our comprehensive survey of a state's telecommunications facilities,
and of the services delivered via those facilities, was apparently
unique in 1978. Much attention has been focused on our efforts.
The National Telecommunications and Information Administration,
formed in the Department of Commerce after our study was underway,
appointed a special liaison to attend our meetings, observe our
progress, and provide professional advice as needed.

The title INTERCONNECTIONS FOR NORTH CAROLINA AND BEYOND stems
from variations on the interconnection theme observed throughout
the study period. Telephone, teleprocessing, broadcast and other
networks interconnect people with each other, and people with
information, throughout North Carolina and beyond. Public agencies
are -- or might be -- interconnected and thereby share in the use
of public facilities. Interconnections beyond the borders of this
state, by satellite communications, for example, are an increasingly
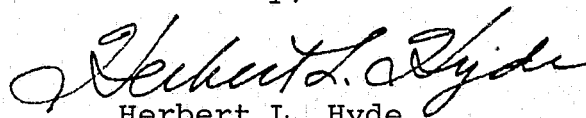important consideration.

Because some Task Force recommendations were intended for action during the 1979 session of the General Assembly, major portions of the recommendations were presented to you early this year. These and the other recommendations in this report share three general goals: (1) to promote coordination and cooperation in telecommunications activities so that they may be undertaken effectively and efficiently; (2) to sustain interest in examining forms of telecommunications, old and new, as a way of equalizing and improving citizen access to quality services; and (3) to maintain the means or, if necessary, establish the means, whereby North Carolina will have the needed information and flexibility to make sound decisions during the coming decade of explosive technological developments.

Our recommendations and this report fulfill the Task Force's responsibilities. Yet they constitute a beginning as well as an ending. In the future, quicker access to communications in emergencies could save lives. Video communications could allow residents of the most distant and rural areas of the state to tour the opening of the North Carolina Museum of Art in its new building. Citizens in every part of the state could listen to the proceedings of the General Assembly, or of their local school board, and thereby participate more directly in their government. Telecommunicated meetings of people in distant places could save energy, time and money.

We are grateful for the privilege of exploring the public telecommunications potential for North Carolina. This state can harness telecommunications for the economic, cultural, educational, social and, literally, physical welfare of its citizens. Under your leadership, the right course has been set toward interconnections of people with people, and of people with information. We are confident that this course will be followed into the excitement of the dawning telecommunications era.

Sincerely,

Herbert L. Hyde
Chairman

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SPECIAL THANKS

Dr. George Bair, Director of Educational Television at the University of North Carolina, and Elsie Brumback, Director of the Division of Educational Media of the Department of Public Instruction, gave distinguished service to the Task Force as representatives for Dr. William C. Friday and Dr. A. Craig Phillips, respectively, on those occasions when the members were unable to attend meetings.

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Introduction

The North Carolina Task Force on Public Telecommunications was created by Executive Order in February, 1978, to study, within a year, all aspects of the state's public telecommunications and to plan for their future development so that North Carolinians may derive maximum benefit at least cost from the rapid growth of telecommunications technologies. The study, supported chiefly by private foundation grants and carried out by a 23-member commission chaired by Herbert L. Hyde, included an inventory of facilities and personnel currently engaged in telecommunications; and interviews with about 200 public officials concerning the telecommunications-dependent services offered by their agencies.

Inventory

Telecommunications means transmitting signals (pictures, sound, data, etc.) from one place to another place, usually by electronic means. Two examples of large state-supported telecommunications systems are the state telephone network (DAIN) and the Highway Patrol's two-way radio system. Systems inventoried by the Task Force included telephone, teleprocessing (data communication), two-way radio, satellites, microwave, closed-circuit, cable, public radio broadcasting, and public television broadcasting, among others. More than 300 separate systems were identified.

Interviews

Through personal interviews, the Task Force found a variety of services offered via telecommunications. For instance, Wildlife law enforcement officials rely on two-way radio communications in the field. The General Assembly relies on teleprocessing for bill status reports. CARE-LINE, in the Department of Human Resources, uses telephones

and data banks to provide citizens with information. The Department of Public Instruction, through its Division of Educational Media, plans in-school programs to be broadcast by UNC-TV.

Problems and Solutions

Based on the evidence assembled, the Task Force determined that there are currently imbalances between facilities available and facilities needed to deliver services. These imbalances take several forms. Some facilities are underused because they were purchased or leased to serve one office which make only partial use of them. Other facilities are insufficient to the needs of the office for which they were obtained, so that some services go undelivered. Many facilities cannot be shared because they are incompatible. Substantial funds can be saved and services improved by redressing these imbalances.

During the eight-month period of the inventory and interviews, the Task Force heard more than 50 presentations about uses of telecommunications to deliver services within North Carolina and elsewhere. Also attending these meetings were personnel representing almost every department in state government. They were often surprised to learn what was going on in offices other than their own. Many of them were pleased to find out for the first time about new technologies and chances for coordination. This strongly suggested that the problems of imbalance could be redressed by more coherent planning and better understanding of new technologies.

Thus the Task Force reached two conclusions about how to achieve better balance between service needs and available facilities. One was that more cost-effective and efficient use of telecommunications systems would result if personnel in various offices were systematically informed about facilities and encouraged to share them. The second conclusion was that emerging technologies offer fresh opportunities to improve efficiency. New technologies will un-

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questionably continue to lead to displacement of current facilities. Satellites, for example, have the potential of providing for a wide range of communications needs and should become increasingly cost-effective during the next decade as users are aggregated across agencies and across states. Moreover, much of the technology for telecommunications is decreasing in price, following the pattern exemplified in an earlier decade by the shift from vacuum tube to transistor. Finally, comprehensive planning for the use of emerging systems can promote compatibility.

Based on these conclusions—that users can be aggregated and that new technologies offer a good chance to plan aggregation—the Task Force recommends two pieces of legislation as ways to save money while improving services through telecommunications. The Task Force has made a third major recommendation discussed later in this summary under public broadcasting.

APT

One piece of legislation creates the Age ncy for Public Telecommunications (APT). This agency will (1) advise public agencies on technological developments, available facilities, and opportunities for coordination; (2) operate a media center to produce materials that may be telecommunicated by cable, landlines, closed circuit, satellite, broadcast, microwave, or other distribution systems; and (3) support development of public radio.

$550,000 is requested for APT each year of the biennium, of which $125,000 is specifically for public radio.* After the first few years, only about $100,000 (plus an amount for radio) would appear as an annual request. This recurring appropriation would support APT's advisory function concerning all aspects of telecommunications planning, including two-way radio frequency coordination; digital systems for telephones and teleprocessing; satellite-sharing to decrease costs of communications; uses of cable to deliver public services; computer-assisted instruction; and other kinds of systems. The Task Force study documented at least $50 million being spent annually to operate the more than 300 separately operated, publicly supported telecommunications systems. The Task Force is therefore confident that substantial savings, many times the investment of $100,000, will be derived from focusing attention on improved coordination, greater compatibility, and more efficient uses of new technologies.

The bulk of the funds requested is to be used in the first year to begin to acquire facilities and to select personnel needed for the media production center. As APT begins to operate as a consolidated center for state government production needs, other agencies will contract for services and there will be income and support for APT from many state government departments. After three years,

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*Public radio and its role in APT are discussed later in this summary.

APT's annual request can be expected to support chiefly the Agency's advisory functions. Thus, the amount of money requested in state appropriations will progressively decrease to a level about one-fourth of the current request, and APT should become gradually self-supporting as to its production functions within a very few years. In fact, the APT production center should be discontinued unless it shows signs of becoming self-supporting within a very few years. The proposed legislation requires a report within three years, part of which will evaluate the merit of the media center.

From nearly the beginning, however, state appropriations for the media center can be counted on to result in substantial savings. Last year, more than $3.5 million was spent on media productions (for personnel, facilities and contracts) by general state government, exclusive of the University system. The Task Force found cameras tucked away in closets, tape recorders unused, and expensive, low-quality productions on contract with outside agencies. At the same time, the Task Force found many unmet needs. Among them: for video and audio tapes to be distributed to the schools; for information tapes teaching good home health practices which may help curtail rising medical costs; for advice on the most efficient ways to produce programs; and for alternative distribution technologies. With APT centralizing media facilities and personnel, other agencies' practices of buying materials on a piecemeal basis can be phased down with substantial savings to the taxpayer.

Department of Administration Statutes

A separate piece of legislation recommended by the Task Force will pull together currently fragmented statutes in the Department of Administration. While this legislation does not substantially change the Department's role, it defines and clarifies in modern terms the Department's traditional statutory responsibilities for operating and managing many state telecommunications systems. This legislation involves a request for $52,123 for each year to provide two additional technical staff members needed to get the job done. This amount can be more than offset by savings through coordinated planning, buying, and maintenance of telecommunications facilities.

One example of the coordination to be provided under the proposed legislation will help explain why technical staff should be added to the Department of Administration. Currently, there is no office in state government specifically assigned to coordinate all two-way radio frequencies used by state and local agencies. Although the Federal Communications Commission (FCC) *allocates* frequencies at both state and local levels, it uses the North Carolina Chapter of the Associated Public-Safety Communications Officers to help *coordinate* police radio frequencies. The FCC works with a different group for fire department frequencies. Neither the police nor the fire group is responsible for coordinating radio frequencies for Emergency Medical Ser-

vices, Wildlife, and so forth. This means that state and local agencies may sometimes be in competition for scarce frequencies from the FCC; that no one is responsible for planning across systems so that agents from different offices can communicate with each other during emergencies; and that the state loses the benefits of both the monetary savings and improved services that could be achieved by joint planning.

These statutory revisions clarify the responsibility of the Department of Administration to perform frequency coordination. An engineer employed under the funds requested would have, as one of his functions, the coordination of frequencies among the different agencies. This person would provide the engineering support that otherwise, and under current practices, would have to be contracted for at far greater expense. Note that frequency coordination represents only a small part of the long list of responsibilities for telecommunications planning and coordination, both as currently written and as revised (see GS 143-340).

The Legislative Package

The Task Force considers the two proposed pieces of legislation—APT and the Administration statutes revision—as a "package" enabling North Carolina to take maximum advantage of telecommunications developments at least cost, with the flexibility to respond to rapidly changing technologies. In this package, operational and management functions rest clearly with the Department of Administration, as they have in the past, except for the operation of the media production center, responsibility for which rests with the APT Board. This Board is to be composed of a broadly representative citizen group and of state officials heading departments with substantial telecommunications commitments, including the state's major educational agencies, the Department of Administration, and the General Assembly. The impact of APT's advisory functions should be great because of the integral participation of governmental leaders themselves in developing the advice. Top executives will be kept constantly informed of the effect of telecommunications on their operations and will therefore be more likely to emphasize telecommunications planning in their departments.

The APT Board will balance a concern for cost-effectiveness with a concern for improving services. It will use its advisory powers to focus attention on telecommunications as an efficient means of extending benefits to all citizens, especially underserved groups such as rural citizens and handicapped persons. The relationship envisioned between APT and the Department is one between advisor and implementer. The Department will continue to be responsible for planning and operations. Thus cooperation between the Department and APT is essential to the success of the proposed plan.

Re-evaluation of Task Force Recommendations

The APT legislation, in paragraph (12) of 143B-422.3, calls for a report to the Governor between two and three years after APT is established to determine how well the plan is working. The Task Force believes that, at the time of the re-evaluation, the merits of a separate Department of Telecommunications should be considered. Such a Department would have responsibility for telecommunications policy and management across state government. The Task Force did consider making this recommendation, but rejected the idea as premature or perhaps ultimately unnecessary. More experience is needed. The year-long Task Force study only scratched the surface of the state's far-flung and copious telecommunications activities. Information known to be missing will have to be dug out on a continuing basis by the APT staff as an essential part of the APT Board's advisory function. Thus, while the Task Force agreed that it was not appropriate to recommend concentrating telecommunications management in a separate state agency at this time, the possibility should be examined again in about three years. One source of information will be the experience of some industries and the federal government, for which telecommunications management is being centralized.

What the Task Force is proposing may suffice: structuring a telecommunications advisory system and centralizing media productions through APT; and clarifying management responsibilities through the Department of Administration. When the re-evaluation takes place, it may well be determined that no additional major changes are needed.

The Relationship of APT to Public Broadcasting

The Task Force considered public broadcasting and its relationship to other forms of public telecommunications. Two important premises underlie Task Force recommendations in this area. One is that, to paraphrase the Carnegie Commission's recent designation of public broadcasting as "a national treasure," public television and public radio should be viewed as state treasures and strongly supported. The second premise is that production and distribution facilities are required for the offering of many important services to the public, and that public agencies must have recourse to more avenues for both production and distribution than through public broadcasting alone.

While public broadcasters and state agencies can be mutually supportive, the state cannot and should not try to depend exclusively on public broadcasting licensees to deliver cultural, educational, and informational programs to the public. A broadcasting station, whether public or commercial, is like a newspaper, with First Amendment rights. The FCC holds broadcast licensees responsible for balanced programming and for operating "in the public convenience, interest and necessity." This means that requests for uses of public broadcasting facilities, personnel, or air time must be evaluated by the public broadcaster, no matter what his

sources of support are, in the context of the needs of his entire "community of license"—the people in the area reached by the transmitter for which he is licensed. Hundreds of requests a year from public agencies must be evaluated against hundreds of requests from various other worthy organizations and individuals, and all of these against national programming which also may be in the public interest to broadcast. Thus state and local agencies cannot and should not be able to count on public broadcasters alone to meet their media communications needs, however important.

Another reason for not relying exclusively on public broadcasting for public media services is that nonbroadcast technologies or commercial broadcasting also may be used to deliver services and will sometimes be preferable, depending on the objectives to be accomplished. There will be times when the ideal means of distributing a North Carolina history program will be to make enough videotapes to go around so that teachers will have them in their libraries to use when and as needed. There will be times when a message about upcoming weather and crops will best be delivered on local commercial radio stations in farm areas. There will be times when cable TV channels could be used—audio or visual channels—to distribute information to audiences interested in the proceedings of the General Assembly. (In fact, cable TV has recently been selected as part of the system for distributing the proceedings of the House of Representatives in Washington.) And there are other means of distribution—closed circuit, satellite, landlines among them—which might be chosen to fit the need.

Cooperation

The APT production center can supply the resources and flexibility enabling public agencies to meet media-related needs not met by public broadcasting. Each job to be done by a public agency seeking media services should be evaluated: How can the job be done most effectively? Least expensively? Are interactive (two-way) telecommunications called for? There is every reason and opportunity for cooperation between public broadcasting and the APT facility. The public broadcaster will continue to choose to undertake particular projects for which public broadcasting is the appropriate producer and distributor. Moreover, the APT facility will be available to public broadcasters as well as to other public agencies, as a regular part of APT's receipts-based operation.

The different missions of public broadcasters and the APT production center will mean negligible overlapping. The former will produce and broadcast either public television programs or public radio programs designed to satisfy the audiences in their "communities of service." APT will offer a wide variety of products—tapes, both audio and video; closed circuit interactive teleconferences; instructional or informational programs; computer-assisted instructional materials—and employ a wide variety of distribution systems to reach various target groups. And the APT production center will be in business for the express purpose of responding to the media needs of public agencies, without the competing responsibilities of a broadcast licensee. The largest users of public media traditionally have been the educators. The three Task Force members representing the state's major educational systems supported the workability of this cooperative arrangement.

Support of Public Broadcasting

As asserted earlier, the Task Force concluded that public broadcasting is a state treasure meriting not only continued but expanded state support. The nature of the support has to be worked out differently for public television and public radio. There are two public television licensees in the state: the University of North Carolina Board of Governors, licensed to operate UNC-TV, a statewide television network; and the Charlotte-Mecklenburg Board of Education, which operates WTVI, Channel 42. By way of contrast with the statewide nature of UNC-TV, public radio has had no statewide voice, though it has attracted interest in the General Assembly. The Task Force brought together the non-commercial radio broadcasters in North Carolina for the first time at a meeting in June, 1978.

Public Television

The Task Force approached its study of the University of North Carolina Television Network in the wake of a General Assembly appropriation to extend the reach of the Network's signal to parts of the state not currently reached, or reached with a poor signal. This commitment by the State Legislature was interpreted as a sign of its continuing recognition of the value of North Carolina's publicly supported statewide television network. At the same time, the Task Force came to realize that the dollar commitment to public television has been small in North Carolina relative to that in other states. While North Carolina state funds comprise $2.97 million of the total annual UNC-TV budget, Nebraska provides $4 million of the total in funding for its educational television system; Pennsylvania provides $6.5 million; and South Carolina provides $8.7 million. These amounts become doubly significant when it is remembered that federal funds are available on a matching basis. Moreover, of UNC-TV's total $3.7 million budget, most funds must go for operations, engineering, and for the purchase of national programs, so that relatively little is left for local North Carolina productions. It was further recognized that there is a danger that the importance of public television may tend to be overlooked when its operating budget is one small part of the entire budget of a major university system. Finally, UNC-TV's own management led the Task Force to understand that the Network has aspirations beyond its current means. One area of development discussed by the

Task Force, for example, was the need for more North Carolina news programs.

A way of solving these problems was suggested by the member of the Task Force closest to the matter, UNC President William C. Friday, who proposed that there be established a special Board of Trustees for UNC-TV, to operate in much the manner of the Board for Memorial Hospital. This new Board would become an advocate for University Television, giving it more visibility and promoting its welfare and progress. The Task Force unanimously endorsed President Friday's proposal, and it is understood that the Board of Governors will present legislation to establish the new Board of Trustees for UNC-TV.

As to the Charlotte station, the Task Force followed the suggestion of another of its members, Carrie Winter, who also is a member of the Charlotte-Mecklenburg Board of Education, licensee for the station. She asked that means of cooperation be sought between independent WTVI, Channel 42, and WUNG, Channel 58 of the UNC-TV Network. These neighboring transmitters currently carry many of the same PBS programs in the evenings, though daytime school programs are often different. The UNC-TV statewide signal strengthening plan calls for upgrading the WUNG transmitter; WTVI's transmitter needs replacement. WTVI has production facilities and a studio; WUNG has none in the Charlotte area. The Task Force has gone on record as suggesting that the Network management and new UNC-TV Board work with the Channel 42 licensee to see whether some sort of agreement between the two could lead to better services at reduced costs to Charlotte taxpayers, with a possible single licensee serving as a model for the state in offering local as well as statewide public television services.

Public Radio

About thirty stations were represented at the June, 1978, Task Force meeting on public radio. These included stations licensed to campuses in the University system; stations licensed to private educational institutions; and stations licensed to private nonprofit community boards. Three stations were members of National Public Radio (NPR), meaning that they meet certain facility and personnel requirements enabling them to qualify for participation in NPR's national program services. The others ranged from fairly large stations with NPR aspirations to small ones serving student needs and interests.

One of the panelists at the June radio meeting was Task Force member and State Representative William McMillan, who announced during the meeting that he had just introduced a bill to fund consideration of public radio *networking*. In the discussion that followed, public radio professionals emphasized that FCC licensing is based on *local* service and that networking should be considered only as an interconnection of independently operated local sta-

tions, which should continue to produce and broadcast programs for their respective local "communities of interest." Representative McMillan explained that his interest was in seeing that North Carolinians across the state have access to the benefits of public radio, including access to NPR programs now available only in the areas where the three current NPR-member stations are located.

Following the June meeting, a Radio Advisory Committee, chaired by UNC-CH Professor Wesley Wallace, was appointed. The Committee had the joint duties of (1) advising the Task Force about public radio; and (2) preparing a report for the University to present to the General Assembly, under the terms of the McMillan-sponsored $125,000 appropriation to the Board of Governors to study and plan for public radio in North Carolina. The Task Force heard from Professor Wallace and others associated with the Radio Advisory Committee on a number of occasions. The report of that group is summarized in Appendix H. It includes an engineering study recommending an orderly process for adding and upgrading public radio stations across the state. An important underlying assumption was to build, where possible, on existing stations. The report also provides for these independently licensed FCC stations to share programs and operate sometimes on an interconnected basis.

The Task Force stipulated, in the proposed legislation creating APT, that a Radio Committee be established to advise the APT Board on disbursing state funds for the development of public radio across the state. The chairman of the Radio Advisory Committee is to be a voting ex officio member of the APT Board. Funding requested in support of public radio, through APT, is $125,000 for 1979-80. In addition, funds remaining from the $125,000 for the radio study are requested to be transferred from the Board of Govern 's to the APT Board, and designated for public radio development.

Security, Privacy, and Access

Individual liberties may be threatened by some applications of telecommunications. For example, the capacity to gather, store and retrieve health information by teleprocessing carries both the possibility for better health care, through fuller and better organized information, and the violation of privacy if such information is misused. While some assert that information stored by computer can be better protected than information in file drawers, important questions remain as to who should have access to what information and when that access is in the public interest.

Following lengthy study, the Department of Crime Control and Public Safety is proposing to establish a group to study the problems of privacy and freedom of information. The Task Force on Public Telecommunications endorses in principle the establishment of this commission.

The Future

Members of the Task Force, mindful that the public is demanding a lean, effective, and accountable government, believe that the legislative package creating APT and updating Department of Administration telecommunications statutes will save money. The millions spent annually on production services, personnel, and contracts can be reorganized for greater efficiency, thus reducing costs while allowing improved services. Fragmented expenditures in other areas should also become consolidated, and costs should decline because state government will be looking at telecommunications operations as a whole rather than as a collection of parts. The Task Force itself, though only a temporary enterprise, has sparked interest among state personnel in economizing: various agencies consulted with members and staff for help in making the most economical use of their telecommunications systems. The legislative package is a direct result of Task Force members' desire to put into place a continuing means to save money in telecommunications.

There are other benefits as well. U.S. Representative Charles Rose, a Vice Chairman of the Task Force, asserts that telecommunications can bring people closer to each other and help citizens to participate more actively in their government. One example: the proceedings of the General Assembly (and of local school boards, city councils and other governmental bodies) could be made available regularly to North Carolinians in their homes. Another: public hearings by teleconferencing could facilitate participation by citizens living in remote areas. The possibilities of reaching people through telecommunications—and of having them reach back—are nearly limitless.

· The Task Force members have been privileged to explore the public telecommunications potential for North Carolina and to make recommendations for developing that potential. Many hours have been devoted during the past year to hearing and seeing demonstrations, studying materials, and conducting interviews. From this experience, members have come to understand the dramatic impact changes in telecommunications are bound to have on our society, an impact far more dramatic than that associated with the introduction of television. The Task Force recommendations are stated in the pragmatic language of economies to be gained and services to be performed, as they should be. Let not such plain talk veil the excitement foreseen through the harnessing of modern telecommunications for the future of this state.

CHAPTER I:
Introduction

The North Carolina Task Force on Public Telecommunications came into existence on February 14, 1978, as a response to numerous state and national developments in telecommunications. 1977 had been a year of profound change in telecommunications technology, marketing, legislation, and regulation. The Task Force was created to advise North Carolinians about opportunities to achieve the full benefits of modern public telecommunications technology within this shifting framework.

BACKGROUND

Technological Developments

Telecommunications has traditionally been defined as electronic communications over long distances employing such means as television, radio, telephone and remote data processing (teleprocessing). What had been a workable definition in the past has become increasingly complicated in recent years, as telecommunications technologies have blended into one another, and newer technologies have begun to appear. While some new technologies were *emerging*, others were *merging*. Optical fibers provide a good example: these glass fibers, which carry information in the form of light pulses, will probably replace telephone cables in many areas within the next dozen years and will make possible the introduction of a wide range of data, audio, and video signals to the home. The blurring of traditional distinctions between the various telecommunications methods is a crucial reason for basing telecommunications planning on a unified view rather than on narrower portions of the overall picture.

Satellite communication is an example of a new technology that not only can improve the delivery of existing services, but also can increase opportunities for human interaction over long distances. In 1977, the Corporation for Public Broadcasting (CPB) and the Public Broadcasting System (PBS) agreed to use satellite distribution as a replacement for the leasing of conventional telephone lines. This change is expected to result in reduced costs, better technical quality, and increased opportunity for programs selectivity by local stations. By 1980, when station members of National Public Radio (NPR) join the satellite distribution system, simultaneous radio/television broadcasts in stereo or even quadraphonic sound will become available. Farther ahead is the likelihood of data and text transmission services entering homes via satellite (as is already happening by cable), and of an exponential growth in programming choices through direct broadcast-to-home satellite capabilities. Satellites also offer unique opportunities for public/government interaction. On April 15, 1977, a videoconference between U.S. Representative and Task Force Member Charles Rose and citizens in Raeford, North Carolina, demonstrated the feasibility of using satellites and two-way television as a means of increasing public involvement in government.

Such technological developments as packet switching, text transmission, video disks, and miniaturization of component parts in all telecommunications systems are expected to influence our lives in the next decade. Even when these developments are only in the planning stages, they have an impact on business marketing decisions and ultimately on society itself. These marketing decisions affect and are strongly affected by governmental action: regulation, legislation, and policy making. Planning, therefore, cannot be viewed in a vacuum but rather in relation to the broad economic and political currents affecting public telecommunications law, regulation, and policy.

The National Scene

In response to these many developments, a number of legislative, regulatory, and administrative movements took shape at the national level during 1977. Option papers were

prepared in the U.S. House of Representatives for the rewrite of the 1934 Communications Act, in a legislative attempt to reflect the major social, economic, and technological changes over the past decades. Many of the proposed reforms contained serious implications for regulation of the telephone industry, public and commercial broadcasting, and teleprocessing. One proposal would in effect have put the Federal Communications Commission (FCC) out of business. The 1968 Public Broadcasting Act was also being rewritten to reflect the many new telecommunications technologies used, in addition to broadcasting, to distribute public programming. A use tax assessed against commercial broadcasters has been under consideration as a means of funding public broadcasting.

Changes in regulations and Congressional rewrites have not been the only forces acting to alter the national telecommunications picture. Many federal telecommunications policy functions which had previously been dispersed—some in the White House Office of Telecommunications Policy, others in Commerce's Office of Telecommunications, and still others in various agencies such as the Defense Department, HEW, and NASA—were brought together to ensure greater coordination in telecommunications planning. The Carter administration closed down the White House office and created a new agency, the National Telecommunications and Information Administration (NTIA) in the Department of Commerce, to coordinate planning and policy. Henry Geller, NTIA Administrator and Assistant Secretary of Commerce, has worked closely with the Task Force, both by addressing the group in October, 1978, and by designating a special liaison from NTIA to the North Carolina research effort.

Other Movements

Various public and private groups were also emphasizing telecommunications. In June, 1977, the Carnegie Corporation of New York announced the formation of a commission to study the future of public broadcasting in light of technological, social, administrative and legal changes. "Carnegie Commission II" was a follow-up to an earlier study on the role of public broadcasting and made far-reaching recommendations in early 1979. (One of the second Carnegie Commission's members, Eli Evans of the Revson Foundation, was also a Task Force member.) In the past few years, national conferences were being held, organizations were being formed, and previously fragmented groups were realigning as part of a growing realization that the old pigeonholes—telephone experts, broadcasting specialists, data processing managers, public safety two-way radio communicators, and so on—would not be adequate for the problems and opportunities for the 1980's, nor even for the late 1970's. The need for unified approaches, for cooperative efforts, was clear.

One such conference was held at the Goddard Space Center near Washington, D.C., in the spring of 1977 under the co-sponsorship of the National Governors' Conference and the White House Office of Telecommunications Policy, among other groups. The Conference on Federal/State/Local Telecommunications, although only one of many similar meetings held throughout the United States, was instrumental in bringing to the attention of various North Carolina state government officials and policy advisors the need for a unified effort at telecommunications planning. This one conference dealt with a full range of telecommunications issues, including public broadcasting, 911 implementation, radio frequency management, emergency needs for public safety, and the complex web of relations between state/federal and state/local telecommunications. Various approaches were discussed as a means of simplifying the complicated structure which had developed over decades of technological growth, including the sharing of talent, expertise, software, and hardware in ways that could lead to more economical and more effective uses of telecommunications systems.

The North Carolina Picture

The telecommunications picture in North Carolina in 1977 naturally reflected national patterns of fragmentation and separation, in the way technology had developed, the way business had grown up, and the way laws and regulations had been written. A number of different agencies in general state government and the University system operated sometimes overlapping portions of the overall telecommunications system in North Carolina.

The Communications Office in the Department of Administration had major responsibility for the state's telephone service and for consultation to other departments for making recommendations on systems (including two-way radio, data transmission, and microwave) for cost estimates, technical specifications, and compliance with FCC requirements. Additionally, the Communications Officer was responsible for investigating and developing new communications systems utilizing emerging technologies.

The Management Systems Division in the Department of Administration was charged with responsibility for automated data processing in state government, performing such functions as (1) planning, coordination, and training; (2) applications and systems development; and (3) operation of the State Computer Center (SCC). Some offices of state government were served by the SCC, while others had their own "host computers." Each office was purchasing its own communications-related equipment, especially for teleprocessing, without achieving the potential economies and efficiencies to be gained from shared utilization.

Public safety communications functions were distributed among various offices of state government. The statutory responsibilities of the Departments of Administration (DOA) and of Crime Control and Public Safety (CCPS) were refined in a memorandum of agreement concerning the two departments' roles. CCPS was delegated

responsibility for planning emergency and public-safety communications. Overall coordination and planning, research, development and policy, and other general communications responsibilities were retained by DOA. Not all public safety communications systems, however, are located in CCPS. Natural Resources and Community Development's Forestry and Wildlife Divisions operate separate major radio systems; Human Resources' Emergency Medical Services Offices has facilities and consultative resources for medical public safety applications; and the Department of Justice operates a Police Information Network.

Public broadcasting is another telecommunications interest of the state. The seed for the establishment of a statewide public television network in North Carolina was the FCC licensing in 1954 of the "Consolidated University of North Carolina" to operate Channel 4 in Chapel Hill, with production studios on each of the member campuses (Chapel Hill, Greensboro, and Raleigh). The General Assembly gave birth to the concept of a statewide network when, in 1963, it made a special appropriation of $250,000 for operations and $1,250,000 for facilities to develop a "State-wide educational television program." Between then and 1977, UNC-TV, licensed to the Board of Governors of the 16-campus system, added seven transmitters and a central Network staff, operating on funds allocated through the budget for General Administration and headed by the Director of Educational Television for North Carolina. Funds for the three campus studios were channeled through the respective campus budgets.

The 1963 appropriation to establish a network was the result of recommendations made by a Study Commission established by then-Governor Terry Sanford. There has been no statewide study of public television in North Carolina since. Interest in UNC-TV, however, has by no means diminished. An effort to set up a commission to study various aspects of public television in North Carolina failed in the 1977 General Assembly, partially because legislators may have felt that such a study would constitute interference with the internal operations of the University of North Carolina, in violation of legislation according the University the prerogative to set its own priorities. In the summer of 1977, a Select Committee on Educational Television, chaired by Representative Liston Ramsey, was appointed by the Speaker of the Houe, Carl Stewart. The Ramsey Committee was restricted to the technical requirements that would enable UNC-TV's signal to reach all areas of the state. At the subsequent Ramsey Committee hearings, Department of Public Instruction personnel presented lists of schools which had inadequate or no reception of the daytime educational broadcasts over UNC-TV. The Ramsey Committee report, issued in April, 1978, resulted in capital appropriations of some $5.8 million for additional transmitters, translators, microwave systems, and other broadcasting equipment necessary to extend and improve UNC-TV reception throughout the state.

Efforts to develop a public radio network in North Carolina, using some of the UNC-TV transmitters, had begun as early as 1975. Representative William McMillan and others interested in a North Carolina public radio network wanted to assure that public radio would be available throughout the state. A related issue which received some attention in 1977 was the potential use of subsidiary communications authorization signals (SCA's) to provide a variety of services, especially radio reading programs to the blind and print-handicapped. Several conferences of commercial and public broadcasters, along with state personnel, were held to explore the possibilities of establishing SCA services in North Carolina. Legislative interest in public radio in 1978 resulted in the assignment of $125,000 of the $5.8 million appropriated for UNC-TV signal expansion to a study of public radio.

Governor James B. Hunt, Jr., had demonstrated his interest in telecommunications policy and planning early in 1976 when, as Lieutenant Governor, he sponsored a Conference on Television in Raleigh. National and North Carolina broadcasting representatives explored the public's concerns for improving the quality of programming, especially for children. As Governor, Mr. Hunt has expressed interest in harnessing the potential of telecommunications for delivering various educational services.

Other activities were influencing North Carolina's telecommunications during this period. Cable television underwent rapid growth. The Appalachian Educational Satellite Project and the Rural Renaissance Project demonstrated the role that the innovative application of telecommunications could play in extending educational and cultural programs to remote parts of the state. Money to support new telecommunications facilities was being requested by a wide array of state government offices, and the potential benefits of a coordinated state effort were becoming evident.

ESTABLISHMENT OF THE TASK FORCE

To take advantage of the special opportunities made available by telecommunications, and to forge a coherent approach to telecommunications planning, Governor Hunt issued Executive Order Number 18 (see Appendix A) on February 14, 1978, appointing 23 selected citizens to the North Carolina Task Force on Public Telecommunications. Many of the members represented various interests of the general public; others brought special skills and experience in telecommunications applications, law, and technology; still others had official duties which were important in the continuing oversight of telecommunications practices and policies.

The Executive Order instructed members:

(1) To study existing state telecommunications facilities and the services they deliver, and identify telecommunications needs.

(2) To study telecommunications costs in relation to current services, including exploration of potential monetary savings through greater interagency coopera-

tion and improved liaison with federal agencies which can provide financial and technical telecommunications assistance.

(3) To study, evaluate, and inform state agencies about new telecommunications technologies and the services they can deliver, with special emphasis on cost reduction and the improvement of services to the people.

(4) To consider how citizens' rights can best be provided for in the telecommunications activities of the State, including the right to privacy, the right of public access to facilities and services, and the right of public participation in policy making.

(5) To write a report, for delivery to the Governor, recommending administrative, legislative, and regulatory modifications necessary to assure that the citizens of the State receive their full share of the benefits of modern public telecommunications technology.

Beginning the Study

Operating with a start-up grant of $4,375 from the Mary Reynolds Babcock Foundation, the Task Force began to devise a means for approaching its telecommunications study. When major funding in the amount of $82,677 was granted by the John and Mary R. Markle Foundation, the Task Force was ready to move ahead with an overall plan.

The Task Force divided itself into four "panels." Each panel investigated a portion of the telecommunications field: Panel I studied public services delivery; Panel II, laws and regulations; Panel III, the state's facilities and systems; and Panel IV, emerging technologies. Because of the conviction that telecommunications technologies are but a means of delivering services, special emphasis was given to the first panel. Panel I was divided into five committees dealing with specific categories of public services: (1) educational, cultural, and information services; (2) health and social services; (3) public safety services; (4) government operations; and (5) services furthering public/government interaction. The panels gathered information in a variety of ways. Presentations to the Task Force at monthly meetings dealt with a wide array of telecommunications-related subjects. Public services delivery information was gathered primarily through personal interviews conducted by members with over 100 state government officials. Facilities data were collected both through interviews and written survey forms.

The panel and committee structure served the Task Force well. This research design (detailed in Appendix B) provided an effective format for studying telecommunications and ultimately for the organization of this report. Thus, the next chapter reports Task Force findings relating to public services in the five service categories; Chapter III reviews telecommunications laws and regulations; Chapter IV inventories facilities; and Chapter V looks toward telecommunications on the horizon. The final chapter presents the conclusions of the study and Task Force recommendations aimed at harnessing the telecommunications potential for the benefit of the citizens of North Carolina.

A CHRONOLOGY OF EVENTS

January 31, 1978
Notification received of Task Force start-up grant of $4,375 from the Mary Reynolds Babcock Foundation.

February 14, 1978
Executive Order Number 18 by Governor James B. Hunt, Jr., establishing the Task Force.

February 17, 1978
First Task Force meeting. Presentations by:
Honorable James B. Hunt, Jr., Governor of North Carolina, charge to the Task Force and award of commissions to members.
Honorable Joseph W. Grimsley, Secretary of Administration, on state telecommunications systems and management.
Dr. William Lucas, then of Rand Corporation and now Asciate Administrator for Telecommunications Applications, National Telecommunications and Information Administration, Washington, D.C., on innovative uses of telecommunications for services delivery.
Dr. Harold Morse, Director, Education Division, Appalachian Regional Commission, on the Appalachian Education Satellite Project.

March 17, 1978
Second Task Force meeting. Presentations by:
Honorable Charles G. Rose, III, Member of the United States House of Representatives and Task Force Vice-Chairman, on federal/state telecommunications concerns and uses of telecommunications for public/government interaction.
Frank Leatherman, Communications Officer, Department of Administration, on existing state telecommunications systems and new technologies.
Robert Johns, Director, Management Systems Division, Department of Administration,

on state teleprocessing operations.

April 21, 1978
Third Task Force meeting. Presentations by:
Dr. Joseph B. Carter, Director of Educational Resources, Department of Community Colleges, on the telecommunications programming needs of the community colleges.
Harold Greene, Staff Director, Criminal Justice Information System, Department of Crime Control and Public Safety, on the current and planned CJIS system.
Plan of operation for Task Force study approved by members.

April 28, 1978
Notification received of $82,677 grant in support of the Task Force from the John and Mary R. Markle Foundation.

May 19, 1978
Fourth Task Force meeting. Presentations by:
J. S. Grimes, III, Director, CARE-LINE Information and Referral Service, Department of Human Resources, on health and social service information systems.
Dr. Maxine Rockoff, then of the Department of Health, Education, and Welfare, later of the Department of Energy, Washington, D.C., on telemedicine.

June 9, 1978
Conference on Public/Educational Radio sponsored by the Task Force Panel on Cultural, Educational, and Information Services. Presentations by:
Julian Burroughs, Director of Radio, WFDD-FM, Wake Forest University, Winston-Salem; John Cameron, Educational Broadcast Facilities, Department of Health, Education, and Welfare, Washington, D.C.; Joseph Ross, Director, Com-

munications Center and WFSS-FM, Fayetteville State University, Fayetteville; all on "Local Stations."
Mary Dinota, Educational Broadcast Facilities, Department of Health, Education, and Welfare, Washington, D.C.; Nathaniel Fullwood, Policy Advisor on Higher Education and the Handicapped, Department of Administration; Gary Shivers, Director of Radio, WUNC-FM, Chapel Hill; all on "Programming."
Sam Holt, Public Broadcasting, Washington, D.C.; Valeria Lee, Station Manager, WVSP-FM, Warrenton; Alan McIntyre, Director of Engineering, University of North Carolina Television Network, Chapel Hill; all on "National Affiliations, State Networking, and Local Options."

June 19, 1978
Fifth Task Force meeting. Presentations by:
Elsie Brumback, Reta Richardson, and Johnny Shaver, of the Division of Educational Media, Department of Public Instruction, on school use of instructional television and computer-assisted instruction.
Ronald Bradshaw, of the Western Regional Educational Center, Canton, on a proposed multi-county teleprocessing system for computer-assisted instruction and management data applications.
Jack Binns, Administrator, Florida Department of Education, on Instructional Television Fixed Services (ITFS).

August 24-25, 1978
Sixth Task Force meeting. Presentations by:
Dr. Leroy B. Martin, Jr., Assistant Provost for University Computing, North Carolina State University at Raleigh, on "Development of Today's University Computing Facilities."

Dr. Leland H. Williams, Executive Director, Triangle Universities Computation Center (TUCC), on "TUCC As It Is Today."

Louis Parker, Executive Director, North Carolina Educational Computing Services (NCECS), on "The North Carolina Educational Computing Service."

Erwin Danziger, Director of Administrative Data Processing, University of North Carolina at Chapel Hill, on "University Administrative Data Processing Using Telecommunications."

Dr. Wesley Wallace, et al., on the preliminary report of the Task Force's Special Advisory Committee on Public Radio.

Dr. George Bair, Director of Educational Television, University of North Carolina, on the University of North Carolina Television Network.

Dr. Ron Hull, Assistant General Manager for Programming, Nebraska Educational Television Network, on the Nebraska ETV Network.

Henry Cauthen, President and General Manager, South Carolina Television Commission, on public broadcasting in South Carolina.

David Leonard, General Manager, Pennsylvania Public Television Network, on public television in Pennsylvania.

Paul Marion, General Manager, WTVI, Channel 42, Charlotte, and Dona Lee Davenport, Executive Director of WTVI, Inc., Charlotte, on public television in Charlotte.

Donald Luzius, U.S. Coast Guard, on ICSAR.

Frank Adams, National Association for Search and Rescue, on "The Concept of Operations for the Emergency Response Communications Program."

Rex McKinnon, ICSAR, on capabilities desired in a public service satellite.

David Kelley, Assistant Secretary of Crime Control and Public Safety, on public safety communications in North Carolina.

Cliff Blalock, Radio Communications Engineer, Division of Civil Preparedness, Department of Crime Control and Public Safety, on emergency communications systems.

Colonel Larry Butera, U.S. Air Force, on the Air Force Search and Rescue Coordination Center.

Presentation of the report of the "Brumback Committee." Recommendation for new board for UNC-TV approved.

September 15, 1978

Seventh Task Force meeting. Presentations by:

Honorable Joseph W. Grimsley, Secretary of Administration, on management of state government telecommunications.

Dr. John McCain, Chairman, Committee on Communications, North Carolina Medical Society, on needs for health programming and alternative means of distribution.

Frank Gray, Associate General Counsel, North Carolina League of Municipalities; Lee Wallenhaupt, President, Summit Cable Company; Brian McMurray, North Carolina Cable Association; Bruce Owen, Professor of Law and Business Administration, Duke University; Sharon Briley, Attorney, Federal Communications Commission, Wash-

October 16, 1978: Task Force members, staff and advisors, and members of the general public meet in the Governor's Press Conference Room, Department of Administration, Raleigh, to discuss the Task Force's recommendation concerning the University of North Carolina Television Network.

ington, D.C.; all on cable tele-
vision/state relationships.
Preliminary recommendations pre-
sented by Task Force members.

October 16, 1978
Eighth Task Force meeting. Dis-
cussion of public television in
North Carolina and related mat-
ters. Presentation of members'
recommendations concerning pub-
lic broadcasting. Naming of the
"Brumback Subcommittee" to
study alternative proposals and de-
velop comprehensive recommen-
dation.

October 26-27, 1978
Ninth Task Force meeting, includ-
ing regional hearings for the South-
east Conference on Emergency Re-
sponse Communications (ERC);
sponsorship of the ERC Confer-
ence by the Task Force, the De-
partment of Crime Control and
Public Safety, and the Interagency
Committee on Search and Rescue
(ICSAR) Working Group. Pre-
sentations by:
   Major Raymond J. Hufnagel,
   ICSAR Working Group Chair-
   man, on the Emergency Re-
   sponse Communications Pro-
   gram.
   Henry Geller, Administrator,
   National Telecommunications
   and Information Administra-
   tion (NTIA); U.S. Representa-
   tive Charles Rose, Task Force
   Vice-Chairman;   Dr. William
   Lucas, Deputy Assistant Direc-
   tor for Applications, NTIA;
   Herbert Hyde, Chairman of the

Task Force; Joseph W. Grims-
ley, Secretary of Administra-
tion; David Kelly, Assistant
Secretary of Crime Control and
Public Safety; Ben Bemis, Na-
tional Aeronautics and Space
Administration; and others, all
participating in a radio-satellite
demonstration linking Raleigh
and Washington, D.C.
Henry Geller, Administrator,
NTIA, on public service satel-
lite utilization; and on federal
developments in telecommuni-
cations.

November 15, 1978
Tenth Task Force meeting. Fur-
ther discussion of Task Force
members' recommendations. Com-
mittee appointed to develop con-
sensus recommendations concern-
ing proposed state agency for pub-
lic telecommunications and revi-
sion of Department of Adminis-
tration telecommunications stat-
utes.

December 16, 1978
Eleventh Task Force meeting. Dis-
cussion of revised plans for pro-
posed state agency for public tele-
communications and updating of
Department of Administration
telecommunications statutes. Dis-
cussion of draft of final report
from the Advisory Committee on
Public Radio, as presented by
Radio Committee member Gary
Shivers (for Committee Chairman
Wallace).

January 24, 1979
Twelfth Task Force meeting. Ap-
proval of final lanaguage of rec-
ommendations and proposed stat-
utes for Agency for Public Tele-
communications (APT) and for
Department of Administration.
Twenty-one suggestions to the
Task Force are transmitted by
vote of the members to the APT
Board for consideration. Five
additional proposals are transmit-
ted to the new UNC-TV Board
of Trustees for consideration.
Endorsement in principle of a
Privacy and Freedom of Infor-
mation Commission.

February 5, 1979
Receipt of Advisory Committee
on Public Radio final report, in-
cluding engineering study.

April 4, 1979
Final Task Force meeting fol-
lowed by lunch at Governor's
Mansion. Approval of final report
of the Task Force, *Interconnec-
tions for North Carolina and
Beyond.*

April 13, 1979
Satellite videoconference. Tele-
communications experts in Wash-
ington, D.C., linked to General
Assembly members in Raleigh in
demonstration arranged by Task
Force for the Joint Appropria-
tions Committee.

A **high point** of the Task Force's year of research was the visit to Raleigh by National Telecommunications and Information Administration head Henry Geller, Assistant Secretary of the U.S. Department of Commerce. Chairman Herbert Hyde of the Task Force and Mr. Geller confer during the October 1978 radio-satellite demonstration.

CHAPTER II:
Public Services and Telecommunications

INTRODUCTION

Public services are at the heart of the Task Force Study. Governor Hunt's Executive Order establishing the Task Force required that facilities be studied in light of the services they deliver; that costs be studied "in relation to current services"; that new telecommunications technologies be studied "with special emphasis on cost reduction and the improvement of services to the people"; that protection of rights be considered, including "the right of public access to facilities and services"; and that the Task Force seek ways to assure that North Carolinians "receive their full share of the benefits of modern public telecommunications technology."

Accordingly, the Task Force approached its work with the view that telecommunications technology is a tool, a means to an end. The services orientation of the Task Force study is evident in the interviews with over 100 state officials and others involved in the delivery of public services. Every member of the Task Force participated in the interviews to assure that final recommendations would reflect an understanding of government's role in providing services to the people.

As discussed in Chapter I, services were categorized as follows: (1) cultural, educational, and information services (Chapter II-A); (2) health and social services (Chapter II-B); (3) public safety services (Chapter II-C); (4) government operations (Chapter II-D); and (5) services involving public/government interaction (Chapter II-E). Interviewees and agencies were assigned to one of these five service categories largely on the basis of state government organization. Inevitably, however, many categorizing decisions were arbitrary because an office could be classified more than one way.

In the end, the interviews were valuable for the exchange of information as well as for the data they produced. It was not only the Task Force members and staff who learned. Often, the person being interviewed found out about a facility not known about before, one possibly available for shared use. Many interviewees began, perhaps for the first time, to see their own telecommunications needs in relation to the needs of others. All were eager to learn. A most gratifying result of the interviewing process was the overwhelming impression that public servants would *prefer* to share facilities when increased cost-effectiveness or improvement of services results. If action can be taken to follow through on this apparent willingness to cooperate, the taxpayers of North Carolina can only benefit.

Task Force member and University of North Carolina President William C. Friday makes a point at the October 16, 1978, meeting on UNC-TV.

CHAPTER II-A:
Cultural, Educational, and Information Services

Cultural, educational, and information services are vital state activities. The special emphasis that North Carolina gives to cultural services is reflected in the fact that this was the first state to form a cabinet-level department for cultural affairs. Educational services are provided for both children and adults and represent a massive state commitment: in fact, the budget for the Department of Public Education is larger than that of any other state departments. Information services are essential to society; an uninformed citizenry would be a poorly served citizenry.

These three categories of services are interrelated, and often involve similar uses of telecommunications. The potential benefit of telecommunications in distributing cultural, educational, and information services is especially great in North Carolina, where many citizens live in smaller communities spread over large distances.

The Task Force completed 20 interviews with 34 public officials most specifically involved in these service areas, but also considered pertinent information from interviews categorized primarily in other service areas as well as information from presentations made at Task Force meetings. Officials responsible for cultural, educational, and information services make extensive use of telecommunications now, and most foresee even more exciting uses in the future.

USES OF TELECOMMUNICATIONS

Cultural Services

Television and radio broadcasting were most frequently mentioned as current means of delivering cultural services by telecommunications. For example, the Communications Office of the Department of Cultural Resources often uses radio and TV public service announcements to help advise the public of upcoming events. But beyond this informational use, TV and radio are also used to make cultural events themselves available to more citizens.

Public television has broadcast a number of North Carolina artistic performances. UNC-TV videotapes and broadcasts parts of the Eastern Music Festival each year, covers small group performances on its *North Carolina—The Arts* series, has aired performances from the North Carolina School of the Arts, and so on. In addition, several major productions at the School of the Arts are being covered by the South Carolina public TV network. Public television also provides a way to connect North Carolina homes with the national and international cultural world through programs acquired from the Public Broadcasting Service.

Some public radio stations in North Carolina have been active in broadcasting cultural events. WFDD-FM in Wake Forest, for example, airs between four and five hours of School of the Arts performances per week. National cultural programming is also brought to North Carolina by WFDD and the two other stations that are now members of National Public Radio.

Commercial broadcasters have cooperated in covering some cultural events, according to Sara Hodgkins, Secretary of Cultural Resources. For example, both public and commercial broadcasters were involved in the live coverage of the North Carolina Symphony performance in Washington, D.C. in April, 1978.

While broadcasting is the most visible application of telecommunications in cultural services, telephones and data communication are also used. Telephones are relied upon extensively, for example, in communication between the North Carolina Arts Council and local arts groups around the state. The only IN-WATS 800 number primarily for cultural services is in the State Library and is used by local library staff to request interlibrary loans or ask reference questions.

The Southeastern Library Network (SOLINET) computer information system is the main example of teleprocessing (data communication) now being applied to cul-

tural services. SOLINET is a computerized library cataloguing and inventory system. At this time, the State Library, libraries at UNC campuses, and those at larger private colleges have on-line terminals for access to the main SOLINET computer in Ohio. The Charlotte County Library will join SOLINET soon, and other county libraries are expected to follow in the future.

Educational Services

As is the case with cultural services, television is the most obvious telecommunications application in the delivery of educational services. Public TV has taken the lead in providing these services: in his presentation to the Task Force, Dr. George Bair, Director of the University of North Carolina Television Network, stated that the Network's primary purpose is to "provide television programming which sustains, enriches, and extends the educational opportunities of North Carolinians." The main thrust of UNC-TV's educational effort is in the broadcast of in-school instructional programs. These programs are acquired in cooperation with the Department of Public Instruction, which works out the daytime broadcast schedule with the Network. During the school vacation period in the summer, the Network is off the air until late afternoon. In a more general sense, much of the other programming on UNC-TV can also be considered educational, ranging from locally produced public affairs shows to nationally produced programs for both children (e.g., *Sesame Street*) and adults (e.g., *Nova*). State educational agencies also arrange for UNC-TV to produce specific programs. For example, an in-service training program for teachers was produced for the Division of Exceptional Children in the Department of Public Instruction, broadcast over UNC-TV, and videotaped for re-use by the Division.

Nonbroadcast video distribution techniques also play an important role in education. Nineteen community colleges have closed-circuit TV systems for instructional use. The North Carolina School for the Deaf also uses a closed-circuit system, with captions inserted on-campus. Many cable TV companies are cooperating with local schools; for example, Central Piedmont Community College has one cable channel available for instructional use. Four community colleges in the western part of the state take part in the Appalachian Education Satellite Project (AESP), coordinated through the Appalachian Regional Commission. These schools have ground satellite receiving stations allowing them to use instructional programs originating at the University of Kentucky. The AESP focuses on in-service training for professionals, especially teachers.

Educational uses of data communication are widespread and becoming more so. The hub of educational computing activity in North Carolina is the Triangle Universities Computation Center (TUCC), a not-for-profit corporation formed by Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University.

These universities use TUCC, through remote data entry, for a broad range of administrative, instructional, and research applications. TUCC computers are also made available to other schools through the North Carolina Educational Computing Service (NCECS). Schools linked to TUCC, either directly or through NCECS, also can gain access to a network linking major academic computing facilities in universities throughout the U.S. and Canada. The School Computer Service Corporation (SCSC), based in Raleigh, uses the TUCC computers to provide computer-assisted instructional programs to elementary, junior high, and senior high schools. Instructional programs are available in a number of curriculum areas including math, English, and spelling. The Department of Public Education has remote terminals linked to the State Computer Center, on which such records as those for financial management, the school food program, and teacher certification are maintained.

Information Services

A large number of state agencies use radio and TV public service announcements (PSA's) to pass information to the public. Agencies acquire or arrange for production of PSA's and distribute them to commercial and public stations. The stations donate a limited amount of air time for broadcast of PSA's in compliance with FCC regulations.

Radio and TV also inform the public through their news programs; many state agencies distribute news releases which are used at the discretion of broadcast stations as well as newspapers. Some agencies produce informational programming in cooperation with broadcasting stations. For example, the Agricultural Extension Service at North Carolina State University is particularly active in audio and video production. The Service has its own video unit, producing videotaped materials for use in training extension agents. The Service also produces and distributes audio tapes. On the average, the office sends public service announcements and programming to 151 radio stations and receives 90 hours of air time each week. The Extension Service also cooperates with both commercial television for the production and broadcast of PSA's, and with UNC-TV for special-topic workshops and the regular series *Backyard Gardener*.

The Department of Agriculture is also a broadcast user, producing a daily radio program of market news. However, Commissioner of Agriculture James A. Graham, in a Task Force interview, expressed a need for better access to production facilities and assistance in distribution over various systems including broadcast, cable, etc. These needs were also expressed in a number of other Task Force interviews.

The primary nonbroadcast use of telecommunications to provide information is, not surprisingly, the telephone. Virtually all state offices receive citizen phone requests for information; several maintain toll-free IN-WATS lines

to increase public access. The Department of Human Resources has CARE-LINE, staffed by information specialists who can either answer questions, solve problems, or put people in contact with the agency that will. CARE-LINE answered over 5,500 calls in its first 5 months, and the number of calls is increasing. Agricultural Information has TELETIP, which allows callers to choose from a large number of prerecorded audio tapes on agricultural and household topics. TELETIP averages 15,000 calls per month.

Other information services are provided over IN-WATS lines in Wildlife Resources (primarily hunting and fishing license information) and the Energy Division (a hotline for assistance in energy conservation, etc.).

PROBLEMS AND PLANS

Broadcasting, "Narrowcasting," and Target Audiences

Just as the broadcast media play a central role in providing cultural, educational and information services, they are also at the center of the expressed concerns of many administrators. Many of North Carolina's public officials see great potential in public radio and TV and have high expectations about their use. Those expectations have led to effective programming in some cases and frustration in others. State government should not and cannot rely solely on public radio and TV for needed production and distribution for a number of reasons.

Repeatedly in Task Force interviews, officials expressed a desire to have more programming on UNC-TV to meet the objectives of their particular agencies. The University Network, however, must make its programming decisions within a complex of competing priorities. The Network operates under broadcast licenses issued by the Federal Communications Commission (FCC) to the Board of Governors of the University of North Carolina. By law, all licensees must operate "in the public interest, convenience, and necessity." The Network is responsible for serving both the general public and, through instructional TV, the schools. State support of the Network, through the UNC Board of Governors, does not modify those obligations nor permit UNC-TV to elevate to higher priority the communication needs of state agencies, however worthy. Both production facilities and air time on UNC-TV are limited resources. State agency requests must compete with each other and with the more basic objective of the Network to provide the alternative educational, informational, and cultural programming for which national public broadcasting was established. Similar considerations apply to public radio stations, each of which holds an FCC license.

Availability of production assistance or air time is not the only limiting factor. Relying exclusively, or even chiefly, on broadcasting (whether public or commercial) to communicate information from state agencies to the public may not be effective. Field experiments at the Annenberg School of Communications at the University of Southern California have shown that PSA's broadcast on donated air time are largely ineffective. Elizabeth Martin, Public Information Director for the Department of Human Resources, agrees. Although her office has participated in the production of both TV and radio PSA's, Ms. Martin suggested that the state consider a policy of paying (at perhaps slightly reduced rates) for all public service advertising for the most appropriate positioning of the ads. Currently state agencies are generally communicating with the public during low viewership periods such as late night and early morning. Paid messages could be positioned to reach broader or more appropriate audiences."

There are other options for the most effective means of distributing information. Radio costs about one-tenth as much as television, and studies show it can often be as, or even more, effective in getting the message across. Broadcasting, whether TV or radio, may not be the best means of distributing many of the messages state agencies wish to communicate. The very name "broadcasting" implies a broad-based viewership (or, in the case of radio, listenership). Many PSA's from state agencies, however, are not really intended for a broad audience: health ads may be aimed at mothers-to-be, social agency messages may be directed at children of deceased veterans, and so forth. Ms. Martin and others interviewed by the Task Force noted the need for systematic methods of reaching target audiences; television broadcasting especially offers a "scattershot" approach to message dissemination. Radio messages can be targeted for each station's style and listening audience. Increasingly in the future "narrowcasting" may be the most appropriate way to reach specialized audiences. "Narrowcasting" implies delivering signals to target groups, whether they are in a specified geographic location or have some other shared characteristic, such as an interest in medical education. Narrowcasting may rely on a number of alternatives to traditional broadcasting, such as cable TV, satellite transmission, and closed circuit TV. A related concern expressed by various officials was the need for computerized mailing lists allowing agencies to effectively communicate with targeted populations. In the distant future, electronic networks may eliminate much paper mail and allow messages to be delivered nearly instantaneously to specified homes.

Public Television

The two public television licensees in North Carolina are the University's Board of Governors and the Charlotte-Mecklenburg Board of Education. The Task Force heard presentations from both the UNC-TV Network and the Charlotte-Mecklenburg station, WTVI, Channel 42. In addition, the Task Force memberships of Dr. William Friday, President of UNC, and Carrie Winter, of the Charlotte-Mecklenburg Board of Education, provided continuous representation of each licensee. To achieve a wider per-

spective, the Task Force also heard presentations on public TV in Nebraska, South Carolina, and Pennsylvania.

It was quickly apparent to the Task Force that the dollar commitment to public television in North Carolina has been small relative to that of other states. While North Carolina state funds comprise $2.97 million of the total annual UNC-TV budget, Nebraska provides $4 million of the total in funding for its educational television; Pennsylvania provides $6.5 million; and South Carolina provides $8.7 million. These amounts become doubly significant when it is remembered that federal funds are available on a matching basis. Moreover, of UNC-TV's total $3.7 million budget, most funds must go for operations, engineering, and for the purchase of national programs, so that relatively little is left for local North Carolina productions. It was further recognized that there is a danger that the importance of public television may tend to be overlooked when its operating budget is one small part of the overall budget of a major university system. UNC-TV's management stated to the Task Force that the Network has aspirations beyond its current means, and emphasized the need for improved production capacity. The Task Force concluded that increased attention to the funding needs of UNC-TV is necessary and that means should be found to increase the visibility of the Network within the University system.

The Charlotte-Mecklenburg station, WTVI, has a community service area which is nearly the same as that of WUNG, Channel 58 of the UNC-TV Network. These neighboring transmitters currently broadcast many of the same Public Broadcasting Service programs to the same general audience, although daytime in-school programs are often different. The two stations have complementary strengths and needs in their facilities: WTVI needs a new transmitter but has a production studio; WUNG's transmitter is about to be upgraded, but the station does not have a local production studio. Since both WTVI and WUNG are publicly supported, local taxpayers could benefit from cooperation between, or even eventual merging of, the two stations. Such cooperation might also result in improved local programming services and demonstrate the potential of local production for other Network stations across the state.

Public Radio

There is no statewide public radio network in North Carolina. Existing stations are variously licensed to public and private educational institutions, and to private nonprofit community boards. These range from the three large full-service stations to small stations on college campuses oriented toward student entertainment and services. There is no direct state support of public radio, although the approximately 14 stations on campuses of the University or community college system receive some state support in-

directly through their schools.

The Task Force brought public radio broadcasters from around the state together for the first time in June, 1978, for a Conference on Public/Educational Radio. One of the panelists at that Conference was Task Force member and state Representative William McMillan, who announced during the meeting that he had just introduced a bill to fund consideration of public radio networking. In the discussion that followed, public radio professionals emphasized that FCC licensing is based on local service and that networking should be considered only as an interconnection of independently operated local stations, which should continue to produce and broadcast programs for their respective local "communities of interest." Representative McMillan explained that his interest was in seeing that all North Carolinians have access to the benefits of public radio, including National Public Radio (NPR) programs now available only in the areas where the three current NPR-member stations are located.

Following the June meeting, a Radio Advisory Committee, chaired by UNC-CH Professor Wesley Wallace, was appointed. The Committee had the joint duties of (1) advising the Task Force about public radio; and (2) preparing a report for the University to present to the General Assembly, under the terms of the McMillan-sponsored $125,000 appropriation to the Board of Governors to study and plan for public radio in North Carolina. The Task Force heard from Professor Wallace and others associated with the Radio Advisory Committee on a number of occasions and received its final report in February, 1979.

The report of the Radio Committee included an engineering study recommending an orderly process for adding and upgrading stations so that public radio may begin to reach across the state. The Committee strongly advised that new development should build on existing stations, where possible. The report suggested a means of interconnecting stations so that they might share programming at times, and it proposed a mechanism for distributing state-appropriated funds to the stations. (A summary of the Radio Advisory Committee report is included as Appendix H.)

The Task Force concluded that the state should support the development of public radio across the state. The Task Force also resolved that state contributions to the funding of public radio are proper and needed, and that the manner of that support should be studied further. The precise mechanisms for support require careful consideration of a variety of factors, including the character of the local community to be served. One policy consideration is whether stations in rural communities, with fewer local resources, should receive more state assistance than stations in big cities. The Radio Advisory Committee proposed a fixed amount to be appropriated to each eligible station, whatever the size of its community. The Task Force chose to recommend the means for continuing consideration and final resolution of problems like this, but did not recommend what the solutions should be.

Toll-Free Information Lines

Several agencies indicated during interviews that they would like to have IN-WATS lines to improve public access to information. Some lines now in use are approaching maximum volume and additional lines may be needed in the future. Typically, however, the limitation on expansion is the lack of funds for additional personnel. A policy issue which will require continuing study is the extent to which information and referral functions should be centralized. It would be possible to establish a single IN-WATS number to give information on all state activities. The effectiveness and efficiency of such centralization would have to be evaluated.

Conclusions

North Carolina has a major commitment to provide all citizens access to cultural, educational, and information services. The role of telecommunications in meeting this commitment is significant now and potentially even more exciting. Currently, the emphasis is on the use of broadcast media. Radio and TV are clearly powerful and effective for many purposes. But now, with expansions of technology, broadcast media are being joined by new telecommunications techniques which will allow increased cultural, educational and information services to reach more citizens in every part of North Carolina.

Telecommunications Applications:
TEACHING WITH TELEVISION

The opening sequence is typical of those slickly packaged local news productions that TV stations fight ratings wars over: the titles flicker on the screen over a loud, nervous accompaniment of electronic rock and flashing pictorials. If the medium is the message, this bright, pulsating introduction seems to tell us we've tuned into a nerve center of fast-paced, action-packed news.

But on this show the lead story is likely to be a discourse on today's lunch of chili dogs, or a briefing on Mrs. Wallace's Home Ec field trip. This is, live from East Cary Junior High in suburban Wake County, the Imp-Action News, and it's produced every weekday at 8:02 a.m. by 50 energetic kids and one dedicated teacher.

Imp-Action News gets East Cary Junior High's educational program rolling each morning, but the show, carried to each classroom on campus through an elaborate homemade cable system, is but a small portion of the school's overall video activities. In fact, East Cary's instructional television (ITV) program is so well developed that it could be a model for every public school in North Carolina.

Consider, for starters, East Cary's television facilities, which include:
—a fully equipped color production studio;
—three portable cameras with remote productions;
—a control room with connections to TV outlets in every room on campus;
—two cable systems, one for distribution of videotaped ITV programs, and the other for production capability anywhere on campus;
—a library of 800 videotaped ITV programs.

Equally impressive are the human resources behind ITV at East Cary. In addition to the staff of 50 students who produce, direct, write, announce, and operate all of the technical equipment, East Cary is fortunate to have on its staff Mike Stroud, who is both

an accredited science teacher and an experienced television technician (in fact, he works part-time at a Raleigh commercial TV station).

With the enthusiastic support of Principal Don Lee, Stroud and his student staff have managed to put together an outstanding facility. Some basic equipment had been purchased four years ago through local school funds. Additional equipment was donated by a parent who owns a retail TV store. But most of the program has been funded through the support of the entire faculty at East Cary. In 1977-78, for example, the faculty agreed to cut their budget for supplementary aids by $4,000 in order to finance the TV system.

Stroud says that faculty support is absolutely essential in establishing a successful ITV system in a school. Perhaps even more crucial, although he would be too modest to admit it, is an energetic and highly trained leader like Stroud. The two coaxial cable systems linking classrooms and the production/control rooms, for example, were laid during the summer on Stroud's spare—and unpaid—time. Stroud was also responsible for the production studio, control room, and most of the other engineering. Most other North Carolina school systems are not fortunate enough to have a professional television technician on their faculties.

Lacking such an expert in each school, what can education and telecommunications planners in North Carolina do to help all schools use ITV better? Stroud emphasizes the need to set up demonstration centers—schools (like East Cary Jr. High) with the proper facilities in place so that others can plan their systems similarly. He suggests the state could help local schools by buying equipment in bulk at discounts. He also notes that there is a need for negotiations with television production companies for copyright releases on ITV programming aired over systems like UNC-TV's.

In calling for model demonstration schools, Stroud has pinpointed a problem plaguing North Carolina edu-

cational television specialists: not many people fully understand the actual problems faced in setting up a school closed circuit system for ITV. The 1978 General Assembly appropriated $5.8 million to the UNC Board of Governors to extend the UNC-TV signal throughout the state. Under the provisions of the bill, virtually everyone in North Carolina should be able to receive a strong, clear educational television signal within a few years. To many, this sounds as though it should solve all of the problems schools face with ITV utilization.

Not so, Mrs. Elsie Brumback, Director of the Department of Public Instruction's Division of Educational Media, told the Task Force last June. Making the signal available is a necessary step, of course, but that is only one of a number of obstacles that must be overcome in providing ITV services, she said. Currently, only 28% of the state's teachers use ITV. Some obstacles to increased use:
—School buildings and individual classrooms must be wired for television. Ideally, a wiring system will allow teachers to use ITV in their own classrooms, rather than having to share a TV set in the media center, gym, or cafeteria.
—Schools need additional television sets (monitors). A common reason for under-utilization of ITV is that many teachers must share one or two sets.
—Schools need videotaping facilities so that teachers and pupils can use ITV when the program fits their learning needs. With videotape, programs may be stored indefinitely on campus and replayed to overcome scheduling conflicts and meet individual learning styles. The scheduling problem, Mrs. Brumback commented, is the single most important reason why more teachers do not use ITV more fully.

Not until all three needs are met, Mrs. Brumback said, will school ITV usage meet its potential for broadening the educational horizons of North

Carolina students. Thus, the General Assembly's appropriation for signal reach is but a first step—and DPI's requests for additional personnel and facilities to accomplish the in-school wiring tasks have gone unmet for three successive years.

Schools like East Cary Junior High are atypical, then, not only in having highly trained, capable media leadership, a supportive faculty and administration, and dedicated, enthusiastic students, but also in having solved all three of the problems associated with facilities.

Consider Trinity High School as a more typical North Carolina public school seeking to implement ITV. Marinelle Weaver is the Media Specialist at Trinity, near High Point in Randolph County. Although the school receives a strong signal from UNC-TV, has an outside antenna and two television sets, and has an ITV-conscious faculty, Mrs. Weaver laments that not much has been done with the UNC-TV signal in the classrooms. Why? "The programs don't come on at the right time," Mrs. Weaver says. "There are several teachers here who are very interested in using a number of UNC-TV programs, but it's almost impossible to plan a classroom instructional program around an ITV program broadcast schedule. It just has to work the other way."

Using about $3,000 of federal funds, the school has now taken steps to remedy the situation. A video tape recorder and an additional monitor have been ordered so that off-the-air taping can provide teachers with a library of materials to be used at a time appropriate to their students' learning needs. The solution is not an ideal one: the school, which will now be equipped with a total of three television sets, will still not be internally wired to allow any teacher in any classroom to tap into the system whenever he or she chooses.

Not every school system is going to be able to find a professional television technician to set up an in-house system, as East Cary has. For North

ITV advocate and dedicated teacher Mike Stroud is flanked by a few of the necessities of any successful in-school television system: a central monitoring and closed-circuit distribution system (foreground) and a library of videotaped instructional materials which teachers can use at their convenience (background).

Carolina to have a successful ITV program in all schools, Mrs. Brumback says, it will be necessary for technical leadership to be exerted on the state level—the decisions about implementation are generally too complex to be left entirely to local staffs. Now that the UNC-TV signal will be available throughout the state, the next logical step would be for an enhancement of the Department of Public Instruction's school television consultation services. With additional personnel and equipment, DPI should be able to help schools like Trinity High School and others seeking to broaden their students' horizons through educational television.

Members Jim Goodmon and Superintendent of Public Instruction Dr. A. Craig Phillips participate in Task Force discussions.

CHAPTER II-B:
Health and Social Services

Members of the Task Force investigated the ways telecommunications technologies can and do deliver health and social services. The Task Force heard presentations on the potential of telecommunications for health education and preventive medicine (Dr. John McCain, N.C. Medical Society); on trends in telemedicine (Dr. Maxine Rockoff of the U.S. Department of Health, Education, and Welfare); and on state government information services in the health-social services areas (Mr. Pete Grimes of the N.C. Department of Human Resources). (See Chronology, Chapter I.) Task Force members interviewed the Secretary of Human Resources and various assistant secretaries, numerous division and section chiefs, and telecommunications personnel in the department, as well as regional and local health center personnel, both public and private. Twenty-one interviews were conducted with people in the health and social services communities.

USES OF TELECOMMUNICATIONS

A major telecommunications investment for health and social services is in teleprocessing (remote automatic data processing). The Department of Human Resources (DHR) uses teleprocessing for efficient storage and retrieval of the volumes of information necessary in the administration of social services, such as public assistance. Teleprocessing is also helping to provide health services, both through better management of medical and hospital records, and in giving medical center staffs ready access to computer libraries of diagnostic and treatment information.

Telephone systems are used not only for normal communications between and within agencies, but also as a means of sharing information about services with the public through CARE-LINE, DHR's toll-free referral service. Widespread interest exists in extending IN-WATS services in the health and social services area. For example, Assistant La-

bor Commissioner Charles Jeffress cited a need for a 24-hour accident reporting line rather than the current 9 to 5 weekday operation.

Teletype use in health/social services is primarily applied to providing information and educational services to the hearing-impaired. TTY (telephone-teletype) technology is available for a variety of telecommunications services to North Carolina's deaf population. For example, CARE-LINE includes a TTY feature for the hearing-impaired.

Radio services are primarily informational in nature. Public service programs are currently developed by the Department of Human Resources through a variety of informal arrangements. Tape recorders are available in the Department of Human Resources' Public Information Office for spot interviewing, but most production work is done by arrangement with local broadcast stations. Production efforts here as in other service categories are therefore fragmented. Distribution of programs is through traditional broadcast channels. Radio reading services for the blind, despite high interest from agencies and others serving the blind and print-handicapped, "are at a standstill in North Carolina," in the words of Dr. Nat Fullwood, a policy advisor to the Governor. There is a small effort underway currently in Charlotte, but funding from the state may be necessary to institute reading services and other subsidiary communications authorization (SCA) services through radio.

Video informational services are produced in the same way radio services are produced: departments contract for services with local stations or with independent producers. Officials expressed interest in gaining access to a greater variety of television distribution opportunities, including cable, public television, commercial broadcast television, and closed-circuit. Current state capabilities for production do not begin to meet the multi-channel service needs expressed by interviewees. Production resources of local Area Health Education Centers, on the other hand, are possibly underused.

PROBLEMS AND PLANS

Health/social service personnel interviewed by the Task Force emphasized four issues: (1) equal access to telecommunications services; (2) organization of data facilities for sound managerial decision-making; (3) the need for health care "software" or programming; and (4) the need for better means of distributing information to the public.

Equal Access

The issue of equal access to telecommunications services arises not only because telecommunications technologies promise increased access to information and health/social services for some groups (the blind and print-handicapped, for example) but also because such technologies may create inequality of access for other groups (e.g., the poor or residents of rural areas) unless there is planning to provide equal access to these services. The positive contribution which telecommunications technology can make to the handicapped were repeatedly brought to the attention of Task Force members. Rance Henderson, head of the Schools for the Deaf, pointed out that school-produced captioned educational television programs could be shared with deaf people in surrounding communities. Distribution of captioned programs through local cable companies has been stymied, however, by an upper-level state government policy decision prohibiting such sharing of programs. The reasoning was that new subscribers to private cable companies would be attracted by these programs. It was considered inappropriate, and perhaps unethical, for state-funded programming to benefit a private company. The impact of this decision is especially great because the very presence of a school for the deaf attracts a disproportionate number of hearing-impaired residents to the locality. There is an apparent need for policies that encourage full use of all telecommunications distribution systems, public and private, for the public welfare.

Providing health services to remote areas is another equal-access issue about which the Task Force heard divergent views. Dr. Maxine Rockoff's May 19, 1978, presentation to the Task Force examined the exciting opportunities for rural health care through "telehealth." A more detailed discussion of telehealth services follows this chapter.

Organization of Data Facilities

A number of problems arise in the planning of teleprocessing for health and social services. Remote data connections between Raleigh and field offices could provide many benefits, including reduction of time-consuming paperwork and travel, of work duplicated in central and at local offices, and of huge mailing costs, particularly in public assistance and Medicaid programs.

Respondents from the Medical Assistance program, the Office of Alcohol and Drug Abuse, and the Department of Administration favored providing county agencies with on-line access to data bases in Raleigh, especially for the Division of Social Services and of Medical Assistance. Little overall disagreement exists with the concept of a statewide teleprocessing network, which would, in the view of virtually every interviewee, be a tremendous asset to the state in delivering services both more efficiently and effectively. Maintenance costs and inadequately trained personnel, however, were viewed as obstacles to developing such networks. The failure of an earlier system (which was begun and eventually dismantled during the previous administration) was ascribed by Director of the Division of Social Services Robert Ward to a lack of adequate planning, particularly planning for personnel to develop software. A new teleprocessing connnection between the Division and county agencies is being planned, he said, but "one step at a time."

Dr. Minta Saunders, Assistant Secretary for Children at the Department of Human Resources, was one of the respondents who favored a "system to manage all . . . information . . . (which) is now accumulated in discrete compartments." Dr. Saunders currently examines information from at least seven separate data bases. Coordination of these data bases could provide managers with better information for responsible decisions. Other respondents expressed concern about the possibilities of abuse of the right to privacy in such a centralized system. Secretary of Administration Joseph W. Grimsley has urged that a distinction be made between specific-case data and summary statistical data; the latter, he said, would provide managers with coordinated data for decision-making while ensuring privacy for individuals. There is a need for a means to determine whether data bases already in existence could satisfy information requirements, before new, expensive, and time-consuming data collection and entry is undertaken. On the other hand, Social Services Division Director Ward cited a report he had prepared for the Department of Human Resources stating that, in other states, centralized data bases had not improved delivery of services.

Central patient tracking and other medical data systems were favored by respondents from the Department of Human Resources, including officials in Plans and Operations, Health Services, and Mental Health, although reservations were expressed about privacy issues. Physicians like Dr. Robert Sullivan of Duke University Medical Center envision, in the more distant future, interactive teleprocessing networks which can provide patient records, continuing medical education, data on illnesses, and pharmacists' authorizations for prescriptions.

Production and Distribution Services

A distinction must be made between the next two concerns expressed by the respondents: the need for the means to create informational programs and the needs for the means to distribute this material. Dr. John McCain told the

Task Force that the North Carolina Medical Society is working toward the goal that public health education may, "through various forms of public telecommunications ... prevent disease and promote health (and) slow ... the rising cost of health care." Public health programming would be aimed at educating the public "to make prevention a way of life for our citizens." Needs for programming were also expressed by public information officers. Most government agencies have no continuing arrangements for the preparation of informational programs in the health/social services field; public information officers occasionally enlist the help of commercial stations or UNC-TV facilities, but such help is informal and sporadic. Another programming need is for the handicapped: radio reading services, captioning of video programs, and computer-assisted instruction, etc.

The multiplicity of service program needs will require use of a mix of distribution systems. Single-channel broadcasting, whether radio or television, cannot alone distribute all communicated services. Alternative methods for distribution of information to the public must be found. Dr. John McCain cited "radio and TV and cable and closed-circuit channels" as possible means for distributing preventive medical information. To that list might be added sub-sidiary communications authorization radio channels (SCA's), satellites, telephones, and data networks. Secretary Grimsley of the Department of Administration noted the need for improving service to the public through programs for children, parents, and teachers, and proposed increased video services for the approximately 5,700 day care centers and homes in the state.

Conclusions

The areas of concern cited by interviewees pose a challenge to North Carolina as well as an opportunity for exciting, imaginative solutions. Telecommunications applications can help provide equal access to social and health services. Better organization of teleprocessing facilities and data banks should contain spiraling costs and improve service delivery. Rising medical costs may also be contained through better home health care, which can be promoted through improved informational programming. Telecommunications can provide a wide variety of means to distribute such materials. New opportunities to deliver health and social services through telecommunications merit continued attention and study.

Telecommunications Applications:
NORTH CAROLINA LOOKS AT TELEHEALTH OPPORTUNITIES

A medical student in Alaska studies a slide of diseased tissue for her pathology class.

A heart specialist in a major urban medical center listens to a heart murmur, studies an X-ray, and advises a colleague on how to treat a patient with an atrial defect.

A Saxapahaw, N.C., pacemaker user consults with her doctor and learns that her mild heart problem is being caused by medication, not the electronic device implanted in her chest. She is relieved to learn surgery will not be necessary.

Routine medical occurrences all, except that the Alaskan student is studying a slide telecommunicated via satellite from Seattle; the heart specialist uses only an electronically enhanced telephone capable of delivering a picture to study the X-ray, listen to the heart murmur, and talk to his rural colleague many miles away; and the Saxapahaw pacemaker user is examined by and receives her diagnosis from the Memorial Hospital doctor in Chapel Hill over her telephone, without leaving home.

Telehealth (or telemedicine) is the umbrella term which encompasses these and many other activities linking doctors, nurses, other health professionals, patients, and health care facilities which are geographically remote from one another. Dr. Wanda Rappaport, in charge of telehealth systems development for the MITRE Corporation of McLean, Virginia, says that there are two kinds of telecommunications-based health care services. The first harnesses computer technology for better health care, providing doctors not only with automated billing and accounting services, but also with "an organized statistical medical record for each patient. This can give providers a well-organized report on each patient, and allows researchers to analyze over a long period of time how health care is delivered," Dr. Rappaport adds.

Telehealth

The second area of activity is usually referred to as telehealth, and consists of actual provision of medical care over long distances through telecommunications. Most frequently, some form of video transmission—usually of still pictures—is made over a normal telephone, with voice signals, monitoring of EKG and similar signals, and facsimile transmission also possible. "Most of the activity in this country is, of course, in rural areas," Dr. Rappaport comments, "and is sponsored by the Health Underserved Rural Areas Program of the Bureau of Community Health Services in HEW." Through telecommunications, health care providers and patients can consult with specialists in major medical centers many miles away.

Members of the North Carolina Task Force on Public Telecommunications were briefed on telehealth in May, 1978, when Dr. Maxine Rockoff, formerly a telemedicine planner with the Department of Health, Education, and Welfare, spoke on the state of telecommunicated health services. (See Chronology, Chapter I.)

Dr. Rockoff defined three levels of telemedicine technology:

1. Technologies using telephones transmit voice signals only and may include features such as call-forwarding (so that calls to an unattended phone may be automatically transferred to that of another health professional), speakerphone (for audio teleconferencing), and answering services.

2. Augmented telephone technologies enhance the basic voice transmission capabilities with various types of additional signals. Telemetry systems, for example, use the telephone system to transmit EKG, EEG, or other electronic signals to doctors. Slow scan video systems transmit still television pictures (of, for example,

X-rays, EKG's, or a patient's wound) over normal telephone lines at a rate of one every 90 seconds.

3. Broadband technology consists of transmission of live (moving) television images. In order for motion to be portrayed, a wider frequency bandwidth is necessary than in the telephone or augmented telephone (narrowband) systems. As might be expected, broadband uses of telemedicine are extremely expensive and relatively uncommon.

Advantages and Disadvantages

The key, Dr. Rockoff told the Task Force, is participation. All of the above systems, narrow-or broadband, are interactive. The Seattle-Alaska satellite connection, for example, is not simply an extended broadcast of educational material, but an opportunity for classroom-style exchange between student and teacher —over a very long distance. Interactive telehealth systems may have numerous beneficial effects, Dr. Rockoff said. Doctors who had previously been unwilling to practice in rural communities because of a lack of specialists, other health professionals, and backup facilities, would no longer have to practice in isolation. Small rural communities which could not hope to attract a physician could enjoy the services of a "physician extender" electronically linked to a major hospital for consultation. Telehealth would make an overall contribution toward health cost control in this view because such systems would tend to allow doctors to delegate more and more routine tasks to extenders and other less costly personnel.

"The most obvious rewards of an operating telehealth system," Dr. Rappaport has written in *Commitment* magazine, "are those that improve patient care directly and immediately."
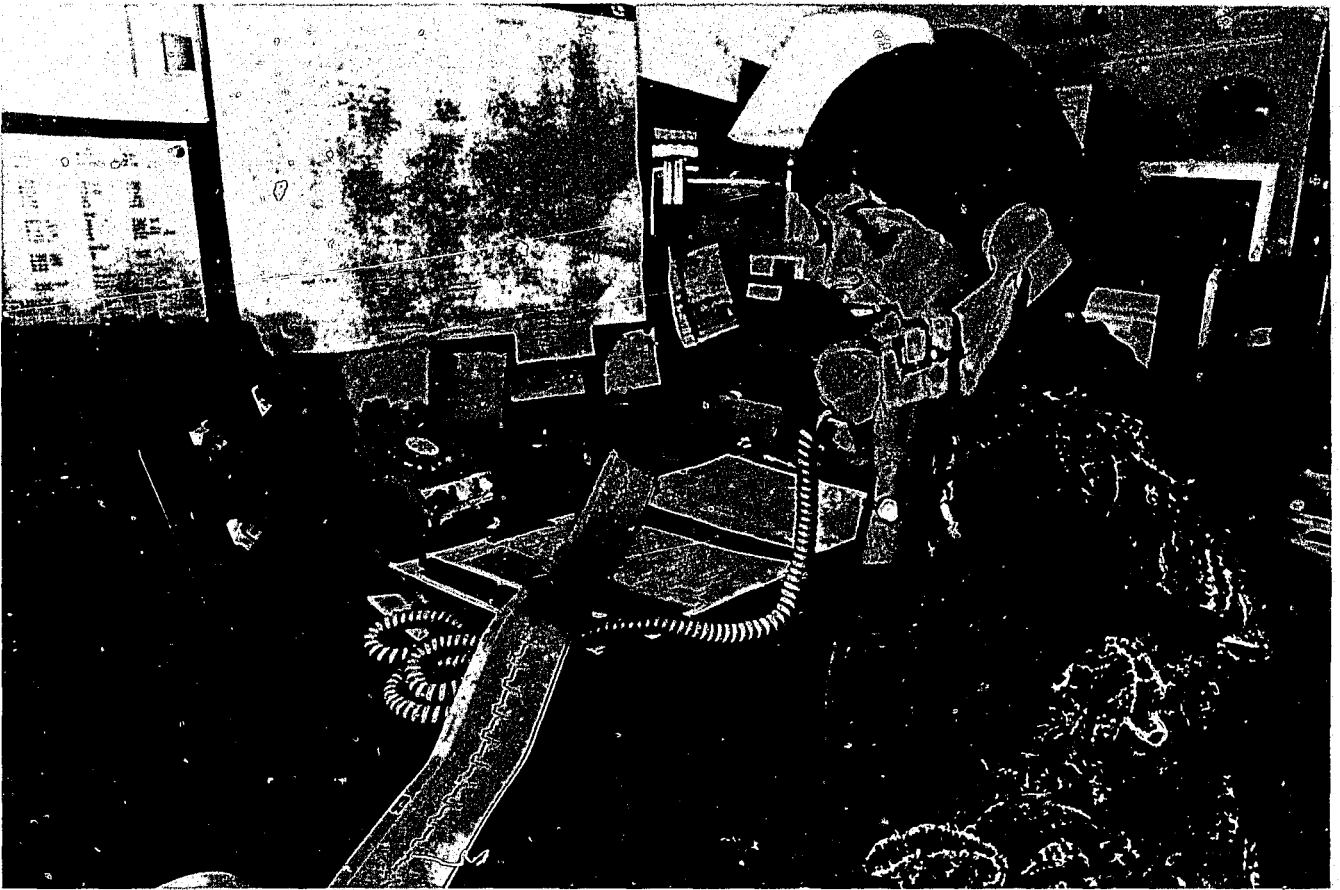
"Ticker" tape: Technician Nancy Munn checks the condition of a patient's heart via long-distance telephone in the Pacemaker Clinic at Chapel Hill's North Carolina Memorial Hospital.

Dr. Rockoff's presentation to the Task Force focused on several examples of this kind of benefit: rural health center hookups to urban hospitals; inner-city clinics connected to major medical centers; and smaller hospitals linked to teaching hospitals. Reduction in patient travel time, improved capabilities at dispersed sites to care for more complex cases, and increased attractiveness of rural areas to doctors and other health professionals are advantages with direct impact on patient health care, Dr. Rockoff said.

And, as the Alaska-Seattle satellite connection vividly demonstrates, there are important applications of telehealth for medical education as well. Through telecommunications, medical students and professionals can "observe lectures and conference remotely ..., participate in grand rounds, or take a variety of medical education courses," Dr. Rappaport writes.

What about disadvantages? Telehealth is still in its infancy, Dr. Rockoff told the Task Force, and various problems still need to be worked out. One is cost: broadband systems are very expensive. But even narrowband systems, Dr. Rockoff said, are slow to win acceptance from doctors. Why? Most of the benefits go to the patients, while health care providers must pay for the facilities. Thus, there is no rush by doctors to investigate opportunities in telemedicine.

North Carolina Applications

The Task Force discovered relatively few applications of telemedicine in North Carolina. The Memorial Hospital pacemaker project uses telemetry. The Appalachian Education Satellite Project beamed a workshop on nursing practices and patient education to participate via satellite. A number of hospitals are working on projects for medical education using closed-circuit

or cable television facilities. And a number of physicians are working on automated data bases for patients' records, while the Duke University Medical Center has a nationally recognized cancer diagnosis program based on computer analyses.

In general, however, North Carolina's approach to rural health care has not made extensive use of telemedicine technology, according to Jim Bernstein, Chief of the Rural Health Section of the Department of Human Resources. Except in a few mountainous areas, Mr. Bernstein noted, distances to hospitals are generally not prohibitively great in North Carolina, even though this is a rural state. The Rural Health Services Office, however, is being served by computer technology which gives providers, managers, and policy makers comprehensive medical and billing data. The role of on-site minicomputers is also growing. But in general North Carolina is letting other areas experiment with

new, high-cost technologies in primary care until they are shown to be justifiable in terms of reliability, cost-effectiveness, and the willingness of medical personnel to actually use the equipment. The next priority in health-oriented telecommunications planning in North Carolina, Mr. Bernstein said, is in the development of automated record systems allowing instantaneous retrieval of patient records at various points, both rural and urban. Later, assuming that testing elsewhere proves

the effectiveness of telehealth systems, North Carolina may enter into EKG and X-ray transmission.

Despite the obstacles and the serious, well-informed concerns expressed by health professionals like Mr. Bernstein, telehealth is likely to grow in North Carolina as a supplement to—not a replacement for—in-person medical attention. As medical technology accelerates its development and becomes even more expensive, rural hospitals unable to afford high-

priced facilities may wish to develop links with major medical centers. Health care planners like Dr. Rappaport will continue to look for ways to make telemedicine attractive to physicians and other professionals. And patients will continue to reap benefits from the favorable cost structure. As at least one grateful Saxapahaw pacemaker-wearer can attest, a simple long-distance telephone call to Chapel Hill is certainly cheaper than surgery.

CHAPTER II-C:
Public Safety Services

The Task Force conducted 16 interviews with state agencies that use telecommunications to provide public safety services. The Task Force also sponsored a two-day regional Conference on Emergency Response Communications. Attendees from the southeastern states, federal government, and various communications groups discussed emergency communications problems and opportunities (such as shared satellite use). In an era of rising citizen concern about crime and the possibility of natural disaster and other emergencies, telecommunications can play a vital role in the provision of public safety services. In no other service category was a concern for coordination of the various systems more pronounced: while in other public service fields uncoordinated systems may cost dollars, in the public safety field lack of coordination may cost lives.

USES OF TELECOMMUNICATIONS

Twenty-four telecommunications systems were categorized by the Task Force as providing public safety services, ranging from relatively simple paging systems to complex statewide data and voice communication systems.

Telephones are the basis of the state's public safety telecommunications complex. While few telephone systems are devoted exclusively to these purposes, the telephone is widely regarded by public safety experts as the cornerstone of an effective emergency communications network. In addition to normal use of the state government Dial Access Intercity Network (DAIN) by law enforcement officials, the Highway Patrol maintains a dedicated telephone communications channel for administrative control over its microwave system as well as a toll-free leased IN-WATS number for citizens to report emergencies. Telephones, however, have been the object of a great deal of study and debate in North Carolina as citizens, policy makers, law

enforcement officials, and telephone company representatives continue to consider the merits and problems associated with implementation of the universal emergency telephone number 911, which is further discussed in an article accompanying this chapter. At present, six 911 systems are in place in North Carolina in Durham, Orange, and Lincoln counties; and in the cities of Winston-Salem, Fairmont, and Newland.

The state operates two teletype systems for public safety purposes. The Division of Civil Preparedness of the Department of Crime Control and Public Safety uses teletype at each of its six district offices for administrative records communications. This system consists of teletype devices that are interconnected through telephone lines. The Department of Natural Resources and Community Development's Forest Resources Division operates a 23-terminal teletype system linking each district office for administrative and fire control messages. Forestry's teletype system operates over leased circuits and is also used for records communications. Each of these teletype systems is closely associated with two-way radio systems operating in the respective divisions.

At a plant value of over $1.5 million, and an annual operating cost of $168,100, the Highway Patrol microwave system is one of North Carolina's biggest investments in telecommunications. The microwave system is used to distribute two-way radio and telephone communications; some of its towers are shared by UNC-TV for distribution of public television signals. Of the 360 channels it is licensed to operate, the microwave system uses an average of 24 channels on any given "leg" of the network. One such leg is a planned expansion of five new sites (two terminals and three repeaters) from Raleigh south to Bladen County; this addition to the network should be operating by April, 1979. Because of substantial unused capacity, it is possible that the microwave system could be further utilized. Such use would be dependent, however, on the capability and

cost for local telephone companies to extend their lines to meet the microwave system. Further study of this possibility is needed.

Two-way radio and other paging and voice communications systems are an important resource in support of public safety services. Thus, it is not surprising that the 13 systems in this category form the largest part of telecommunications facilities used for public safety. Two of the largest systems have already been mentioned: the Civil Preparedness high-frequency and FM one-way voice system and the Forest Resources two-way FM radio system, each associated with its respective teletype network. The Division of Marine Fisheries operates an owned network of one base station, three repeaters, and 118 mobile units for enforcement purposes. The Division of Motor Vehicles (DMV) of the Department of Transportation operates another major state-owned two-way radio network. This statewide system includes 150 mobile units and 13 receivers at fixed locations. DMV's radio system allows public safety personnel access to license and theft information. Transportation's Highway Division operates yet another owned system, consisting of a base station, four repeaters, and 830 mobile units. The system is used for safety information pertaining to clearing roads in bad weather, etc. The State Bureau of Investigation, Civil Air Patrol, and National Guard operate the other large two-way radio systems for public safety services. Additionally, there are numerous security and paging systems, ranging from the very large (e.g., N.C. Memorial Hospital's security/paging system costing $46,000 annually) to the very small (e.g., campus systems costing as little as $1,100 per year).

Five teleprocessing systems were categorized by the Task Force as supporting public safety services: those in the Departments of Correction and Justice, the Wildlife Resources Commission, the Administrative Office of the Courts, and the Police Information Network (PIN), which is administered by the Department of Justice. Correction's system handles all of that department's administrative needs except payroll, and maintains inmate, probation, and parole records. The Department of Justice has a terminal connected to the State Computer Center (SCC) for text processing during drafting or revision of regulations, etc. Wildlife Resources maintains records of hunting and fishing licenses, boat registrations, and federal assistance in the SCC. The Administrative Office of the Courts is in the process of establishing a pilot regional Court Information System for Wake and surrounding counties. This initial system is eventually to be part of a statewide court information network providing data records to track offenders from arrest to release. This system, under a plan which has been the subject of some disagreement among state officials (see next section), will be linked to PIN, the Department of Correction data system, and others to form the Criminal Justice Information System (CJIS).

PIN is the heart of CJIS, serving as the message switch for the system. PIN was established in 1969 and now pro-

vides communications between local law enforcement agencies, the FBI, Highway Patrol, Wildlife Resources, Division of Motor Vehicles (License and Theft), Division of Marine Fisheries, and three district attorneys' offices. PIN gives all participating agencies the opportunity to communicate with each other about administrative matters, stolen property and securities, wanted persons, and driver and vehicle registration information. Recently, computerized criminal histories and boat registrations have been added to the data base. The PIN system is totally interactive: that is, terminals can "talk" not only to the main computer but to each other. Users have the capability both of entering information and of making inquiries. In addition to the 286 video terminals in place, radio links to police cars allow officers to receive information when in the field. Eventually, according to PIN Director William Corley, mobile video terminals may be placed in police cars.

PROBLEMS AND PLANS

The Task Force investigated three particularly important issues facing telecommunications planners in the public safety services category. One such issue, that of 911 implementation, is treated separately at the end of this chapter.

Frequency Coordination

A second issue, one which faces not only North Carolina but all other states, is that of coordination of radio systems frequencies. The frequency spectrum can best be viewed as a precious commodity; sufficient frequencies are not available for all desirable uses, and a means of managing this scarce natural resource is necessary. All radio frequencies are scarce, but AM and FM radio broadcast frequencies are not of direct concern to public safety service planners. The radio frequencies which most concern state planners fall into six categories:

1. Special emergency frequencies (e.g., those used by emergency medical service providers);
2. Highway or state police frequencies (e.g., those used by the Highway Patrol);
3. Local police frequencies, including various other law enforcement agencies (e.g., those used by a county sheriff's office);
4. Highway maintenance frequencies (e.g., those used by maintenance and construction crews from the Division of Highways);
5. Local government frequencies (e.g., those used by municipalities or counties in dispatching maintenance crews);
6. Fire frequencies (e.g., those used by municipal and rural fire departments).

These varied uses and users make comprehensive frequency planning a complex exercise—and such planning is further complicated by factors such as topography. Mountainous terrain, for example, can severely limit the normal

range of communications. In such a case, the same frequency might be reassigned in a relatively nearby area.

Responsibility for frequency allocation (deciding which applicant may operate on which frequency) rests with the Federal Communications Commission (FCC), upon application by the using agency. But the FCC does not have sufficient manpower to monitor every local use and special circumstance (such as topography). Therefore, the FCC works with various available groups to determine frequency allocation. The Associated Public-Safety Communications Officers, Inc. (APCO), an organization of public employees engaged in communications, coordinates applications for frequencies in three of the above categories: those for highway or state police forces; those for local police organizations; and those for local government. Emergency medical frequencies in North Carolina are allocated by the FCC in coordination with the state's Office of Emergency Medical Services, a division of the Department of Human Resources. Highway maintenance frequencies are allocated by the FCC in coordination with personnel in the Department of Transportation. Fire department frequencies are allocated by the FCC in coordination with the International Municipal Signal Association. The in-state agencies coordinating with the FCC, whether public or private, vary from state to state, except that APCO chapters act as police frequency coordinators for each of the states.

The individuals and organizations assisting the FCC in frequency allocation, it should be noted, are not compensated for their work. Consequently, there are no funds for on-site planning of frequency allocation, a consideration especially important in North Carolina, with its mountainous areas. In addition, the different groups have little opportunity for liaison. Viewed individually, each cooperating group is doing a creditable job: the problems that occur exist because there is no overall mechanism for planning, management, and engineering of frequencies for their most efficient use.

A hypothetical example can serve to illustrate the overall problem. Nearby public safety agencies operating on different frequencies may not be able to communicate during an emergency. A Wildlife Resources Commission officer in the field observing suspected drug smuggling offshore may not be able to communicate with a Marine Fisheries dispatcher or the Coast Guard. The need is for a comprehensive plan which will allow agencies to communicate with each other.

Cliff Blalock, Communications Officer for the Department of Crime Control and Public Safety, and Frank Leatherman, Communications Officer for the Department of Administration, both emphasized, in presentations to the Task Force, the need for comprehensive frequency planning and coordination. State government, through the Department of Administration telecommunications statutes (G.S. 143-340 [14]) has the authority necessary to coordinate planning by the various agencies. The Task Force's concern about the need for frequency coordination, as expressed by a number of interviewees, is reflected in its proposed revision of statutes to clarify the Department of Administration's responsibilities for providing leadership in developing a comprehensive frequency plan for North Carolina (see Appendix F).

CJIS

A final area of concern for telecommunications planners in the public safety services area is the Criminal Justice Information System (CJIS). When the Court Information System is operational, CJIS will be a comprehensive data network tying together existing systems such as PIN, the Department of Correction system, local law enforcement agencies, the Division of Motor Vehicles, and national data systems. Proponents of the system have noted that judges often do not have complete previous criminal histories when sentencing defendants; and that there may be instances where persons wanted in one locality are arrested and released in another because information about that person was not able to be transmitted and shared.

The CJIS concept has received much of its support from the federal Law Enforcement Assistance Administration (LEAA), created in 1968 to grant funds to local and state agencies to fight crime. LEAA funds have supported and continue to support purchase of computer hardware in numerous departments—hardware which will, under the CJIS proposal, be linked into a comprehensive network. An additional proposed component to this system would include facsimile transmission of fingerprints for identification of arrested persons. Support for the CJIS concept was expressed by interviewees from the Department of Crime Control and Public Safety (where CJIS planning is administered currently), the Department of Correction, and other law enforcement officials.

In a written presentation to the Task Force, and in an interview conducted at the Department of Justice, however, Attorney General Rufus L. Edmisten voiced concern that the various proposals for CJIS may present statutory conflicts with responsibilities mandated to the Attorney General by the General Assembly. He further stated that the CJIS system as planned may be duplicative of current efforts and not cost-effective. The Police Information Network, widely viewed as the core of the CJIS system, is housed in the Department of Justice. The Attorney General argued that information processing and communication among all criminal justice agencies can best be handled by the operating programs of the Department of Justice.

The differences of opinion concerning costs, administration, and sharing of information about criminal justice matters clearly require further analysis. The Task Force therefore suggested that this and related matters be studied in more depth by a permanent policy advisory mechanism for telecommunications in state government.

Conclusions

The state's investment in public safety telecommunications is large: systems are numerous, complex, and expensive. Coordination of services is imperative, as the various agencies cooperate to meet emergencies and maintain order. In public safety, perhaps more than in any other area of state activity, personnel from different agencies must communicate and information must be shared. Two current examples of the need for coordination in telecommunications have been reviewed here: CJIS and radio frequency management. Effective coordination can best be achieved with objective advice. The Task Force concluded that public safety agencies need a place to turn to receive telecommunications advice and assistance from an objective, comprehensive perspective that encompasses the total telecommunications picture in North Carolina.

Telecommunications Applications:
911—HELP IS JUST THREE DIGITS AWAY

When Teresa Cardina, 26, answered the call at the 911 emergency communications center in Buffalo, New York, she was confronted with the scourge of telephone operators everywhere: on the other end of the line all she could hear was heavy breathing.

Many people would have concluded that a particularly malevolent prankster was tying up the emergency lines that day and would have hung up. But Miss Cardina tried a different response.

"If you need help and can't talk," she said, "let me know by tapping once for 'yes' and twice for 'no.'" The reply was a single tap.

Over the next half hour, Miss Cardina posed a series of questions to be answered by taps to determine the location of the caller. Thanks to her quick thinking and resourcefulness, the life of Emily Kimberly, 75, who had respiratory problems and could not speak, was saved.

Not all uses of the telephone for emergency response are stories with such happy endings. It is clear, however, that the 911 emergency telephone number can be helpful in providing for the public's safety when citizens are educated to use it and when operators are, like Teresa Cardina, trained in techniques for emergency communications.

Benefits and Problems

As the nationwide three-digit telephone number set aside for public access to emergency aid, 911 has come a long way since the first system was installed in Alabama in 1968. Every major national public safety organization as well as the federal government has recommended its use. More than 700 communities in the United States have 911, including six (three counties and three cities) in North Carolina. Nine states have adopted legislation designed to speed implementation of 911 on a statewide basis. Other states, including North Carolina, are currently considering similar legislation.

The concept is fairly simple and

Two views of the Durham 911 Center: At far left, the "card-minder" system, which is linked electronically to the large "vehicle status" maps at the right. Each slot in the card-minder represents a patrol vehicle; those slots with cards inserted represent cars on assignment. The maps show the location of general vehicle assignments (but not the actual location of a vehicle from moment to moment); its colored lights also indicate whether public safety officers are on call or available for duty. Durham Public Safety Communications Director Ed Cannady notes that all 911 calls and dispatches are recorded and stored for 31 days.

the benefits very apparent. People living in a 911 service area will benefit because the number is easily remembered and dialed—easy especially for dialing by blind persons, for those who have to call in darkness for whatever reason, and for travelers and others who may not know how to obtain aid in a strange community. With 911, local citizens in emergencies don't have to look up numbers—and in some cases as many as 40 emergency numbers have been found listed in the front covers of local telephone books. That 911 is a *local* service will also become an increasingly important factor in the future: in ten or twenty years, North Carolinians who dial "O" when they want help will likely speak to an operator in a central telephone office which may be distant from the caller's home. Operators in these centralized locations are not likely to know street names or appropriate emergency agencies in other towns. Public safety agencies also benefit: a single, central emergency communications center allows for better coordination between agencies—coordination which is especially

important in single incidents requiring responses from several agencies. Generally, response time to emergency calls is reduced through 911 implementation. Thus, citizen confidence in public safety agencies is strengthened.

911 is not without its problems, however, nor its detractors. In some areas, citizens have complained that slow response times are a result of the inefficiency of some poorly trained 911 operators. One Rhode Island fire chief notes that his state is "a highly congested area and the towns and cities are continuous suburban and industrial sprawl. The telephone exchanges overlap from one town to the next, and with duplicate exchanges and duplicate street names in the adjoining towns, much confusion could result with a central answering point." Even 911 planners, who obviously favor the concept, concede that when 911 is implemented on a city rather than county basis, unnecessary confusion may result when emergency services provided by the county do not become part of the 911 team. Because North Carolina has very few

large metropolitan areas, state 911 planners are advocating countywide rather than citywide implementation.

North Carolina 911 Planning

In North Carolina, responsibility for statewide planning of 911 has rested with the Department of Crime Control and Public Safety, where Communications/911 Coordinator William Lynch and Assistant Coordinator Susan Harris have headed an *ad hoc* 911 Task Force, including representatives from both public and private groups. Formed in early 1978, the 911 Task Force met over a period of eight months, and arrived at a single set of guidelines and standards for 911 planning and operations.

Conducted independently of the 911 Task Force by Lynch and Harris, a survey of North Carolina's 100 counties was particularly instructive. Evidence of the great interest in 911 was the excellent response rate of 75% and the fact that only five counties listed themselves as opposed to 911 implementation. Mr. Lynch and Ms. Harris organized the responses in "priority categories:" counties whose current arrangements made 911 implementation relatively simple (for example, where only one telephone company operated or where public safety communications were already consolidated) were visited first. Key people such as local sheriffs, chiefs of police, fire and rescue coordinators, and city and county managers and elected officials were brought together to begin planning for 911—an effort which is continuing. But planning is complex and often slow. "It took one county nine months to even name a planning committee," Ms. Harris reports. From the time a county formally asks a telephone company to provide 911, it normally takes at least 18 months for the company to make 911 operational. At present, Ms. Harris says, at least 17 North Carolina counties are presently in some planning stage of 911, with several nearly at the point of ordering their systems.

Three principal obstacles must be overcome for 911 to be implemented:
1. **Technology/Economics:** In order for 911 to be installed, modifications must be made on telephone company central office switching equipment. Newer elec-

tronic switching systems are relatively easy and inexpensive to modify for 911, but many central offices in North Carolina still use the old mechanical "step-by-step" switch requiring expensive and extensive modifications for 911 implementation. Thus the principal obstacle is not only technological, it is also economic: with the average cost of modification per electro-mechanical central office running over $100,000, the question is, "Who will pay?" Southern Bell's policy has been to spread costs over its wide customer base so that nobody really feels the pinch; but North Carolina's many smaller, independent companies do not have the large subscriber base over which to spread these costs without undue burden on the customer.
2. **Politics/Turf:** The 911 concept requires consolidation of various public safety communications offices into a single central answering service, preferably with a central dispatch as well. The fear of losing control over their operations by public safety agency heads can be a factor hindering efforts to implement 911. Solutions to this problem vary. Durham, with its "Public Safety Officer" concept (a consolidation of police and fire functions) has found one solution. Lincoln County has another: a separate Communications Department answerable to a city/county board was created to operate 911. Still other areas assign coordination of the 911 center to that agency with the highest volume of calls to coordinate the 911 center.
3. **Personnel/Training:** Traditionally, the dispatcher has been the low man on the police department totem pole. Unfortunately, this view of the dispatching function as relatively unimportant has not totally disappeared. The need is for alert, capable operators with expertise in emergency medical services, fire, and police functions. —people, in other words, who know what questions to ask and who can operate dispatch radio equipment as well as answer incoming phone calls.
There are, of course, other aspects

of 911 implementation to be decided. For example, one option is free 911 dialing from pay phones. Many North Carolina pay telephones would have to be modified at extra cost to permit citizens free access to the 911 emergency response centers from non-residential locations. Another option, this one very expensive, would add a location-finding mechanism that would pinpoint the source of all calls to the 911 center. Chicago's 911 system automatically prints an address, telephone number, and police/fire zone information on a computer screen to help operators speed help along. Obviously such a system would have saved both Teresa Cardina and Emily Kimberly a half hour of agonizing suspense.

Results

Legislation proposed by the Department of Crime Control and Public Safety in early 1979 had five principal parts: (1) it established an "emergency telephone services program" in the Department of Administration; (2) it stated the intent of the General Assembly "to establish and coordinate a cohesive statewide emergency telephone system" under the 911 concept; (3) it instructed the Secretary of Administration to develop a 911 plan within a year, including coordination with local governments, public safety agencies, telephone companies, the N.C. Utilities Commission, state government, and others; (4) it transferred 911 staff from Crime Control and Public Safety to Administration; and (5) it limited the applicability of the statute so that "nothing in this act shall be deemed to require or to authorize the requirement of the use of a 911 system by any unit of local government."

Members of the Telecommunications Task Force took great interest in the opportunities and problems associated with 911. In their recommendations, greater coordination of telecommunications systems was encouraged, including coordination for public safety services. Specific recommendations favoring 911 were directed to the attention of the recommended permanent mechanism for investigating these and similar needs, the proposed Agency for Public Telecommunications.

CHAPTER II-D:
Government Operations

The Task Force conducted 25 interviews on government operations. This category was defined to include both internal management of government (for example, the Budget Office, Treasurer's Department, and Administrative Analysis Office); and resources management (for example, the Divisions of Earth Resources and Marine Fisheries). Unifying this umbrella category are a strong current reliance on telecommunications, and an interest in potential cost-savings and better services through telecommunications in the future.

USES OF TELECOMMUNICATIONS

The data communications activities of state government are largely concentrated in the Department of Administration's State Computer Center (SCC) in Raleigh. As part of the Management Systems Division (which also provides support to other state government agencies in software, planning, coordination, and staff training), the SCC operates two cost-shared computers for some 70 users. Nearly half (44%) of the data processing done during daylight hours is input from 250 remote terminals. Remote data entry (teleprocessing) is expected to continue to grow in the future. Currently, the uses as well as the users are varied:

—the Commerce Department uses 104 terminals for industrial accident claims and management, beer and wine permits, job opportunities records, and materials handling at the State Ports Authority;
—the Department of Administration uses 37 terminals for econometric analyses, applications development, the State Personnel Management System, and the Purchase Order System;
—the General Assembly uses 22 terminals during its sessions for bill preparation, bill status and history, and special committee status reports;
—the Agriculture Department uses three terminals for pest control and soil services.

Fifteen major departments, as well as numerous other boards and agencies, are currently using the SCC for data services. But this statistic does not reveal the true extent of state computer use. Of these 15 departments, six (the Departments of Human Resources, Transportation, Natural Resources and Community Development, Public Education, Justice, and State Treasurer) also have their own major (with teleprocessing) or mini computing facilities. Moreover, the Department of Correction, which does not use the SCC, has its own data processing system, and the Administrative Office of the Courts, a current SCC user, is planning a major statewide system. Most of these additional facilities and systems serve both external service delivery and internal management functions. The Department of Correction computer, for example, maintains inmate records and administrative data for management; it is to be an important part of the Criminal Justice Information System which is planned to link Correction, the Justice Department's Police Information Network, and various other data systems into an integrated network. In his March 17, 1978, presentation to the Task Force, Robert E. Johns, State Management Systems Officer, stated that a total of 718 terminal devices were then in general state government, and 670 additional terminals were planned for activation in the next few years, based on figures available as of July 1, 1977.

The state telephone system, operated by the Department of Administration's Communications Office, is a network of data and voice circuits for state government and is expected to be 98% complete by June, 1979. The Direct Access Intercity Network (DAIN) connects local telephone instruments with a DAIN switching center in Raleigh over leased circuits. Together with Wide-Area Telephone Service (WATS), the state's telephone system is providing what most interviewees agreed is excellent service at rates significantly lower than those available commercially. While voice communication is the major use of the state telephone system, other potential uses are not curently being fully realized; among these are call-forwarding and teleconferencing.

Facsimile transmission and telegraph are additional,

but not major, modes of communication for management purposes. The Departments of Revenue and Administration use facsimile systems for communications with local tax offices and North Carolina's Washington, D.C., Office, respectively. Use of facsimile transmission is expected to increase as technological improvements make it faster and more accurate. The Division of Purchase and Contract used a direct-line telegraph between its offices in the Department of Administration in Raleigh and the Western Union office for receipt of bids until maintenance problems caused removal of the system.

Most two-way radio applications in state government are for public safety services and do not fall in the government operations category. However, the radio in the Governor's limousine is now linked to the Highway Patrol Communications system. Under a recent proposal by Frank Leatherman, Department of Administration Communications Officer, a separate frequency will be reserved for the Governor, Executive Cabinet officers, and other state officials.

While data and voice circuits are used for most management purposes, some video has also been used. Television, whether via broadcast, cable, or closed-circuit, has become an increasingly important educational tool in our society. State government has facilities and personnel at the State Personnel Development Training Center in Raleigh to produce video programs for staff development. There are black and white cameras, audio recorders, and playback equipment in a small studio, but most of the facilities are obsolete or in need of repair. Moreover, staffing at the Center is not adequate to produce sufficient high-quality programming to provide management with a first-rate training tool. A number of agencies have purchased other video equipment with management uses evidently in mind, but these facilities too are often obsolete, unused, or both. Videoconferencing is not used, except for an occasional demonstration project such as that provided through the Appalachian Regional Commission in Asheville in November, 1978, when governors, officials, and citizens from states throughout Appalachia were able to discuss plans for "bringing up a new generation" of children in the area.

PROBLEMS AND PLANS

The Need for Coordination

The Task Force found several barriers to effective telecommunications management. State personnel classification and state accounting systems, for example, do not reflect the exact costs of telecommunications personnel and hardware. Job categories tend to be inexact and outdated; an outstanding employee working in telecommunications may be promoted to a job title which does not accurately reflect his work because no appropriate job title had been established. Object codes in the Departmental Accounting System do not reflect the important role of telecommunica-

tions in management. The planned adoption of the Fixed Asset Accounting System should help provide accurate data reflecting modern technology and practices.

One of the projects under the Department of Administration's Total Management Improvement Program—Information Systems Planning (ISP)—is being used to determine what information is required by top-level managers. The ISP project has been developed as a response to the current problem that very little information is available on a standardized basis. Different agencies collect and report data in different ways, making comparisons difficult. To satisfy management needs, it may be necessary to develop a standardized management data "package."

One area of telecommunications planning where progress was being made even while the Task Force was still in its study stage was that of teleprocessing. In 1978, the General Assembly acted to require a consolidated state plan for automated data processing (ADP) which, in its teleprocessing mode, is an important aspect of telecommunications. With leadership from the Management Systems Division of the Department of Administration, meetings were held throughout the second half of 1978 and early 1979 with representatives from the ADP staffs of various state government departments. By early spring, a state plan was in draft form. The need for greater ADP coordination had been expressed by the Director of Management Systems during one of the earliest formal presentations to the Task Force. Thus, at the time this Report was being written, substantial forward movement had been made in ADP coordination.

A more fundamental issue was identified in Task Force research. Many state employees do not fully understand the advantages of telecommunications in government operations and services. The need for education of state personnel at all levels about telecommunications is suggested by the large number of employees who are unaware of provisions for conference telephone calls, and have no idea about how to place such a call. While effective use of telecommunications could save energy and time over travel as a means of holding meetings, there is relatively little advantage being taken of these opportunities. On the other hand, Task Force interviews confirmed that officials do want to achieve better and less expensive management, and many were excited to hear how telecommunications can help.

The suggestions made by state officials interviewed by the Task Force were instructive. The existence of the Task Force, though only for a one-year lifespan, pointed up the need for a permanent means for collecting and disseminating information on telecommunications. Information is needed, for example, on how to use current systems more efficiently, on how to take advantage of new systems and technologies, and on how to avoid unnecessary purchases or leases. Currently, advice on purchase or lease of new systems is obtained largely from vendors; a disinterested view is needed to help state government avoid the costly mistake

of seeking technical solutions to administrative problems. Vendors may recommend elaborate and expensive telecommunications equipment, such as a costly telephone switching system, when better organized secretarial staff could easily handle incoming calls using present resources. Interviewees also said some agency needs to take the lead in facilitating the sharing of systems, and that there needs to be better training for state employees in the effective use of systems, including the telephone. Several interviewees felt that each major state agency needs at least one in-house staffer with expertise in telecommunications technology and systems.

A central telecommunications agency could promote coordination, create economies, and provide information. Such a mechanism could serve as a planning agency to examine long-range problems and opportunities in telecommunications that face state government. Several groups have been formed to address particular problems: for example, committees are studying word processing and data processing, both closely allied to telecommunications. Still lacking, however, is an integrated approach to planning in all of telecommunications. Comprehensive planning could explore the suggestion raised by several telecommunications experts that state government consider purchasing its own interconnect systems (telephone instruments and switching devices), rather than continuing to lease telephone company terminal equipment. Many large institutions, both in and out of state, have concluded that purchase and installation of their own equipment would be cost-beneficial. In a government setting there is abnormally high job turnover resulting in much expensive reorganization of office telecommunications equipment. Therefore, significant savings might be accomplished by having the state do its own installation, moving, and removal of telephone equipment. A carefully designed and implemented study of state government services should provide top management with an answer to this purchase-or-lease question.

Teleconferencing

Teleconferencing also merits careful study. Telephone conference calls, as mentioned above, are readily available for use now. Video teleconferences are becoming more attractive in the context of today's rising prices and energy shortages, and the decreasing cost of the technology involved. Even if videoconferencing does not prove to be absolutely cost-effective in every case, the state may still wish to investigate the video option to improve its internal communications and to increase citizen participation in government. As computer terminals become more widespread in state government, their use as devices for interactive conferencing will become feasible. These matters require investigation by policy makers with the assistance of competent telecommunications professionals.

Telecommunications in the Budgetary Process

An especially interesting and potentially money-saving proposal for a telecommunications system was made by interviewees at the Office of the Budget and the State Treasurer's Department. State Budget Officer and Executive Assistant to the Governor John A. Williams and four Division Directors of the Treasurer's Department all expressed great interest in a centralized statewide telecommunications network for budgetary purposes. Current teleprocessing procedures, Mr. Williams noted, do not give the Budget Office needed knowledge of existing liabilities, nor control over liabilities and encumbrances. As a result, it is not possible under the present system to know precisely what funds are available for a given budgetary item. Under the centralized budget/disbursing concept, the progress of each budgetary item from proposal to appropriation to expenditure would be recorded automatically, making possible payment of all state obligations from one disbursing point. Mr. Williams noted that this system could have as advantages:

—a substantial reduction of the number of people currently involved in these functions;
—a substantial improvement in disbursing procedures so that first, the state could take advantage of cash discounts by prompt payments; and second, the state could make last-minute payments, thereby increasing funds available for investment;
—improved management efficiency resulting from decreasing the paper work and other problems of the current system. (Presently, the biennial budget preparation involves dealing with large numbers of typewritten budget requests with accompanying problems of paper work. Each change must be explained by additional paper work in subsequent steps until appropriation of funds.)

The four Division Directors of the Treasurer's Department independently made the same proposal. They noted that such a system should include connections to banks to speed receipt of state monies. The potential significance of this connection, and of Mr. Williams' suggestion of some last-minute payments of state funds, lies in the fact that interest earned on cash balances is the state's fifth largest source of income and will amount to about $60 million in the current fiscal year. Under the present system, funds are idle simply because, at times, it takes days for the Treasurer's Department to be notified of a deposit by a state agency. On-line entry to the social security and retirement systems would also be possible.

None of the respondents actually endorsed this concept, because the potential for cost-savings, however great, is rivaled by the very great expense of implementing such a comprehensive system. A network like the one visualized

above is feasible but costly if it is dedicated to a single purpose. If, however, requirements for several statewide data networks are aggregated, a comprehensive network might be cost-effectively created using emerging technologies. In the future, a totally digital switching network would be capable of transmitting *all* forms of communications—video, data, voice, text—after conversion to digital form. A predecessor to this form of network, one which is available technologically today, is packet-switching for teleprocessing. Packet-switching (a new technology permitting different types of computers to communicate, with the possibility of reducing circuit costs) is already under some investigation by the Office of Communications in the Department of Administration and merits further study as a means of providing an integrated statewide network. If a packet-switching network becomes a reality in North Carolina, planners should be able to ensure its compatibility with the total digital network of the future. If the investment seems large, the potential for savings of taxpayers' money may be larger, and a feasibility study certainly seems justified.

Conclusions

Government management already relies heavily on telecommunications. Nevertheless, the Task Force encountered examples of a lack of knowledge among some state employees of some management tools and of developing technologies.

During its year of research, the Task Force stimulated a great deal of discussion between state government managers and telecommunications experts and advocates. Although many state employees have now become aware of the opportunities for savings and services, Task Force members are convinced of the need for the state to provide continuing information and education so that its employees will achieve a better understanding about how to use current systems; how to plan for new ones, including consideration of emerging technologies; how to obtain non-vendor-oriented information; and how to incorporate telecommunications considerations into personnel, accounting, purchase/contract, and property/construction procedures.

Telecommunications Applications:
EYE IN THE SKY

Satellites. To most people, the word conjures up trips to the moon, James Bond adventures, countdowns, and Cape Kennedy. To land-use planners at the Region D Council of Governments in Boone, however, satellites suggest such earth-bound concepts as "urban development" and "deciduous vegetation."

The reason is simple: Region D planners, faced in 1977 with a federal requirement for a comprehensive land-use analysis of their seven-county (Alleghany, Ashe, Avery, Mitchell, Watauga, Wilkes, and Yancey) region, examined a number of options for compiling a regional map. The choice of the telecommunications alternative —satellite imagery/computer processing—provides a lesson in how these technologies can be a cost-effective and efficient tool for government.

A comprehensive map had become necessary when the federal Department of Housing and Urban Development (HUD) required all applicants for planning funds to develop a regional land-use plan prior to August 22, 1977. Mindful of the 1,615,000 acres in the seven counties, a budget which did not allow for additional staff, and the HUD deadline, Region D planners examined three alternatives for compiling the map:

1. Windshield Survey: So-called because staff members would drive around the region compiling information manually from their automobiles, the windshield survey technique was cost-estimated at between $15,000-$20,000— some .$5-$7 per square mile. The high cost was not the only drawback to this technique: it would have required ten man-months to complete and was of questionable reliability because of the lack of roads in some parts of the region.
2. Aerial Photography: The last aerial photography reconnaissance of the region was made in 1964; this information was badly outdated and a new flight would have to be made. Region D planners estimated the cost of a new

flight at $35,000, or $12 a square mile. Additonal costs would be incurred in the post-flight photographic analysis. This method would have required an estimated twelve months for completion of the work.
3. Satellite Imagery / Computer Processing: The telecommunications alternative consisted of imagery from the NASA LANDSAT Satellite Program and data process- by a private subcontractor for analysis of the imagery. The cost of the satellite imagery: $200; of the computer analysis: $6,300. The per-square-mile cost estimate for this option, therefore, was $2.30, less than half the first alternative and about one-fifth of the second. Reliability of information was estimated at 90% accuracy, and the job could be completed within four months. Obviously, the Region D staff chose the satellite/computer option.

LANDSAT had been continuously recording information about every portion of the earth through its remote sensing capabilities since January, 1975. (A sister satellite, the Earth Resources Technology Satellite, had been in orbit since 1972.) The satellites are able to recognize different amounts of energy ("signatures") radiated by various land and water features. The satellite transmits its imagery information to various earth receiving stations; where the data can then be transmitted to a computer for analysis.

Data analysis provided by the Aerospace Systems Division of the Bendix Corporation produced a color-coded map showing eight categories of land use: urban developed areas; deciduous vegetation; mixed vegetation; open field/pasture; bare soil; mining areas; water; and miscellaneous areas. The map produced by LANDSAT information, Bendix, and the Region D staff was based on one-acre data elements and was supplemented by analyses showing the types and extent of land and water characteristics.

The advantages of using telecommunications for this application are clear: costs were lower, the work-completion time shorter, and the accuracy sufficient for Region D's needs. The satellite/computer application, however, has limitations. The satellite was not able to subcategorize urban areas into commercial, residential, and industrial uses. Nor was the satellite able to differentiate between some heavily forested or low-density residential areas and timber or pasture areas. Finally, the uncategorized classification (less than 1% of the total) needed to be manually studied. In order to make up for these limitations, a small windshield survey was completed to provide supplemental data.

Richard Reiman, now with the Department of Administration and an original participant in the Region D study, notes, "The efficiencies of using LANDSAT data in combination with aerial photographic analysis or windshield surveys could be lost in heavily urban areas because much more time would be spent compiling and analyzing the supplemental information." In Region D, however, urban areas are less than 1% of the total acreage, so the LANDSAT technique was in fact cost-efficient. And cost-effectiveness would increase even more were a larger area surveyed. The satellite could "see" over one-third of North Carolina and Tennessee when the Region D survey was done. Reiman says the additional areas could have been analyzed at little extra cost.

Satellite technologies offer state government a number of possible applications. Task Force members heard briefings on:
—rapid transmission of educational or cultural programming for storage and later playback at normal speeds;
—videoconferencing (discussed in Chapter II-E);
—emergency communications, including capabilities like those used in land use planning which might be developed so that the satellites could identify contamination by
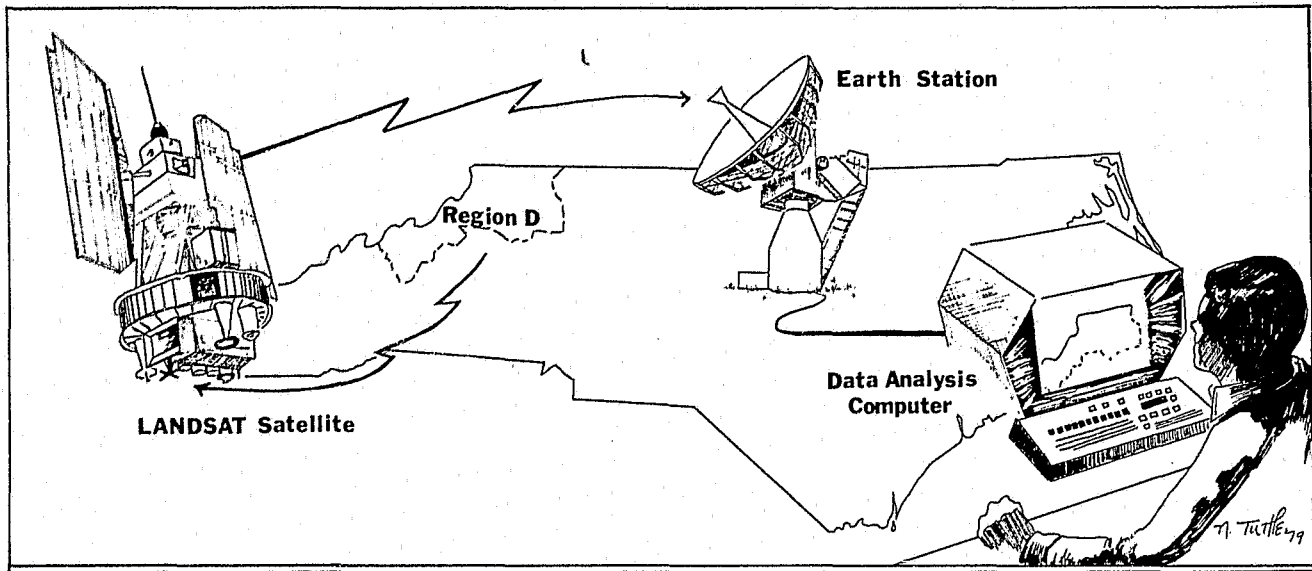
Satellite sensing capabilities are able to recognize different amounts of energy radiated by land and water areas. These "signatures" of one-acre resolution are transmitted to an earth receiving station and sent along to a computer for processing and production of the color-coded land-use maps.

chemical spills such as those which have recently plagued North Carolina;

—extending telecommunications services to remote and otherwise nearly inaccessible areas at reasonable cost;

—and teleprocessing, with transmission costs that are the same, regardless of distance from the central computer to receiver.

It is important to recognize that not all satellite uses will be cost-effective alternatives. But, particularly with the possibility of sharing satellite time among agencies and/or states, it is equally important to consider them as time-saving, energy-saving, and money-saving methods of accomplishing a task.

CHAPTER II-E:
Public/Government Interaction

Executive Order No. 18 instructed the Task Force to "consider how citizens' rights can best be provided for in the telecommunications activities of the State, including ... the right of public participation in policy-making." Accordingly, the Task Force conducted 18 interviews with public information officers, elected officials, members of citizens' boards, representatives of local government organizations, and others interested in and/or responsible for fostering greater interaction between the citizenry and government. Public/government interaction was defined to also include exchanges between state and local levels of government.

USES OF TELECOMMUNICATIONS

Telecommunications can play a vital role in facilitating citizen access to elected and appointed officials. Indeed, a number of demonstration projects across the country have suggested that a significant effect of the telecommunications revolution may be the establishment of a new sense of community through a kind of electronic town hall: home access to government through interactive telecommunications. In Reading, Pennsylvania, senior citizen centers are connected via the Berks TV Cable Company to government agencies such as the local Social Security office, so that the elderly may, through videoconferencing, question administrators in downtown offices about eligibility and benefits. In Columbus, Ohio, subscribers to Warner Cable Television's experimental QUBE system can vote in local straw polls on city and local services by using telephone-sized consoles attached to their television sets.

Most uses of telecommunications in North Carolina state government for fostering public/government interaction are less sophisticated than those in Columbus or Reading and are qualitatively different in that interaction is missing: the communication is strictly one-way. The most exciting possibilities for increasing citizen participation in public policy-making are through interactive tele-

communications. At present, the main interactive systems for public/government communication are the few toll-free telephone lines that state government offers North Carolinians.

Two such lines, for example, have been established at the Governor's Office of Citizen Affairs, which promotes citizen involvement in government, public affairs, and volunteerism. Citizens may call in with comments and concerns about state or local policies. They can call the State Ombudsman for help in cutting through red tape, getting answers to complicated questions, and dealing with the bureaucracy. These IN-WATS lines are staffed from 9 to 5 on weekdays. During off-hours, callers hear a recording inviting them to call back during office hours. The Department of Natural Resources and Community Development has two lines available for local government officials to call in with questions and problems. Some state agencies (e.g., the Consumer Services Division of the Department of Insurance) have had such toll-free lines, but many have been discontinued because of insufficient funding.

Other than toll-free lines, telecommunications systems are used only sporadically in North Carolina to promote public/government interaction. Call-in television and radio programs have been used occasionally. Governor James B. Hunt, Jr., recently answered citizens' phoned-in questions about the statewide high school competency tests in a live broadcast by the UNC-TV network. North Carolina has also hosted a regional videoconference by the Appalachian Regional Commission (ARC) on the theme of "Raising a New Generation in Appalachia." This October, 1978, conference via satellite included a call-in/video segment in which Governors Hunt (North Carolina), Schapp (Pennsylvania), Finch (Mississippi), and ARC Co-Chairman Robert Scott responded to citizens' inquiries.

An April, 1977, satellite videoconference featuring U.S. Representative Charles Rose has served as a prototype for North Carolinians interested in promoting public/government interaction. Students at Hoke County High School

and city and county officials in Raeford, North Carolina, "met" with Congressman Rose in Washington via an interconnection consisting of a portable earth station in Raeford, the Communications Technology Satellite, the NASA-Goddard Earth Terminal in Greenbelt, Md., and studio facilities in NASA headquarters in Washington, D.C. Rose, a Task Force Vice-Chairman and a nationally-recognized Congressional leader in telecommunications, said that satellite videoconferencing:

> opens up a whole new vista for congressional communications . . . The immediacy of this . . . medium permits . . . a dialogue to take place in an atmosphere second only to face-to-face meetings . . . Committee hearings, "town meetings," press conferences, meetings with constituents and dozens of other congressional activities could take advantage of this space-age technology . . .

The Washington-Raeford videoconference report, prepared jointly by NASA and George Washington University, stated that:

> —Satellite videoconferencing is technically feasible. In addition to the Raeford experiment, similar demonstrations between Illinois and California with Washington were also successfully completed.
> —Satellite videoconferences are useful. Participants (both members of the public and of Congress) agreed that the demonstration projects had provided information valuable to the governmental process.
> —Satellite videoconferencing is cost-effective. The report notes that videoconferences will cost about $300 per hour by 1980-82. "For a typical congressional . . . hearing," the report stated, "videoconferencing would be about three times cheaper than the cost of airfare, travel time, and per diem for the witnesses. The benefit/cost ratio is about 3:1, and this does not include the subjective value placed on participation of citizens who would not otherwise have the time or money to come to Washington, D.C." Nor does this ratio take into account energy savings.

The hearings, however, were one-time demonstrations only. The experiment has shown policy planners and the public alike that citizens can increase their participation in the governmental process through telecommunications, but permanent mechanisms for citizen input to government are still relatively uncommon.

PROBLEMS AND PLANS

"Tuning In" On Government

While the use of telecommunications to further public/government interaction in North Carolina may be limited, the opportunities are numerous. Task Force interviews established a number of concerns that policy-makers should consider.

To participate effectively in public decision making,

citizens must have access to information about governmental activities. A number of respondents discussed the general difficulty encountered by state government officials, both elected and appointed, in informing the general public. Many government activities may, quite rightly, not be seen as particularly newsworthy by the mass media. Aides to three of the state's most influential elected leaders made similar points during Task Force interviews:

> —Bill Franklin, Administrative Assistant to Lieutenant Governor James C. Green, noted that not many avenues are open for elected officials to speak directly to the people of the state.
> —Gary Pearce and Stephanie Bass, press aides to Governor James B. Hunt, Jr., suggested that direct teletype connections between the Capitol press office and North Carolina newspapers would help in fuller dissemination of state news to the public. Radio, Mr. Pearce and Ms. Bass noted, can be an especially worthwhile medium for increasing citizen interaction with government officials. Radio call-in programs are effective because participants are more spontaneous than when they are being televised.
> —Sidney S. Eagles, Counsel to Speaker of the House Carl Stewart, said that members of the General Assembly find it very frustrating to try to communicate their activities to their constituents. There is no way to give broad coverage to "unglamorous" programs, however important they may be, he said. In the highly competitive world of broadcasting, where mass audiences are sought, full coverage of legislative sessions, no matter how worthwhile a goal, is unlikely. Mr. Eagles expressed interest in exploring alternative non-broadcast technologies that could distribute news of General Assembly activities to the people.

On a national level, there is already substantial movement toward letting the people "tune in" on Congressional proceedings. National Public Radio affiliates carried live coverage of the Panama Canal debates in the United States Senate. Cable television systems from New York to California are now or will be soon carrying live debates from the U.S. House of Representatives via satellite. The service, begun in early 1979, is expected by Brian Lamb, President of the Cable Satellite Public Affairs Network, to reach nearly half of the nation's cable viewers. Similar arrangements, at least for audio coverage, might be made for the North Carolina General Assembly, quite possibly using audio-only transmission to cable television companies.

Teleconferencing

Interest in teleconferencing as a means of increasing citizen participation in government was evident in Task Force interviews, but so were concerns about related policy issues. As a result of discussions with the Task Force, the Legislative Study Commission for State Policies on the Meetings of Governmental Bodies (commonly called the

"Open Meetings Commission"), included in its 1979 proposed legislation an expansion of the definition of "official meeting" to cover "meetings conducted by simultaneous conference telephone or other electronic means." The proposed bill also requires public bodies to provide means for the public to listen to such electronic meetings. Dickson Phillips (then Chairman of the State Board of Ethics, now a federal judge) felt that telephone conferencing is a "poor substitute" for face-to-face meetings, but stated that tele-conferencing might nevertheless be valuable in eliminating difficult travel during adverse weather conditions, in reducing the amount of time board members have to be away from their work, and in facilitating participation by people residing in remote areas of the state. Judge Phillips and Patrick Sears, Director of Communications for the Department of Cultural Resources, noted that video teleconferencing systems would probably not be cost-effective unless the costs were shared by departments. Most respondents, then, seemed to give qualified approval to the video teleconferencing concept, given some means of coordination and sharing of systems by various agencies.

Arthur Cassell, Vice-Chairman of the State Goals and Policies Board, said that telecommunications could be beneficial in the Board's work. The Board has held numerous local, regional, and statewide hearings on North Carolina's Balanced Growth Policy. Telecommunications could be a help in conducting similar hearings, Mr. Cassell commented. Additionally, telecommunications technology could help equalize access to services for both urban and rural areas throughout the state—a basic tenet of the Balanced Growth Policy. Education, telemedicine, and cultural enrichment are some of the applications of telecommunications which would help those in rural areas receive their full share of government services, he said.

Local Government

Members of the Public/Government Interaction Committee included local government use of telecommunications among their areas of concern. The organization of local governments reflects many of the same aspects as those discussed in Chapter II-D for state government in telecommunications planning and utilization. Local governments are crucially important in the delivery of many services which are coordinated and planned by state government: local school boards, for example, work closely with the State Department of Public Instruction. Local governments could benefit from a comprehensive study of services to be delivered and an inventory of means for delivering those services. One such study, using much of the same methodology as that used by the Telecommunications Task Force in its study of state government, is now being conducted in Haywood County by the National Telecommunications and Information Administration and the National Rural Center. Members of the Task Force expressed interest in seeing

further study conducted so that state and local services that could be delivered through telecommunications might be coordinated more closely.

Several interviewees also noted the important role of telecommunications in providing training to state and local government employees. Both Ronald Aycock, Executive Director of the North Carolina Association of County Commissioners, and Leigh Wilson, Executive Director of the State League of Municipalities, commented that the Institute of Government in Chapel Hill (the principal training agency for appointed or elected officials) has not been easily accessible to all of those who might benefit from its services, especially those from remote rural areas. Mr. Wilson suggested that telecommunicating the instruction available at the Institute to remote areas of the state would help ensure that all sections of North Carolina have the most competent public officials possible.

Other Applications

Secretary of State Thad Eure expressed the opinion of numerous interviewees when he stated that there is a need for a toll-free 800 number to direct all inquiries to the appropriate agencies. A comprehensive state telephone information system, Mr. Eure said, "would be a splendid government service."

Finally, Alex Brock, Director of the State Board of Elections, discussed a number of important applications of telecommunications to electoral matters. Through video and audio informational programs, he said, telecommunications could help combat the growing problem of voter apathy. Mr. Brock stated that the average North Carolinian has little if any idea of the exact functions of county and municipal governments and officials. He called for voter education projects to be delivered into voters' homes via telecommunications. Telecommunications can also be a valuable asset in the actual operation of elections, he said. Nine counties are presently using data processing to count votes and the Board of Elections has approved the use of an electronic voting machine. While these uses do not involve teleprocessing now, they suggest a potential for linking the machines so that, for example, votes in statewide races could be electronically transmitted to the State Board for data processing. Mr. Brock also suggested that "the ultimate answer to low participation" in elections may be a "dial-a-vote" system. Under this system, voters could dial an identification number from home telephones and enter their voting preferences into a computer. A home-based system like this would almost certainly increase voter participation markedly but could also involve problems in ensuring ballot secrecy and access by all voters. "Dial-a-vote" is still in the experimental stage, and Mr. Brock said he would favor a pilot project to explore the costs, benefits, and policy considerations of instituting such a system in North Carolina.

Conclusions

North Carolina has begun to explore only a fraction of the potential uses of telecommunications to increase citizen participation in government. Current practices include several information/referral/help lines, a few of them toll-free; some broadcast call-in programs; and occasional video teleconferences.

The potential uses of telecommunications in increasing citizen participation in government are numerous. Among the ideas discussed by Task Force interviewees were better access to the people by state officials; teleconferencing; using telecommunications to improve local government services; and using telecommunications in various ways to combat voter apathy. Each of the potential uses of telecommunications could help North Carolina become an even more democratic, open state, as well as a national leader in increasing public/government interaction. But each use also requires careful study as to costs, benefits, and policy implications.

Telecommunications Applications:
SATELLITE VIDEOCONFERENCE LINKS RALEIGH-WASHINGTON

"Mr. Chairman," the witness began, "I appreciate very much the opportunity to come to you this way in Raleigh to testify before the North Carolina General Assembly. Basically what we have to say to the General Assembly is this: the whole field of telecommunications is developing and expanding very rapidly today—and if our state of North Carolina is to maintain its position of leadership in this country, we should seriously consider a coordination of all our telecommunications activities... We will do a great service to our people if we will consider a mechanism that would allow for coordination and avoidance of duplication in telecommunications."

Inspiring words from Congressional telecommunications leader and Vice-Chairman of the Telecommunications Task Force Rep. Charles G. Rose, III—and particularly inspiring to fellow members of the Task Force and state telecommunications planners in view of the fact that, in this case, the medium was truly the message. The medium: satellite videoconferencing, linking telecommunications experts in Washington, D.C., with General Assembly members in Raleigh. The message: telecommunications technology is making revolutionary advances, and North Carolina needs to be in a position to take advantage of them.

It was all part of an April 13, 1979, demonstration of satellite capabilities arranged for members of the General Assembly by the Task Force, in cooperation with UNC-TV (which provided Raleigh video services), through the facilities of the Public Service Satellite Consortium, an organization contracting for satellite services to public agencies (which coordinated technical matters) and NASA (which provided a portable satellite earth terminal and studio facilities in Washington). By any measure, the videoconference was a resounding success.

Witnesses assembled in Washington at NASA headquarters' videoconference studio included Representative Rose, who served as Washington moderator; Robert Feragen, Administrator of the Rural Electrification Administration (REA) in the U.S Department of Agriculture; Dr. Robben Fleming, President of the Corporation for Public Broadcasting; Anne Jones, a Federal Communications Commissioner; and Dr. William Lucas, Deputy Assistant Director for Applications of the National Telecommunications and Information Administration of the U.S. Department of Commerce.

Raleigh-based participants included some 25 legislators and state officials who asked the Washington experts a series of challenging and fascinating questions. Lieutenant Governor James C. Green, for example, asked Congressman Rose about privacy/security matters in the collection of health data; about the future availability of satellites for teleconferencing, land-use mapping, and other services; and about what states should do to plan for technological changes. Senator Kenneth Royall asked Rep. Rose how Congress uses its teleprocessing facilities. Senators Harold Hardison, Edward Renfrow, and Joe Palmer, as well as Representative Ruth Easterling, asked about rural telecommunications and its role in North Carolina's Balanced Growth Policy. Senator Dallas Alford quizzed CPB President Fleming on ways of providing public broadcasters with political insulation. And so on. The Raleigh legislators and other officials who participated demonstrated an awareness of the many important telecommunications-related issues which North Carolina has to plan to address.

The Washington participants began the proceedings with brief statements. Congressman Rose, as noted, called for North Carolina to seek means of coordinating its telecommunications services and facilities so that the state can meet the technological, regulatory, and marketing changes of the future. NTIA's William Lucas praised the work of the Task Force in identifying telecommunications expenditures, noting that some 10% of $60 million estimated as an annual telecommunications expense in North Carolina is from federal sources. He called for the states to organize themselves to avoid the "potential for terrible fragmentation and duplication" in telecommunications, and said that North Carolina's work through the Task Force was a useful example for other states to consider following. CPB President Fleming reviewed the history and role of the Corporation in providing funding for public broadcasting across the country, and noted that $800,000 in CPB funds had gone to North Carolina in the 1979 fiscal year for the UNC-TV Network, Charlotte's WTVI, and the three CPB-affiliated public radio stations in the state. FCC Commissioner Jones reviewed the changing marketing and regulatory environment and the proposed revisions to the 1934 Communications Act, concluding that "we are all in for a lot of change." Finally, REA Administrator Feragen discussed his agency's role in providing $5 billion in loans to rural telephone companies in the past and in planning for programs to facilitate cable TV and other broadband services for rural areas in the future.

So much for the message. The medium involved three links of a telecommunications chain. The Washington experts met at NASA Headquarters in the District, where personnel and facilities (cameras, microphones, etc.) are available for such conferences. The video and audio signals were transmitted from NASA's earth station to the Canadian Communications Technology Satellite, in orbit 22,300 miles over the Pacific. The signal was then retransmitted to NASA's Portable Earth Terminal, a converted city bus which serves as a mobile earth station/control center for videoconferences, and which was parked outside the General Assembly building for the purposes of this application.

The videoconference demonstrated that telecommunications can be used in innovative ways to provide important services that may have not been hitherto available. Moreover, satellite videoconferencing could result

in cost savings over conventional means of holding meetings. Factors to be considered include:

—The number of participants and the distance separating them. Generally, the more participants, and the more travel avoided, the greater the savings.

—Honoraria or *per diem* payments. A videoconference can reduce the time away from a job considerably; usually, such fees would be waived entirely when a participant's time away from work is reduced from a full day to an hour or two.

—Production costs. PSSC and NASA curently offer their services at extremely favorable rates. These rates vary with other producing organizations. Studio equipment and services, provided at no additional cost for the April 13 demonstration by UNC-TV and NASA, must be taken into account.

—Travel and energy costs, convenience to the participants, and the

substantial increase in participation likely for such conferences when travel is avoided.

The general applicability of satellite videoconferencing as a means of saving time, travel, energy, and money should increase as satellite costs decrease. The National Research Council's 1978 report, *Telecommunications for Metropolitan Areas: Opportunities for the 1980's*, includes a review of various studies of the substitutability of telecommunications for travel. Among the findings:

—The National Academy of Engineering has estimated that some 85% of all travel is for the purpose of exchange of information; accounting for social visits and other recreational travel, about 15% of all travel is susceptible for substitution by telecommunications.

—A study by J. M. Nilles *et al.* (1976) estimates that replacing 1% of all urban commuting by telecommunications would save over 5 million barrels of gasoline annually.

—A 1976 study by M. Tyler *et al.* indicates that up to 53% of all business meetings in the United Kingdom could be conducted via videoconferencing.

It is apparent that the general cost-effectiveness of teleconferencing will grow. The April 13 videoconference was a valuable exercise for North Carolinians on many counts: legislators were able to gain valuable information from Washington experts; North Carolina demonstrated that its leaders are very much aware of and deeply concerned about the changing telecommunications picture; and all of the participants were able to experience an exciting new service offered through the emerging technology of communications satellites. Finally, it was also an historic occasion: The April 13 demonstration was the first linking of the leadership from both houses of a state legislature with federal agency witnesses in the nation's capital.
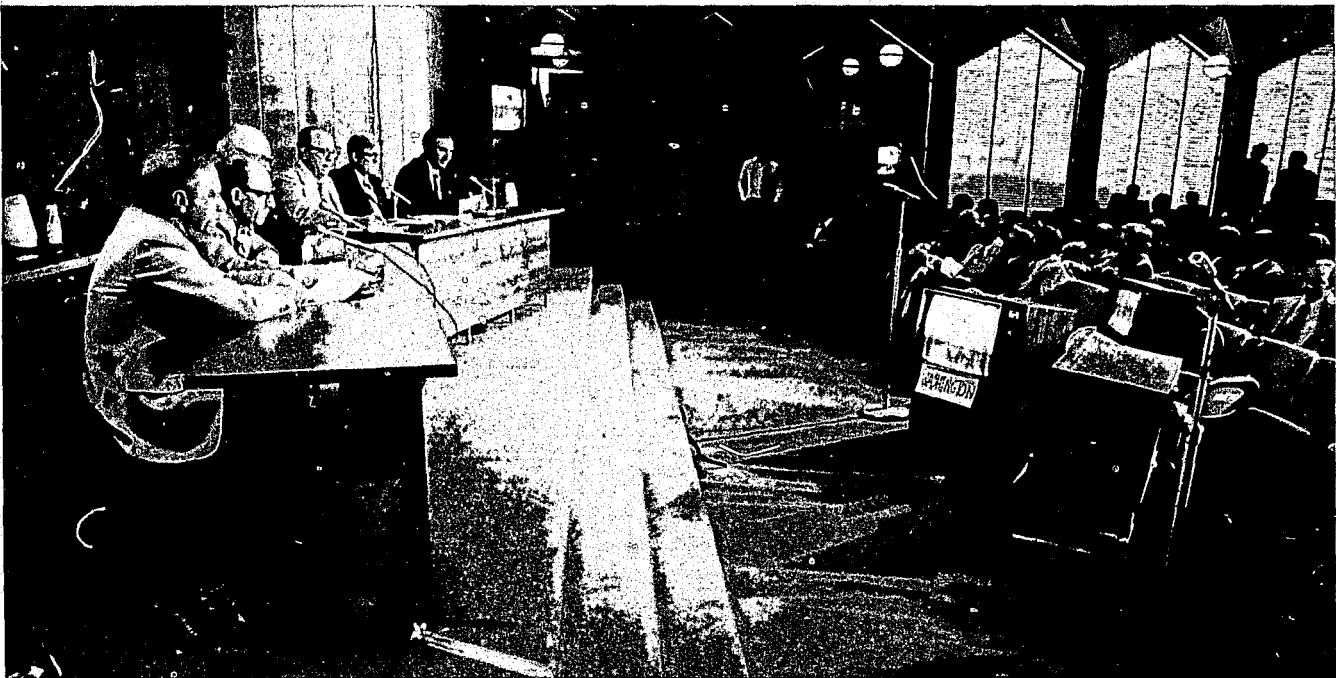
Videoconferencing: A full house of attentive legislators listened to telecommunications experts such as Federal Communications Commissioner Anne Jones (on monitor) answer questions from a panel of Raleigh General Assembly leaders. The panel included (from left) Lieutenant Governor James C. Green; Task Force Chairman Herbert L. Hyde; Senator Harold W. Hardison, Chairman, Appropriations; Senator Kenneth C. Royall, Chairman, Ways and Means; Representative Edward S. Holmes, Chairman, Appropriations; and Senator Marshall A. Rauch, Chairman, Finance.

CHAPTER III:
Laws and Regulations

Executive Order 18 noted that "there are administrative, legislative, and regulatory changes taking place at the Federal level which can increase funds available to North Carolina for telecommunications." It instructed the Task Force "to consider how citizens' rights can best be provided for in the telecom- .:nications activities of the State, including the right to privacy, (and) the right of public access to information." The Task Force was instructed to recommend "administrative, legislative, and regulatory modifications" to the Governor.

To meet these objectives, the Task Force formed a Panel on Laws and Regulations, which kept abreast of national, state, and local legal regulatory developments. In addition to considering broad movements, the Panel focused on two issues especially important to North Carolinians: (1) whether the state should enter into regulation of cable television systems; and (2) what the state can do to protect citizens' rights to privacy and access to information. These concerns are treated in depth in separate sections later in this chapter.

The Shifting Legal Framework

Telecommunications planning in recent years has been especially complicated by the shifting framework of telecommunications law. The legal and regulatory aspects of telecommunications issues are numerous, often complex, and currently the subject of intense national debate. They involve questions of the government's role in regulation of telecommunications and encouragement of the development of new systems and facilities, as well as of the government's acquisition and management of its own telecommunications systems.

In the past, under the Communications Act of 1934 and the Commerce Clause of the United States Constitution, regulatory authority for telecommunications has been divided between the state and federal governments. Microwave transmission and commercial television and radio broadcasting are subject primarily to regulation by the federal government through the Federal Communications Commission (FCC). Local microwave transmissions for two-way radio systems have been primarily under the jurisdiction of state regulatory commissions, once the FCC has made a frequency allocation. The regulation of common carrier industries, principally the telephone, has been split between the FCC, which regulates the industry structure, and the states, which regulate service rates. Cable TV has been regulated by the FCC, with certain regulatory functions left to state and local governments. This split regulatory jurisdiction was generally affirmed by the state and federal courts until the late 1960's. At that time, federal court decisions in the areas of common carrier competition and cable regulation began to redefine regulatory powers and jurisdictional division. The result of these decisions has been the erosion of the monopolistic format in common carrier services and the creation of competition between broadcast and cable television.

An equally significant catalyst for change has been the new technological developments of the mid-1960's—the advent of microwave technologies, satellite systems, fiber optics, coaxial cables, and so forth—which have opened new markets for telecommunications services that do not fit into the traditional regulatory framework. For example, the advent of commercial domestic communications/satellite services is being accelerated by policies of governmental deregulation and the improvement of satellite technologies. These technological developments have brought about new service options while lowering costs for almost all telecommunications services. The current regulatory structure has achieved basic universal service for telephone users at the price of a guaranteed income for telephone companies in the form of a rate of return on investment.

However, the competition created by technological changes in common-carrier services has caused a re-evaluation of the governmentally insured service costs currently in place.

The roles of federal, state, and local government in the regulation of various telecommunications services are currently being reconsidered on a national level. The United States Congress may revise the 1934 Communications Act, which for decades has been the legal framework for this nation's telecommunications. Several proposed bills have been put forth, and predicting the final shape of the rewrite is probably futile. But whatever revisions of the Communications Act are enacted, the regulatory jurisdictions and functions of the federal, state, and local governments in telecommunications will be realigned. Issues being discussed for the rewrite effort include the following questions:

—Should commercial users of the frequency spectrum be assessed a usage fee? Should regulation of broadcasting be relaxed?

—How can the federal government improve the allocation, assignment, and authorization of use of the radio frequency spectrum?

—To what extent, if at all, should telecommunications industries be deregulated?

—To what extent, if at all, and by whom, should the cable television industry be regulated?

—How can government encourage and assist growth in rural telecommunications?

—What revisions, if any, should be made in the administrative structure of federal telecommunications regulation?

The New Financing Act

Another major legal development on the federal level has been the passage of the Public Telecommunications Financing Act of 1978. Any discussion of this Act might well begin with noting that, in previous years such a law would have been called a "Public Broadcasting Act." It is apparent that, just as North Carolina through this Task Force has chosen to look at telecommunications comprehensively, so is the federal government recognizing the blurring of distinctions among technologies. The 1978 Act allocated $40 million, which will provide three federal dollars for every applicant dollar, "for the construction of public telecommunications facilities." Applicants may be public broadcasting stations; "a noncommercial telecommunications entity"; "a system of public telecommunications entities"; nonprofit groups organized for educational or cultural purposes; or "a State or local government (or any agency thereof) or a political or special purpose subdivision of a State." The new Financing Act also requires that applicants have participated "in comprehensive planning for such public telecommunications facilities in the area (to be served) ... (including) an evaluation of alternate technologies and coordination

with State educational television and radio agencies as appropriate." Thus, federal policy favors comprehensive telecommunications planning and allows for a wide variety of applicants. The planning requirement and the broadening of groups eligible for receipt of federal funds will be significant factors in North Carolina's telecommunications future. Provisions for public television and radio include an appropriation of $121 million in 1978, rising incrementally to $220 million by 1983. Another $1 million has been set aside for demonstration projects to promote innovative uses of telecommunications.

Other Proposals

New legislation concerning governmental acquisition, storage, and use of data on individuals is also being considered by Congress. The increasing use of communications and information systems is profoundly affecting both the substance of the law and legal procedures. The substantive issues of privacy and access to information are discussed later in this chapter. But the impact of telecommunications on legal procedures is also potentially great. Legal systems are founded on information—the facts of a specific case, the reasoning of court opinions, the records of legal transactions, the language of statutes and regulations, and so on. The very manner in which state and county governments operate their court systems, maintain and document their legal records, and record their statutes, ordinances, and opinions is likely to be revolutionized by new information management systems. These systems may bring new efficiencies to the traditionally slow and tedious daily business of legal systems. The capability of law enforcement agencies to acquire and rapidly process more and more criminal information may dramatically increase the effectiveness of those agencies—but this capability may raise serious new problems in preserving constitutional and procedural rights and protections as well.

Reorganization of federal administrative and regulatory telecommunications agencies is sure to have important implications for state planning. The Department of Health, Education, and Welfare's Office of Educational Broadcast Facilities, a source of much federal telecommunications facilities funding, has been moved to the National Telecommunications and Information Administration in the Department of Commerce and retitled the Public Telecommunications Facilities Program. Numerous proposals have been made about other possible reorganizations, including those for the abolition or severe curtailment of the Federal Communications Commission (FCC), and for the creation of an independent national telecommunications agency.

Impact on North Carolina

These and other legal/regulatory proposals and actions at the federal level could have significant impact on North Carolina. State planners must take into account federal

policies for the financing of telecommunications facilities to ensure that North Carolinians will be able to obtain their fair share of federal funds. Communications Act revisions include proposals for increased deregulation of telephone and cable industries, and for increased competition in data transmission and other telecommunications industries; other legislation proposes new definition of currently clouded privacy/access issues. All of these proposals require response at the state level. The bills now before Congress need North Carolina's immediate attention in order to ensure that proper state and local government functions will be preserved or created. When new federal laws are passed, there will be a need for state government to move ahead with new policies based on the new requirements of these statutes and subsequent regulations. Within this state of flux, there are issues that require continuing study. The following sections outline some legal and regulatory issues which should be addressed by an effective mechanism in state planning.

CABLE TELEVISION IN NORTH CAROLINA

The Task Force's examination of the state's interest in cable television began with the question of whether North Carolina should follow the 11 other states that now regulate cable TV. The Task Force studied federal, state, and local regulatory procedures.

The Regulatory Pattern

The history of the federal regulation of cable television has been both confusing and restrictive of the growth of the industry. Federal regulatory policy has generally been protective of the broadcast television industry at the expense of cable systems. In the mid-1970's, however, the federal courts began to reverse the FCC's restrictive regulations and to permit cable systems, especially pay-cable services, to become more economically competitive. The FCC has regulated the number of distant signals that a system may import, and establishes technical standards and guidelines. Until the recent Supreme Court decision (*Midwest Video* vs. *FCC*) struck down the regulation, the FCC also required that cable systems serving over 3,500 subscribers provide a public access channel for local use. This decision has significant implications for the issues discussed by the Task Force. It exemplifies the current state of flux in telecommunications laws and regulations.

The history of state regulation of cable has followed a checkered pattern. Only 11 states currently regulate cable at the statewide level, some by a Public Utilities Commission, and others through a Cable Television Commission. The regulatory policies pursued by those commissions have divergent legal and philosophical grounds. The result has been that from state to state cable is regulated for different purposes, with different results. There are different rate structures for essentially the same services because of a lack of

agreement on what the proper state regulatory role should be.

In the remaining states, including North Carolina, cable is regulated in varying degrees by local government. The result is an even more divergent patchwork of rules, policies, and rates. Local governments in North Carolina write franchise agreements that set rates, establish other financial conditions, typically require certain portions of the service area to be cabled within a given period of time, and often make other requirements of the companies. (The City of Durham's franchise agreement with Durham Cablevision requiring the employment of a full-time staffer to coordinate local production services is examined in an article accompanying this chapter.)

The proposed revisions of the new Communications Act would redefine the regulatory relationships between these three levels of government and may well shift the principal regulatory burden to state and local governments. Because the scope of future federal regulation is uncertain, the role of any potential state jurisdiction is still unclear. The Task Force examined cable regulation by other states, but found no evidence that state regulation serves the needs of local communities any better than the current locally-based system in North Carolina. Nor did the Task Force discover any existing problems that demand immediate state regulation. But bills now before Congress suggest major changes in the regulatory roles of the various governments. Therefore, careful study of any new federal legislation in telecommunications is absolutely mandatory before the question of state regulation can be finally resolved.

Statewide Concerns

Aside from the question of regulation, the state does have two areas of interest in cable television: one, the potential use of cable systems to meet public service needs; and the other, the need for a minimum standard of quality for cable service.

These concerns were evident in a survey conducted for the Task Force by the North Carolina League of Municipalities. Officials of the 43 North Carolina cities with a population over 100,000 were asked the following questions:

1. If the state developed innovative programming ideas for the public access channels on cable systems, would the cities be interested in using this programming?
2. If the state developed and offered technical assistance to the municipalities in the area of cable TV franchising, would the cities be interested in and take advantage of such assistance?

Responses came from 34 of the 43 cities. The response to the question about using programming developed by the state for public access channels was unanimously favorable —so long as there would be no state requirement that such programming be carried at the local level. The responding

cities were also unanimous in giving an affirmative answer to the second question. They expressed a definite need for expert assistance in dealing with technical aspects of franchising and regulation.

Public Access and Local Programs

The former federal requirement for a public access channel on any cable system serving over 3,500 subscribers established a substantial service delivery system in over 120 North Carolina communities currently enjoying cable services. But public access channels in this state have been largely an underutilized resource. The response to the Task Force/League of Municipalities survey indicates that local government officials would like the state to work with them and with cable operators to develop better franchise agreements and better programming for use in the delivery of public services.

The Task Force considered two possible means of fostering the growth of local programming capabilities: encouraging the formation of citizen advisory groups to work with local and state government, as well as cable operators (and perhaps with operators of other telecommunications distribution systems); and contracting for leased channels for public service programs. Advisory groups could serve as liaisons to obtain public service programming, encourage local production, and help solve problems in the relationship between the cable company and local government. In addition, cooperative agreements could be reached for cable companies to distribute public service programming over leased channels, with local and state government compensating the systems on a contract basis.

Throughout its discussion about helping localities obtain public service programming, either from their own local efforts or from elsewhere, the Task Force was mindful that a great opportunity for extending services to the people exists on cable channels. But the Task Force was equally mindful that cable channels are only one of many ways of distributing programming services to the people.

Technical Assistance

The survey conducted by the League of Municipalities for the Task Force also revealed that local government officials would welcome assistance in technical and franchising aspects of cable operations. Local governments, the Task Force concluded, should continue any appropriate rate-setting functions, but there is a need for consistent standards of technical quality throughout the state, and this is where state government can help the localities. In view of the possibility that cable systems in the future might be interconnected, local governments need advice during the franchising process so that technical standards that are economically reasonable and practical will be adopted. Furthermore, the state may wish to study the benefits of encouraging all cable franchise agreements to

require at least a 20-channel capacity; to study the potential uses of interactive cable systems that allow nearly instantaneous two-way communications; and to study the potential problems of future point-to-point data communications via cable systems. Such problems may be both technical and legal, with particular impact on individual rights to privacy and on the possibility of data theft.

Cable in Rural Areas

One particularly important concern for North Carolina is that rural areas are not adequately served by cable. The economies of cable make operation in areas of concentrated population reasonably lucrative, but, in sparsely populated rural areas, generally unprofitable. A related problem arises from the fact that both city and county governments make franchise agreements with cable operators; a county franchise which is excluded from the more densely populated city areas may not be economical. These problems, crucial in a state striving fo balanced growth, merit continuing study. In its September, 1978, meeting the Task Force discussed the possibility of a governmentally subsidized low-interest loan program for the development of cable systems in rural areas. Were such a program to be developed, the loans might be made to any group capable of delivering the desired services, whether a cable company or a rural telephone company. Should the FCC or the Congress permit telephone companies to provide broadband or cable services, then careful examination should be made of requiring telephone companies that provide cable TV services to obtain a local franchise so that all cable systems will meet the same locally created standards. It should be noted that there has already been some movement in the direction of allowing cable services to be delivered by telephone companies: the Carter Administration is going forward with loans for rural cable TV services through the Farmers' Home Administration, the Congress is considering development of a loan program for rural telecommunications services under the Rural Electrification Administration, and the FCC is studying the possibility of allowing rural telephone companies to provide broadband services.

Conclusions

The lack of any formal Task Force recommendation for state regulation of cable should not suggest that the state has no interest in these systems. Local officials have expressed pronounced interest in state assistance with public service program development for leased and other cable channels. Local governments also need assistance in technical and regulatory matters to help ensure responsive service and the capability of interconnection of systems. The state also has an interest in seeing that all its citizens, whether they reside in urban or rural areas, have access to telecommunicated services, including cable, insofar as that is one

important current distribution technique. The possibility of state, local, and private cooperation in developing these resources deserves to be explored.

PRIVACY AND FREEDOM OF INFORMATION

Individual liberties may be threatened by some applications of telecommunications. The era of electronic data collection and transfer in particular presents constant challenges to traditional legal rules in matters of individual privacy and freedom of (access to) information. During the Task Force research, members were confronted by such questions as:

—What information on individuals is it proper for government agencies to maintain?

—Who should have access to this information?

—What guidelines should be established governing the consolidation of previously separate data bases?

—How much of the information maintained by government agencies should be opened to public inspection?

—Is an electronic impulse legally defined as personal property? Can such an impulse, which represents information, be stolen, copyrighted, etc.?

Intertwining Considerations

The legal doctrines of privacy and of freedom of information are closely intertwined in the problems of data collection and access, particularly in the processes of governmental data collection on individuals. Rights of access to governmental information must be balanced against equally important concerns for individuals' rights to protection from governmental intrusion and unauthorized dissemination of private information. Similar problems are increasingly evident in private and commercial data collection and use.

State and federal laws and regulations concerning the collection, use, and dissemination of governmentally assembled information are not sufficiently consistent to protect individual rights adequately. Conflicts currently exist between state and federal laws and among various state laws and practices. The related rules covering access to government-held information are also inadequate—an inadequacy emphasized by the impact of computerization. New technologies are exponentially increasing the data collection and storage capabilities of government. They are at the same time increasing the ease of access to government data: more data are being stored, but terminals are generally unguarded, unlocked, and uncoded. In practice, security is often lax.

Finally, new federal legislative efforts—e.g., privacy protection statutes being considered by Congress in response to the President's Privacy Initiative (a package of privacy-related bills)—may change the ability of state and local governments to use the data collected at all levels of government. These new federal initiatives are sure to have substantial effects on individual rights and protections.

In the private sector, the new "information era" has resulted in massive data collections on individuals' day-to-day activities. Credit reports, health records, educational records, and so on, are regularly gathered and may be accessible to agencies and personnel other than those for whom they were intended. Equally critical is the growing problem of computer theft. As banks, for example, increasingly conduct business through data transferral, the possibility of major crimes increases. Currently data transferred by longlines or cable is neither regulated nor secure.

The rise in data theft presents more than just a challenge to our criminal justice system. The state currently sponsors a multiplicity of programs to train computer operators in high schools, community colleges, technical institutes, colleges, and universities. The skills enabling these students to use computer technology to earn a living also, unfortunately, may enable them to use computer technology for unethical or illegal purposes. Because there is little definition of what constitutes unethical or even illegal uses of data, these graduates of state institutions may, wittingly or unwittingly, transgress the rights of individuals or state or federal laws. This issue and many other concerns demonstrate that the new information era has serious social implications beyond the obvious current legal conflicts.

The State Response

Privacy and freedom of information laws and regulations have been studied in the recent past both by the Task Force and by the Security and Privacy Committee of the Governor's Crime Commission. The Chairman of that group, Wade Hargrove, was also a Task Force member serving on the Panel on Laws and Regulations. Both groups have recognized the need for a means to resolve or mitigate problems created by the application of telecommunications to the handling of personal information. The state should study needed statutes, regulations, and practices to protect individuals and businesses from privacy and access problems and data theft. The state also needs to be able to respond to the new federal privacy/access initiatives to ensure that North Carolina's interests are adequately protected. Additionally, state (and private) educational agencies should consider developing a professional curriculum on ethics and laws governing data use, processing, and manipulation.

Concerns over individual rights are so paramount in our society that they deserve consideration free of any other interests. At present, no agency in state government is sufficiently isolated from data collection activities to be without vested interest in the rules to be considered. The state needs an independent, objective mechanism to evaluate the conflicting statutes, regulations, and practices.

Conclusions

Telecommunications laws and regulations are undergoing dramatic change at various levels. The efforts at federal Communications Act revisions, the passage of new telecommunications financing provisions, possible administrative reorganizations, and other changes demand a state response so that the needs and interests of North Carolinians may be protected. The Task Force concluded that the state should not at this time enter into cable regulation; but that state assistance to local governments on legal and technical considerations, and state leadership in developing public service programming for cable systems, would be beneficial. Privacy and freedom of information matters also require continuing state study. It may be necessary to establish an independent means of providing the continuing study, response to federal initiatives, and technical, legal and programming expertise which are desirable.

Telecommunications Applications:
"BLUE SKIES" FOR DURHAM CABLE USERS

Hillside High School Videotape Club member Tammy McCrae conducts an interview with Person County High School cheerleaders during halftime at a Hillside-Person basketball game. The game was carried live to subscribers over Durham Cablevision facilities in February, 1979.

"Team A will cover the game tomorrow, and these are the assignments: Camera One—Anthony Lassiter; Camera Two—Malcolm Rourk; Camera Three—Andre Reams. James and Robert will do the play-by-play, Tammy has two half-time interviews, and Paula, you're on as production assistant."

It sounds like a television sports production director prepping the staff for one of those passionately followed North Carolina basketball games—and it is. But the production director in this case is Cheryl Johnston, a busy 25-year-old high school English teacher— and the staff consists of 25 teenaged members of the Videotape Club at Hillside High School in Durham.

The Videotape Club

The planned television production involves taping a Hillside varsity basketball game on a Friday night for replay five days later by the Durham Cablevision Company to its subscribers. This will be one of the last times Hillside students are to videotape their games, however: within four weeks, Durham Cablevision is scheduled to provide interconnections to the school's gymnasium so that the students can cover subsequent games live. Basketball games are only part of Durham Cablevision's locally originated offerings, and the Hillside production crew only one of a growing number of Durham citizens' goups producing programming for the cable system.

In existence for only five months, the Hillside Videotape Club has already produced a variety of programs featuring local teenagers. Among the offerings: a talent show, homecoming activities, football, basketball, and volleyball games, choir and band concerts,

school assemblies, and meetings of the Durham City School Board. Some of the programs are taped for cablecasting during a regular weekly three-hour Durham City Schools program. Others, like the School Board meetings, are covered live.

Perhaps, as some claim, today's younger generation already spends too much time in front of the "tube." But Mrs. Johnson argues that TV in the classroom is an appropriate educational resource because it "creates interest and wakes up the kids." Besides, these students spend most of their time on the other side of the television set. Their cablevision production activities, she says, "help develop initiative, organizational abilities, technical skills, and language abilities in writing and speaking."

The students agree. Says Clarke Egerton III, Senior Program Director of the Club, "I'm getting a lot out of the experience. It's good training for me—I'll be getting into electronics when I go to college and eventually want to work in television as a director." Cameraman William Leathers also agrees; he has already parlayed his high school cable experience into an internship as a technician with a local television station, and views his work with the Videotape Club as a stepping-stone to what he hopes will be a career in video electronics. For still others, like interviewer Tammy McCrae, the cablecasting experience is an enjoyable hobby while she prepares for a career in biomedical engineering.

Mrs. Johnson's involvement with television production extends into the classroom as well. Her first experience at Hillside with videotape, in fact, was in 1977, when her Journalism II students produced *55 Minutes: A Period at Hillside High*, a news-feature presentation closely modeled on CBS' *60 Minutes*. The five-part program, shown to the school during an assembly, included segments featuring club activities, sports, fashions, development of job skills, and editorial commentary. "The kids did everything—they wrote the scripts, planned the production, ran the camera," says Mrs. Johnson,

adding that her newspaper staffers are planning more "electronic issues" of the *Hillside Chronicle* in the future. The response from the students, other teachers, and the community has been extremely favorable—so favorable, in fact, that Mrs. Johnson is the Durham City Schools' nominee for the state Terry Sanford Creative Teaching Award for 1978-79.

Thus, Hillside's booming cable "industry" is composed of two strains: one, the in-class efforts of the newspaper staff; a second, the extra-curricular work of the Videotape Club. All of the students, moreover, have received extensive initial training by Dr. George Harvey, Audio-Visual Director for the City Schools. "If you want to know who's really responsible for the success of this project," Mrs. Johnson comments, "you have to talk to George Harvey."

Changing Attitudes

As Audio-Visual Director for the Durham City Schools since 1966, George Harvey has seen attitudes towards instructional television change dramatically. Early on, he recalls, television was viewed as an educational panacea by many teachers, and the stereotype of the non-teaching coach who relied on television as a way of filling up an hour of his social studies class was, unfortunately, not always far from the truth. Other teachers thus tended to view televised instruction as the refuge of the lazy, a means for poor disciplinarians to get some quiet time from unruly students, or just another way schools were avoiding their responsibilities to teach the basic 3 R's. But now, he says, attitudes are slowly beginning to change.

"It's taken a while and it's going to take some more time for teachers to learn how to use television in the classroom," Dr. Harvey notes. The most common mistake is allowing classroom television experiences to be as passive as those at home. Thus, teachers are being trained to provide students with "active watching" experiences: discussion questions, handouts, and interest-provoking reading materials will often precede the program to be viewed. Activities emphasizing concepts discussed or providing practice in skills learned during the program

will follow. Television can therefore be a highly effective teaching aid. Teachers have used films, tapes, slides, and other audio-visual materials for a long time, Harvey says, and television, properly used, can be an equally effective teaching supplement.

The presence of Durham Cablevision since 1977 has given Dr. Harvey's efforts new impetus. The company is developing two-way links between City Hall, the downtown administrative offices of the school system, the schools' central audio-visual facility, Durham and Hillside High Schools, Durham County Stadium and Durham Technical Institute. Other schools in the system will eventually be interconnected as well. The cable networking will provide students and teachers with many new opportunities and services, Harvey says. One important and immediate benefit will be a new capability to videotape UNC-TV educational offerings for use at times convenient to teachers, since one of the most commonly cited reasons for the underutilization of broadcast educational programming is the scheduling problem. Durham Cablevision is allocating two channels to the school system for its own use—or, more accurately, for a variety of uses. Harvey's office at the Audio-Visual Center will be able, on request, to videotape any program to be fed to the appropriate school via cable at a specified time. In addition, Dr. Harvey is beginning to accumulate an impressive videotape resource library. He notes that conferencing between school administrators will be possible without having to leave a campus, and that other, more innovative uses are likely to follow: "There's no reason," he says, "why journalism classes at Durham and Hillside High Schools can't interview Durham's mayor through the cable system." Eventually, he says, the cable system and the schools may be able to provide help for hospital- or home-bound students through television. The possibilities are nearly endless.

A "Model for Public Access"

At the hub of this sudden flurry of local television activity is Durham Cablevision. From the perspective of local planners who would like similar

activities in their own communities, the stipulations of the franchise agreement between the company and the City of Durham are especially noteworthy. The contract was called "a model for public access" by the North Carolina Center for Public Policy Research in its 1978 report, *Cable Television in North Carolina*. Among the provisions of the agreement awarding the Durham franchise to American Television and Communications Corporation of Englewood, Colorado, were requirements for an access channel, a mobile van, a color-equipped access studio, free training to Durhamites interested in video production, wiring of public buildings into the cable system, and employment of a full-time staffer for coordination of locally originated programming. (The recent Supreme Court decision [*Midwest Video* vs. *FCC*] will not affect public access channel requirements embodied in *local* franchise agreements, but eliminates the *federal* requirement for such channels.)

Richard Weigand, General Manager of Durham Cablevision, says that most cable operators are willing to meet local service needs. In the most extreme manifestations, public access requirements have resulted in X-rated channels which cable operators have been forced to lease to blue-movie entrepreneurs, often resulting in a considerable loss of protesting home subscribers. Durham Cablevision, he suggested, is developing programming more along the lines of the "local origination" concept—which, broadly speaking, is any programming provided by the cable system which is not available over broadcast channels. Local origination thus includes public access material as well as programs which are not actually locally originated. Durham Cablevision's "local" channel 11 uses some of its allocated time for sportscasts via satellite of Madison Square Garden sports, as well as a children's program distributed by satellite.

But, says Dave Reid, who has been hired to coordinate all locally produced programming, it is hoped that by mid-summer 1979 Durham Cablevision's channel 11 will have enough local programming to force nationally distributed programs like the Madison Square Garden package

onto another channel. Current trends support this projection: channel 11 programming time went up 280% (from 38 to 106 hours per month) from April, 1978, to November of the same year. Sixteen programs filled the April channel 11 log; 61 programs were shown on channel 11 in November. Moreover, enrollment in Reid's television production courses is up and classes are booked months in advance. Among recent local program producers:

—the League of Women Voters, presenting a "Meet the Candidates" forum;

—"Employment Horizons," a local volunteer group, presenting a seminar on developing job skills;

—Duke University's "Channel 13" on-campus cable group, presenting a weekly spoof of the news;

—North Carolina Central University, presenting sports coverage of Mid-Eastern Athletic Conference activities.

Additionally, Durham Cablevision is planning programs to serve the needs of senior citizens: "We're going to work with Duke's Center for the Study of Aging and Human Development," Reid says, "and build a file of senior citizens' programming." One idea which has been developed, for example, is an exercise program for the elderly. Among other ideas in the works: a survey of Durham's night life; further cooperation with the Duke cable group for access to its library of materials; a program featuring the Durham Recreation Department's Fun Caravan; and the possibility of Durham Technical Institute providing both community education and classroom instruction over one or more channels. There's even talk of what Weigand terms "blue sky" options like implementation of home security alarm systems via the cable network.

Now, Reid says, "We're able to have something on channel 11 virtually every night, and we hope fairly soon to have full utilization of the local channel."

It is already apparent that for many Durham citizens, cable television represents an opportunity for public service communications experiences previously reserved for those lucky few operating out of major national or statewide networks. Moreover, these public services are being provided through a unique partnership of private and public interests—state and local funds in the educational system, private funds in the cable company, and a mix of other public and private groups. The facilities are in place, the cooperation, interest, and expertise are growing, and the future of local public service cablecasting in Durham appears to be "blue sky" all the way.

Among the members of the Task Force were Frank Daniels, Jr., and Joseph Ross.

CHAPTER IV:
State Facilities and Systems

Executive Order 18 directed the Task Force to "study existing state telecommunications facilities and . . . costs in relation to current services . . . ." The Task Force formed a Facilities Panel and engaged a technical consultant to identify, locate, and describe the various state-related telecommunications systems and determine their costs.

FACILITIES SURVEY

The facilities survey was the first such broad-gauged effort to be undertaken in North Carolina. As a way to begin, the Task Force staff examined the state's 1977-79 budget to try to identify existing telecommunications systems and expenditures. Unfortunately, current budget classifications do not include clearly defined telecommunications categories. Telecommunications information is often mixed with other categories, such as mail costs and general personnel or administrative functions. Therefore, the Task Force's review of the budget had to be followed by an exhaustive survey of telecommunications facilities in general state government, as well as at the 57 community college and 16 University of North Carolina campuses.

Personnel responsible for the operation of telecommunications facilities were either personnally interviewed or sent a written survey questionnaire with detailed instructions. (See Appendix D.) They were asked to detail facilities and equipment, connections with other systems, and capital and operating costs.Despite the generally good cooperation of the various agencies, the facilities survey was hampered by the lack of a precedent for the Task Force's work, by some respondents' apparent lack of understanding about the systems they manage, and by the complex and comprehensive nature of the survey itself. As of March 5, 1979, 185 questionnaires of the 319 distributed had been completed. (See Table 1.) This report presents survey information in summary form; the completed questionnaires are on file in the Task Force office.

Summary of Facilities Survey

The Task Force identified 308 existing and 11 planned telecommunications systems owned or leased by the state. In keeping with the directive to the Task Force to study telecommunications systems and costs in relation to public services, systems were classified both by the type of technology used and by the primary service provided. (See Table 2.) Assignment of a system to a particular service category involved some arbitrary decisions. For example, community college teleprocessing systems were included in the cultural, educational, and information services category even though many of the data communicated are for administrative and management functions that might just as properly fall under the heading of government operations.

Perhaps the most striking insight to be drawn from the Task Force survey is an appreciation of the state's massive investment in telecommunications. Existing systems have, at a minimum, a capital value of over $22.4 million and a total operating cost of over $45.4 million each year. (See Table 3.) These preliminary cost estimates must be considered to be quite conservative; in its year of work, the Task Force Facilities Panel was unable to determine all telecommunications costs. The capital value of equipment is not listed in the biennial state budget, so survey results were the primary source of this information. Because 42% of the questionnaires were not returned, and, on some that were, cost information was omitted or questionable, the Task Force estimates must be considered tentative.

It is also important to note that the facilities survey reflects only one point in time. Telecommunications systems are dynamic: new equipment is acquired, different interconnections among systems are established, and existing systems are brought into use to provide new services. The Task Force did not have the resources or

Table 1
NUMBER OF TELECOMMUNICATIONS SYSTEMS, BY TYPE, AND
SURVEY RESPONSE RATE

	Systems Information			Data Collection Information	
	Estimated Number Existing	Estimated Number Proposed(a)	Total of Existing and Proposed Systems	Survey Sheets Completed	Percent of Survey Sheets Completed
Telephone Systems(b)	95	1	96	52	54%
Teleprocessing Systems	73	6	79	63	80%
Teletype Systems	7	0	7	7	100%
Radio Broadcasting	13	1	14	9	64%
Television Broadcasting	2	0	2	1	50%
Cable Television	0	0	0	0	0%
Closed-Circuit Television	38	2	40	10	25%
Microwave Systems	2	0	2	2	100%
Satellite Terminals	2	0	2	0	0%
Two-Way Radio Systems	76	1	77	41	53%
TOTAL	308	11	319	185	58%

(a) Includes major upgrades of existing systems.
(b) Includes facsimile systems.

Table 2
NUMBER OF EXISTING STATE-OPERATED TELECOMMUNICATIONS SYSTEMS, BY SERVICE CATEGORY

	Cultural, Educational, and Information Services	Health and Social Services	Public Safety Services	Government Operations	Public/ Government Interaction	TOTAL
Telephone	77	7	3	5	3	95
Teleprocessing	39	10	5	19	0	73
Teletype	1	4	2	0	0	7
Radio Broadcasting	13	0	0	0	0	13
Television Broadcasting	2	0	0	0	0	2
Cable Television	0	0	0	0	0	0
Closed-Circuit Television	35	3	0	0	0	38
Microwave	1	0	1	0	0	2
Satellite Groundlink	2	0	0	0	0	2
Two-Way Radio	28	24	13	11	0	76
TOTAL	198	48	24	35	3	308

authority to establish a means of continuous updating of inventory and systems information.

In addition to systems owned or leased by the state, North Carolina's total telecommunications complex is augmented by a number of public and private systems. The state is the location of five major military installations (Coast Guard, Marine, Army, and two Air Force bases), with extensive communications facilities and a large number of trained personnel who could help the state in the event of a disaster. Better state liaison with these installations is required if North Carolina wishes to avail itself of these opportunities. There are also commercial radio and television broadcasting facilities throughout the state, many of which can offer public services through regular program-

ming or through leasing of sub-carrier channels. Some 52 cable TV systems are now serving an estimated one million North Carolinians in 123 communities. Further, over 30 telephone companies are currently operating in North Carolina under the regulation of the Public Utilities Commission. Finally, earth receiving and sending stations owned by private companies may offer service opportunities for satellite communications, especially for teleconferencing.

Information Analysis

The facilities survey, although incomplete, generated a great deal of information. To reduce this material to a more manageable form so that Task Force members and

Table 3
ESTIMATED PUBLIC TELECOMMUNICATIONS COSTS*
(As of June 26, 1978)

Departments	Communications			Data Processing			TOTAL
	Services	Personnel	Plant Value	Services	Personnel	Plant Value	
General State Govt. ...	$7,680,371(a)	$4,869,884(c)	$16,569,602(d)	$9,966,471(a)	$10,309,592(c)	N.A.	$32,826,318
University System	N.A.	3,007,230(c)	N.A.	N.A.	7,588,398(c)	N.A.	10,595,628
UNC-TV	640,475(b)	1,415,065(c)	5,833,199	. . .	. . .	. . .	2,055,540
TOTAL	$8,320,846	$9,292,179	$22,402,801	$9,966,471	$17,897,990	. . .	. . .
Services/Personnel subtotal	$17,613,025			$27,864,461			
TOTAL ANNUAL COST							$45,477,486
TOTAL PLANT VALUE							$22,402,801

*Costs do not include figures for electricity, physical facilities, paper, etc.

N.A.—Not available.

(a) Costs extracted from the Departmental Accounting System (DAS), which does not include the Departments of Revenue or Insurance or the University system. Cost data for these agencies require a file search and manual extraction of figures. Services costs do not include (a) communications and automatic data processing maintenance costs; (b) communications equipment rental or purchase costs; (c) existing plant values.

(b) Costs extracted from the Ramsey Committee Report to the North Carolina General Assembly, April 1978.

(c) Costs extracted from the State Personnel Information Management System. These costs are understated because they do not reflect benefits, nor do the job titles and classification codes encompass all personnel involved in telecommunications. Also, these costs may be overstated by as much as $4 million because some personnel listed may or may not be involved in telecommunications—e.g., "Information and Communications Specialist."

(d) This figure reflects plant value for the following systems only: (1) state-operated two-way radio systems, estimated by an August 1976 survey at $13 million; (2) the Highway Patrol Microwave System, at $1.5 million; (3) owned equipment for local telephone service, at $1.5 million.

staff could analyze and evaluate it, basic descriptive information on each of the systems was entered in the State Computer Center. The resulting one-line descriptions included the date the questionnaire was returned; the type of system (telephone, teleprocessing, etc.); the service category (public safety, etc.); the department and agency of state government; the general purpose of the system; major equipment (e.g., number of mobile radio units); and capital and operating costs. This information about systems was then organized in four different ways to help answer different types of questions. Systems were categorized by (1) type of technology; (2) service category; (3) state department operating the system; and (4) operating cost. (The complete set of the brief descriptions is on file in the State Computer Center under Application Number TQ001. A printed copy is also available in the Task Force office.)

Examination of the "one-liners" revealed problems in eliciting management information about telecommunications facilities and equipment. The survey was necessitated by the current lack of a comprehensive inventory. If managers are to explore methods to save money or improve services by sharing or acquiring compatible systems, they must have access to accurate, current information about the telecommunications systems and facilities already in use.

No comprehensive inventory exists now, and the Task Force's experience underlines the difficulty of collecting the information when it is needed. Respondents often omitted pertinent information from the survey questionnaires, especially estimates of equipment value. It was often difficult or impossible to find an individual who had knowledge about all the telecommunications systems of a particular agency; completed questionnaires sometimes failed to describe a system which was known to belong to that agency. Descriptions of the interconnections among systems were often omitted or incomplete, and estimates of costs were often not comparable because of the lack of common agreement about what constitutes a telecommunications cost. Some of these problems might have been alleviated if personal interviews had been used throughout, or if more explanatory material had accompanied mailed survey forms. Problems of accounting for facilities and major equipment will almost certainly be reduced as the new uniform Fixed Asset Accounting System is introduced. But the real need is for one comprehensive source of information on telecommunications facilities and services so that the potential savings and public benefits of coordinated systems may be achieved. The results of the Task Force survey, though incomplete, can be the basis for the continuing effort needed to gather and maintain management information.

OVERVIEW OF STATE FACILITIES AND SYSTEMS

Telephone Systems

The major statewide telephone system is the Direct Access Intercity Network (DAIN) made up of three elements: (1) leased Telpak circuits (see Map 1, at the end of this chapter) which, in conjunction with leased Wide-Area Telephone Service (WATS), provide long-distance circuits

to state government and University system users at a cost of about $700,000 annually; (2) the DAIN switching center in Raleigh, operating at a cost of $2 million annually; and (3) local telephone services, including provision of actual telephone instruments, key systems (multi-line telephones, intercoms, and call-switching equipment), and local circuits at $11 million annually. (Local telephone services, it should be noted, are provided for state agencies throughout the state, not just in Raleigh.) The DAIN system provides excellent and economical voice service to most state government and University system users. Most respondents to both services and facilities interviews expressed satisfaction with the level of telephone services. However, tighter administrative control and education in effective telephone use could help promote even greater efficiency and reduce the number of non-business calls by users.

Additional leased and owned switching equipment and services are operating at University campuses, community colleges, hospitals, and other institutions. Other telephone services are operated for the express purpose of furthering public/government interaction: for example, the Department of Human Resources' CARE-LINE is an IN-WATS service through which both the general public and employees of health or social service agencies can obtain information about service agencies in the state. There is a need to study the feasibility of a state information center which would consolidate the existing IN-WATS services.

Any planning about state telephone service must take into account the fact that there are over 30 telephone companies currently operating within North Carolina. (See Map 2.) The Public Utilities Commission is the primary state body with regulatory jurisdiction over these companies. But the state relationship to the phone companies also involves other concerns: for example, the telephone system is widely viewed as the basis of provision of public safety services. Currently, state and local agencies are involved in an effort to establish the uniform emergency phone number 911 in many localities, a fuller discussion of which can be found in Chapter II-C. Clearly, state and local officials must work closely with these telephone companies for the provision of 911 and many other services.

Table 4 lists excerpts from the one-line descriptions compiled by the Task Force of state-funded telephone systems.

Teleprocessing Systems

Whenever computers are linked together or to remote terminals in a mode called teleprocessing, telecommunication is involved. Strictly local data processing is giving way to increased use of remote terminals. While the facilities survey was aimed primarily at collecting information about teleprocessing, the Task Force inevitably also gathered some data on all aspects of computer use, including applications which are, for the present, strictly local.

Many general state government departments (non-University system users) are being served by the State Computer Center (SCC) operated by the Department of Administration in Raleigh. About 44% of the time, the SCC's computer resources support teleprocessing. Service interviews and data collection on planned facilities show that this mode of operation is continuing to grow.

Other general state government computer centers include central processing units at the Departments of Commerce, Revenue, Transportation, Correction, and Justice (the Police Information Network—"PIN"), as well as at some community colleges. (State government and PIN teleprocessing are charted on Maps 3 and 4, respectively.) Except for PIN, these computers operate largely in the local entry mode, but use of remote processing can be expected to increase.

Some agencies, such as the Departments of Human Resources and of Natural Resources and Community Development, have minicomputer systems providing for the specialized needs of one or more programs (e.g., the Land Resources Information System serves several agencies). In some cases, these minicomputers also provide administrative and financial data services for management. The abundance of independently operated computer systems suggests the need for objective, case-by-case evaluation of the relative merits of centralized vs. decentralized computing services.

The state's schools and universities receive data services from the Triangle Universities Computing Center, the North Carolina Educational Computing Service, and the School Computer Corporation of Raleigh, which provides both administrative and educational services to public school systems. Additionally, all University of North Carolina campuses have or plan to have computer systems or remote terminals on campus providing administrative and academic services. (Educational teleprocessing is charted on Map 5.)

A number of important conclusions may be drawn from a review of North Carolina's large investment in computer systems. First, the trend clearly appears to be toward more teleprocessing and less local entry. (See Table 5.) Second, it is unclear to what extent these systems should remain separate. The sharing of computer information and teleprocessing systems needs to be examined in light of management needs, cost effectiveness, and emerging technologies. The coordination of data bases and the interconnection of computers could provide improved access to information for all users (with appropriate attention to issues of security and privacy); but standardization of formats and computer language would be required and could be costly. Third, personnel training and management of computers varies widely across the state; standardization of job titles, descriptions, and personnel training is needed to gauge telecommunications operating costs accurately. The Department of Administration's Management Systems Division has been working towards resolving many of these concerns. Finally, the potential for saving money through

Table 4
ONE-LINE DESCRIPTIONS OF SEVERAL TELEPHONE SYSTEMS

Ref. Date	Type	Cat.	Dept.	General Purpose	Item	Count	Status	Plant Value	Annual Cost
08/78	Telephone	AD	US	Pembroke State Campus Centrex	Centrex PBX Telephones	1 175	...	...	$ 46,728
08/78	Telephone	AD	US	UNC Wilmington Admin. Telephone System	Telephones	388	Leased	...	82,994
08/78	Telephone	AD	US	UNC Asheville Admin. Telephone System	Telephones Centrex	169	Leased	...	37,966
08/78	Telephone	AD	US	UNC Charlotte Admin. Telephone System	Telephones Key System	1,693 67	Leased	...	240,5.9
08/78	Telephone	AD	US	Western Carolina Univ. Admin. Telephone System	Telephones Centrex	2,100	Leased	...	285,202
08/78	Telephone	B	DHR	Lenox Baker Children's Hospital Telephone System	Telephones Key Systems	21 2	Leased	...	9,717
07/78	Telephone	BA	DHR	IN-WATS CARE LINE SERVICES	Calls per Year Circuits Full Time	33,000 4	Leased	...	212,000
06/78	Telephone	C	DCCPS	IN-WATS Highway Patrol Emergency	Calls per Year Circuits Full Time	15,480 2	Leased	...	8,760
06/78	Telephone	D	DOA	Local Telephone Service	...	...	...	$1,500,000	11,000,000

"One-liners" collected as part of the survey of state facilities and systems. This table shows one-liners detailing information on 9 of the 95 telephone systems supported by state funds. The first column, Reference Date, gives the month and year that the information was received. The second column, Type, gives the kind of system surveyed—in this case, telephone systems. The third column, Category, gives the kinds of uses of each system by service category. For example, Pembroke State University's telephone system (first listing) is categorized as supporting cultural, educational, and information services (Category A) and internal management services (Category D). Other service categories used were: health/social services (B); public safety services (C); and services furthering public/government interaction (E). Classification of systems into service categories was somewhat arbitrary; in general the first letter listed in a system providing dual services reflects the primary use of the system. The fourth column,

Department, lists the department of general state government—e.g., DHR or Department of Human Resources—or designates a system as controlled through the University System (US). The fifth column, General Purpose, gives the name and purpose of the system. The sixth column, Item, lists some major pieces of equipment comprising the system. The seventh column, Count, tells the number of items listed in column six. For example, CARE-LINE (line 7), the Department of Human Resources' IN-WATS information/referral service, has 33,000 calls per year over four full-time leased circuits. The eighth column, Status, shows whether the system is owned or leased. Leaders in this or any other column means that respondents did not provide the requested information. The ninth column, Plant Value, applies to owned systems, in whole or in part, and shows the net worth of the state-owned system. The tenth column, Annual Cost, shows reported annual expenditures for operation of the system.

shared use of transmission facilities needs to be examined. The use of the new packet-switching technology might allow several agencies to share a single data transmission network more economically than the leasing of separate data lines.

Teletype Systems

Teletype systems are a relatively small portion of the state's overall telecommunications investment. Of the seven teletype systems reported to the Task Force, two provide public safety services in fire control and civil preparedness; another is a news service terminal at Lenoir Community College; and the other four are telephone-teletype systems serving the hearing-impaired at the campuses of the North Carolina School for the Deaf and through the Department of Human Resources' CARE-LINE. It appears that the use of teletype systems is being replaced by video-display data terminals in most cases, although at this time teletype may be more affordable for use by the hearing-impaired.

Radio Broadcasting

Non-commercial radio stations operate in many North Carolina communities. (See Map 6.) With the exception of WUNC-FM (Chapel Hill), a full-service public station, public/educational radio broadcasting facilities in North Carolina operating on state funds are primarily student-oriented 10-watt stations, providing both entertainment for the public and training for the student staff. (There are two other full-service, Corporation for Public Broadcasting-qualified radio stations in North Carolina. One [WFDD-FM] is licensed to a private university, Wake Forest, and the other [WVSP-FM] is licensed as a community station to an independent community board in Warrenton.) Under current FCC directives, the 10-watt stations, many of them campus-based, will have to increase their transmitter power substantially in order to retain their frequency allocations. This raises the policy issue of whether the state, through the University system or Department of Community Colleges, should make the investments necessary to retain these sta-

Table 5
ONE-LINE DESCRIPTIONS OF SEVERAL TELEPROCESSING SYSTEMS

Ref. Date	Type	Cat.	Dept.	General Purpose	Item	Count	Status	Plant Value	Annual Cost
09/78	Teleprocessing	A	CC	Durham Technical Institute Instructional	Terminals CPU at TUCC	1	...	$ 218,000	$ 36,516
06/78	Teleprocessing	A	DOED	Public Instruction School Computer Corp.	Terminals Remote CPU Raleigh	51	...	...	142,800
05/78	Teleprocessing	A	DOED	Public Instruction	Terminals Local CPU SCC Raleigh	29	...	...	225,206
09/78	Teleprocessing	A	US	East Carolina Univ. SOLINET Library Cataloging	Terminals Remote CPU Ohio	2	...	4,000	3,630
08/78	Teleprocessing	A	US	Triangle Universities Computation Center (TUCC)	Terminals CPU Res. Triangle Pk.	125 1	...	4,200,000	...
11/78	Teleprocessing	A	US	UNC Chapel Hill Research & Instruction	Terminals CPU on Campus	200	...	100,000	105,164
08/78	Teleprocessing	AD	CC	Cape Fear Tech. Institute Instructional & Admin.	Terminals CPU at TUCC	1	...	...	17,493
09/78	Teleprocessing	AD	CC	Cent. Piedmont Comm. Coll. Admin. & Academic	Terminals CPU at TUCC	1	Leased	...	19,608
10/78	Teleprocessing	AD	CC	Guilford Tech. Institute Instructional & Admin.	Terminals CPU on Campus	4	Leased	48,243	75,263
08/78	Teleprocessing	AD	US	Appalachian State Univ. Instructional & Admin.	Terminals CPU on Campus	53	...	250,000	117,296

Part of the massive state investment in remote data processing (teleprocessing) is shown in this excerpt from the facilities survey "one-liners." Teleprocessing applications for educational, cultural, and information services (Category A) and administrative services (Category D) are shown here for various community college and university campuses, as well as for departments of general state government. Column information is the same as that described for Table 4; but note that the designation "CPU" in column six, Item, shows where the main computer (central processing unit) for each teleprocessing system is located. For exmaple, the first listing shows Durham Technical Institute's teleprocessing connection of one terminal linked to a CPU at the Triangle Universities Computation Center at Research Triangle Park. The Task Force identified 73 existing and 6 planned teleprocessing systems, and the remote mode of computer operation is expected to continue to grow relative to local data entry.

tions. These and other broadcasting stations represent for the state a potential resource which currently is almost untapped: sub-carrier authorization channels, which could be used for specialized public service broadcasting (e.g., radio reading services for the print-handicapped), and are being used now at only one of the non-commercial stations.

The Task Force's Advisory Committee on Public Radio (see Chapter II-A) has employed independent consultants to study locations, frequencies, and other facilities for developing full-service public radio across the state. A summary of the Committee's report is printed as Appendix H.

Television Broadcasting

There are two public television licensees in North Carolina: the University of North Carolina Television Network (eight stations), licensed to the Board of Governors; and WTVI in Charlotte, licensed to the Charlotte-Mecklenburg School Board, and funded by local and state monies. (See Map 7.) With a one-time $5.8 million appropriation by the General Assembly in 1978, UNC-TV appears to have the means to solve its past signal-reach problems: virtually all North Carolinians should be able to receive a clear public television signal within two years, by which time additional transmitters and translators should be in place. The Net-

work distribution facilities are not used during certain off-hours, such as school hours during the summer and late nights all year. If off-hours use of these facilities by other agencies were agreed to by broadcast licensees, it might be possible to arrange to broadcast, through high-speed technologies feeding hours of programs in a matter of minutes, educational materials to be locally stored, recorded, and used for later playback at regular speeds at schools, community colleges, personnel training centers, etc. The costs, benefits, and workability of this possibility need to be explored. The co-location of the Network's microwave relay system with that of the Highway Patrol at several sites has resulted in economies for the taxpayer. Additional opportunities for cooperation in using telecommunications facilities should be pursued, especially in the Charlotte area, where two public television licensees operate.

Cable Television

Although the state does not itself operate any cable television systems, the existence of commercially operated systems in 123 communities (and an additional 22 communities with planned or pending systems) suggests the need for investigating possibilities for cooperation with these private cable operators to increase and improve the delivery of public services. (See Map 8.) One possibility is to pro-

duce programs of cultural, educational, or informational merit for use by cable systems. Another possibility is networking between the various systems so that programs may be shared. A third possibility—based on the fact that cable systems provide not only video but also audio-channels to subscribers—is the proposal made to the Task Force during its research that voice circuits from Raleigh to the various companies could provide audio coverage of General Assembly activities to homes and institutions linked to cable systems. A final opportunity is for state assistance in providing public service programming to those cable systems and communities wishing to use it. Statewide liaison with local cable systems could encourage use of public or educational programming. The facilities already exist, and, without attempting to regulate, the state could work with private companies to make greater use of their distribution capacities in the public interest.

Closed-Circuit Television

Many closed-circuit television systems in North Carolina serve educational purposes in various universities, community colleges, and schools. In addition, hospitals and other institutions, as well as some state agencies, use closed-circuit TV. Like other telecommunications facilities, these are often not fully used. Coordinated or cooperative use by more than one agency is hampered by differences in equipment—for example, systems vary as to the width of videotape used. Standardization of equipment would make greater sharing of programs possible.

Satellite

Two earth terminals are operated by public funds in North Carolina—one for educational uses under the Appalachian Educational Satellite Project, serving community colleges in western North Carolina, and the other by UNC-TV to receive Public Service programs. The potential for distribution of a wide variety of public services via satellite is enormous, and further study of these capabilities is necessary. One intriguing possibility discussed by the Task Force at its October, 1978, regional hearings on emergency communications was a multi-state consortium for sharing satellite services.

Two-Way Radio

The Highway Patrol, the Division of Forest Resources, the Wildlife Resources Commission, and the Division of Highways operate the major statewide two-way radio systems in North Carolina. In addition, the Division of Civil Preparedness has plans for and to some extent already operates a statewide FM and single-sideband high-frequency two-way radio system. (See Maps 9, 10, 11, and 12.) The numerous other local two-way systems largely provide paging, administrative, and security services in general state government, hospitals, community colleges, and University campuses.

Many important issues are apparent from the Task Force's examination of state two-way radio facilities. Perhaps none has been more troublesome for public safety users than the question of frequency coordination. Many frequencies assigned to local governments for fire, rescue, and other services are not fully utilized or properly coordinated for communication among agencies. There is a definite need for the state to help in shaping the federal allocation process. The Task Force concluded that some mechanism should be established within state government to assist in frequency coordination and management. Additionally, emergency medical services (EMS) communications systems require additional assistance and coordination to expedite full implementation of the state's EMS plan.

Microwave

Microwave transmissions systems are used by the Highway Patrol to interconnect the base stations in its two-way radio network and for some telephone connections (see Map 13); and by the UNC-TV Network (Map 7). These two systems share some tower locations. The Highway Patrol system provides some circuits for use by other agencies, such as the Wildlife Resources Commission. The Highway Patrol system, in particular, may provide opportunities for increased sharing, in that the system is licensed for 360 channels, while, on the average, only 24 channels are in operation on any given segment. Costs of arranging for greater use should be examined against the likelihood of the circuits actually being put to use, given the remote locations of the microwave towers.

Other Equipment

Audio-visual equipment for the production of programs and other media products was considered by the Task Force in its study of state facilities and systems because those products often are distributed by telecommunications systems. Table 6 reveals the substantial investment by the state in audio/visual equipment and services over twelve months. (These figures are not included in Table 3, Estimated Public Telecommunications Costs.)

Examination of the one-year cost statistics for audio-visual services reveals that general state government (non-University) expenditures account for about 70% of the total. There is clearly a significant state government investment in such facilities and services. Audio/visual equipment purchases and contracts appear to be fragmented. The Task Force learned of rarely used or unused audio/visual equipment stored in closets; high costs for preparation of materials from commercial services; and the absence of systematically available, low-cost loan and repair facilities for state government users. The need is clear for audio/visual loan and low-cost repair capabilities, consolidation of some of

Table 6
AUDIO/VISUAL COSTS (FOR ONE YEAR)
(As of October 1978)

	AV Contracts July 77-78	AV Equipment Oct. 77-78	Video Equipment July 77-78	Total Equipment & Contracts— One Year
General State Govt.	$139,600(a)	$1,996,302	$1,309,854	$3,445,756
University System	—0—	655,434	561,366	1,226,800
TOTAL	$139,600	$2,661,736	$1,871,220	$4,672,556

(a) Includes only contracts for $2,500 or more. Figures on contracts for less than $2,500 are not readily available.

the inventory, and a clearinghouse approach to coordinate state government audio/visual investments and use.

CONCLUSIONS

This chapter's discussion of facilities has proceeded in a compartmentalized fashion: specific conclusions about particular systems can be found on the preceding pages. Because most of these technologies can be used to deliver different types of services, however, a more unified view is required; many of the particularized conclusions could be easily applied to other telecommunications systems. This section, then, deals with the more general questions of telecommunications facilities management.

Fulfilling the first directive in the Executive Order—to study existing state telecommunications facilities—proved to be an extremely difficult task and led the Task Force to one of its first conclusions: *there is an imperative need for more comprehensive management control of telecommunications facilities and systems operated by public funds, including a means of maintaining a continuing inventory of existing facilities.* At present, there is no single office in state government (except, perhaps, through the temporary existence of the Task Force itself) where users can go for objective non-vendor-oriented evaluation of facilities needs; for information about what is already available, and where; and for advice on future options in telecommunications facilities. If North Carolina's goals include promoting efficiency, encouraging sharing, and reducing costs, then reliable information on publicly supported facilities must be gathered, maintained, and made available at a central facitity.

Once such a data base is established and provisions have been made for its continual updating, effective use of telecommunications facilities will require long-range planning in a number of areas. Compatibility of systems is one such area: the state has already invested millions in systems which cannot currently share software. Proper planning could ensure that incompatibility is avoided in future purchases and leases, and that steps could be taken to standardize and interconnect current systems that can be made compatible. Planning can also help to coordinate and aggregate user requirements for the most effective use of

systems and facilities. Finally, North Carolina needs to plan for effective use of new technologies.

More comprehensive management control for telecommunications facilities will require better coordination within as well as among all agencies of state government. To support purchase/contract decisions, there is a need to strengthen non-vendor-oriented technical expertise for telecommunications. Coordination is also needed with the state's property and construction personnel for better site location for telecommunications facilities, including more co-location of separate systems, and for telecommunications needs to be incorporated into construction plans. Experts in telecommunications should review budget requests for new or upgraded telecommunications facilities.

Coordination with the Department of the State Auditor is needed in a number of areas. Telecommunications experts should help design accounting systems so that object codes will show total telecommunications expenditures and resources. For example, the object code "Communications" includes both telephone (a telecommunications activity) and postage (a non-telecommunications activity). Two-way radio, facsimile systems, and audio/visual equipment may be listed under a miscellaneous category or in a number of other object codes. "Equipment" may include desks or radios. In short, there is no functional system to account for fixed telecommunications assets, yet effective management control demands an accurate, complete accounting of all such equipment.

There is also a need for a more accurate personnel classification system. In many cases, Task Force facilities researchers discovered that job titles and classifications did not accurately reflect actual job performance. Telecommunications experts should be called upon to help ensure that the state has accurate figures for personnel costs in this important area.

There is clearly a need for better liaison with operators of non-governmental telecommunications systems, in order to explore, for example, possible lease arrangements for use of facilities such as cable and radio broadcast systems. The need for a unified view of telecommunications extends beyond the state government/University of North Carolina telecommunications complex to an innovative exploration of all telecommunications options available to the state.

Finally, there is a fundamental need for policy makers and telecommunications technologists to investigate the numerous opportunities for improved services, lower costs, and greater efficiencies becoming available through telecommunications. The Task Force uncovered many opportunities for the state, such as a multi-state consortium approach to satellite use for various services; coordinated frequency allocations for fuller use of the spectrum; greater use of the Highway Patrol microwave relay system capacity, possibly as a means of improving government services in rural areas; and use of underutilized systems such as broadcast sub-carrier authorizations, commercial cable facilities for lease, and off-hours broadcast facilities. A complete list of opportunities would be, of course, much longer. A planning mechanism is needed so that the state can explore the feasibility of sharing existing systems, planning wisely for new systems, using telecommunications as a means of more efficient service delivery, minimizing travel and mail costs, and increasing citizen participation in government.

Telpak Routes

MAP 1
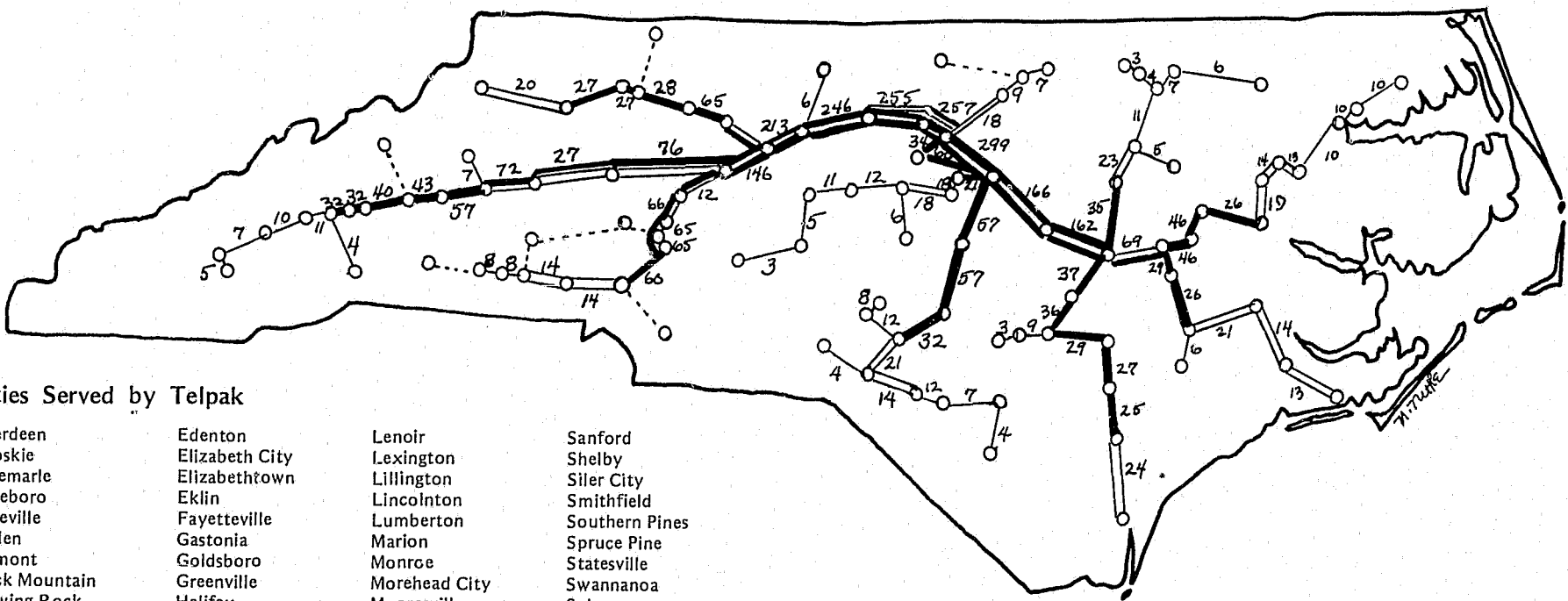
Cities Served by Telpak

Aberdeen	Edenton	Lenoir	Sanford
Ahoskie	Elizabeth City	Lexington	Shelby
Albemarle	Elizabethtown	Lillington	Siler City
Asheboro	Eklin	Lincolnton	Smithfield
Asheville	Fayetteville	Lumberton	Southern Pines
Ayden	Gastonia	Marion	Spruce Pine
Belmont	Goldsboro	Monroe	Statesville
Black Mountain	Greenville	Morehead City	Swannanoa
Blowing Rock	Halifax	Mooresville	Sylva
Boone	Hamlet	Morganton	Tarboro
Boonville	Havelock	Mt. Airy	Taylorsville
Burgaw	Henderson	Mt. Olive	Trenton
Burlington	Hendersonville	New Bern	Troy
Canton	Hertford	North Wilkesboro	Wallace
Cary	Hickory	Oxford	Warsaw
Chapel Hill	High Point	Pembroke	Washington
Charlotte	Hillsboro	Pittsboro	Waynesville
China Grove	Jackson	Plymouth	Weldon
Clinton	Jacksonville	Raeford	Whiteville
Concord	Kannapolis	Raleigh	Williamston
Creedmoor	Kenansville	Reidsville	Wilmington
Cullowhee	Kings Mountain	Roanoke Rapids	Wilson
Durham	Kinston	Rocky Mount	Windsor
	Laurinburg	Roxboro	Winston-Salem
		Rutherfordton	
		Salisbury	

LEGEND

240 channels leased
60 channels leased
24 channels leased
12 channels leased
12 channels planned
Numbers indicate channels actually in use.

Total channels
Leased—5,028   Used—3,865

Total cost
Monthly—$59,112   Annually—$709,344

As of May 8, 1978

Operating Areas of Telephone Companies

MAP 2
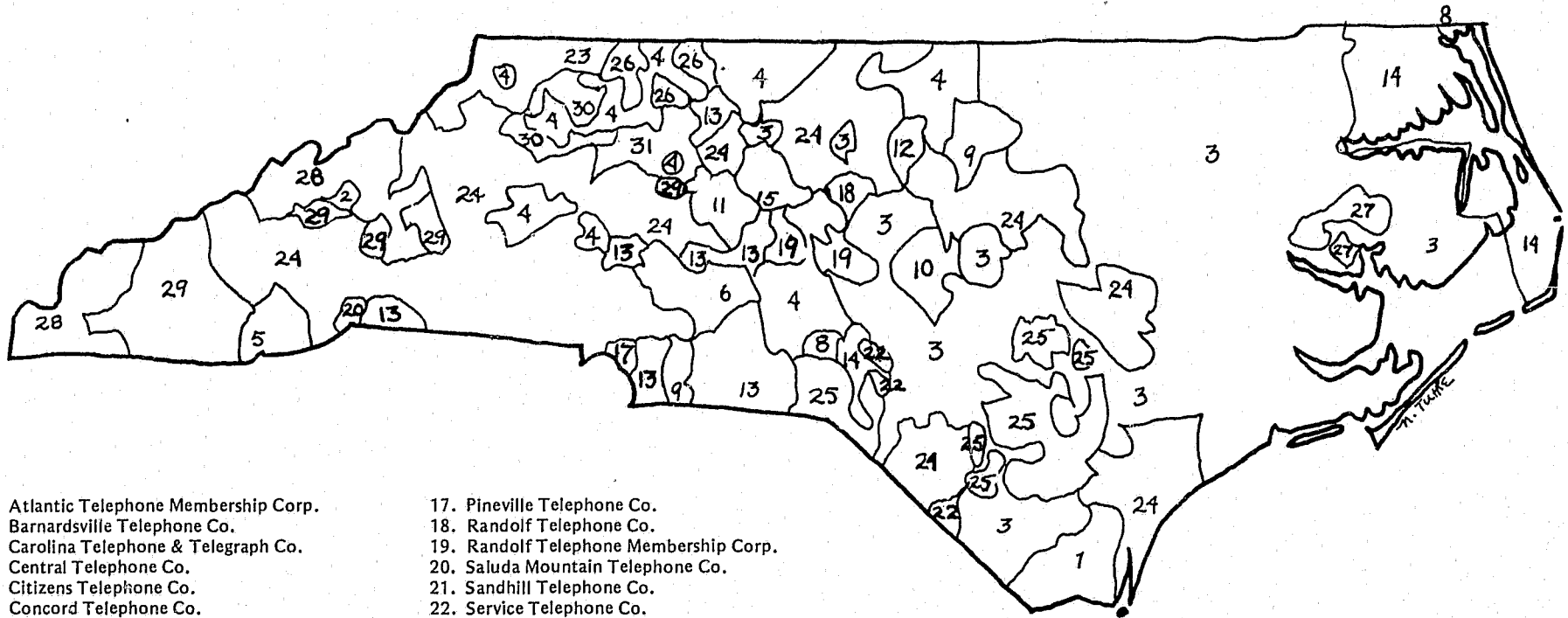
1. Atlantic Telephone Membership Corp.
2. Barnardsville Telephone Co.
3. Carolina Telephone & Telegraph Co.
4. Central Telephone Co.
5. Citizens Telephone Co.
6. Concord Telephone Co.
7. Ellerbe Telephone Co.
8. First Colony Telephone Co. of Virginia
9. General Telephone Co. of the Southeast
10. Heins Telephone Co.
11. Lexington Telephone Co.
12. Mebane Home Telephone Co., Inc.
13. Mid-Carolina Telephone Co.
14. Norfolk Telephone & Telegraph Co.
15. North State Telephone Co.
16. Piedmont Telephone Membership Corp.

17. Pineville Telephone Co.
18. Randolf Telephone Co.
19. Randolf Telephone Membership Corp.
20. Saluda Mountain Telephone Co.
21. Sandhill Telephone Co.
22. Service Telephone Co.
23. Skyline Telephone Membership Corp.
24. Southern Bell Telephone & Telegraph Co.
25. Star Telephone Membership Corp.
26. Surry Telephone Membership Corp.
27. Tri-County Telephone Membership Corp.
28. Westco Telephone Co.
29. Western Carolina Telephone Co.
30. Wilkes Telephone Membership Corp.
31. Yadkin Valley Telephone Membership Corp.

Note: No. 14 is in the process of merging with No. 3.

As of December, 1978.

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Teleprocessing—General State Government

MAP 3
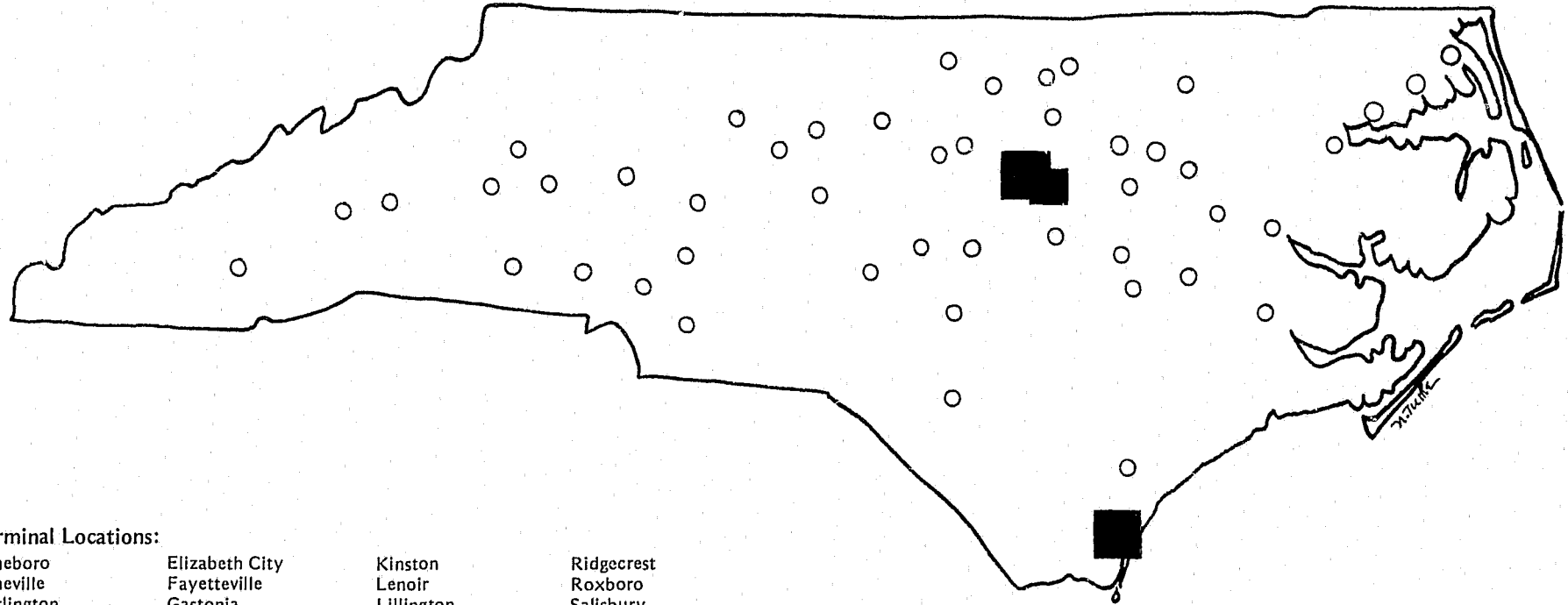
Terminal Locations:

Asheboro	Elizabeth City	Kinston	Ridgecrest
Asheville	Fayetteville	Lenoir	Roxboro
Burlington	Gastonia	Lillington	Salisbury
Carthage	Goldsboro	Louisburg	Sanford
Chapel Hill	Greensboro	Lumberton	Seven Springs
Charlotte	Greenville	Monroe	Shelby
Concord	Halifax	Morganton	Smithfield
Cullowhee	Hartford	Nashville	Statesville
Currituck	Henderson	New Bern	Warrenton
Durham	Hickory	Oxford	Washington
Edenton	High Point	Raleigh	Wilmington
			Winston-Salem

Note: These locations represent only those reported to the Task Force. There are additional locations that were not reported.

LEGEND

Central Processing Unit—Main computer (CPU). . . . . . .7 in Raleigh
. . . . 1 in Wilmington ■

Mini-CPU. . . . . .3 in Raleigh ■

Terminal locations . . . . 180 in Raleigh ○
. . . . 78 in outlying areas

Teleprocessing—Police Information Network

MAP 4
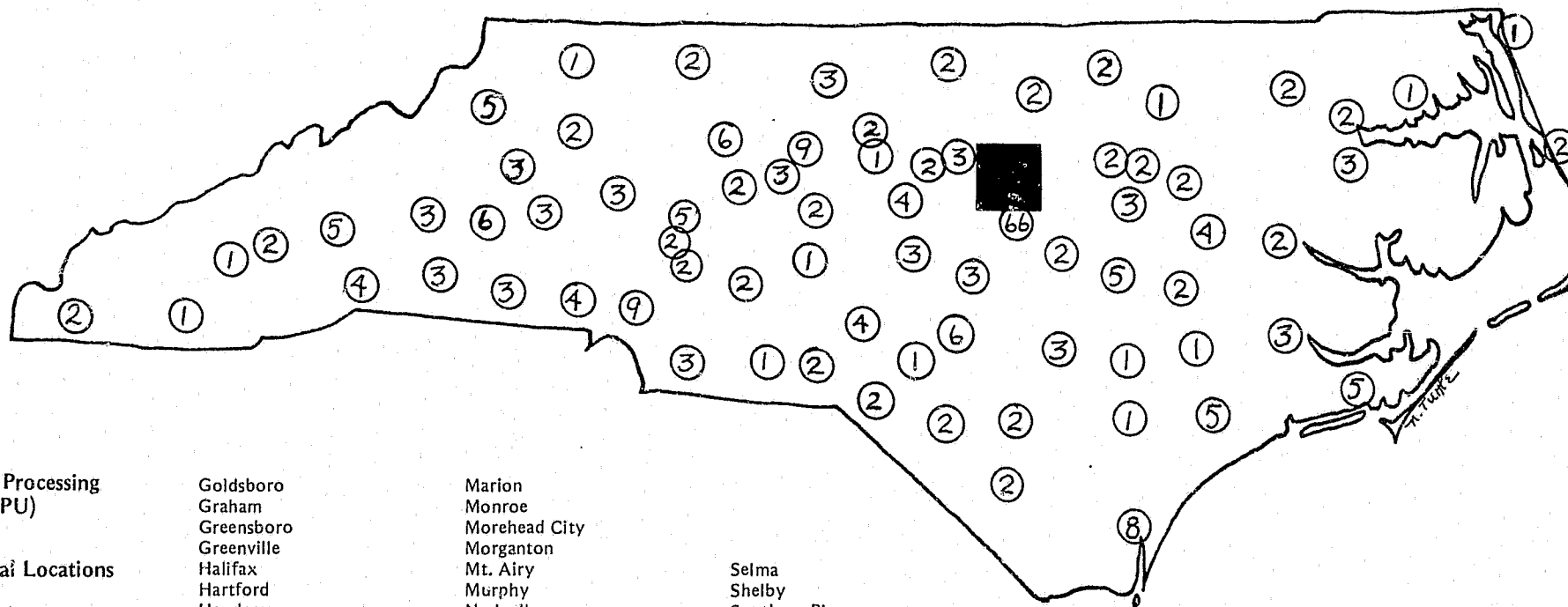
Central Processing Unit (CPU)
Raleigh

Terminal Locations
Ahoskie
Albermarle
Asheboro
Asheville
Boone
Burlington
Chapel Hill
Charlotte
Clinton
Concord
Currituck
Durham
Elizabeth City
Elizabethtown
Fayetteville
Franklin
Gastonia

Goldsboro
Graham
Greensboro
Greenville
Halifax
Hartford
Henderson
Hendersonville
Hickory
High Point
Hillsboro
Jacksonville
Kannapolis
Kenansville
Kinston
Laurinburg
Lenoir
Lexington
Lillington
Lumberton
Manteo

Marion
Monroe
Morehead City
Morganton
Mt. Airy
Murphy
Nashville
New Bern
North Wilkesboro
Pittsboro
Plymouth
Raeford
Raleigh
Reidsville
Roanoke Rapids
Rockingham
Rocky Mount
Roxboro
Rutherfordton
Salisbury
Sanford

Selma
Shelby
Southern Pines
Sparta
Statesville
Sylva
Tarboro
Trenton
Troy
Wadesboro
Wallace
Washington
Waynesville
Whiteville
Wilmington
Wilson
Winston-Salem

LEGEND

Central Processing Unit ■

Number of computer terminals at each location ◯

Total number of terminals throughout state: 280

As of August, 1978

Triangle Universities Computation Center (TUCC) Terminal Locations

UNC—Asheville
Caldwell Community College—Lenoir
Winston-Salem State University—Winston-Salem
Gaston College—Dallas
Forsyth Technical Institute—Winston-Salem
Davidson County Community College—Lexington
Rowan Technical Institute—Salisbury
Central Piedmont Community College—Lexington
UNC—Charlotte
Charlotte-Mecklenburg School System
Guilford Technical Institute—Jamestown
UNC—Chapel Hill
North Carolina A & T State University—Greensboro
Richmond Technical Institute—Hamlet
Sandhills Community College—Carthage
UNC—Greensboro
UNC—Wilmington

North Carolina Central University—Durham
Durham Technical Institute—Durham
Wake Technical Institute—Durham
Fayetteville State University—Fayetteville
Pembroke State University—Pembroke
Wilson Technical Institute—Wilson
Wayne Community College—Goldsboro
East Carolina University—Greenville
Pitt Technical Institute—Greenville
Cape Fear Technical Institute—Wilmington
Coastal Carolina Community College—Jacksonville
College of the Albermarle—Elizabeth City
Elizabeth City State University—Elizabeth City

A total of 125 terminals provide access to TUCC
through the North Carolina Educational Computing
Service.
TUCC's Central Processing Unit is owned jointly by
N.C. State University, Duke University, and UNC—
Chapel Hill.

On-Campus Computers

Western Carolina University—Cullowhee
UNC—Asheville
Caldwell Community College—Lenoir
Appalachian State University—Boone
Central Piedmont Community College—Charlotte
UNC—Charlotte
North Carolina School of the Arts—Winston-Salem
Guilford Technical Institute—Jamestown
UNC—Chapel Hill
North Carolina State University—Raleigh
East Carolina University—Greenville
UNC—Wilmington
Elizabeth City State University—Elizabeth City

The number of teleprocessing terminals in each location ranges from 3 to 200.

School Computer Services Corporation

Central Processing Unit
Raleigh

Terminal Locations
Burlington
Cleveland County
Durham City
Durham County
Kings Mountain
Nash County
Shelby
Rocky Mount
Wake County
Wayne County
Wilson County

Teleprocessing—Education

MAP 5a

Triangle Universities
Computation Center (TUCC)
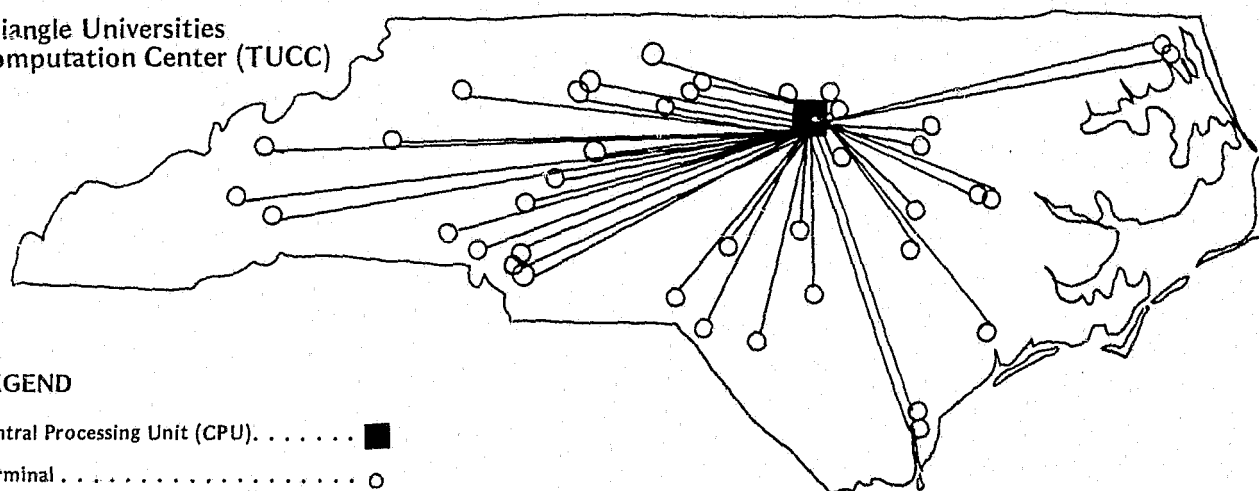
LEGEND

Central Processing Unit (CPU). . . . . . . ■

Terminal . . . . ○

As of September, 1978

MAP 5b

On-Campus Computers
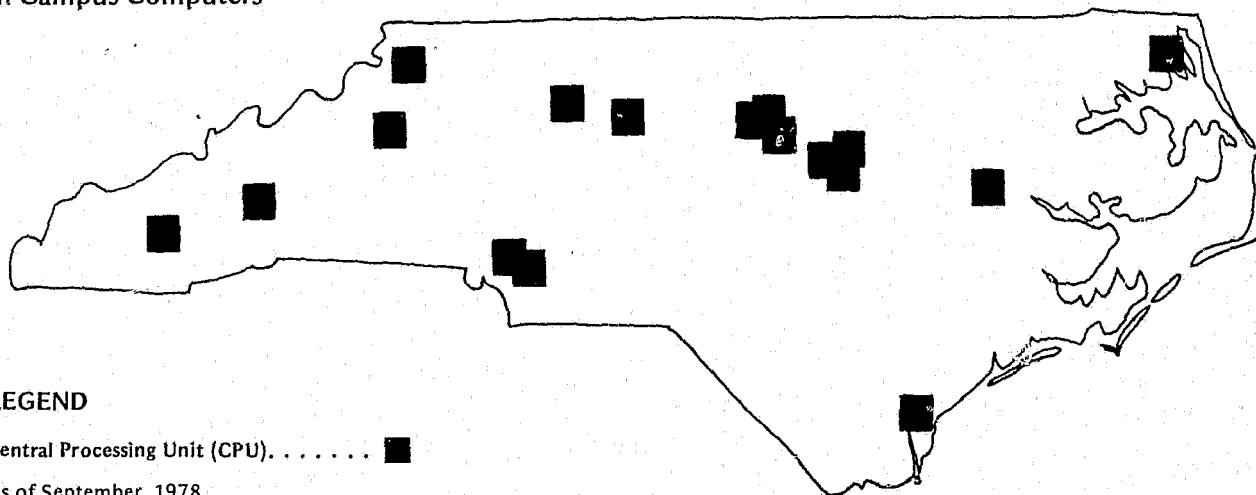
LEGEND

Central Processing Unit (CPU). . . . . . . ■

As of September, 1978

MAP 5c

School Computer
Services Corporation
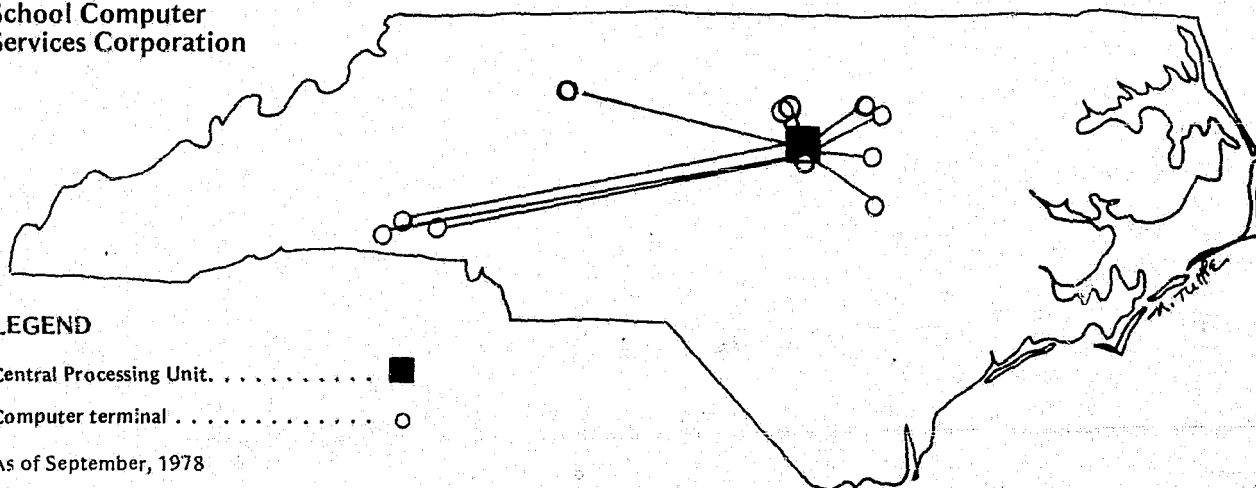
LEGEND

Central Processing Unit. . . . . ■

Computer terminal . . . . ○

As of September, 1978

Existing Public Radio Stations

MAP 6

WFDD
Winston-Salem

WUNC
Chapel Hill
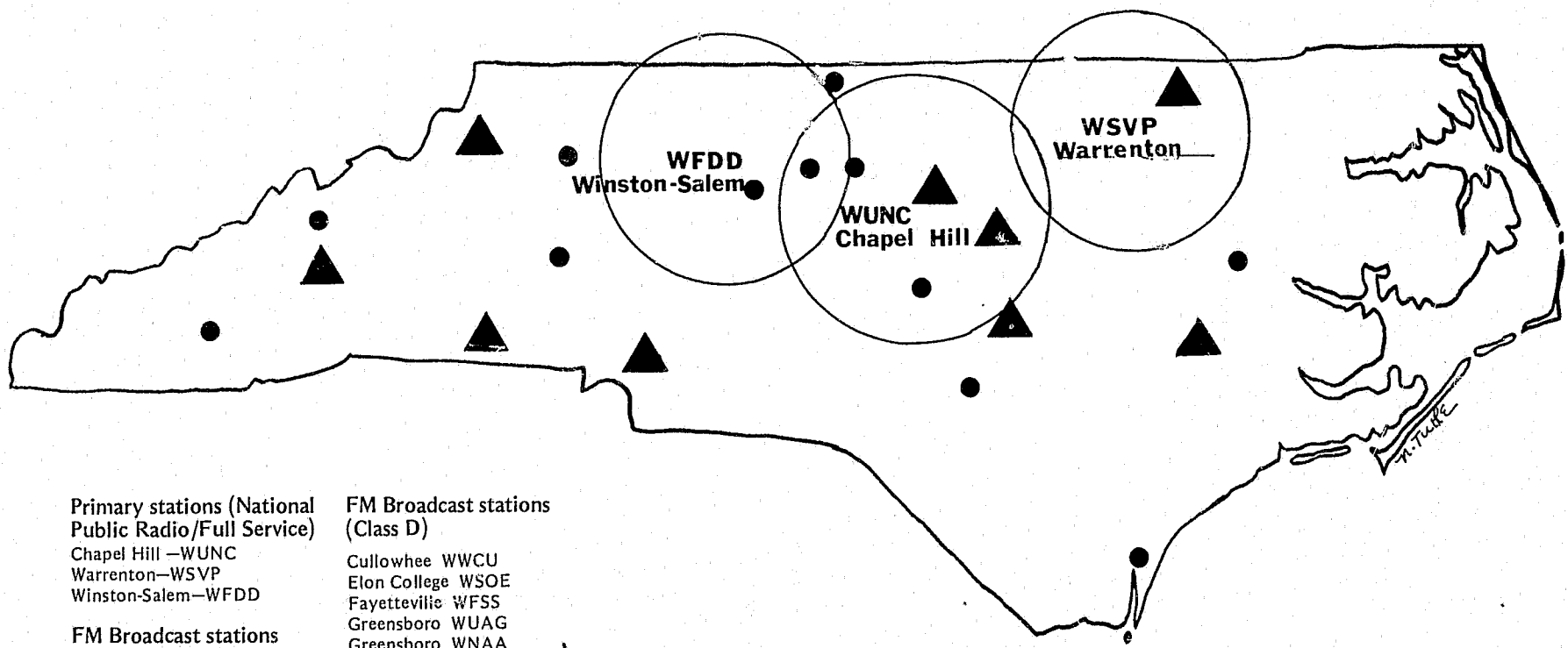
WSVP
Warrenton

Primary stations (National
Public Radio/Full Service)
Chapel Hill —WUNC
Warrenton—WSVP
Winston-Salem—WFDD

FM Broadcast stations
(Classes A, B, C)
Asheville WUNF
Asheville WBMU
Boiling Springs WGWG
Boone WASU
Buies Creek WCCE
Chapel Hill WXYC
Charlotte WFAE
Kinston WKNS
Raleigh WKNC
Raleigh WSHA
Raleigh WCPE
Roanoke Rapids WPGT

FM Broadcast stations
(Class D)
Cullowhee WWCU
Elon College WSOE
Fayetteville WFSS
Greensboro WUAG
Greensboro WNAA
Greensboro WQFS
Greenville (Application pending)
High Point WWIH
Mars Hill WVMH
Rockingham WRSH
Salisbury WNDN
Sanford WOCC
Wilkesboro WSIF
Wilmington WLOZ

LEGEND

Primary stations (Full-Service
National Public Radio-affiliated) ◯

FM broadcast stations (Classes A, B, C) ▲

FM broadcast stations (Class D) ●

As of February 1, 1979

Public Television

MAP 7
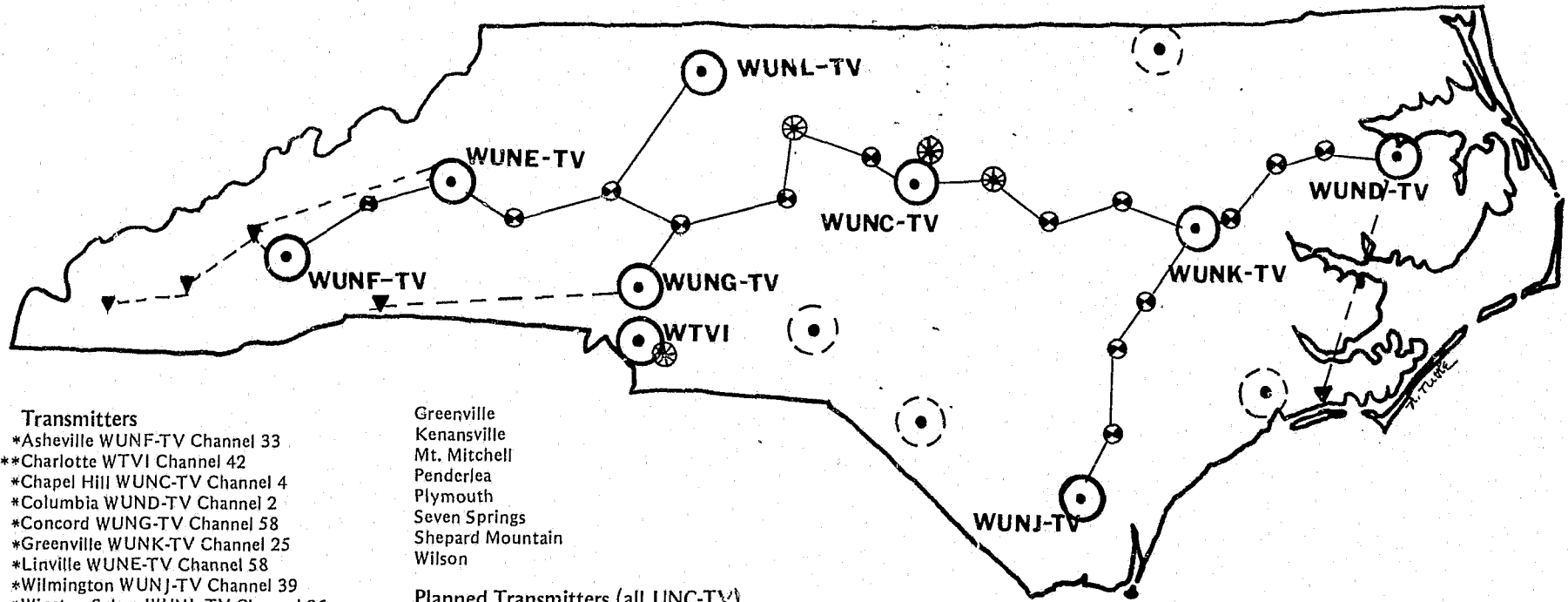
Transmitters
*Asheville WUNF-TV Channel 33
**Charlotte WTVI Channel 42
*Chapel Hill WUNC-TV Channel 4
*Columbia WUND-TV Channel 2
*Concord WUNG-TV Channel 58
*Greenville WUNK-TV Channel 25
*Linville WUNE-TV Channel 58
*Wilmington WUNJ-TV Channel 39
*Winston-Salem WUNL-TV Channel 26

*Licensed to the Board of Governors of the University of North Carolina.
**Licensed to the Charlotte-Mecklenburg School Board.

Studios
Chapel Hill (UNC-TV)
Charlotte (WTVI)
Greensboro (UNC-TV)
Raleigh (UNC-TV)

Microwave Repeaters (all UNC-TV)
Archer's Lodge
Baker Mountain
Barium Springs
Cane Mountain
Everetts
Faith

Greenville
Kenansville
Mt. Mitchell
Penderlea
Plymouth
Seven Springs
Shepard Mountain
Wilson

Planned Transmitters (all UNC-TV)
Buie
Ellerbee
Jacksonville
Roanoke Rapids

Planned Translators (all UNC-TV)
Crabtree
Green Creek
Mill Spring
Morehead City
Topton

Fifteen to twenty translators are planned for the mountain areas in western North Carolina from Cherokee County to the Virginia border. These translators will provide signals to all major population centers in this area.

LEGEND
Transmitters (9) ⊙
Studios (4) ⊛
Microwave Repeaters (14) ⊖
Planned Translators (5) ▼
Repeaters Controlled by Main Transmitter(s) ———
Planned Associated Station Links - - - - -
Planned Transmitter Sites Within Next 2 Years (4) (⊙)

As of February, 1979

North Carolina Cable TV Systems and Service Areas

Franchises and Communities Served

1 MURPHY CABLE TV Murphy
2 SAMMONS COMMUNICATIONS Black Mountain, Haywood County, Hazelwood, Swannanoa, Waynesville
3 THOMS CABLEVISION Asheville
4 CLEARVIEW CABLE Burnsville, Yancey County
5 ALPINE CABLEVISION Banner Elk, Elk Park
6 UNITED ANTENNA SERVICE OF BOONE Boone, Watauga County
7 BLUE RIDGE CABLEVISION Beaver Creek, Jefferson, Smethport, West Jefferson
8 SULLIVAN CABLE OF NORTH CAROLINA Henderson County, Hendersonville, Laurel Park
9 MADISON CABLEVISION Marion, Morganton
10 LENOIR TV CABLE Lenoir, Whitnel
11 WKBC CABLEVISION North Wilkesboro, Wilkes County, Wilkesboro
12 CABLEVISION OF MOUNT AIRY Mount Airy, Surry County
13 VISION CABLE OF SHELBY Shelby
14 CATAWBA VALLEY CABLE TV Hickory, Longview
15 SUMMIT CABLE SERVICES OF STATESVILLE Statesville
16 YADKIN VALLEY CABLEVISION Arlington, Elkin, Jonesville
17 CABLEVISION OF GASTONIA Bessemer City, Gastonia
18 CABLEVISION OF CHARLOTTE Charlotte
19 CABLEVISION OF SALISBURY Salisbury
20 SUMMIT CABLE SERVICS OF WINSTON-SALEM Forsyth County, Winston-Salem
21 SUMMIT CABLE SERVICES OF THOM-A-LEX Davidson County, Lexington, Thomasville
22 CAROLINAS CABLE High Point
23 CABLEVISION OF GREENSBORO Greensboro
24 CABLEVISION OF ALAMANCE COUNTY Burlington, Elon College
25 ALBERT CABLE TV OF NORTH CAROLINA Hillsboro
26 CABLEVISION OF ROCKINGHAM-HAMLET Hamlet, Rockingham
27 SANDHILLS CABLEVISION Aberdeen, Pinehurst, Southern Pines
28 CASS COMMUNITY ANTENNA TV Sanford
29 ALBERT CABLE TV OF NORTH CAROLINA Apex, Cary, Fuquay-Varina
30 CABLEVISION OF RALEIGH Raleigh
31 CABLEVISION OF DURHAM Durham
32 HENDERSON CATV Henderson, Vance County
33 COMMUNITY ANTENNA East Laurinburg, Laurel Hill, Laurinburg, Maxton, Robeson County, Scotland County
34 NORTH CAROLINA CABLE TV Raeford, Red Springs, St. Paul's
35 FAYETTEVILLE CABLEVISION Cumberland County, Fayetteville, Fort Bragg, Hope Mills, Pope AFB, Spring Lake
36 CABLEVISION OF DUNN-ERWIN Dunn, Erwin
37 ALERT CABLE TV OF NORTH CAROLINA Clayton, Garner, Wake County
38 ALERT CABLE TV OF NORTH CAROLINA Johnston County, Selma, Smithfield
39 CABLEVISION OF LUMBERTON Lumberton
40 CABLEVISION OF WHITEVILLE-CHADBOURN Chadbourn, Whiteville
41 ALERT CABLE TV OF NORTH CAROLINA Goldsboro, Seymour Johnson AFB, Wayne County
42 ALERT CABLE TV OF NORTH CAROLINA Wilson
43 TAR RIVER CABLE TV Rocky Mount, Tarboro
44 ROANOKE RAPIDS TELECABLE Gaston, Halifax County, Northampton County, Roanoke Rapids, Weldon
45 CAROLINA BEACH CABLE TV Carolina Beach, Kure Beach
46 CABLE TV New Hanover County, Wilmington, Wrightsville Beach

47 JACKSONVILLE TV CABLE Jacksonville
48 CAROLINA TV CABLE Craven County, New Bern, Trent Woods
49 WINDSOR CABLEVISION Plymouth, Williamston, Windsor
50 PEMBROKE CABLE Ahoskie, Murfreesboro
51 ELIZABETH CITY VIDEO Elizabeth City, Pasquotank County
52 OUTER BANKS VIDEO Dare County, Kill Devil Hills, Kitty Hawk, Manteo, Nags Head, Wanchese

Franchises Not Yet Operating

MURPHY CABLE TV Andrews
SYLVAN VALLEY CATV CO. Brevard
MOUNTAIN CABLEVISION LTD. Bryson City
ANDREW McKAY Elizabethtown
CABLE ANTENNA SYSTEMS Goldsboro
KINGS MOUNTAIN CABLE TV INC. Kings Mountain
ALPINE CABLEVISION INC. Newland
MADISON COMMUNICATION INC. Old Fort
OXFORD CABLE TV CO. Oxford
RUTHERFORD CABLE TV Rutherford
SPARTA CABLE TV CO. Sparta

Applications Pending

Asheboro
Cedar Falls
Chapel Hill
Conover
Kinston
Southport
Stanley

Systems With Satellite Groundlink Receivers

THOMAS CABLEVISION Asheville
CATAWBA VALLEY CABLE TV Hickory, Longview
CABLEVISION OF CHARLOTTE Charlotte
SUMMIT CABLE SERVICES OF WINSTON-SALEM Forsyth County, Winston-Salem
CASS COMMUNITY ANTENNA TV Sanford
CABLEVISION OF RALEIGH Raleigh
CABLEVISION OF DURHAM Durham
FAYETTEVILLE CABLEVISION Cumberland County, Fayetteville, Fort Bragg, Hope Mills, Pope AFB, Spring Lake
TAR RIVER CABLE TV Rocky Mount, Tarboro
CABLE TV New Hanover County, Wilmington, Wrightsville Beach
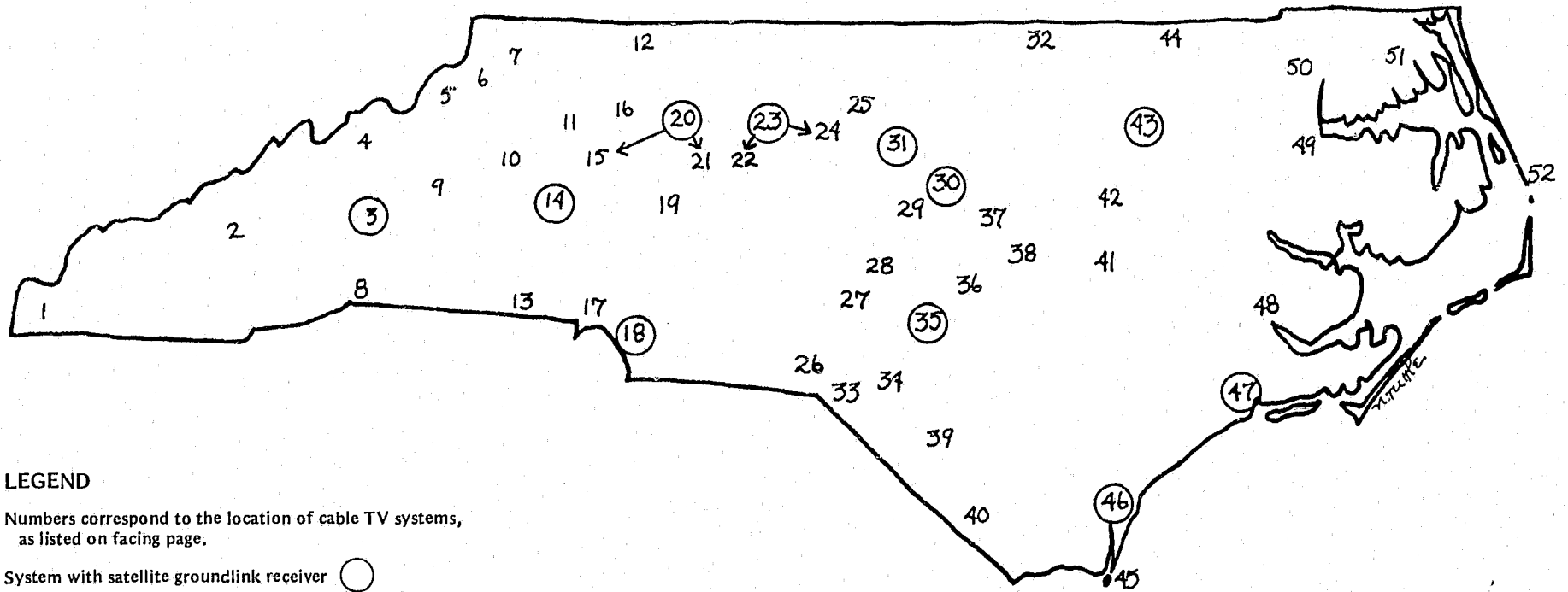JACKSONVILLE TV CABLE Jacksonville

Systems Receiving Satellite Programming via Microwave

SUMMIT CABLE TV SERVICES OF STATESVILLE Statesville
CABLEVISION OF ALAMANCE COUNTY Burlington, Elon College
SUMMIT CABLE SERVICES OF THOM-A-LEX Davidson County, Lexington, Thomasville
CAROLINAS CABLE High Point

Cable TV Systems and Service Areas

MAP 8

LEGEND

Numbers correspond to the location of cable TV systems,
  as listed on facing page.

System with satellite groundlink receiver ◯

System receiving satellite programming via microwave ⟶
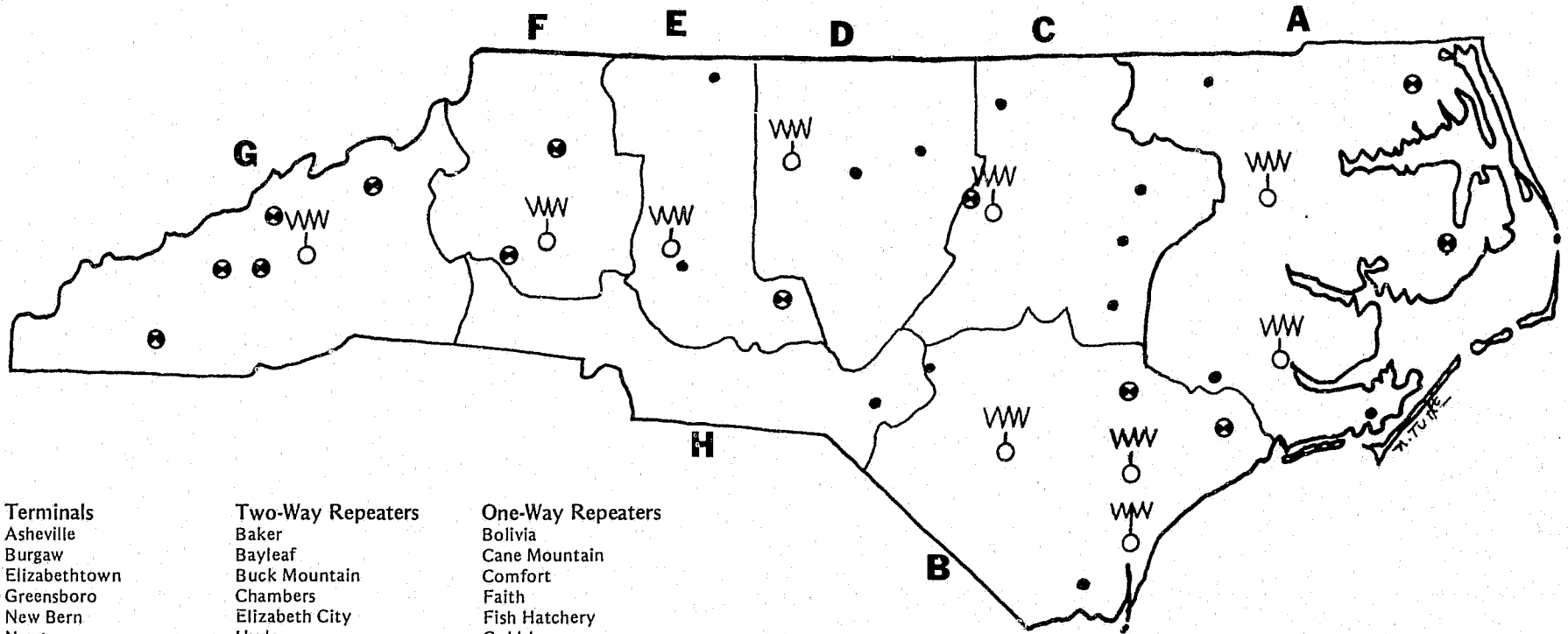
As of August, 1978.

Population Served
Number of Subscribers. 237,921
Potential Subscribers 455,758
Population Served. . . . . 1,000,000 (est.)

CONTINUED

1 OF 2

Highway Patrol Two-Way Radio

MAP 9

F E D C A

G

H

B

Terminals	Two-Way Repeaters	One-Way Repeaters
Asheville	Baker	Bolivia
Burgaw	Bayleaf	Cane Mountain
Elizabethtown	Buck Mountain	Comfort
Greensboro	Chambers	Faith
New Bern	Elizabeth City	Fish Hatchery
Newton	Hyde	Goldsboro
Raleigh	Jacksonville	Hillsboro
Salisbury	Kenansville	Jackson
Williamston	Meadows	Maxton
Wilmington	Mitchell	Otway
	Pores Knob	Oxford
	Soco	Rocky Mount
	Wine Springs	Sauratown
		Wilson

LEGEND

Terminal—Main & Sub Control Stations 10

Two-Way Repeaters. 13

One-Way Repeaters. 14

Mobile Units. 1,448

Portable Units. 50

Aircraft Units 2

Plant value . . . . $8,000,000+

Annual cost $450,000

As of June 22, 1978

Forest Resources Two-Way Radio and Teletype

MAP 10

R III R II R I

D-2 D-10 D-11 D-5 D-7

D-1

D-9

D-12

D-3

D-13

D-6

D-8

D-14
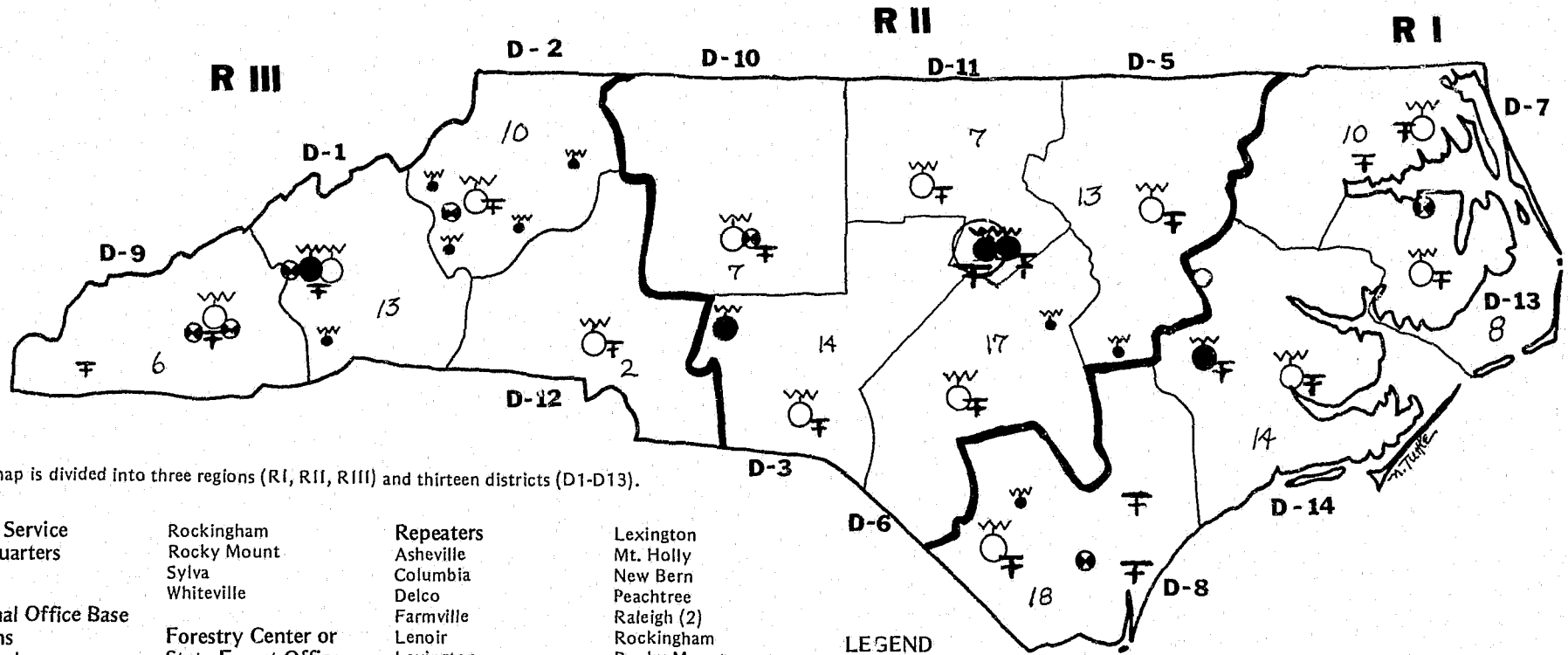
This map is divided into three regions (RI, RII, RIII) and thirteen districts (D1-D13).

Forest Service Headquarters
Raleigh

Regional Office Base Stations
Albermarle
Asheville
Kinston

District Office Base Stations
Asheville
Elizabeth City
Fairfield
Fayetteville
Hillsboro
Lenoir
Lexington
Mt. Holly
New Bern

Rockingham
Rocky Mount
Sylva
Whiteville

Forestry Center or State Forest Office
Clayton
Crossnore—Gill State
 Forest
Elizabethtown—Bladen
 Lakes State Forest
Goldsboro
Hartland—Tuttle State
 Forest
Hendersonville—Holmes
 State Forest
Morganton
North Wilkesboro—Ren-
 dezvous Mtn. State
 Forest

Repeaters
Asheville
Columbia
Delco
Farmville
Lenoir
Lexington
Sylva (two locations)

Teletypes
Asheville
Burgaw
Edenton
Elizabeth City
Fairfield
Fayetteville
Hillsboro
Kinston
Lenoir

Lexington
Mt. Holly
New Bern
Peachtree
Raleigh (2)
Rockingham
Rocky Mount
Sylva
Whiteville
Wilmington

LEGEND

Forest Service Headquarters 1
Regional Office Base Station 4
District Office Base Station 13
Forestry Center or State Forest Office . 8
Repeaters 8
Teletype half-duplex . . . .
 . . . . 20 sites, 23 terminals in all
Regional division . . . .

District division . . . .
Numbers inside districts indicate forest
towers, county headquarters, and
zone headquarters with FM stations.
Mobile units 959
Portable units 179
Plant value $1,400,000
Annual cost $180,000
 As of July 11, 1978

79

Wildlife Radio Systems

MAP 11
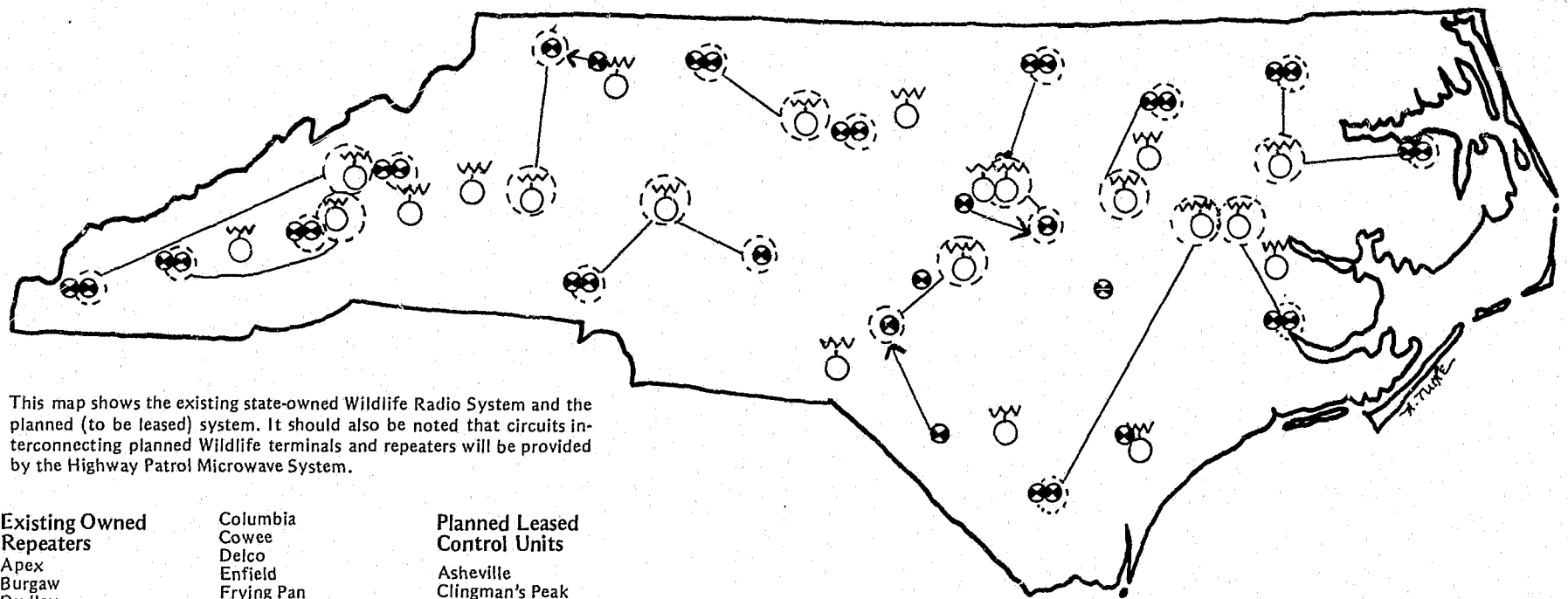
This map shows the existing state-owned Wildlife Radio System and the planned (to be leased) system. It should also be noted that circuits interconnecting planned Wildlife terminals and repeaters will be provided by the Highway Patrol Microwave System.

Existing Owned Repeaters
Apex
Burgaw
Dudley
Lumberton
Pineview
Roaring Gap

Planned Leased Repeaters
Cane Mountain
Henderson
McCain
Mulberry Gap
Smithfield
Uhparrie

Combined Systems Repeaters
Ahoskie
Clingman's Peak

Columbia
Cowee
Delco
Enfield
Frying Pan
Joanna Bald
New Bern
Sauratown
Spencer Mountain

Existing Owned Control Units
Burgaw
Elizabethtown
Elkin
Hamlet
Marion
Mebane
Morganton
Rocky Mount
Waynesville
Wilmar

Planned Leased Control Units
Asheville
Clingman's Peak
Farmville
Greensboro
Greenville
Hickory
Salisbury
Slocomb
Williamston
Wilson

Combined Systems Control Unit
Raleigh

LEGEND

	Existing Owned System	Planned Leased System	Combined
Repeaters			
Control Units			

Existing equipment relocated to new site →

Repeater(s) controlled by main terminal ——

As of June, 1978.

Civil Preparedness Radio and Teletype

MAP 12

FM Radio	Teletypes	Area B:	Area D:
Base Stations	(half-duplex)	Halifax	Greensboro
Asheboro	Asheboro	Henderson	High Point
Asheville	Asheville	Louisburg	Reidsville
Hatteras	Lincolnton	Roxboro	Winston-Salem
Lincolnton	Raleigh	Wilson	
Raleigh	Wallace		Area E:
Wallace	Washington		Charlotte
Washington		Area C:	Concord
		Alliance	Lenoir
		Burgaw	
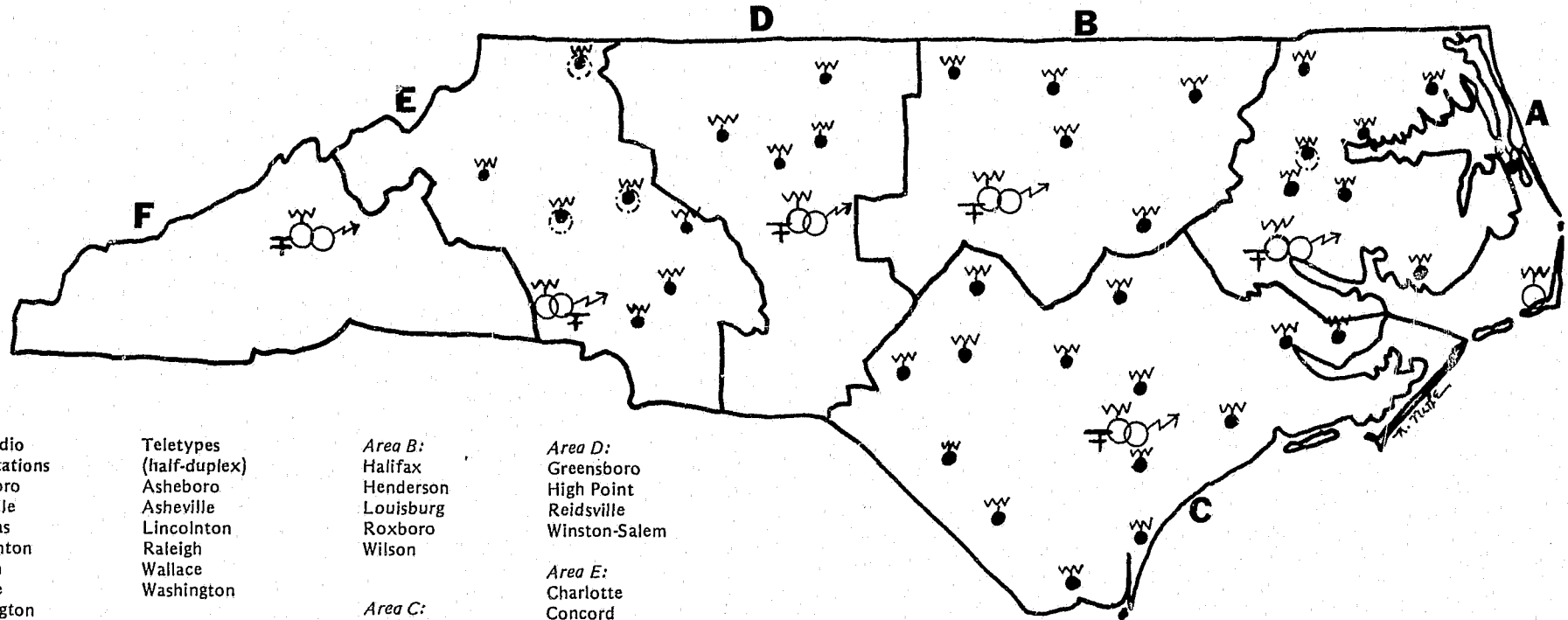
FM Radio
Base Stations
Asheboro
Asheville
Hatteras
Lincolnton
Raleigh
Wallace
Washington

Teletypes
(half-duplex)
Asheboro
Asheville
Lincolnton
Raleigh
Wallace
Washington

Area B:
Halifax
Henderson
Louisburg
Roxboro
Wilson

Area C:
Alliance
Burgaw
Clinton
Fayetteville
Goldsboro
Jacksonville
Kenansville
Lillington
Lumberton
New Bern
Raeford
Supply
Whiteville
Wilmington

Area D:
Greensboro
High Point
Reidsville
Winston-Salem

Area E:
Charlotte
Concord
Lenoir

HF SSB
Base Stations
Asheboro
Asheville
Lincolnton
Raleigh
Wallace
Washington

County Stations in
State FM Network:
Area A:
Edenton
Elizabeth City
Manteo
Plymouth
Swan Quarter
Williamston
Winton

Planned County
Stations
Newton (Area E)
Sparta (E)
Statesville (E)
Windsor (A)

LEGEND

FM Radio base stations. 7

HF SSB base stations. 6

Teletype half-duplex 6

County stations in state FM network. 34

Planned county stations 4

Plant value. $131,000
. . . . $500,000 including federal equipment

Annual cost . . . .$ 55,000

As of June 30, 1978

Highway Patrol Microwave

MAP 13
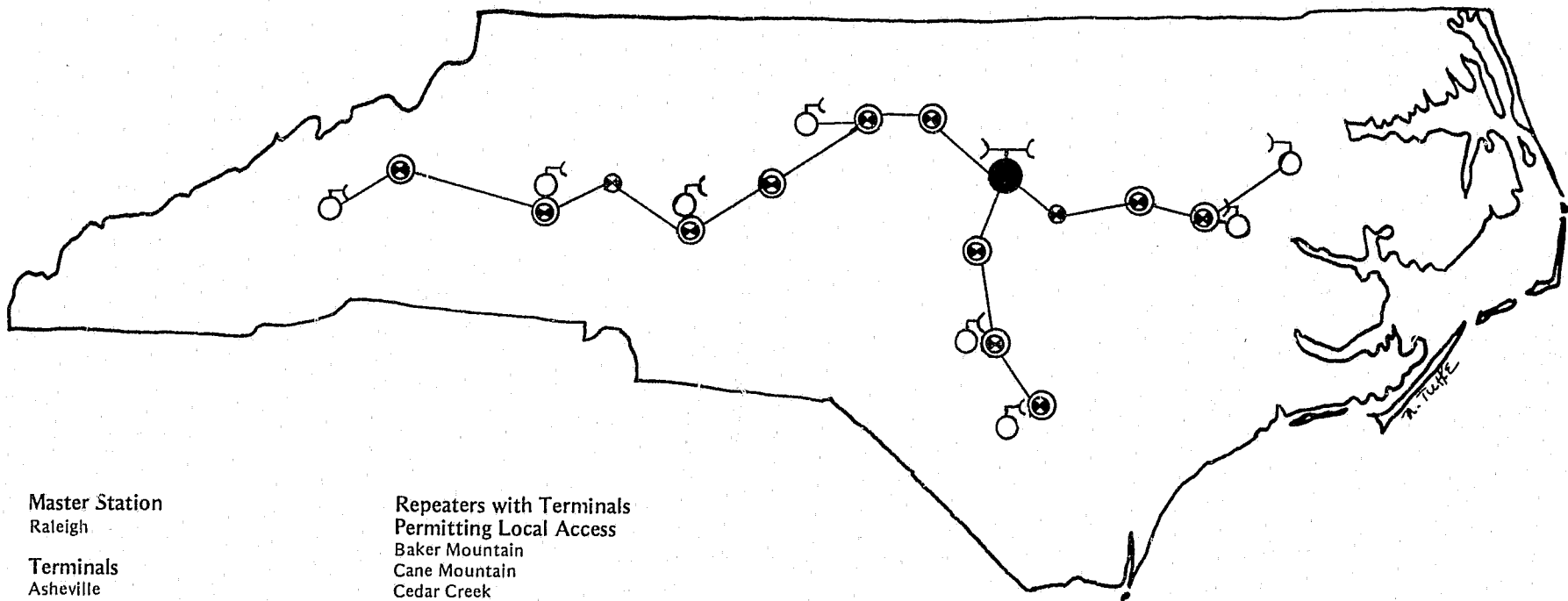
Master Station
Raleigh

Terminals
Asheville
Elizabethtown
Fayetteville
Greensboro
Greenville
Hickory
Salisbury
Williamston
Wilson

Repeaters
Archers Lodge
Barium Springs

Repeaters with Terminals Permitting Local Access
Baker Mountain
Cane Mountain
Cedar Creek
Clingman's Peak
Duncan
Faith
Farmville
Hillsboro
Shepherd Mountain
Slocomb
Wilson

LEGEND	Existing	Planned	
Master Station (Terminal.	1	0	●
Terminal	6	2	♂
Repeater with L/D Terminal.	8	3	◉
Repeater	2	0	⊖
Plant value	$1,500,000+		
Annual cost	$168,100		

As of June 22, 1978

Telecommunications Applications:
DAISY—A UNIQUE TEACHING CONCEPT FOR ADULT LEARNERS

A fundamental point that Task Force members encountered during their year of research is that facilities and systems can be used in more ways than one. One of the most unusual uses of telecommunications is now in the planning stages at Durham Technical Institute (DTI), part of North Carolina's system of community colleges. DTI is introducing DAISY (Dial Access Instructional System), a unique teaching concept making use of one of those newfangled, fancy, complex telecommunications devices: the ordinary household telephone.

There's nothing unique about using the telephone to provide information services. The Agricultural Extension TELETIP Service, for example, tells callers who dial its foll-free number how to care for roses or how to can peaches. Central Piedmont Community College's DOLLY phone/tape system in Charlotte helps callers quit smoking, keep warm, or find jobs. But

the planned Durham Tech system is not just broadly informational, it's instructional, focusing on learning specific "how-to" skills. And DAISY's instruction is directed at a task that's difficult even in a one-to-one classroom environment: teaching adults how to read.

"It has to be unique, almost frighteningly so," says the Director of Curriculum for DAISY, Mrs. Susan Payne. "No one can really predict if this is going to work. The lack of personal contact could prove to be a real weakness in the system." But, she is quick to add, there are equally strong arguments in favor of the learn-by-telephone concept: many adult illiterates cannot attend regular classes because of work schedules; others have hidden the fact of their illiteracy so long that they might risk their jobs or self-esteem if seen attending such a class; the basic reading materials are so simple that many adults associate

public participation in them as being juvenile; working alone at home allows an individual the opportunity to repeat lessons as often as the student wishes without causing other class members inconvenience; and for Durham residents, the instruction will be free.

Thus, the DAISY system: ten telephone lines into Durham Tech, a central console to be staffed from 9 a.m. to 9 p.m., and a series of instructional cassettes which are to take participants from the most elementary prereading skills to reading competency. The concept originated with DTI's President, Dr. John Crumpton, says Mrs. Payne: "He got the idea from the DOLLY system at Central Piedmont in Charlotte, but their dial-access facility does not feature instructional tapes." Mrs. Payne, whose teaching background is in elementary education, was brought on to develop the taped lessons (or "modules"). Full implementation of

Innovative teaching blooms at Durham Tech where Susan Payne has headed the Dial Access Instructional System (DAISY). Mary Reynolds Babcock Foundation funds were used to purchase the taping and tape-duplicating equipment shown here.

the system is expected by summer, 1979.

One of Mrs. Payne's concerns is the lack of direct personal contact inherent to this type of system. However, she says, "We've tried to build in a kind of contact. We plan to hire two reading assessors to work with the people who participate by telephone. The assessors will encourage them to come in and be tested for whatever reading background they have and be given their initial packets of materials that supplement the taped lessons."

Designing the curriculum, Mrs. Payne comments, requires both an understanding of the very basic tools needed to read and of the desire of adults for a non-juvenile approach. The prereading tapes, lessons 1-6, teach "basic elementary concepts that most adults would take for granted." For example, callers for the first module will be instructed to connect lines between common symbols to illustrate the left-right eye movement necessary in reading. Two subsequent tapes give the caller clues for identifying objects on their activity sheets to help the caller learn to listen carefully, a requirement for success with the

DAISY system. Subsequent lessons help callers learn to follow directions and write the various letters of the alphabet—"an amazingly complicated task over the telephone," according to Mrs. Payne. And though the concepts are elementary, each tape takes some time to explain to the caller the purpose of the lesson: "They may not care about the purpose," Mrs. Payne says, "But they are *adults*. They ought to know what they're doing and why they're doing it."

Ultimately, the system will include hundreds of tapes, but Durham Tech plans to get DAISY rolling by the time some 50 fifteen-minute lessons have been completed. During daylight hours, callers will be able to ask for specific lessons; between 9 p.m. and 9 a.m. the ten lines will operate on an automated rotary basis—so that callers can dial a specific number and receive one of ten tapes selected for automated playback. Mrs. Payne hopes to use local newspaper advertising to help area residents determine what tapes are scheduled on any particular day.

The average participant, she says,

will have heard of the program through radio, TV, and other advertising. The student will then contact DTI for a personalized lesson on campus and obtain printed instructional materials. The majority of the instruction from this point will be by telephone, although Mrs. Payne hopes that it will be possible to test students on campus at different intervals to measure progress. Tutoring for those who wish it will also be available.

Operating under a $2,000 start-up grant for tape production/duplication equipment from the Mary Reynolds Babcock Foundation (which also provided start-up funds for the Task Force), and now funded through the Durham Tech budget, the DAISY system is moving towards full implementation and could well become a model for systems elsewhere. "We won't know until we've had it going for a while," Mrs. Payne says, "but we do have high hopes for it. It's incredible to me that we can teach someone to read over the phone—and if we can, a creative teacher will be able to come up with a million more ways to use this kind of system."

CHAPTER V:
Emerging Technologies

As one of its primary duties, the Task Force was assigned to "study, evaluate, and inform state agencies about new telecommunications technologies and the services they deliver, with special emphasis on cost reduction and the improvement of services to the people." This chapter investigates emerging technologies in three ways: by looking at a few of the developing technologies that may influence the future shape of telecommunications in North Carolina; by examining some of the important policy issues that must be confronted when considering implementation of any new technology; and by noting specific ways new technologies may affect our lives.

DEVELOPING TELECOMMUNICATIONS TECHNOLOGIES

The Task Force's Panel on Emerging Technologies studied both new developments in telecommunications and new applications of older technologies. A high point of the research was an October, 1978, trip by the Panel Chairman, Dr. William Ballenger, to three private research/development laboratories. Dr. Ballenger reported his findings to the Task Force at its October 27, 1978, meeting. Among his conclusions: we are living in the midst of a technological revolution, and North Carolina must have forward-looking planners poised to take advantage of coming opportunities.

Telecommunications technologies are advancing along a broad front, changing the face of telecommunications in a variety of ways. It is possible to discern several underlying trends in this advance. Telecommunications systems today are in transition from analog to digital (that is, from signals which are in the form of waves to signals which are in the form of discrete pulses); from single-purpose systems to multi-purpose systems; and from systems serving only large users to systems serving a greater range of demands. The opportunities presented by technological developments can be dazzling, yet Task Force members were mindful that tech-

nologies must not be adopted simply because they are new. Costs must always be weighed against benefits. Such general considerations can be applied in discussion of communications satellites, fiber optics, and digital techniques.

Communications Satellites

Space technology has made it possible to launch a communications satellite into orbit so that it appears stationary with respect to points on the earth within its 8,000-mile radius area of coverage. In such "geostationary" orbits, communications satellites have been acting as relays between large terminals on earth. Many telephone and television channels are relayed both internationally and domestically via satellite. Until recently most satellite communications systems were engineered for high volumes of traffic between large earth terminals. In the future, systems will increasingly be designed to interconnect smaller earth terminals with larger ones, and eventually with each other.

Satellite technologies have important implications for North Carolinians planning for future telecommunications needs. One is that a number of satellite communications systems are becoming available to reach remote areas (such as valleys in mountainous areas) that are difficult or expensive to reach by terrestrial line-of-sight systems. Another consideration: communications satellites equalize the costs of transmission over varying distances. Therefore, unlike landline telephone services, for example, satellite costs are distance-insensitive. Furthermore, satellites can reach many receiving sites with just one transmission. Use of satellites for communications with remote areas of this state could be an attractive option. (South Carolina, a much smaller state than North Carolina, is now actively considering replacing its public television landline distribution network with a satellite-connected system.)

Satellites can be particularly useful for multi-point teleconferences. Regardless of the number of conferees

for either audio or video teleconferences, only one satellite channel is needed, provided the necessary access and control methods have been worked out. The distance-insensitive cost structure of the transmissions makes satellites a particularly cost-effective means of teleconferencing. Dr. Ballenger reported that Bell, GTE, and other companies are now cooperating in operation of a demonstration system linking various labs in Florida, Massachusetts, and New Jersey. The system includes videoconference studio equipment (cameras, microphones, etc.) and rooftop antennas from which video and audio signals are beamed to a satellite. A complex of such centers across a state could help public officials and others save considerable time, travel, and energy.

Finally, at its October, 1978, regional hearings on emergency communications, Task Force members learned that two-way radio communication via satellite is especially suited to emergency situations. Satellites reduce reliance on land-based links that might be damaged in a natural disaster. Satellite links allow users of different frequencies to communicate. Also, satellites can provide cost-effective communication over great distances.

Fiber Optics

Optical fibers, a new development in transmission, are glass fibers that carry information in the form of light pulses. The advantages of optical fibers are their light weight, small diameter, wide bandwidth (high capacity), low transmission loss, and insensitivity to electro-magnetic interference. Furthermore, their manufacture is less dependent than that of copper wire on the availability of scarce raw materials. Each of these advantages is likely to encourage application of fiber optic cables both for some specialized uses and for more general applications, ultimately bringing a vast transmission capacity into offices and homes. Considerable effort is being expended, particularly in this country and Japan, to overcome the technical problems that remain to be solved before fiber optic communications are an attractive economic alternative to existing systems generally.

Dr. Ballenger says that optical fibers are "no longer a laboratory toy." Both GTE and Bell Labs have begun to plan implementation of optical fibers as replacements for the standard copper wire now commonly used for signal transmission. Over time, the copper wire network linking telephones, data terminals, and other terminal devices may be replaced by optical fiber. In fact, Dr. Ballenger notes, "it's even conceivable that if copper prices rise high enough, we may end up 'mining' the copper cables buried all over the country—and then replacing them with optical fibers."

North Carolina must plan to take advantage of fiber optics. If cable TV systems install optical fiber, citizens may benefit from a much larger number of channels, including interactive capacity for two-way communications. As telephone companies install fiber optics, so will state

government be able to take advantage of vastly greater circuit capacities and of greatly increased opportunities for transmitting many different types of signals.

Miniaturization

One of the most significant trends in electronic technology is miniaturization. The popular notion is of huge room-sized computers (like HAL in *2001*) as the wave of the future. Just the opposite is true. Today, research scientists have developed microprocessors, or "chips," that are no bigger than a fingernail—and which have the computing capacity of a full-size computer.

The concept is simple. "If you look at a chip under a microscope," Dr. Ballenger says, "you'd see a piece of silicon coated with metallic particles. These particles serve as circuits that electrons can follow—like miniature wires." Chips with large computing capacities are simply overlaid with a number of materials; at the junctions of the various strata of materials, transistors—places where switching of electron flow occurs—are in effect created. Companies working with microprocessing technology are now capable of creating integrated circuits on chips for as little as $5— circuits which have essentially the same processing powers as computers costing $100,000 ten years ago. Possible applications of microprocessors are varied: home and office computers linked to central processing units; traffic density-sensitive stoplights; "robots" used in the automation of manufacturing; and so on.

Digital Technologies

In digital transmission, either a pulse or a space (absence of a pulse) is transmitted in each unit of time. A stream of pulses and spaces might represent various types of information—for example, computer data or an analog signal, such as a voice, encoded digitally. Digital techniques have become cost-effective because of the transistor, the integrated circuit, and the steady advance in methods of manufacturing integrated circuits. As computers become smaller and smaller, they become cheaper, use less energy, and are faster, because the physical distances that signals travel are shorter. The application of digital techniques pervades almost every aspect of telecommunications systems.

The declining costs of digital technologies have stimulated a proliferation of terminals for data and word processing, including home computers. There is an increasing trend toward interconnection of such terminals with central computers, data banks, and each other. With the rapidly growing volume of digital data to be transmitted over analog circuits (such as traditional telephone lines)—and with a reciprocal need to transmit analog signals over new digital networks—there is a greater need to convert information from one form to the other. Fiber optic systems, for example, require information to be in digital form. Another application of digital technologies is encryption—the encoding

of information to prevent its disclosure during transmission. Still another application is for digital radio, which can allow for more efficient use of the frequency spectrum.

Digital technology is also being applied to transmission and switching systems. An advantage of digital transmission is that a signal can be regenerated at intervals along the transmission path without also amplifying any intervening noise. Digital techniques have also made possible new ways to interconnect terminals. Previously there were two methods of communicating in a network: circuit switching, using a direct, continuous electrical path between sender and receiver, as in telephone calls; and store-and-forward switching, in which a message would be relayed successively through relay points (switches) until it reached the addressee. A store-and-forward network uses transmission facilities more efficiently and permits the sender to transmit even when the recipient is busy, but it requires more time for message delivery than would be possible using a through electrical connection. A new method, packet switching, applies digital technology to the store-and-forward method in a way that message delivery becomes virtually instantaneous. Messages are sent as a number of short "packets" through a network of high-speed memories interconnected by high-capacity circuits. As packets arrive at each relay point, a small computer inspects them for instructions and sends them on their way over whatever path will at that instant provide fastest delivery.

State telecommunications planners and other state government officials have shown great interest in the widespread move into digital systems. Dr. Ballenger reported to the Task Force that a statewide digital network would be useful in many ways. It could carry voice, data, and video signals, serving telephone, radio, television, and teleprocessing systems. Department of Administration Communications Officer Frank Leatherman reported to the Task Force that he was investigating the costs and feasibility of a digital switching system for electronic mail. State Budget Officer John A. Williams expressed interest in a centralized statewide telecommunications network for budgetary purposes—a network that would most probably be based on packet-switching technology. (A full discussion of this proposal can be found in Chapter II-D.) Further study of the possibilities of these and related ideas is needed.

Digital Telephones

Digital technology is now being applied to telephone switching systems and to the actual telephone instrument. In the future, all telephone switching centers will be digital. In fact, Southern Bell's Glenwood Avenue switch in Raleigh already is. Dr. Ballenger reported on the work being done in digital telephone switching at the GTE/Sylvania laboratories in suburban Boston.

An implication of this transformation, Dr. Ballenger says, is "that the telephone can become 'smart.'" For example, the telephone will be able to forward calls auto-matically for users when they leave the house or office. The push-button phone becomes, in a sense, a data terminal: since the digital switching mechanism is essentially a computer, each user's telephone becomes a terminal which can "access" the central computer. The telephone company will be able to offer many new services to the home via the telephone network. The telephone user could dial up a bank and, by punching additional buttons, transfer funds. The telephone could store callers' messages for later playback without recourse to an additional tape unit. Callers could use their home telephones for data entry or information retrieval from other computers.

The GTE/Sylvania demonstrations were of operational and near-term developments in digital telephone switching technology. A subsequent trip to the GTE labs focused on longer-range developments, in which the actual telephone instrument, not just the switching center, becomes a digital device. With a combination of digital switching and the digital telephone, users will be able to perform any number of tasks over the telephone network. An office worker could call his home and instruct the telephone terminal to turn on the oven, adjust the burglar alarm, set the video tape/recorder to tape a certain television program, and so on. Funds transfer and meter reading are only two among various services that may no longer require travel. "The crucial part," says Dr. Ballenger, "is the network." All of the above tasks will be possible so long as the respective devices are part of the network connected to the telephone. But the telephone does not have to be the major link: cable television companies, with their network of connections into homes, are already providing some of these services using the television set as the terminal device.

Summary

In some of the above examples, new technologies have created telecommunication capabilities that could not previously have been achieved. For example, a statewide digital network could provide a consolidated transmission system to carry signals now distributed over many separate types of systems. The new technologies have also, in some cases, so dramatically reduced costs that some long-desired capabilities can be cost-effectively achieved for the first time. The rates at which the technologies are advancing are not the same, and may not be uniform, but the advances can be expected to continue—and perhaps to accelerate. These changes offer North Carolina exciting opportunities to harness new technologies for more efficient and effective provision of public services.

POLICY ISSUES AND EMERGING TECHNOLOGIES

The continuing need for a means to examine both the potential benefits and the potential effects of implementing new technologies was brought to light in many Task Force

interviews and presentations. This section attempts to identify some of the many policy issues raised by the emergence of new technologies and the merging of old ones into new forms.

In the evaluation of whether new technologies should be implemented within state systems, economic and technical factors interplay with social concerns. The basic problem is one of costs versus benefits, but both costs and benefits must be defined socially as well as economically.

Social Factors

Will a new technology improve access to services for all citizens of the state? The state seeks to equalize the access of all citizens to services. This policy relates to telecommunications in two ways: (1) telecommunications systems can provide a means to deliver public services; and (2) the topology of the state and distribution of its population are important factors in evaluating the relative economies of alternative telecommunications technologies.

It is difficult to quantify the value of implementing a telecommunications system that allows citizens in, for example, rural areas equal access to state services which have previously been readily available only to residents of larger cities. And yet implementation of such a system clearly provides a potential benefit to a state pursuing an equal access policy. This benefit must be weighed in the process of evaluating a possible system.

Topology and population density are significant factors in telecommunications economics. It can be prohibitively expensive to build terrestrial line-of-sight systems to reach all citizens in mountainous areas, for example. Cost of traditional transmissions are distance-sensitive: the farther the signal must travel, the more expensive the transmission. Newer technologies, such as satellite communications, are less distance-sensitive, so transmission costs might be equalized to users in all areas of the state. The number of people benefiting from a telecommunications system also affects its cost-effectiveness. Historically, many systems have been built only in areas of high population density. Some emerging technologies will allow greater sharing of systems by many users. If enough uses can be made of a single system, it may become cost-effective to serve low-density areas.

How can rights of privacy and freedom of access to information be protected in implementation of a new technology? Implementation of new technological systems, particularly in teleprocessing, must be evaluated in relation to potential problems in privacy or freedom of information. A policy decision might need to be made, for example, that certain data systems should not be consolidated if the result would make extraordinary amounts of information on individuals available from one source—heightening the danger of data theft or abuse. Policy decisions on requirements for encryption of data and broadcast communications might also dictate acquisition of certain types of technical equipment.

Economic and Technical Factors

Is a particular technology the appropriate one to meet service objectives? In its service interviews, the Task Force found a need for information and advice about new systems from some source other than the vendors. Objective evaluation of the level of technology appropriate to meet some goal is essential. In some cases, it may not be necessary to implement any new technology—administrative or organizational changes may solve the problem. In other cases, a relatively simple technical solution may be found, avoiding acquisition of equipment that is more sophisticated than necessary. Choosing less complex technical solutions may save capital and operating costs as well as reduce the amount of staff training necessary before the new equipment can be used efficiently.

Should a system be shared by several users? In transmission systems generally, as the usage increases, unit costs decrease. Thus, economies of scale can often be realized if several agencies share a common telecommunications system. In evaluating new technologies, the capacity for such joint use must be considered. In evaluating what specific uses should be aggregated on a common system, consideration must be given to possible trade-offs in economy versus efficiency and user flexibility, and to provisions for the security of information on individuals. These policy factors, for example, are important in current decision-making as to whether the state should have a few large computers or many smaller ones—centralized or decentralized teleprocessing systems.

Is a new technology compatible with existing systems? Development in telecommunications systems must build upon the existing base, since facilities and services are, or potentially can be, interconnected. A new technology which is compatible with existing systems will probably have a greater long-term benefit than a system which is not compatible with, or requires extensive modifications in, current systems.

Is implementation of a new technology timely? Evaluation of the timeliness of implementation of a new system or technology must be made in the context of trends in innovation and costs. Historically, the costs of many telecommunications technologies have declined dramatically following their initial introduction. And new innovations in some rapidly advancing areas of technology may become obsolete quickly. Emerging Technologies Panel Chairman Ballenger says the rate of innovation, however, is likely to be affected by the expected widespread move toward digital systems. Once the digital transition is achieved, it is possible that our society may have reached a technological "plateau"—a period of relative technological calm as new systems are implemented.

CONCLUSIONS

Telecommunications technologies have been going through a period of rapid advancement. A number of new technologies and applications are now, or soon will be, available for use in the delivery of public services. During the course of its study, the Task Force did not attempt to resolve the many policy issues which relate to the imple- mentation of new systems. It did become clear that oppor- tunities for applying new technologies will continue to arise, that the cost of using such technologies is likely to decline (at least in the near-term), and that previous tech- nical solutions need to be re-evaluated as new technologies and possibilities for consolidating existing systems emerge. The Task Force concluded that it is essential for the state to keep such issues under continuous review.

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Telecommunications Applications:
A DOZEN WAYS NEW TECHNOLOGIES MAY CHANGE YOUR LIFE

1. *You'll be using computers, and may not even know it.* Researchers have developed microprocessors (or "chips"), no bigger than a child's little finger, capable of prodigious feats of computing or memory storage. Microprocessors are likely to be used in many ways: to control your microwave oven, to regulate the temperature and humidity in your home, to take phone messages when you are away, and so on. Telecommunications will make it possible for you to be interconnected with these computers even when you're not at home. Through a digital telephone network, you'll be able to dial up your oven, burglar alarm, or thermostat. The same type of chip that is inside hand calculators forms the basis of home computers, some of which are being sold now. You can use home computers to balance your checkbook, figure your taxes, keep financial records, participate in educational programs, play electronic games, and even keep your recipe file.

2. *You may live in a nearly cashless society.* Our society has been moving away from the use of cash. Salaries are being automatically deposited in banks. "Plastic money"—credit cards—is increasingly being used for retail purchases. Telecommunications may speed along this movement toward a nearly cashless society. North Carolina state government is already experimenting with direct payroll deposits in the Wilmington area. The Task Force heard many public officials express interest in a fully automated payroll, fiscal, and budgetary system. Such a system could substitute electronic data communications for the reams of checks, purchase orders, and other paperwork now used. In the more distant future, increasing numbers of everyday financial transactions are likely to occur without paper money changing hands. Store purchases may be instantaneously deducted from your bank account over a data link. When digital telephones become widely available, you may transfer money directly from your account to your creditors' accounts simply by pressing phone buttons. These electronic funds transfers will be convenient, and should reduce the cost of doing business through reductions in paper-handling. But problems also exist: the definition of a legal document will have to expand to include electronic information; the potential for computer crime will increase; consumers will not be able to write a check on Thursday in anticipation of making a deposit on Friday; and so on.

3. *Your office will never be the same again.* Business offices are becoming more automated and more reliant on telecommunications. Audio, video, and computer teleconferences can be expected to increasingly replace business meetings and reduce business travel. Word processing devices are already saving hours of retyping by allowing electronic corrections. These devices can be linked by telecommunications, reducing the need for inter-office memos and mail, and to central computers, allowing electronic records storage. At some time in the future, it will be possible to do much office work at home, over a telecommunications link with the central office.

4. *You may be safer from poisons in our environment.* The Task Force discussed some uses of satellites for remote sensing in its Conference on Emergency Response Communications in October, 1978. North Carolinians were recently shocked by illegal dumpings of poisonous chemicals along rural roadsides. If appropriate sensors are developed, satellite sensing might provide quick detection of such contamination, allowing faster cleanup and perhaps even apprehension of despoilers of the environment. Such a sensing system could also detect accidental spills of toxic substances and provide various kinds of land use information (see Chapter II-D).

5. *You may be able to hold a family reunion without any travel.* Teleconferences bring people together electronically. One form of audio tele- conference is the familiar conference telephone call. Another form of audio teleconference was used by the Task Force in October, 1978, when a voice link over a satellite allowed experts in Washington, D.C., to participate in a Task Force meeting in Raleigh. With video teleconferencing, participants can see as well as hear one another. The Task Force participated in a satellite videoconference linking the General Assembly members to federal officials in Washington, D.C., in April, 1979. Teleconferencing is likely to be used increasingly by the state. Participants in teleconferencing might need to travel to regional centers with studios, but wouldn't have to come from around the state to just one central location, such as Raleigh. The resulting reductions in travel costs and time away from work might make it possible for many citizens to take part in government who otherwise could not. And the savings in energy through reduced travel is of particular benefit in this era of energy shortages. Thus, teleconferencing may be a valuable supplement to, although probably never a total substitute for, face-to-face meetings. At some point in the future, when teleconferencing facilities and networks are in place, non-institutional uses of videoconferences may become common. You may, for example, hold an electronic family reunion, possibly through the cable television connection to your home.

6. *Your new postman may be your TV set.* New uses of telecommunications technologies present the potential of transmitting mail electronically. The first step might allow companies who use computer billing or mass mailings to send the material electronically to local post offices, where the bills or letters would be printed, and then delivered like normal mail. Further off is the possibility of transmitting electronic mail directly into offices or even homes, where it could be displayed on a television set connected to the telephone or a cable TV system. The federal government is
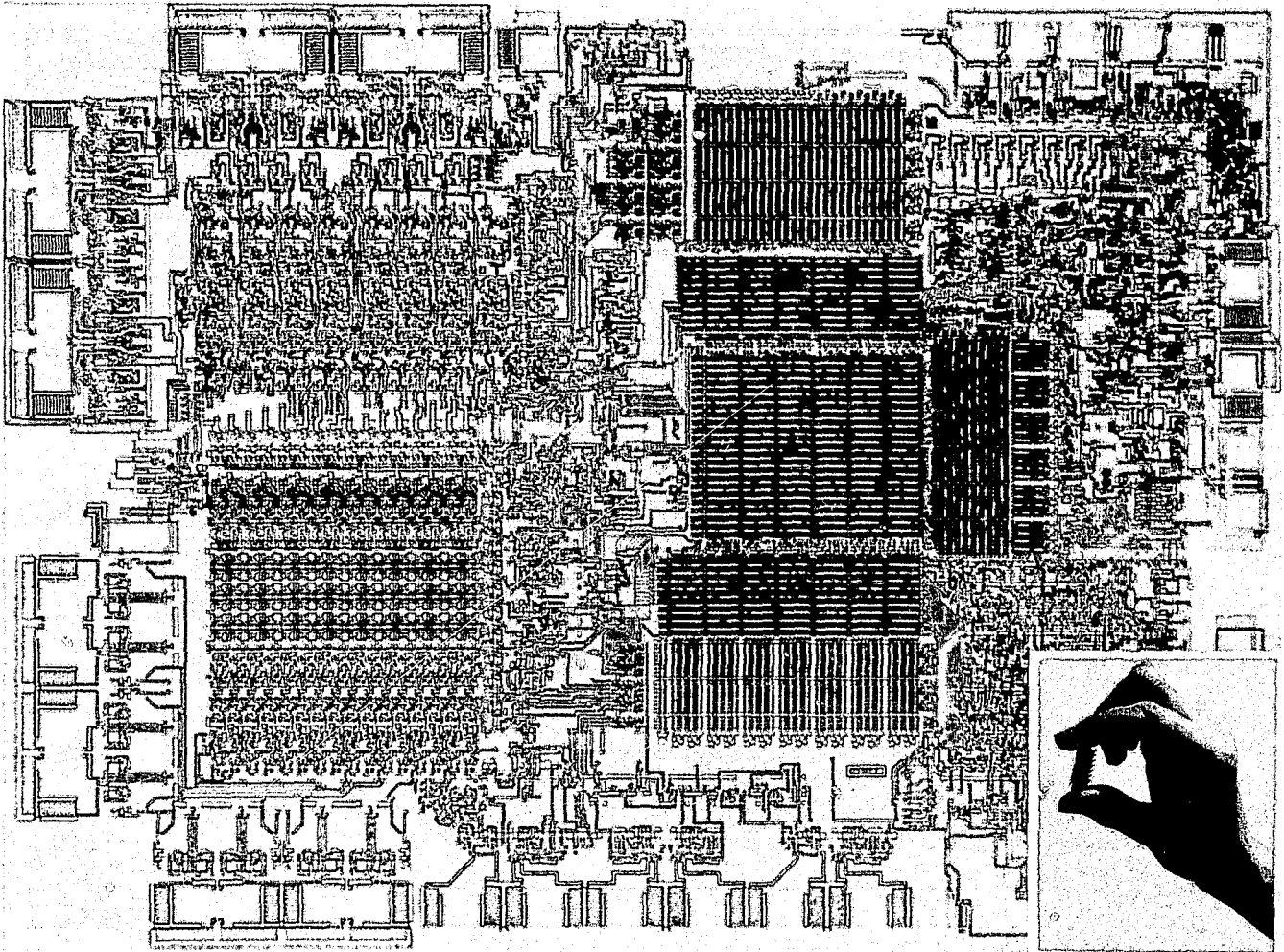
Miniaturization is one of the most significant developments in emerging telecommunications and electronics technologies. A microprocessor "chip" smaller than a child's finger (see inset) is a tiny maze of electrical circuits created by overlays of silicon. A microprocessor like the one pictured here (Intel Corporation's 8085) could process monthly payroll information for a company of 100 people in a few seconds.

currently studying whether the U.S. Postal Service should compete with private companies in the mail-by-wire industry.

7. *You may be healthier, thanks to telecommunications.* Telecommunications applications to health involve both distribution of health information and provision of medical services. Doctors and medical administrators are increasingly using computer technology to store and, through telecommunications, to transmit patient records, health statistics, and billing data. In some experimental applications, doctors telecommunicate symptoms to central computers, which reply with comprehensive lists of possible diagnoses. Groups like the North Carolina

Medical Society have begun to look at the telecommunication of preventive health information as a good way to curtail rising health costs. Actual medical services can also be delivered through telecommunications. The specialized services of major medical centers can be extended to remote areas through systems which transmit voice, telemetry (signals like electrocardiograms), still pictures, and sometimes television pictures (see Chapter II-B).

8. *Your personal safety may be enhanced.* New developments in telecommunications promise increased applications for public safety. Comprehensive criminal justice information systems, including facsimile transmis-

sion of fingerprints, should make it easier to apprehend criminals. Cable television systems are already offering burglar and fire alarm services. As the digital network becomes a reality, such home security services may also be offered over telephone lines. There has even been speculation that senior citizens and others susceptible to criminal attacks may wish to wear small transceivers which could send out automatic alarms and location information in case of emergency. Public safety telecommunications applications, however, require particular attention to the protection of individuals' rights to privacy.

9. *You may be able to participate more easily in government decision-*

making. Many cable companies are currently providing coverage of local government meetings. Some newer systems feature interactive capabilities: viewers can respond to questions and polls, for example, about municipal services. In the more distant future, it may become possible to cast your ballot through your home telephone. Such "dial-a-vote" systems, of course, require safeguards against abuse, safeguards which new technologies may provide.

10. *You may live in a world in which people with handicaps can participate more fully.* Digital technology has already made possible machines that read books aloud to blind and perceptually handicapped people. As the number of information channels available to homes increases, it may become possible to link homes with such reading machines in libraries, etc. Subsidiary communications authorization channels (SCA's) of both public and commercial broadcast stations are now underused. Radio reading services for the visually handicapped could be extended over these channels. And captioning of television programs can be provided for the hearing-impaired. Opportunities for hearing-and/or speech-impaired individuals to communicate will be enhanced by increases in the availability of home computers linked to larger networks, and by the movement toward a digital telephone system, allowing the home phone to be used like a computer terminal. Printout capabilities on these home computers will greatly expand the number of people and institutions with which the hearing-handicapped can communicate.

11. *You'll be able to talk it over with your computer.* A great deal of effort is being devoted to the development of computers which can recognize human speech. In the not too distant future, you may be able to call up your home computer and tell it to turn on the lights, close the windows, let the dog in out of the rain, and pay your bills. Computers which can interpret the meaning of human speech may be a long way off. A more immediate application may be in computer analysis of speech patterns as a means of identification.

12. *You will be interconnected with more people in more ways than you've ever dreamed possible.* The number and kinds of information, education, and entertainment sources available to you will dramatically increase through new and expanded technology—for example, interactive cable television, fiber optics, satellites (including those which broadcast directly to homes), and all of the elements of the digital telephone network. You will be connected to a dizzying array of entertainment options—live artistic performances, sporting events, and many others, from local, national, and international sources. You will be interconnected with vast storehouses of information. For example, you may be able to dial up a libary, punch in a selection, and read text or see pictures on your television set. Or you may summon up consumer information over your cable television system, telling you the closest store with a particular product in stock, or where you can find it on sale. You will be interconnected with a world of ideas. The new multiplicity of channels will make it possible for all citizens to pursue education as a life-long process. Perhaps more important, you will be interconnected with other people. Just as senior citizens in Spartanburg, South Carolina, are now using interactive cable television to meet with public officials and with each other, so will the citizens of the future be able to use telecommunications to reach out to others, and enable them to reach back.

CHAPTER VI:
Recommendations

As the Task Force entered its final phase of operations in the fall of 1978, members reached conclusions based on the research and drafted recommendations to be transmitted to Governor James B. Hunt, Jr. Members were aware that, because of federal and other interest in their work, whatever recommendations they finally made would be the object of nationwide, as well as statewide, attention. Members were also aware, however, that North Carolina's specific solutions might well be different from those applied elsewhere. Looking at telecommunications comprehensively was an untried, almost radical, methodology, but in suggesting changes the Task Force had to be sensitive to the state's political and social traditions. For example, the Executive Organization Act of 1973, which streamlined the departmental structure of state government, influenced the conclusions and recommendations. Much attention was devoted to the Department of Administration, designated by that Act as the principal service agency for telecommunications in North Carolina; careful attention was paid to preserving the integrity of the University of North Carolina Television Network, the various public radio stations, and other agencies, to protect them from outside interference; and a cautious conservatism was evident in the Task Force's recommendation concerning consolidation of media production services. Where possible, the recommendations finally adopted tried to build on what was already in place and working.

MAJOR RECOMMENDATIONS

The Task Force transmitted three major recommendations to Governor James B. Hunt, Jr.:

(1) That a Board of Trustees for the University of North Carolina Center for Public Television be established;
(2) That statutes defining the role of the Department of Administration in telecommunications be clarified and modernized; and
(3) That an Agency for Public Telecommunications be established.

A New Board for UNC-TV

The first recommendation (See Appendix G) formally approved by the Task Force was for the establishment of a "Board of Trustees of the University of North Carolina Center for Public Television, the members of which shall consist of eight persons to be appointed by the Board of Governors, four persons to be appointed by the Governor, and ex officio, the Secretary of the Department of Cultural Resources, the Superintendent of Public Instruction, and the State President of the Community College System."* Other provisions of the recommendation included the addition of the Secretary of Human Resources to the list of ex officio members; the stipulation that all members, including ex officio members, would have voting privileges; and the staggering of terms of offices of all members. It should be noted that the recommendations of the Task Force included the stipulation that the present licensee for the University of North Carolina Television Network, the University Board of Governors, would continue to be responsible for maintaining, directing, and operating the Network and the Center; and that the Board of Governors would delegate to the (new) Board of Trustees whatever powers and duties "the Board of Governors deems necessary and appropriate for the effective discharge of the purposes and functions of the University of North Carolina Center for Public Television."*

The recommendation for a new UNC-TV Board stemmed from the Task Force's consideration of public broadcasting generally and its relationship to other forms of public telecommunications. As discussed in Chapter II-A, the Task Force concluded that public television, to paraphrase the recent report of the Carnegie Commission, is a treasure meriting not only continued but expanded state support. During the course of its study, the Task Force recognized that North Carolina's state support of public

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*From the initial proposal by Task Force member and UNC President William C. Friday.

television is smaller than that of many other states; that UNC-TV's needs may not receive sufficient attention because its operating budget is one small part of the entire University budget; and that the Network needs greater support in order to fulfill its aspirations.

The Task Force recommendation for a new Board of Trustees is a way of solving these problems. The Board is to operate in much the same manner as the Board for the University of North Carolina's Memorial Hospital in Chapel Hill. It will become an advocate for University Television, giving it more visibility and promoting its welfare and progress. It may also be helpful in resolving policy questions pertaining to public television generally in the state. For example, the Task Force suggested that the Board seek a means of cooperation between the two public television stations in the Charlotte area (as described in Chapter II-A). Other issues about public television in North Carolina were not resolved by the Task Force but instead will be referred to the new UNC-TV Board. A full list appears at the end of this chapter. The Task Force believes that the new Board will be effective in strengthening the Network and helping to resolve these and other policy matters.

Revision of Department of Administration Statutes

The Task Force's second major recommendation pulls together currently fragmented statutes in the Department of Administration. While this legislation (see Appendix F) does not substantially change the Department's current role, it defines and clarifies in modern terms the Department's traditional statutory responsibilities for operating and managing most state telecommunications. This legislation involves a request for $52,123 for each year of the biennium to provide two additional technical staff members needed to get the job done. This amount can be more than offset by savings through coordinated planning, buying, and maintenance of telecommunications facilities.

Many of the conclusions of the previous chapters support the need for clarification of the Department's role in coordination of telecommunications and other areas of government operation. This Report has discussed the needs for investigation of electronic mail and word processing systems (Chapters II-A and II-B); for state involvement in frequency coordination (Chapter II-C); for coordination of personnel and accounting systems with telecommunications experts, and for long-range telecommunications planning and policy advice as to purchases, contracts, property and construction plans, emerging technologies, and sharing of systems (Chapter II-D); for investigating the cost-effectiveness of teleconferencing as a means of increasing citizen involvement and reducing costs (Chapter II-E); and for legal/regulatory advice, more comprehensive management control of systems and facilities, and study of new technologies (Chapters III, IV, and V, respectively). The proposed telecommunications statutes revisions will help meet these needs by requiring the Department specifically to:

—Exercise full responsibility and authority for all telecommunications matters relating to the internal management and operations of state government;
—Establish, manage, and operate a wide array of telecommunications systems, both current ones and those based on emerging technologies;
—Develop coordinated telecommunication services and systems within and among all agencies and departments and assist in promoting sharing of systems and user aggregation;
—Coordinate continuing work in purchase/contract, property/construction, personnel, and budgetary areas with telecommunications concerns;
—Assure compatibility of telecommunications systems;
—Promote and coordinate planning for emergency telecommunications systems such as 911, and to assist in frequency coordination;
—Develop policies and long-range plans for telecommunications, consistent with the protection of rights to privacy and access to information; provide a continuous, comprehensive analysis and inventory of telecommunications costs, facilities, systems, and personnel within state government; and develop an annual report.

These proposed statutory changes clarify, but do not substantially modify, the current role of the Department of Administration in the management of the state's telecommunications resources. The proposed additional technical staff persons are needed to facilitate frequency coordination; provide advice to the Department's Division of Purchase and Contract as to sharing, compatibility, and aggregation of users; and to help with telecommunications requirements involved in the work of the Department's Office of State Property.

The Task Force considers its proposed updating of telecommunications statutes for the Department of Administration as an important part of a "package" enabling North Carolina to take maximum advantage of telecommunications developments at least cost, with the flexibility to respond to rapidly changing technologies. The final component of this package is the Task Force's recommendation for an Agency for Public Telecommunications (APT).

The Agency for Public Telecommunications

The third and final major recommendation of the Task Force proposes the establishment of the North Carolina Agency for Public Telecommunications. Under its proposed legislation (Appendix E) and the proposed Department of Administration statutory revisions, APT will work closely with the Department to encourage up-to-date telecommunications services, planning, and coordination within state government. APT's responsibilities as envisioned in the Task Force-proposed legislation are to: (1) advise public agencies on technological developments, available facilities, and opportunities for coordination; (2) operate a media

center to produce materials that may be telecommunicated by cable, landlines, satellite, broadcast, or other distribution systems; and (3) support development of public radio. It should be noted that, in this package, operational and management functions rest clearly with the Department of Administration, as they have in the past, except for the operation of the media production center, responsibility for which rests with the APT Board. The relationship envisioned between APT in its first function and the Department of Administration is one between advisor and implementer. Thus cooperation between the Department and APT is essential to the success of the overall plan.

Policy Advice

APT's first function is closely related to many of the operational and management responsibilities of the Department of Administration under the proposed statutory revisions. APT is to assist the Department by advising it and other state agencies and officials (including the Governor, Council of State, and University of North Carolina) "on all matters of telecommunications policy as may affect the State of North Carolina." Among APT's activities will be:
—Providing an information clearinghouse about telecommunications;
—Advising on telecommunications aspects of purchases and contracts, property and construction matters, management operations, and other related concerns;
—Advising on systems compatibility, emerging technologies, frequency coordination, state telecommunications plans, and related matters;
—Acting as an advocate for telecommunications programming and distribution as alternatives to conventional methods of meeting the goals of an agency;
—Advising on relations between state and local governments, regional organizations, the federal government, foundations, and other states and nations on common telecommunications concerns.

APT will balance a concern for cost-effectiveness with a concern for improving services. It will use its advisory powers to focus attention on telecommunications as an efficient means of extending benefits to all citizens, especially underserved groups such as rural citizens and handicapped persons. The Task Force recommended that APT's policy powers be advisory. A separate Department of Telecommunications responsible for telecommunications policy and management across state government had been proposed and rejected as premature at best and perhaps ultimately unnecessary. However, its serious consideration by the Task Force is reflected in the recommendation that the possibility of a separate department be reconsidered later. In the meantime, the advisory capacity for APT was given visibility and strength through the structure of its Board.

This Board was designed to be broadly representative both of the general public and of state government and other public agencies with substantial telecommunications commitments. Among the ex officio members (all with voting rights) are the heads of the state's major educational agencies, the Department of Administration, the Department of Human Resources, the Utilities Commission and its Public Staff, and the proposed Privacy and Freedom of Information Commission; there are also two rotating memberships from other state government departments. Four members are to be drawn from the North Carolina General Assembly. Two additional members will represent the UNC public television network and the interests of public radio stations in North Carolina. Finally, eleven members, including the Chairman of the APT Board, are to be appointed by the Governor to represent the general public.

The impact of APT's advisory functions should be great because of the integral participation of governmental leaders and representatives of the public in providing advice. Top executives will be kept constantly informed of the effect of telecommunications on their operations and will therefore be more likely to emphasize telecommunications planning in their departments.

Many telecommunications policy concerns were presented to the Task Force during its year of operation. The Task Force did not attempt to resolve these specific issues; rather they will be referred to the APT Board and are appended to this chapter.

The Media Center

APT's second function is to operate a public agency media center which is to "develop and provide media programs and programming materials and services of a noncommercial educational, informational, cultural, or scientific nature." It will also "undertake innovative projects in interactive telecommunications and teleconferencing whenever such projects might serve to improve services, expand opportunities for citizen participation in government and/or reduce the costs of delivering a service."

$550,000 has been requested for APT each year of the biennium, of which $125,000 is earmarked specifically for public radio development. After the first few years, only about $100,000 (plus an amount for radio) would appear as an annual request. This recurring appropriation would support APT's advisory function concerning all aspects of telecommunications planning. But the bulk of the funds requested is to be used in the first year to begin to acquire facilities and personnel needed for the media production center. In succeeding years, with other public agencies paying APT for their media productions, there will be income to the Agency, so that the amount of money requested in state appropriations should progressively decrease. The proposed legislation requires a report within three years evaluating APT's success in paying its own way.

From nearly the beginning, however, state appropriations for the media center can be counted on to result in substantial savings. Last year, more than $4 million was spent on media productions (for personnel, facilities, and

contracts) by general state government, exclusive of the University system. The Task Force found cameras tucked away in closets, tape recorders unused, and expensive but low-quality productions made on contract with outside agencies. At the same time, the Task Force found many unmet needs. Among them: for video- and audio-tapes to be distributed to the schools; for information tapes teaching good home health practices to curtail rising medical costs; for advice on the most efficient ways to produce programs; and for alternative distribution technologies. With APT centralizing media facilities and personnel, other agencies' practices of buying materials on a piecemeal basis can be phased down, with substantial savings to the taxpayer.

The media production facility should not only provide economies as the $4 million already spent annually begins to become consolidated, but also should provide state government and other public agency users of the facility needed expertise and flexibility about the types of products and means of distribution to be used. Task Force research demonstrated that some respondents are not aware of the many telecommunications paths available for distribution of messages and information; quite often, they viewed broadcast television as the only means available for meeting their needs. APT will encourage its users to consider tape duplication, cable, closed-circuit, satellite, landline, radio, and other distribution systems alternative to television broadcasting when these alternatives are appropriate to their goals.

The media production facility will provide other services as well. As telecommunications-related equipment purchases begin to be consolidated, APT will be able to offer state government and other public agency users a comprehensive equipment loan and repair service so that taxpayers will not be funding equipment that is used a few times and stored for years thereafter. Video and audio teleconferences may be possible through the APT facility, as a means of increasing public/government interaction and of saving time, money, energy, and travel. APT will be a continuing means of identifying and then harnessing new developments in production and distribution technologies. The media center therefore reflects the Task Force's own mixture of concerns: born in a desire to cut costs and consolidate fragmented efforts, it offers at the same time exciting opportunities for new and improved services, and for particularly innovative uses of interactive and other new technologies to create new interconnections for North Carolina.

Public Radio

APT's third function is to support the development of public radio in North Carolina. The proposed legislation creates a Public Radio Advisory Committee to the APT Board which "shall advise the Board on distribution of state funds to public radio licensees in North Carolina and on any other matter which the Board may refer to it." The

APT Board, in turn, is empowered "to serve as a means of acquiring governmental and private funds for use in the development of services through telecommunications"; and "to serve as a means of distributing state funds and grants." The Public Radio Advisory Committee is to be composed of nine members representing both public radio licensees and the general public; its chairman will be a voting ex officio APT Board member. Task Force members recognized that public radio has special needs (see Chapter II-A) meriting separate appropriated funds, and for that reason chose to create the Public Radio Advisory Committee to APT. The proposed APT legislation, however, allows the Board authority to create other special committees as needed.

Funding requested in support of public radio, through APT, is $125,000 for 1979-80. In addition, some $80,000 in funds remaining from the $125,000 appropriated in 1978 for the radio study has been requested to be transferred from the Board of Governors to the APT Board, and designated for public radio development.

The Task Force recognizes that public radio, like public television, is a national treasure, and that it too merits continuing and expanded state support. It is to this end that it has recommended, through APT and its Public Radio Committee, a means for nourishing the growth of public radio across the state.

OTHER RECOMMENDATIONS

The Task Force's designation of its proposals for UNC-TV, the Department of Administration, and the Agency for Public Telecommunications as its major recommendations should not detract from the importance of a large number of other concerns presented to members over the past year. One additional formal recommendation concerns the issues of privacy and access to information.

A Commission on Privacy and Freedom of Information

The Task Force endorsed in principle the recommendation of the Department of Crime Control and Public Safety for the creation of a Commission on Privacy and Freedom of Information. This recommendation arises from the realization that individual liberties may be threatened by some applications of telecommunications. For example, the capacity to gather, store, and retrieve health information by teleprocessing carries both the possibility for better health care, through fuller and better organized information, and the violation of privacy if such information is misused. While it may be true that information stored by computer can be better protected than information in file drawers, important questions remain as to who should have access to what information and when that access is in the public interest.

North Carolina has studied these matters in the recent past both through the efforts of the Task Force and of the

Governor's Crime Commission Committee on Security and Privacy. The proposal for a Commission on Privacy and Freedom of Information is a recognition of the need for a study group to consider these matters and make recommendations to the 1981 General Assembly; and to serve as an appeals body for those who feel their rights to privacy and/or access to information have been abridged.

Unresolved Issues

Finally, the Task Force received a large number of recommendations from members, advisors, state government personnel, liaisons, and other interested parties. In its January meeting, the Task Force voted not to attempt to evaluate these suggestions, but rather to refer 21 of them to the APT Board for consideration, and five additional suggestions to the new UNC-TV Board of Trustees. The full list of these proposals follows.

SUGGESTIONS TO THE TASK FORCE TRANSMITTED FOR CONSIDERATION BY THE PROPOSED APT BOARD

1. That APT consider establishing an Advisory Committee on Cable Television, to be composed of, among others, cable television industry representatives and local government representatives; that APT employ a technical staff to assist local governments in technical decisions and franchising matters relating to cable television.

2. That APT study billing for data circuits and modem charges by public utility telephone companies so as to ensure adequate verification of charges.

3. That APT study implementation of an Offender Case Management System to track criminal offenders through the correctional process.

4. That APT study implementation of the Criminal Justice Information System.

5. That APT study access to information systems such as job banks for the Department of Correction.

6. That APT study the organization of state and local government to identify the structure of telecommunications distribution requirements to establish congruent network requirements among all agencies.

7. That APT study the establishment of a telecommunications awareness and development program for all state and local government personnel.

8. That APT consider an engineering and economic analysis to identify the best means of establishing statewide networks and service facilities: locations, network structure, and alternative technologies.

9. That APT study the continuation of efforts by state government to coordinate a 911 program; and that it consider financial incentives for 911 implementation for telephone companies, aid to local governments, and better training for operators.

10. That APT consider means of assisting telecommu-

nications-related programs in the Department of Natural Resources and Community Development.

11. That APT investigate alternatives to broadcasting for distributing educational programs.

12. That APT consider appropriation of funds to local school systems on an average daily membership matching basis for audio and video record and playback equipment.

13. That APT consider the State Board of Education's budget request for additional staffing in ITV reception and distribution.

14. That APT consider the Department of Community Colleges' request for an electronic cataloging system; electronic library security systems; IN-WATS telephone services; closed-circuit television systems; and automated data processing for fiscal management.

15. That APT study implementation of teleconferencing capabilities between schools and public officials.

16. That APT study extension of the microwave system for public safety services into Columbus County.

17. That APT study the possibility of substantive experiments to be conducted by public agencies before implementation of any telecommunications system; and encourage agencies to lease rather than purchase telecommunications systems.

18. That APT study extending public radio broadcasting to all North Carolinians.

19. That APT study alignment of telecommunications offices/staff in state government agencies so as to facilitate interdepartmental coordination.

20. That APT study development of telecommunications in rural areas.

21. That APT study local program production through closed-circuit systems, cablevision facilities, etc.

22. That APT study the need for a North Carolina Frequency Advisory Committee whose purpose would be to review frequency assignment requests from North Carolina local governments, county governments, and state government, and assist in coordination of these requests for both the FCC and the applicants.

SUGGESTIONS TO THE PROPOSED NEW UNC-TV BOARD OF TRUSTEES

1. That the UNC-TV Board of Trustees explore accommodations between Channel 58, WUNG-TV, and Channel 42, WTVI, Charlotte for merging, blending, or sharing of facilities for production and/or transmitting so that ultimately a Charlotte public television station could be a model for local input, flexibility, efficiency, and network responsiveness.

2. That the UNC-TV Board of Trustees study the possibility of local origination of programs from each of the University Network's various stations.

3. That the UNC-TV Board of Trustees study the possibility of additional adult programming for continuing education, health education, and coping skills.

4. That the UNC-TV Board of Trustees study provision of remedial and enrichment educational video services during summer daylight hours.

5. That the UNC-TV Board of Trustees study provision of North Carolina news programming to be distributed by public broadcasting, especially in areas of the state where there are no North Carolina-based commercial stations.

NORTH CAROLINA AND BEYOND

The Task Force viewed telecommunications not as an end in itself but as a means to ends such as the delivery of public services, the efficient administration of government, and the effective interaction of citizens and government. The study took a comprehensive view in recognition of the interrelationships of the various forms of telecommunications. And the broad-based nature of the Task Force membership—including as it did representatives of state government and public agencies at the highest levels, as well as of the general public—helped North Carolina look at its service needs, existing systems, plans, and problems without being unduly hampered by concerns about politics or

"turf"—concerns that could critically endanger any such wide-ranging study. These aspects of the Task Force's approach may be helpful to other states seeking better understanding and management of their telecommunications systems.

From the study emerged the theme that more and better interconnections for North Carolina could be economically achieved. New technologies like satellite video-conferencing promise exciting opportunities for all North Carolinians, regardless of their geographic location, to interact with each other, with their teachers, co-workers, students, or with their public officials. State support of cultural, educational, and informational programming services—to be distributed through a number of technologies—can help interconnect North Carolinians with many different worlds of ideas, feelings, and information. More effective interconnections of systems providing health, social, and public safety services can help strengthen the bonds of physical and social welfare for our society. Telecommunications can provide a means of reaching people and of enabling those people to reach back. The potential is nearly limitless.

APPENDIX A:
Governor's Executive Order Establishing the Task Force

EXECUTIVE ORDER NUMBER 18

WHEREAS the State of North Carolina has a multimillion dollar investment in public telecommunications such as telephone data transmission, radio and television systems; and

WHEREAS various departments, agencies, and administrative units of State Government have authority vested by statutes to oversee the operations of these public telecommunications systems; and

WHEREAS there are administrative, legislative, and regulatory changes taking place at the Federal level which can increase funds available to North Carolina for telecommunications; and

WHEREAS nationally and worldwide, rapidly developing telecommunications technologies are increasingly being applied to the delivery of social services, medical services, educational services, and to increase the availability of cultural resources and the opportunity to participate in decision-making processes of government without energy-depleting travel;

NOW, THEREFORE, IT IS HEREBY ORDERED:

Section 1. There is hereby created, for a period of one year, the North Carolina Task Force on Public Telecommunications. The Task Force will have as its primary duties and responsibilities the following:

(a) To study existing state telecommunications facilities and the services they deliver, and identify telecommunications needs.

(b) To study telecommunications costs in relation to current services, including exploration of potential monetary savings through greater interagency cooperation and improved liaison with federal agencies which can provide financial and technical telecommunications assistance.

(c) To study, evaluate, and inform state agencies about new telecommunications technologies and the services they can deliver, with special emphasis on cost reduction and the improvement of services to the people.

(d) To consider how citizens' rights can best be provided for in the telecommunications activities of the State, including the right to privacy, the right of public access to facilities and services, and the right of public participation in policy-making.

(e) To write a report, for delivery to the Governor on or about January 31, 1979, recommending administrative, legislative, and regulatory modifications necessary to assure that the citizens of the State receive their full share of the benefits of modern public technology.

Section 2. The Task Force shall be composed of not more than twenty-five (25) distinguished and interested citizens to be appointed by the Governor and who will serve, at the pleasure of the Governor, for the one-year life of the Task Force. The Task Force membership shall include at least one (1) member from each house of the State Legislature, and may include members of the Executive Branch. In addition, not more than ten (10) non-voting ex officio

members of the Task Force shall be appointed by the Governor. The ex officio members shall be officers of the Executive Branch or members of state commissions, boards, or agencies with special responsibilities for telecommunications activities or policy. Ex officio members shall also serve, at the pleasure of the Governor, for the one-year life of the Task Force. Members and ex officio members of the Task Force shall be entitled to reimbursement for travel and expenses as may be authorized for members of state boards and commissions generally, pursuant to GS 138-6.

Section 3. The Chairman of the Task Force shall be designated by the Governor from among the Task Force membership. The duties of the Chairman shall include the following:

(a) The Chairman shall plan, schedule, and chair all meetings of the Task Force. He shall cause such meetings to be announced in advance to the public and to interested parties in State Government.

(b) The Chairman shall have the primary responsibility of calling for written reports from state officials and personnel engaged in telecommunications activities and for scheduling presentation of these reports before the Task Force.

(c) At his pleasure, the Chairman may appoint technical advisory committees from the professional community to help assess the current telecommunications status and relate that status to new and developing technologies. Members of such technical advisory committees may be reimbursed for travel and expenses.

(d) The Chairman shall have primary responsibility for coordinating the reports and recommendations resulting from the work of the Task Force.

Section 4. The Staff Director of the Task Force shall be appointed by the Governor from among current personnel of the Policy Development Division of the Department of Administration. The duties of the Staff Director shall include the following:

(a) To supervise, at the direction of the Chairman, the staff of the Task Force.

(b) To supervise, at the direction of the Chairman, the budget of the Task Force.

(c) To arrange for the recording of minutes of Task Force meetings, and to compile all information gathered in the course of the Task Force study.

(d) To serve as a liaison between the Task Force and the various departments, divisions, agencies, and offices of State Government.

(e) To assist, at the direction of the Chairman, in the preparation of all Task Force reports and recommendations.

(f) To employ and supervise personnel necessary to accomplish the purposes of the Task Force.

Section 5. Initial funding for operations and personnel of the Task Force shall come from a grant from the Mary Reynolds Babcock Foundation in the amount of $4,375.00 Additional such fund-

ing is expected from other sources. In-kind support, such as telephone service and office space, shall be assumed by the Department of Administration.

Section 6. Every agency within State Government within my authority is requested to cooperate with the Task Force in providing all necessary information regarding their activities.

Section 7. This Order shall become effective immediately.

Done in Raleigh, North Carolina, this the 14th day of February, 1978.

James B. Hunt, Jr.
GOVERNOR OF NORTH CAROLINA

APPENDIX B:

Methods

FORMATION OF THE TASK FORCE

On February 14, 1978, Governor James B. Hunt, Jr., signed the Executive Order which created the North Carolina Task Force on Public Telecommunications (Appendix A). The Governor appointed 19 members and 4 ex officio members to the Task Force. (One ex officio member, Wade Hargrove, then Chairman of the Security and Privacy Committee of the Governor's Crime Commission, was later reappointed as a regular member. Another ex officio member, Dr. Ben Fountain, then President of the Department of Community Colleges, resigned from that position during the year. Dr. Joseph Carter, Director of Educational Resources for the Department of Community Colleges, was appointed to fill that vacancy.) Among the 23 members were both public officials and private citizens, chosen to represent a wide range of interests and concerns.

Plan of Operation

The Task Force's Plan of Operation divided the study into four phases: Information Collection, Assimilation/Evaluation, Recommendations, and Report Writing. While defining these phases helped to provide a schedule for the study, they were not, in fact, strictly successive in time. For example, the Information Collection phase overlapped much of the Assimilation/Evaluation phase as information gathering, consideration, and evaluation interplayed dynamically.

THE INFORMATION COLLECTION PHASE

During the Information Collection phase, each Task Force member was assigned to two of four panels: Service Objectives, Laws and Regulations, Facilities and Systems, and Emerging Technologies. The Service Objectives Panel was further subdivided into five committees: Cultural, Educational, and Information Services; Health and Social Services; Public Safety Services; Government Operations; and Public/Government Interaction. Each Task Force member served on one of the committees of the Service Objectives Panel as well as on one of the other three panels.

Service Objectives Panel

It was seen as vital that the Task Force consider the service objectives of public agencies in the broad sense, rather than restrict itself only to program objectives currently being met through telecommunications. Because the purview of the Services Panel was so large, the five committees mentioned above, organized around types of public services, were formed. The categorization of services into these five types was, to some extent, arbitrary. (See introduction to Chapter II, Public Services and Telecommunications.)

The committees of the Service Objectives Panel completed personal interviews with over 100 public officials. In general, one or more Task Force members were joined by at least one staff member or consultant in conducting the interviews. The information discussed in each interview followed a standard set of guidelines (Appendix C). A summary report of each interview, organized around the guidelines, was prepared by the staff and sent to each participant for corrections and approval. Additional information relating to service objectives was gathered through presentations at Task Force meetings and conferences on public radio and emergency communications. (See Chronology of Events at the end of Chapter 1.)

Laws and Regulations Panel

The Laws and Regulations Panel surveyed current telecommunications law and regulation, and examined a few current issues of particular concern to North Carolina in depth. One such question was whether the state should take a role in the regulation of cable television. The N.C. League of Municipalities conducted a survey of officials in 43 North Carolina cities about cable issues as part of the Task Force's overall study of cable TV. Another concern was the safeguarding of individuals' rights to privacy and access to information. In relation to these issues several experts made presentations to the Task Force (Chronology, Chapter 1).

Facilities and Systems Panel

The Facilities and Systems Panel undertook an inventory of current state telecommunications equipment and systems. It quickly became apparent that a complete inventory would require more time and resources than the Task Force had available. However, 307 separate systems were identified, and basic descriptive information was collected about most of them.

A data collection form was devised for use in gathering descriptive information on state systems (Appendix D). The surveyed items included a description of equipment, interconnections with other systems, capital value, and operating costs. It was found that personal interviews are preferable to mailed questionnaires in eliciting the type of information required. As an analytic aid, the facilities survey results were reduced to one-line descriptions of systems and entered in the State Computer Center. (See Chapter IV, State Facilities and Systems.)

Emerging Technologies Panel

The Emerging Technologies Panel was formed to investigate new telecommunications technologies and their potential applications. The Panel considered staff research, numerous presentations, and the results of a trip taken by the Panel's chairman to several research and development laboratories. In addition, two satellite teleconferences demonstrated applications of new technologies.

ASSIMILATION/EVALUATION PHASE

As the Services, Laws, Facilities, and Emerging Technologies Panels gathered their information, the Task Force as a whole began to sift through it. The Panels reported on their progress and findings at each Task Force meeting, and summaries of the results of services and facilities surveys were distributed, so that all members had access to the full range of information available. In this and the final stages of the study, the Task Force worked as a committee-of-the-whole, since the total body of information had to be interrelated in order to be evaluated.

The Advisory Committee on Public Radio

A number of controversial issues were raised about the future development of public radio in North Carolina at the Task Force-sponsored Conference on Public Educational Radio in June, 1978. As a result of these pressing concerns, a special Advisory Committee on Public Radio was formed to evaluate the issues and make recommendations to the Task Force. The findings and recommendations of the Radio Committee were given careful consideration by the Task Force in making its own evaluation of public radio issues.

RECOMMENDATIONS PHASE

In the process of formulating and approving recommendations, the members of the Task Force were asked to submit their individual recommendations for consideration by the group as a whole. Other recommendations were forged by a succession of several special subcommittees appointed by the chairman to resolve areas of conflict. Final recommendations were approved by the whole Task Force in open sessions where language was discussed in detail, and drafts of proposed legislation were approved (Appendices E and F). The recommendations were transmitted to the Governor for his consideration. Legislation for the recommendation concerning UNC-TV was drafted by the University of North Carolina; but the language followed the spirit of the Task Force recommendation in every aspect.

REPORT WRITING PHASE

Preparation of this Report was a cooperative effort of the members, staff, and consultants, with the members responsible for final approval. The panel structure of the Information Collection phase proved to be a useful framework around which to structure the Task Force's explorations. Therefore, this same framework was followed in organizing the Report. The Report was approved at the April 4, 1979, meeting.

BEYOND NORTH CAROLINA

The Task Force project was undertaken both because of the importance of the study to North Carolina and because of a conviction that the approach taken might serve as a useful model for others wishing to ensure the best use of telecommunications for the public benefit. Similar projects in the future should profit from the lessons learned and procedures developed by the Task Force. Certain methods followed by the Task Force were dictated by concerns specific to North Carolina. For example, public radio and public television were approached according to their histories in North Carolina, which may be particular to this state. Other procedural decisions made by the Task Force, particularly in taking a comprehensive view of all forms of telecommunications, in focusing on services, and in looking toward applications of new technologies, have proven to be very valuable in this State and should be equally beneficial beyond North Carolina.

APPENDIX C:
Services Interview Questionnaire

PANEL ON SERVICE OBJECTIVES
GENERAL GUIDELINES FOR INTERVIEWS

The following categories of inquiry should be included but should not limit subjects discussed:

1. Interviewers' names

2. Time, date, and place of interview

3. Names and titles of interviewees

4. Title of office or agency, and its Department

5. Contact name and phone number for followup calls

INQUIRE FOR EACH MAJOR SERVICE PROGRAM ADMINIS-
TERED BY THIS OFFICE:

6. Principal objectives of the program. What is this program trying to accomplish? (Examples: "Provide library services to all citizens." "Supply educational media equipment and assistance to school districts across the state." "Provide centralized automated data processing to other state agencies for payroll and other record-keeping.")

7. Exchanges of communications or services. Telecommunications may be needed wherever there is an exchange of information, services or projects. Do you gather information or make use of services provided by citizens, other agencies, the Federal Government? Do you provide information, services or products to any of these? How do these exchanges occur (in-person contacts, mail, phone, data transmission, telecopy, teletext, two-way radio, broadcast, etc.)? Is more communication needed from citizens, additional locations, other sources? Do your services reach everyone they should reach?

8. What kinds of telecommunications do you currently have in use? For example, telephone, teletext, remote data processing, two-way radio, etc.

9. Could new or improved telecommunications help meet the objectives of your current program?

10. Do you have plans or ideas for new programs? Could telecommunications help?

APPENDIX D:
Facilities Data Collection Questionnaire

DATA COLLECTION SHEET

1. Name of System
   (Existing or Planned)

   _____

2. State department/divisions controlling

   _____

3. State department/divisions served

   _____

4. Purpose of facility or system

   _____

5. Type

   a. Voice, telephone
      (Non-secure or secure)

   _____

   (1) Common-user

   _____

   (2) Dedicated

   _____

   (3) Other

   _____

   b. Teletype
      (Non-secure or secure)

   _____

   c. Facsimile
      (Non-secure or secure)

   _____

   d. Radio Broadcasting

   _____

   (1) AM or FM

   _____

   (2) Output, in WATTS

   _____

   e. TV Broadcasting

   _____

   (1) Output, in WATTS

   _____

   (2) CATV

   _____

   (3) MATV

   _____

   (4) Other

   _____

   f. Radio
      (Non-secure or secure)

   _____

   (1) Paging

   _____

   (2) Two-way

   _____

   (3) Other

   _____

   g. Navigational Aids

   _____

   h. Teleprocessing (Data Comm)
      (Non-secure or secure)

   _____

   (1) Digital

   _____

   (2) Analog

   _____

6. Major Components

a. Number of Terminals   _____

(1) Receivers   _____

(2) Transmitters   _____

(3) Transceivers   _____

b. Number of Communications Sites (non-terminals; i.e., TV translators, microwave sites, and TV transmitters)   _____

c. Number of Switching Centers   _____

d. Map of system (see Enclosure   )   _____

e. Number of frequencies   _____

f. Block diagram (see Enclosure   )   _____

g. Annual Operating Costs   _____

(1) Maintenance   _____

(a) Contract   _____

(b) Organic   _____

(2) Personnel Costs   _____

(3) Equipment Costs   _____

(a) Leased/rental   _____

(b) Programming Costs (recurring or non-recurring)   _____

(c) Other   _____

(4) Total Plant Value (if facility or system state-owned)   _____

h. Usage   _____

(1) Messages per year   _____

(2) Hours per year   _____

(3) Transmissions per year   _____

i. Speed of Terminal (WPM, Baud rate)   _____

j. Circuit/channel information   _____

k. Planned or funded upgrades within next FY   _____

l. Storage capacity (memory)   _____

APPENDIX E:
Proposed Statute for the
Agency for Public Telecommunications

Section 143B-422.1. Definitions.—As used in this Part, except where the context chearly requires otherwise, the words and expressions defined in this section shall be held to have the meanings here given to them.

(1) Agency: whenever the term "agency" is used it shall mean and include, as the context may require, an existing department, in-

stitution, commission, committee, board, division, bureau, officer or official; whenever the term "Agency" is used it shall mean the North Carolina Agency for Public Telecommunications.

(2) Board: whenever the term "Board" is used it shall mean the Board of Public Telecommunications Commissioners.

(3) Telecommunications: any origination, creation, transmis-

sion, emission, storage, retrieval, or reception of signs, signals, writing, images and sounds, or intelligence of any nature, by wire, radio, television, optical or other electromagnetic systems.

Section 143B-422.2. Creation of Agency.—membership; appointments, terms and vacan... ; officers; meetings and quorum; compensation.—The North Carolina Agency for Public Telecommunications is hereby created. It shall be governed by a board hereby designated as the Board of Public Telecommunications Commissioners and composed of 27 members as follows:

(1) The Chairman of said Board;

(2) Ten at large members chosen from the general public, appointed by the Governor;

(3) Two members of the North Carolina House of Representatives, appointed by the Speaker of the House of Representatives.

(4) Two members of the North Carolina Senate, appointed by the President of the Senate;

(5) The Secretary of Administration, ex officio;

(6) The Chairman of the Board of Trustees, ex officio, for the proposed University of North Carolina Center for Public Television (if and when established);

(7) The Chairman of the State Board of Education, ex officio;

(8) The Chairman of the proposed North Carolina Privacy and Freedom of Information Commission, ex officio (if and when established);

(9) The Chairman of the North Carolina Utilities Commission, ex officio;

(10) The Director of the Public Staff of the North Carolina Utilities Commission, ex officio;

(11) The Chairman of the Public Radio Advisory Committee of the North Carolina Agency for Public Telecommunications, ex officio;

(12) The Superintendent of Public Instruction, ex officio;

(13) The President of the University of North Carolina, ex officio;

(14) The President of the Department of Community Colleges, ex officio;

(15) Two members ex officio who shall rotate among the remaining heads of departments enumerated in Sections 143A-11, 143B-6, appointed by the Governor.

The Chairman of the Board of Public Telecommunications Commissioners shall be chosen by the Governor and shall serve at the pleasure of the Governor.

The ten at large members shall serve for terms staggered as follows: four members whose appointments shall expire on June 30, 1980; three members whose appointments shall expire on June 30, 1982; three members whose appointments shall expire on June 30, 1984. Thereafter, the members at large shall be appointed for full four-year terms and until their successors are appointed and qualified. The Governor shall consider the following factors in his appointment of members at large: that said members represent the various geographic areas of the State including both urban and rural areas; that said members represent various classifications as to sex, race, age, and handicapped persons; that among said members there should be representatives of the public television, commercial broadcast, non-broadcast distributive systems and private education communities of the State.

The terms of the ex officio members shall be coterminous with their election or appointment to office. In the event that any of the offices represented on the Board shall become non-existent, the successor officer to the designated member shall become an ex officio member of the Board; if there shall be no successor, then the position on the Board shall be filled by a member to be appointed by the Governor from the general public. The ex officio members shall have the right to vote.

The terms of the members of the North Carolina House of Representatives and the North Carolina Senate shall be coterminous with their terms in office or until their successor shall be appointed and qualified.

The terms of the rotating members shall be of one-year duration and the schedule of rotation shall be determined by the Governor.

Each State official who shall serve on the Board may designate a representative of his department, agency or institution to sit in his place on the Board and to fully exercise his privileges of membership.

The Secretary of Administration or his designee shall serve as secretary of the Board.

Ad interim appointments to fill vacancies on the Board shall be for the balance of the unexpired term and shall be made in the same manner as was the original appointment.

The Governor shall have the power to remove any member of the Board from office in accordance with the provision of G.S. 143B-16.

The Board shall meet quarterly and at other times at the call of the Chairman or upon written request of at least six members.

A majority of the Board members shall constitute a quorum for the transaction of business.

Members of the Board who are not officers or employees of the State or members of the General Assembly shall receive compensation in accordance with the provisions of G.S. 138-5. State officers and employees who are members of the Board shall receive compensation in accordance with the provisions of G.S. 138-6. The Legislative members of the Board shall receive compensation in accordance with the provisions of G.S. 120-3.1.

Section 143B-422.3. Purpose of Agency.—The Agency hereinbefore created shall serve as an instrumentality of the State of North Carolina for the accomplishment of the following general purposes:

(1) To advise the Governor, the Council of State, the principal State Departments, the University of North Carolina, the General Assembly and all State agencies and institutions on all matters of telecommunications policy as may affect the State of North Carolina and its citizens.

(2) To foster and stimulate the usage of telecommunications programming, services and systems for non-commercial educational and cultural purposes by public agencies for the improvement of the performance of governmental services and functions.

(3) To serve State government, local governments and other public agencies and councils in the following ways:

a. To provide a clearinghouse of information about innovative projects, programs or demonstrations in telecommunications.

b. To provide advice on the acquisition, location and operation of telecommunications systems, equipment, and facilities and to provide particularly such advice as may foster compatibility of such systems, equipment and facilities and may reduce or eliminate duplication or mismatching of such systems and facilities.

c. To provide advice on the disposition of excess or unused telecommunications equipment.

d. To provide information and advice on new telecommunications developments and emerging technologies.

e. To provide advice on procurement matters on all purchases and contracts for telecommunications systems, programming and services.

f. To provide information and advice on the most cost-effective means of using telecommunications for management, operations and service delivery.

g. To provide information and advice on all matters pertaining to cable or community antenna television systems including but not limited to ordinances, franchising, rate-making, interconnections, public service programming or any other related concerns.

h. To provide advice and assistance in the evaluation of alternative media programming so that the most efficient and effective products may be developed and used.

i. To provide advice and assistance in the identification of various methods of distributing programs and materials.

(4) To study the utilization of the frequency spectrum and to advise appropriate authorities as to effective frequency management.

(5) To assist in the development of a State plan or plans for the best development of telecommunications systems, both public and private, to insure that all citizens of North Carolina will enjoy the benefits which such systems may deliver.

(6) To develop and provide media programs and programming materials and services of a non-commercial educational, informational, cultural or scientific nature.

(7) To undertake innovative projects in interactive telecommunications and teleconferencing whenever such projects might serve to improve services, expand opportunities for citizen participation in government and/or reduce the costs of delivering a service.

(8) To serve as a means of acquiring governmental and private funds for use in the development of services through telecommunications.

(9) To serve as a means of distributing state funds and awarding grants for any purpose determined to be in furtherance of the purposes of this Part.

(10) To operate such telecommunications facilities or systems as may fall within the purview of this Part or as may be assigned to the Agency by the Secretary of Administration, the Governor or the General Assembly.

(11) To review, assess and report to the Governor on an annual basis on the telecommunications needs and services of state and local government and on the production capabilities and services, the non-production services and the research and development services offered by the Agency and by all other agencies of state government.

(12) To review, assess and report to the Governor, after a period of not less than two years and not more than three years after the enactment of this Part, on the telecommunications statutes, plans and operations in state government, including those resulting from the enactment of this Part and from revision of statutes pertaining to telecommunications in the Department of Administration.

(13) To serve as liaison between State government and local governments, regional organizations, the federal government, foundations and other states and nations on common telecommunications concerns.

(14) To study and evaluate all existing or proposed statutes, rules or regulations at all levels of government touching upon or affecting telecommunications policy, services, systems, programming, rates or funds and to advise the appropriate officials, agencies and councils.

(15) To acquire, construct, equip, maintain, develop and improve such facilities as may be necessary to the fulfillment of the purpose of the Part.

(16) To provide information and advice on any related matter which may be referred to it by any agency or council of state or local government.

(17) And in general to do and perform any act or function which may tend to be useful toward the development and improvement of telecommunications services with State government and which may increase the delivery of services through telecommunications programs or systems.

The enumeration of the above purposes shall not limit or circumscribe the broad objective of developing to the utmost the possibilities of telecommunications programming, services and systems in the State of North Carolina.

Section 143B-422.4. Powers of Agency.—In order to enable it to carry out the purposes of this Part, the said Agency shall:

(1) Have the powers of a body corporate, including the power to sue and be sued, to make contracts, to hold and own copyrights and to adopt and use a common seal and to alter the same as may be deemed expedient;

(2) Have the authority to make all necessary contracts and arrangements with any parties which will serve the purposes and facilitate the business of the North Carolina Agency for Public Telecommunications; Provided, however, the Agency shall not contract or enter into any agreement for the production by the Agency of programs or programming materials with any person, group, or organization, other than government agencies; principal state departments; public non-commercial broadcast licensees; non-profit entities organized for cultural, educational or scientific purposes.

(3) Be authorized and empowered to rent, lease, buy, own, acquire, mortgage, otherwise encumber and dispose of such property, real or personal and construct, maintain, equip and operate any facilities, buildings, studios, equipment, materials, supplies and systems as said Board may deem proper to carry out the purposes and provisions of this Part, all or any of them;

(4) Establish an office for the transaction of its business at such place or places as, in the opinion of the Board shall be advisable or necessary in carrying out the purposes of this Part;

(5) Be authorized and empowered to apply for and accept loans and grants of money from any federal agency or the State of North Carolina or any political subdivision thereof or from any public or private sources available for any and all of the purposes authorized in this Part, and to extend or distribute the same in accordance with directions and requirements attached thereto or imposed

thereon by any such federal agency, the State of North Carolina or any political subdivision thereof, or any public or private lender or donor, and to give such evidences of indebtedness as shall be required, provided, however, that no indebtedness of any kind incurred or created by the Agency shall constitute an indebtedness of the State of North Carolina or any political subdivision thereof, and no such indebtedness shall involve or be secured by the faith, credit or taxing power of the State of North Carolina or any political subdivision thereof; Provided, however, at no time may the total outstanding indebtedness of the Agency, excluding bond indebtedness exceed a total of five hundred thousand dollars ($500,000) without approval of the Advisory Budget Commission.

(6) Be authorized and empowered to pay all necessary costs and expenses involved in and incident to the formation and organization of said Agency and incident to the administration and operation thereof, and to pay all other costs and expenses reasonably necessary or expedient in carrying out and accomplishing the purposes of this Part;

(7) Be authorized and empowered to distribute in the form of grants, gifts, or loans such of the revenues and earnings received by the Agency from its operations, subject to the approval of the Advisory Budget Commission and under such conditions as the Board may deem appropriate to the accomplishment of the purposes of this Part;

(8) Have power to adopt, alter or repeal its own bylaws, rules and regulations governing the manner in which its business may be transacted and in which the power granted to it may be enjoyed, and may provide for the creation of such divisions and for the appointments of such committees, and the functions thereof, as the Board may deem necessary or expedient in facilitating the business and Purposes of the Agency.

(9) The Board shall be responsible for all management functions of the Agency. The Chairman shall serve as the chief executive officer and shall have the responsibility of executing the policies of the Board. The Executive Director shall be the chief operating and administrative officer and shall be responsible for carrying out the decisions made by the Board and its Chairman. The Executive Director shall be appointed by the Governor upon the recommendation of the Board. The salary of the Executive Director shall be fixed by the Governor subject to the approval of the Advisory Budget Commission and the Executive Director shall serve at the pleasure of the Governor. Subject to the approval of the Board, the Executive Director is hereby authorized to appoint, employ, dismiss and fix the compensation of such administrative, clerical and other employees as the Board deems necessary to carry out the purposes of this Part; Provided, however, that any and all employees designated by the Board as professional personnel shall be compensated by salaries fixed by the Governor; Provided further, that any employee who may serve as the director of any division of the Agency which may be established by the Board shall be appointed with the additional approval of the Secretary of Administration. There shall be an executive committee of seven members elected by the Board from among its members. Said executive committee shall consist of the Chairman, three of the appointed members and three of the ex officio members; the Chairman shall serve as chairman of the executive committee. The executive committee shall be vested with the authority to do all acts which are authorized by the bylaws of the agency. Members of the executive committee shall serve until their successors are elected.

(10) Be authorized and empowered to do any and all other acts and things in this Part authorized or required to be done, whether or not included in the general powers in this section; and

(11) Be authorized and empowered to do any and all things necessary to accomplish the purposes of this Part.

Nothing herein shall authorize the Agency to exercise any control over any public non-commercial broadcast licensee, its staff or facilities.

The property of the Agency shall not be subject to any taxes or assessments thereon.

Section 143B-422.5. Public Radio Advisory Committee.—creation; duties; members.—The Public Radio Advisory Committee of the North Carolina Agency on Public Telecommunications is hereby created. Said Committee shall advise the Board on the distribution of State funds to public radio licensees in North Carolina and on

any other matter which the Board may refer to it. There shall be nine members of said Committee; three of whom shall be representatives of the public radio broadcast licensees in the State; six of whom shall be at large members chosen by the Governor from the general public. The members shall choose one of the at large members to serve as Chairman of the Committee; said Chairman shall serve ex officio as a member of the Board.

Section 143B-422.6. Approval of acquisition and disposition of real property.—Any transactions relating to the acquisition or disposition of real property or any estate or interest in real property, by the North Carolina Agency for Public Telecommunications, shall be subject to prior review by the Governor and Council of State, and shall become effective only after the same has been approved by the Governor and Council of State. Upon the acquisition of real property or other estate therein, by the North Carolina Agency for Public Telecommunications, the fee title or other estate shall vest in and the instrument of conveyance shall name "North Carolina Agency for Public Telecommunications" as grantee, lessee, or transferee. Upon the disposition of real property or any interest or estate therein, the instrument of conveyance or transfer shall be executed by the North Carolina Agency for Public Telecommunications. The approval of any transaction by the Governor or Council of State may be evidenced by a duly certified copy of excerpt of minutes of the meeting of the Governor and the Council of State, attested by the private secretary to the Governor or the Governor, reciting such approval, affixed to the instrument of acquisition or transfer, and said certificate may be recorded as a part thereof, and the same shall be conclusive evidence of review and approval of the subject transaction by the Governor and Council of State. The Governor, acting with the approval of the Council of State, may delegate the review and approval of such classes of lease, rental, easement, or right-of-way transactions as he deems advisable, and he may likewise delegate the review and approval of the severance of buildings and timber from the land.

Section 143B-422.7. Issuance of bonds.—(a) As a means of raising the funds needed from time to time in the acquisition, construction, equipment, maintenance and operation of any facility, building, structure, telecommunications equipment or systems or any other matter or thing which the Agency is herein authorized to acquire, construct, equip, maintain, or operate, all or any of them, the said Agency is hereby authorized, with the approval of the Advisory Budget Commission, at one time or from time to time to issue negotiable revenue bonds of the Agency. The principal and interest of such revenue bonds shall be payable solely from the revenue to be derived from the operation of all or any part of its properties and facilities. (b) A pledge of the net revenues derived from the operation of said properties and facilities, all or any of them, shall be made to secure the payment of said bonds as and when they mature. (c) Revenue bonds issued under the provisions of this Part shall not be deemed to constitute a debt of the State of North Carolina or a pledge of the faith and credit of the State. The issuance of such revenue bonds shall not directly or indirectly or contingently obligate the State to levy or to pledge any form of taxation whatever therefore or to make any appropriation for their pay-

ment. (d) Such bonds and the income thereof shall be exempt from all taxation within the State.

Section 143B-422.8. Exchange of property; removal of building, etc.—The Agency may exchange any property or properties acquired under the authority of this Chapter for other property, or properties usable in carrying out the powers hereby conferred, and also may remove from lands needed for its purposes and reconstruct on other locations, buildings, facilities, equipment, telecommunications systems or other structures, upon the payment of just compensation, if in its judgment, it is necessary or expedient so to do in order to carry out any of its plans for telecommunications services, under the authorization of this Part.

Section 143B-422.9. Treasurer of the Agency.—The Board shall select its own treasurer from among the at large members. The Board shall require a surety bond of such appointee in such amount as the Board may fix, and the premium or premiums thereon shall be paid by said Board as a necessary expense of said Agency.

Section 143B-422.10. Deposit and disbursement of funds.—All Agency funds shall be deposited in a bank or banks to be designated by the Board. Funds of the Agency shall be paid out only upon warrants signed by the treasurer of the Agency and countersigned by the Chairman or the acting chairman. No warrants shall be drawn or authorized by this Part and only when the account or expenditure for which the same is to be given in payment has been audited and approved by the Board or its Chairman. Any and all revenues received by the Agency from its operations shall be handled according to policies determined by the Board.

Section 143B-422.11. Annual audit; copies to be furnished.— At least once in each year the State Auditor shall cause to be made a detailed audit of all moneys received and disbursed by the Agency during the preceding year. Such audit shall show the several sources from which funds were received and the balance on hand at the beginning and end of the preceding year and shall show complete financial condition of the Agency. A copy of the said audit shall be furnished to each member of the Board and to the officers thereof and to the Governor, the Department of Administration and the Attorney General.

Section 143B-422.12. Purchase of supplies, material and equipment.—All the provisions of Article 3 of Chapter 143 of the General Statutes relating to the purchase of supplies, material and equipment by the State government are hereby made applicable to the North Carolina Agency for Public Telecommunications.

Section 143B-422.13. Liberal construction of Part.—It is intended that the provisions of this Part shall be liberally construed to accomplish the purposes provided for, or intended to be provided for, herein, and where a strict construction would result in the defeat of the accomplishment of any of the acts authorized herein, and a liberal construction would permit or assist in the accomplishment thereof, the liberal construction shall be chosen.

APPENDIX F:
Proposed Statute for the Department of Administration

Amendment to G.S. Section 143-340. It will repeal subsection 14 and replace it with a new subsection 14.

(14) To exercise full responsibility and authority for all telecommunications matters relating to the internal management and operations of state government. In order to implement said respon-

sibility, the Secretary shall be empowered and authorized to do such of the following things as he may deem necessary and advisable:

(a) To establish, manage, and operate, through either state ownership or commercial leasing, the following systems and services as they affect the internal management and operation of state government:

(1) central telephone systems and telephone networks
(2) teleprocessing systems and data networks
(3) teletype and facsimile services
(4) word processing systems or networks
(5) satellite services
(6) closed-circuit TV systems
(7) two-way radio systems
(8) microwave systems
(9) any and all systems based on emerging and future telecommunications technologies.

(b) To charge respective user agencies for their proportionate part of the cost of maintenance and operation of the above-named systems and services in accordance with the rules and regulations adopted by the Secretary and approved by the Governor and Council of State, pursuant to Section 143-341 (8) k.

(c) To develop coordinated telecommunications services or systems within and among all agencies and departments, and to require, where appropriate, cooperative utilization of telecommunications by aggregating users.

(d) To perform traffic analysis and engineering for all such telecommunications services and systems.

(e) Pursuant to Section 143-49, to establish and enforce all telecommunications specifications and designs so as to assure compatibility of the systems within state government.

(f) Pursuant to Sections 143-49, 143-50, to review, coordinate, approve, or disapprove requests by state agencies for the procurement of telecommunications systems or services, including telecommunications studies and consultation contracts for internal management use.

(g) Pursuant to Sections 143-341, 146, to review, coordinate, approve, or disapprove requests by state agencies for state government property acquisition, disposition, or construction for telecommunications systems requirements.

(h) To provide a continuous, comprehensive analysis and inventory of telecommunications costs, facilities, systems, and personnel within state government, and to develop an annual report.

(i) To promote, coordinate, and assist in the design and engineering of emergency telecommunications systems, including but not limited to 911, Emergency Medical Services, and other emergency telecommunications services.

(j) To perform frequency coordination and management for state and local governments, including all public safety radio service frequencies, in accordance with the rules and regulations of the Federal Communications Commission or any successor federal agency.

(k) To advise all state agencies and institutions on telecommunications management planning and related matters and to provide training to users within state government in telecommunications technology and systems.

(l) To develop policies and long-range plans, consistent with the protection of citizens' rights to privacy and access to information, for the acquisition and use of telecommunications systems; and to base such policies and plans on current information about state telecommunications activities in relation to the full range of emerging technologies.

(m) To work cooperatively with the North Carolina Agency for Public Telecommunications in furthering the purposes of this subsection.

APPENDIX G:
Proposed Statute for the Board of Trustees of the University of North Carolina Center for Public Television

(DRAFT of March 14, 1979)

A BILL TO BE ENTITLED
AN ACT TO AUTHORIZE ESTABLISHMENT OF THE UNIVERSITY OF NORTH CAROLINA CENTER FOR PUBLIC TELEVISION

The General Assembly of North Carolina enacts:

Section 1. There is hereby written a new G.S. 116-37.1, to read as follows:

"116-37.1. Center for public television. (a) The Board of Governors is hereby authorized and directed to establish 'The University of North Carolina Center for Public Television' (hereinafter called 'the Center'). It shall be the functions of the Center, through itself or agencies with whom it may contract, to provide research, development, and production for noncommercial educational, cultural, and other public service television; to provide distribution of television programming through the broadcast facilities licensed to The University of North Carolina; and otherwise to enhance the uses of television for public purposes.

(b) The Center shall have a board of trustees, to be named 'The Board of Trustees of The University of North Carolina Center for Public Television' (hereinafter called 'the Board of Trustees'). The Board of Governors is hereby authorized and directed to establish the Board of Trustees of the Center and to delegate to the Board of Trustees such powers and duties as the Board of Governors deems necessary or appropriate for the effective discharge of the functions of the Center.

(c) The Board of Trustees of the Center shall be composed of the following membership: eight persons to be appointed by the Board of Governors; four persons to be appointed by the Governor; and ex officio, the Secretary of the Department of Cultural Resources, the Secretary of the Department of Human Resources, the Superintendent of Public Instruction, and the State President of the Community College System. In making initial appointments to the Board of Trustees, the Board of Governors shall designate four persons for two-year terms and four persons for four-year terms, and the Governor shall designate two persons for two-year terms and two persons for four-year terms. Thereafter, following expiration of the initial appointments, the term of office of persons designated by the Board of Governors or by the Governor as members of the Board of Trustees shall be four years. In making initial and subsequent appointments to the Board of Trustees the Board of Governors and the Governor shall give consideration to promoting diversity among the membership, to the end that, in meeting the responsibilities delegated to it, the Board of Trustees will reflect and be responsive to the diverse needs, interests, and concerns of the citizens of North Carolina.

(d) No person shall be appointed by the Board of Governors or by the Governor to the Board of Trustees who is an employee of the State or of any constituent institution; a public officer of the State as defined in G.S. 147-1, G.S. 147-2, and G.S. 147-3(c); a member of the General Assembly; a member of the Board of Governors; a trustee of a constituent institution of The University of North Carolina; or the spouse of any of the foregoing. And any appointed member of the Board of Trustees who after appointment becomes any of the foregoing shall be deemed to have resigned from the Board of Trustees.

(e) Each ex officio member of the Board of Trustees shall personally serve on the Board of Trustees but may designate in writing a proxy for specified meetings which the ex officio member finds he or she is unable reasonably to attend.

(f) Each appointive member of the Board of Trustees shall personally serve on the Board of Trustees without benefit of proxy. Any appointive member who fails, for any reason other than ill health or service in the interest of the State or the nation to attend three consecutive regular meetings of the Board of Trustees, shall be deemed to have resigned from the Board of Trustees.

(g) When any vacancy among the appointive membership of the Board of Trustees is created by death or resignation, the principal officer of the Board of Trustees shall promptly notify the Secretary of The University of North Carolina, who shall expedite the filling of the vacancy for the remainder of the pertinent appointive term by written notice of such vacancy to the Board of Governors or the Governor, as the case may require.

(h) The Center shall have as its chief administrative officer a Director, who shall be elected by the Board of Governors upon recommendation of the President and who shall be responsible to the President. The Center shall have such other staff as the Board of Governors may provide for."

Section 2. G.S. 116-36 is hereby amended by redesignating subsections (j) and (k) thereof as subsections (k) and (l), respectively, and inserting a new subsection (j), to read as follows:

"(j) The Board of Governors of The University of North Carolina shall establish and maintain in a manner not inconsistent with the provisions of this section or with regulations established under this section an endowment fund for all endowment funds now held or hereafter acquired for the benefit of The University of North Carolina Center for Public Television."

Section 3. G.S. 116-36 at new subsection (k) thereof is hereby amended in the third line by inserting after the word "Press," the phrase "or The University of North Carolina Center for Public Television."

Section 4. This act shall be effective upon ratification.

APPENDIX H:
Summary of the Report of the
Radio Advisory Committee

On July 5, 1978, Herbert L. Hyde, Chairman, North Carolina Task Force on Public Telecommunications, appointed a Special Advisory Committee on Public Radio in North Carolina to recommend a plan that would assure "the benefits of public radio services across the State."

On June 16, 1978, the North Carolina General Assembly had enacted into law a bill that directed the University of North Carolina "to design, plan, and insofar as possible implement a statewide public FM radio network." A sum of $125,000 was made available to carry out the intentions of the Act.

On July 14, 1978, Chairman Hyde and North Carolina University President William C. Friday agreed that the Task Force's Special Advisory Committee on Public Radio was the suitable body both to conduct the study needed by the Task Force and to make the specific recommendations for designing and planning the public radio system in North Carolina called for by the General Assembly.

Professor Wesley Wallace was named Chairman of the Advisory Committee. The other members were: Julian C. Burroughs; Charles H. Crutchfield; Nathaniel N. Fullwood; Valeria L. Lee; Joseph C. Ross; Gary M. Shivers; and Donald M. Trapp. The Advisory Committee submitted its final report, including a full engineering study, on February 5, 1979. Included here is the summary from that report. The full text is available from the Task Force office.

SUMMARY OF THE FINAL REPORT OF THE SPECIAL ADVISORY COMMITTEE ON PUBLIC RADIO

This report recommends the development of a statewide system of full service professionally-operated FM public noncommercial radio stations based upon the following principles:

1. Fifteen main stations and five satellite stations (and an unknown number of very low power translator stations) will be needed to make at least one FM signal available to all North Carolinians.

2. Each station would be licensed by the FCC to a community

group or institution (or combination) in its area, and, as required by federal regulation, all programming is the responsibility of the local licensee.

3. The State of North Carolina should make financial contributions to each qualified or developing station, but the state's contribution to qualified, fully developed stations should never be as much as half the annual operating cost (although a greater portion may be contributed to developing stations), and in no case is funding to be tied to programming considerations.

4. A station becomes qualified when it meets the criteria established by the Public Radio Advisory Committee, criteria which should be at least as demanding as the criteria required by the Corporation for Public Broadcasting, or similar national agency.

5. Interconnection for some network service should be provided, but programming originated by each licensee should be the dominant element.

6. Each station should be equipped, and the state should provide special funds, to broadcast by Subsidiary Communications Authorization (SCA) special material to meet the needs of the handicapped and other specialized audiences within the station's coverage area.

7. The licensee (its body corporate) itself should consist of representatives of a wide range of cultural, racial, sex, age, and handicapped persons groups.

The cost in State-appropriated funds for the first year of the 1979-81 biennium is $348,746 and for the second year is $1,716,746.

The success of the recommended system will depend upon the vision and interest of communities and institutions and the effectiveness of help provided communities and institutions by Radio Broadcast Development Officers.

The public's benefit from the recommended plan will match the degree to which the statewide public radio plan is carried out. Full service, professional stations can provide a wide range of programming and community service, and we think the benefits to the public will be substantial.

APPENDIX I:
References

Unless otherwise noted, all quotations and references in the text of the report of the Task Force are from Task Force presentations, interviews and questionnaires. Copies of all of these materials are on file at the Task Force office.

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APPENDIX J:
Acknowledgments

An astounding number of people provided invaluable advice and assistance to the Task Force. Any list of acknowledgments is bound to be incomplete, and can hardly begin to express the depth of the Task Force's gratitude to our many friends. To all of those who helped—public officials, technical experts, representatives of private industry, and concerned citizens—we give our sincere thanks.

Our utmost thanks must go to the Mary Reynolds Babcock and the John and Mary R. Markle Foundations, not only for their generous funding, but also for the advice and support supplied by their staffs, especially Bill Bondurant at Babcock and Jean Firstenberg and Pope McCorkle at Markle.

Special gratitude must go to Elsie Brumback and George Bair, who ably represented Task Force members A. Craig Phillips and William C. Friday at a number of meetings they were unable to attend.

The Task Force deeply appreciates the efforts of four volunteer advisors: Lt. Col. Scott Reed, Sanford Smith, Dr. Wesley Wallace, and Stanley Webster; and the time devoted by members of the Special Advisory Committee on Public Radio, which Dr. Wallace chaired: Julian Burroughs, Charles Crutchfield, Dr. Nathaniel Fullwood, Valeria Lee, Gary Shivers, and Donald Trapp. Joseph Ross, a member of the Task Force, also served on the Radio Committee.

A large number of representatives from the various departments of state government participated in Task Force meetings throughout the year, and acted as liaisons, including:

Department of Administration: Max Baldwin, Charles Chapman, Mike Davis, Luther Green, Billy Ray Hall, Jim Hathaway, W. Hellmuth, Robert Johns, Frank Leatherman, Charles Long, Bruce Merritt, Joyce Nance, George Probst, Don Schmidt, J. K. Sherron, John Talton, Carol Tyler, Harold Webb. Administrative Office of the Courts: C. R. Puryear, Jr. Department of Agriculture: Carlyle Teague. Department of the State Auditor: Brad Buie. Department of Commerce: A. W. Allers, Frank Coan, Robert Koger. Department of Correction: Ralph Strickland. Department of Crime Control and Public Safety: Cliff Blalock, Chris Griffin, Susan Harris, William Lynch, Collin McKinne, and Virginia Neb. Department of Cultural Resources: David McKay, William Price, Mary Regan, Pat Sears, Alberta Smith, Larry Wheeler. Department of Public Education: Elsie Brumback, Ken Herman, W. F. Pugh, Johnny Shaver, Marsellette Smith. General Assembly: Doug Carter, Hilda Highfill. Office of the Governor: Betty Owen. Department of Human Resources: Sandy Brenneman, Edwin Chapin, Ron Davis, Carl Van Cott. Department of Insurance: Oscar S. Smith, Jr., Chris Sovel. Department of Justice: David Crump, Bill Corley, H. M. Livingston. Department of Labor: Ginny Lawler. Office of the Lieutenant Governor: William Franklin. Department of Natural Resources and Community Development: Bob Hazel, Paul Sebo. Department of Revenue: Edwin Capps, Marshall Currin. Secretary of State: Clyde Smith. Department of Transportation: Doris Gupton, Elizabeth Laney, Reggie Lester. Department of the State Treasurer: Stephen F. Albright.

Liaisons from the University of North Carolina included: Appalachian State University: Al Corrum, E. B. Hartley. North Carolina State University: Ron Kemp. University of North Carolina Television Network: George Bair, W. L. McIver, Alan McIntyre. Liaisons from Community College personnel not in Raleigh included: Central Piedmont Community College: Lynn Moretz.

Liaisons from private industry included: General Telephone: Dan Cowen, Charles Franklin, Robert Alexander. IBM: George Bland, Norm Vogel. Southern Bell: Jim Brooks, Dave Holmes, Bryan Houck, J. L. Spangler. LRN: Robert Chapman. Heins Tele-

phone Company: James W. Heins. Western Electric: Herman Kurre. Carolina Telephone Company: Willis Marshall. N.C. Independent Telephone Association: Carl Sapp. Lawrence Behr Associates: Lawrence Behr, Perry Wheless. Summit Communications: Lee Wallenhaupt.

Other official liaisons and their affiliations included: Friends of University Television: John Clark. Duke University: William Green. N.C. State PTA: Jan Holem. Raleigh News and Observer: David Jones. N. C. Council of Churches: Collins Kilburn. N.C. Center for Public Policy Research: Betsy Taylor, Tom Earnhardt. Research Triangle Institute: Thomas Cook. Institute of Government: Elmer Oettinger. N.C. Association of County Commissioners: Butch Gunnels. Southwest Regional Education Center: Robert Byrd. Congressional staff of Rep. Charles G. Rose III: John Merritt, Toni Nelson. National Telecommunications and Information Administration: Forrest Chisman, Kim Degnan, William Lucas, Roger Reinke. Additional liaisons: Marilyn Bentov, Catherine Sebo, Mr. and Mrs. Mark Wright, and Robert Miss.

The Task Force heard over 50 presentations at its meetings. The interest and participation of the individuals who made these presentations was integral to our work. Our profound thanks go to each of these people, who are listed in the Chronology of Events in Chapter 1 of this Report. In addition, we appreciate the reports made by Susan Harris and William Lynch regarding the work of the 911 Task Force.

Personal interviews about the service objectives of public agencies were held with over 100 officials including, in the cultural, educational, and information services category: George Bair, Elsie Brumback, William Carpenter, Joe Carter, Janice Christensen, Alan Cooper, Ted Drain, Jim Hall, Gene Hinton, Sara Hodgkins, Elizabeth Koontz, David McKay, Katherine Moore, Joe Porter, William Price, Pat Sears, Jack Setliff, Johnny Shaver, Alberta Smith, Robert Suderberg, Larry Tise, Larry Wheeler, and Charlie Williams. In the health and social services category: Ben Aiken, James Bernstein, Sam Cole, Drucie French, Earl Griffith, Rance Henderson, Ron Levine, Bill Loftin, Hal Maness, Elizabeth Martin, Drew Melvin, Ernest Phillips, Minta Saunders, Carl Van Cott, Robert Ward, W. B. Waters, and Nathan Yelton. In the public safety services category: Cliff Blalock, William Corley, Don Curtis, Rufus Edmisten, Ken Farmer, Harold Greene, Susan Harris, F. Hooks, David Kelly, Howard Kramer, Bill Lynch, Collin McKinne, Bert Montague, Kerney Peoples, W. B. Sloop, Barbara Smith, and Robert Trimble. In the government operations category: Stephen Albright, John Allen, E. Lee Barham, J. P. Booker, Stephen Conrad, Sid Eagles, Thad Eure, J. D. Foust, Brian Flattery, Bill Franklin, James Graham, Jim Hathaway, William Holding, Charles Jeffress, Robert Koger, Ginny Lawler, Frank Leatherman, A. F. McRorie, Alex Mendaloff, Bruce Merritt, C. S. Moore, J. C. Moore, W. H. Potter, Laeron Roberts, James Senter, J. K. Sherron, Oscar Smith, Harold Webb, Hugh Wells, Jimmy Williams, John A. Williams, and A. C. Winkworth. And in the public/government interaction category: Jo Albertson, Bill Arnold, Ron Aycock, Stephanie Bass, Alex Brock, Arthur Cassell, Wade Hargrove, Robert Jones, Jane Patterson, Gary Pearce, Dickson Phillips, Betty Sanford, Sandra Thomas, Cynthia Wertz, and Lee Wilson.

The members would also like to thank staff persons in the Division of Policy Development who contributed time and energy to the Task Force work. In addition to those mentioned elsewhere as liaisons, Policy Development staffers helping the Task Force included: Barbara Cook, Judy Dunn, Dr. Nat Fullwood, Florry Glasser,* Emily Hedrick, Dana Herring,* Bill Lewis,* Ann Lichtner, Denny McGuire, Ted Parrish, Ed Regan, Richard Reiman, Margaret

APPENDIX K:
Glossary of Terms Used in This Report

NOTE: All definitions in this Glossary reflect the specific meaning of the term as used in this report.

ADP
Automatic data processing; the application of computer systems, storage, media, and input/output devices to the management and the manipulation of data.

AESP
The Appalachian Education Satellite Program.

AM
Amplitude modulation; one of several ways of modifying a radio wave to carry information; also, the radio band allocated to AM radio services. (see FM.)

analog
A form of information which is represented by continuous wave forms that vary as the source varies. (See digital.)

APT
The Agency for Public Telecommunications proposed by the Task Force.

broadband
A range of frequencies wider than that required for just voice communications. Broadband channels are used predominantly for delivery of video material and for high-speed data transmission. (See narrowband.)

broadcasting
Transmission of information in one direction to a number of receivers, normally using the airwaves by electromagnetic propagation. (See also nonbroadcast distribution.)

cable television
A multi-channel reception and distribution system for audio and video signals. Reception is by a master antenna, satellite groundlink, or leased circuits, all of which can provide both local and distant signals to subscribers. Distribution is by coaxial cable linking a central facility and subscribers. Newer systems can provide interactive capabilities. Cable systems are typically commercial enterprises franchised to serve a community.

closed-circuit television
A distribution system in which television sets are connected (usually by coaxial cables) to a central information source—cameras, microphones, and/or videotape players. As opposed to cable systems, closed-circuit systems are usually confined to a specific area such as a college campus.

CPB
The Corporation for Public Broadcasting.

DCCPS
The North Carolina Department of Crime Control and Public Safety.

dial access
A method by which telephone users can use that network to directly dial another telephone, a computer, or other device, as opposed to requiring an operator's or other manual assistance.

digital
A form of information which is represented by signals at discrete intervals. (See analog.)

direct satellite broadcast (DBS)
A broadcast concept in which (usually) television signals would be transmitted from communications satellites directly to home receivers. Under this concept, many television stations and networks, especially distant ones, would feed their signals to the satellite for transmission to homes.

downlink
Transmission path from a communications satellite to a receiver station (groundlink) on earth. (See uplink.)

electronic mail
The delivery of correspondence, sometimes including graphics, by electronic means, usually involving the interconnection of word processing, facsimile, and computer equipment. Reception can be by electronic video display of text or by printout. (See facsimile, word processing.)

facsimile
Transmission of images of original documents (including both print and graphics) by electronic means—usually via the telephone network. (See electronic mail, word processing.)

FCC
The Federal Communications Commission.

FM
Frequency modulation; one of several ways of modifying a radio wave to carry information; also, a radio band allocated to FM radio services. (See AM.)

frequency
The number of periodic waves (such as radio or television) in a given amount of time, expressed in cycles per second. Different frequencies define the channels of radio or television signals.

groundlink	An earth station for communication with a satellite.
hardware	The electronic equipment (computers, terminals, telephones, switchboards, etc.) of telecommunications and/or data processing systems. (See software.)
ITV	Instructional television. As opposed to broadly educational or cultural television programming, ITV is dedicated to the support of formal classroom education.
interactive	Descriptive of a telecommunications system whose response time to user input is nearly immediate.
IN-WATS	(Wide Area Telephone Service.) A telephone service permitting users to make long-distance toll-free calls to a central location, often an 800 area code number. Charges to the IN-WATS center are made on a monthly flat-rate basis within certain limits.
line-of-sight	Descriptive of distribution systems on the surface of the earth which must take into account the earth's curvature or physical obstacles that would obstruct the signal.
longline	A group of different technologies, including microwave, cable, and satellite, which are combined to distribute information over great distances.
memory	A computer's capability of storing information; the computer component in which information is stored.
microprocessor	A subminiature computing device which can both process and store information.
microwave	A radio wave of less than 10 centimeters length which is used for the transmission of many types of information—e.g., voice, data, and video signals. Microwave transmission/reception systems can carry many signals at once. These systems operate on a terrestrial line-of-sight basis—that is, mountains or the curvature of the earth, for example, can obstruct signals. Thus, microwave systems are usually composed of signal-relaying stations at distances of 25-30 miles apart.
modem	A contraction of "modulator-demodulator." A device which can convert signals from one form to another—for example, to make business machine signals compatible with telephone lines.
911	(Pronounced "nine-one-one" and not "Nine-eleven.") A three-digit telephone number set aside for use by the public to gain access to emergency services in those communities that have established such a system.
narrowband	A range of frequencies not wide enough to include video signals; used primarily for voice signals. (See broadband.)
nonbroadcast distribution	Transmission of information over any distribution path except those designated by the FCC for public and commercial television and radio—i.e., not over specified AM or FM radio frequencies, or over television channels 2-83. (See also broadcasting.)
NPR	National Public Radio.
NTIA	The National Telecommunications and Information Administration of the United States Department of Commerce.
on-line	Connection to a central computer, often remotely and involving the nearly instantaneous entering of information to a processor. (See teleprocessing.)
optical fiber	Threads of glass that have been manufactured to transmit signals of light generated by lasers or light-emitting diodes. Optical fiber transmission systems offer a very large signal-carrying capacity.
packet-switching	A technique, usually digital, in which input information—voice or data—is broken into short "packets" allowing high-capacity, high-speed transmission. At the receiver's end of the transmission, the information is reassembled into its original form.
PBS	The Public Broadcasting Service.
public access channel	A channel on a cable television system made available for local citizen use.
radio bridging	The ability to interconnect one radio frequency with another.
rapid transmission system	A system which allows for high-speed transmission of video signals which can be received, stored, and played back at normal speed at the user's convenience.
remote data entry	Use of a device permitting direct access to a computer in a different location. (See on-line, teleprocessing.)

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repeater	A device used to restore signals which have been distorted or weakened to their original shape and transmission strength; also used to transmit these signals in one or more directions.
SCA	Subsidiary Communications Authorization. Portions of a frequency allocated to a radio or television broadcast station which are not used for the main signal, but which, with appropriate equipment and licensing, can be used to distribute information in addition to the main signal. Those receiving the signal must also have special equipment. SCA's are not considered as broadcast systems. SCA's on radio broadcast stations may be leased for commercial background music in shopping areas, services to handicapped persons, training programs for special target groups, etc.
SCC	The State Computer Center, part of the Management Systems Division of the North Carolina Department of Administration.
sideband	The range of frequencies on both sides of the main frequency content of a radio signal.
software	Computer programs; the instructions that determine the steps to be followed by computer system hardware. (See hardware.)
telecommunications	Any origination, creation, transmission, emission, storage, retrieval, or reception of signs, signals, writing, images, and sounds, or intelligence of any nature, by wire, radio, television, optical, or other electromagnetic means; more generally, communications over distances.
teleconference	The means whereby the interactions between people who are in different places are conveyed electrically (in audio, video, graphic, or textual form).
telemetry	Communication of information generated by measuring devices. A common application in health services is the transmission of electrocardiogram readings to a specialist in a medical center.
teleprocessing	Data processing where the actual data manipulation is performed at a processor that is electrically connected but physically remote from where the data is entered or used. (See on-line, remote data entry.)
teletype	A trademark of the Teletype Corporation. Used generically to refer to a system with keyboard printing devices connected to a computer or communication system. Also refers to the keyboard device.
Telpak	The Bell System's term for the leasing of long-distance channels or circuits in groups of 12, 24, 60, or 240, at costs less than the leasing of the same number of channels or circuits individually.
terminal	A device which can send or receive information over a communications channel. A computer terminal can enter data to a processor and can receive information on how the computer is processing the information. Other examples of terminal devices are telephones or teletypes.
text transmission	Reception and distribution of printed text materials which may be displayed in a video screen format.
translator	A repeater that amplifies and reshapes the form of a broadband signal.
TUCC	The Triangle Universities Computation Center in Research Triangle Park between Durham and Raleigh.
two-way radio	As treated in this report, the term "two-way radio" includes (1) land mobile radio services providing two-way (usually voice) communications between and among mobile vehicles, base stations, and portable hand-held units, with associated repeaters; (2) paging systems, which use the same frequencies as the above systems, but which are actually one-way voice and "beeper" systems.
uplink	Transmission path from an earth station (groundlink) to a communications satellite. (See downlink.)
video disk	A means of recording video programs on a magnetic disk.
word processing	The application of computer technology to automate office functions. Among the capabilities of a word processing system are electronic storage and retrieval of documents; electronic text correction and editing; and, by being linked to a telecommunications distribution system, electronic mail and text transmission. (see facsimile, electronic mail.)

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