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ABSTRACT
                 This report provides information about trends in educational
telecommunications for 1996-97. The first section, "An Overview of
Educational Telecommunications in the USA," presents a summary of trends in
the following areas: the growth of telecommunications and distance education;
leadership and governance in telecommunications development; the changing
questions of effectiveness and cost; telecommunications as an essential
solution; the Telecommunications Act of 1996; state telephone rate
regulation; state networks, technologies, and outlets of distance education;
funding of educational telecommunications; and education policy issues. The
"State-by-State Analysis" section contains a description for each of the 50
states. Each state description is divided into multiple sections: "Recent
Developments" highlights activities since the 1994 report; "Statewide and
Local Planning" treats planning organizations and their activities in
coordinating educational telecommunications development with a particular
view to legislation and policy; "Statewide and Local Networks" offers a brief
view of the technical networks established for and used by educational
institutions; "Higher Education" and "K-12" provide information about
programmatic development in distance education and other telecommunications
activities at each respective level of education; and "Funding" offers a
picture of how educational telecommunications is funded. A glossary is
included. (MES)

Educational Telecommunications: The State-By-State Analysis 1996-97

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The company assists
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that are planning and
using media and
telecommunications for
training and instruction.

➢ A Report

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EDUCATIONAL TELECOMMUNICATIONS:
THE STATE-BY-STATE ANALYSIS, 1996-97

A Report by Hezel Associates

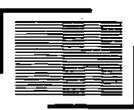Copyright 1996, Hezel Associates

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TRENDS IN STATEWIDE EDUCATIONAL TELECOMMUNICATIONS PLANNING

Never before has telecommunications played such a vital and central role in education as it does now. Telecommunications is no longer viewed as an add-on garnish to the usual fare of education—teachers and administrators recognize that telecommunications is now an essential ingredient to making students smarter and more information rich. Demographic shifts in the student population, especially in Florida, Texas, and California, are creating an urgency about new ways to deliver education among burgeoning and widely dispersed populations. Other studies by Hezel Associates and the National Center for Educational Statistics are confirming the growth in the use of telecommunications and technology. Convergence of computing and telecommunications has contributed to the widespread adoption of educational innovation in schools, colleges and universities across the country.

In these anxious times of corporate shrinkage, learners with family responsibilities who are productively employed and committed to a geographical region, need continuing education to upgrade their skills and thereby remain competitive in the job market. Colleges and universities, burdened with dwindling dollars and rising costs, have been compelled to continue their quest for nontraditional learners and further the goals of lifelong learning through innovative programs. As expected, educational telecommunications is forming a cost-effective gateway to the non-traditional learner. Policy makers at federal, state, and institutional level are involved in developing viable plans to reduce cost and increase effectiveness through intelligent development of educational telecommunications. The Virtual University of the Western Governors Association is an example of such a direction.

Insistence on access to quality education programs and information continues to influence the adoption and use of telecommunications in the K-12 arena. Schools have not only utilized educational telecommunications for reducing costs and sharing resources, but also for altering pedagogical methods and enriching the curriculum. In line with these trends, a greater emphasis on staff and programmatic development is also evident at the state level.

Educational Telecommunications: The State-by-State Analysis, since its origin in 1987, has examined leadership, collaboration, governance, and coordination of telecommunications at the state level. The hypothesis behind the initial study—and the finding of the study—was that the better the coordination, the more likely the development of useful telecommunications infrastructures for education. The hypothesis has been borne out in each analysis: In general, better planning, policies, and management lead to better, longer lasting educational solutions. The analysis for 1996-97 is no exception.
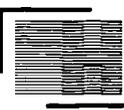
Since 1987 Hezel Associates has studied the leadership and coordination of telecommunications infrastructures and policies, and the coordination of distance learning. The importance of gubernatorial leadership is no less evident in the mid- to late-1990s than it was in 1987, and more than four of five currently sitting governors have advocated for statewide development and coordination of telecommunications.

The role of legislatures in funding and policy leadership regarding educational technologies has been documented in the Hezel reports. Now nearly every legislature faces bills on distance education or, more broadly, information and telecommunications. In many states the legislatures and governors are creating new organizations and agencies to coordinate the intelligent development of statewide plans for telecommunications.

THE TELECOMMUNICATIONS ENVIRONMENT

The much awaited deregulation through the passing of the Telecommunications Act of 1996 in the Congress promises to level the playing field for cable operators, long distance companies and telephone companies to target new markets and partnerships for concentric growth. As a result of deregulation, high end networking services and offerings may be anticipated for educational applications in the near future. Educational institutions on the other hand expect to gain improved bargaining strength and favorable terms in dealing with their phone companies.

One-way video and two-way audio continues to be a method of delivering synchronous distance education that the greatest number of schools have adopted. National, state and local distance learning organizations continue to employ satellite, broadcasting, and ITFS for the delivery of live instruction to the classroom. Satellite technology is alive and growing for distance learning, in part due to the development of new statewide satellite services. Georgia, Louisiana, and Florida join Oregon, Nebraska, and South Carolina as robust users of satellite technology.

The networking and software industry, on the other hand, continues to offer products which make distance learning more accessible over modems and ISDN. All across the country, universities and colleges under cost constraints are flocking to the World Wide Web for distribution of coursework and programs. Phenomenal growth of desktop conferencing for business and government has opened up opportunities for application in education. Effective utilization of available bandwidth through innovative networking products has lowered the barriers to entry and initiated educational technology pilot projects all over the country at K-12 and postsecondary level.

Other technological advancements that are evident in states include adoption of ATM switches for delivery of voice, video and data. Penetration of ISDN across states, how-

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ever, is uneven and where an aggressive phone company has chosen to pursue the technology, educational projects have been evident.

FUNDING

The on-going debate to balance the budget has raised questions of continual funding and stability of long standing educational telecommunication financiers. Evidence of the funding trend at the federal level is the near-termination of Star Schools program, cuts in National Science Foundation allocation, and reduction in Telecommunications and Information Infrastructure Assistance Program (TIIAP) fund managed by the Department of Commerce National Telecommunications and Information Administration (NTIA) to fund educational institutions. Along with the reduction in funding at the federal level, a parallel and more welcoming sign has been the increased role of the states in telecommunications development. Preoccupied with rationalizing state fiscal budgets without compromising on basic services such as health, education and safety, governors have resorted to adoption of technology delivery for increasing access at reduced cost. Statewide telecommunications proposals with a focus on cost effectiveness are being promoted in the halls of the state legislatures across the country.

Universities and colleges seek reduction in cost and increase in revenue through effective use of distance learning. In light of reduced state and federal grants, unlike the past, currently educational telecommunications projects are being dictated more and more by cost-benefit analysis to ensure sustainability over the long run. Barriers to acquiring capital cost and insecurity of continual operating funds continue to challenge administrators across the country.

EDUCATION POLICY ISSUES

Numerous policies regarding education and telecommunications are yet to be drafted. Articulation agreements, assignment of credit and tuition payments remain loosely defined in most states. Sometimes policy is defined in action, often with disastrous results. The chancellor of the University of Maine System resigned when faculty failed to support a plan to establish the Education Network of Maine as a credit-granting campus of the University.

Goals 2000 funding from US Department of Education is having a considerable impact on educational telecommunications as states and local schools look to technology and telecommunications as an integral tool in reaching the goals. In addition to the Goals 2000 initiative, the Department of Education has made Challenge Grants to schools for the integration of technology and telecommunications in the development of improvement-oriented partnerships with other schools.

The development of integrated state networks, first observed in Virginia and reported in the 1987 analysis, continues to advance. It appears, however, that the era of state-owned network development has ended. No state has built its own network since the Iowa Communication Network began service. A variety of factors make state owner-ship less attractive. Although some states such as Washington, Maine, Nebraska, and South Carolina continue to make improvements on their infrastructure, those modifications tend to be incremental.

Hezel Associates is proud to publish its sixth edition of *Educational Telecommunications: The State-by-State Analysis*. First published in 1987 under a contract with the Annenberg/CPB Project, the report has paralleled the growth of Hezel Associates, which was also founded in that year. *Educational Telecommunications* has become a keystone in the development of the company—to the extent that Hezel Associates has become synonymous with statewide educational telecommunications planning and development—along with our work in distance learning research and assessment.

As we approach the completion of one decade of service in distance education and telecommunications, we acknowledge the many people who have assisted us in our information gathering for this nearly-annual endeavor. Some of those individuals have been helping us since 1987. People who have assisted us each year include: John Cheek in Arkansas AETN, Dan McAuliffe at Connecticut's Community and Technical Colleges, Eric Smith for Florida's Office of Public Broadcasting, George Connick at the Education Network of Maine, Lee Rockwell in Nebraska, Ted Smorodin in New Jersey Department of Education, Joe Linnertz in North Dakota, Blanford Fuller and Spencer Northrup in Ohio, Walter Crocker in Rhode Island, Bobbi Kennedy at South Carolina ETV, Steve Hess in Utah, Mike Mullen at SCHEV in Virginia, and Greg Ray in Wyoming. To them we owe much gratitude for keeping us informed about their state's telecommunications development activities over these many years.

In addition, we say thanks to a growing cadre of people in the states who have responded to questionnaires and emails and telephone interviews, who have sent us state policy documents, and who have written or made conference presentations on their states' telecommunications activities. We appreciate their help.

Each year the "state report," as we sometimes call this analysis, requires considerable time from many people at Hezel Associates. The 1996-97 report is no exception. Theresa Gilliard-Cook collected information from the web, Lisa Hallberg from other sources; Fred Wilson conducted interviews and, with Kelly Dembroske, wrote and edited the state descriptions; Donna Boek and Sherri Stock have assured that copies of the report get to the people who need them. Nader Nanjiani, our project coordinator, has managed much of the project. My thanks to all of them.

Richard T. Hezel
President
Hezel Associates
Preface to the 1996-97 Report

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Since 1987 Hezel Associates has documented statewide activities in educational telecommunications and distance learning. *Educational Telecommunications: The State-by-State Analysis 1996-97* is the sixth edition in the series of reports. The analysis is our way of keeping our subscribers up to date on changes in the telecommunications environment as it affects education delivery in each state. As you will see by reading the report, the changes from year to year are numerous.

The report is intended to inform readers about trends in educational telecommunications. The first section, "An Overview of Educational Telecommunications in the USA" provides a summary of trends we have observed through collecting data from many sources. The overview also points to particular telecommunications development events in states.

The State-by-State section contains a description for each of the 50 states. Readers who work in educational institutions or state agencies will find those descriptions valuable in comparing activities in other states with their own activities and in searching for models of good telecommunications practice and policy. Other readers who represent telecommunications and technology suppliers will find that their marketing activities and research can be guided by the state descriptions. One might assume that states involved in planning and funding of educational telecommunications are prepared to invest in technology and are appropriate targets of marketing efforts, while states that have conducted little or no planning and have no funding are unlikely candidates for development in the near future.

Each state description is divided into multiple sections. "Recent Developments" highlights activities since we published the 1994 report. "Statewide and Local Planning" treats planning organizations, agencies, and committees and their activities in coordinating educational telecommunications development, with a particular view to legislation and policy for education, technology, telecommunications, and distance education. "Statewide and Local Networks" offers a brief view of the technical networks established for and used by educational institutions. "Higher Education" and "K-12" provide information about programmatic development in distance education and other telecommunications activities at each respective level of education. Finally, "Funding" offers a picture of how educational telecommunications is funded and, where the information is available, the amount of funding dedicated to educational telecommunications.

The report data come to us through various methods. Since 1987 Hezel Associates has maintained a library of documents about telecommunications in every state. Our consulting and research activities in more than 20 states have give us greater familiarity

with telecommunications projects and the people who organize them. To acquire up-to-date information, we searched the web and contacted by telephone, mail survey, and email nearly 500 individuals across the country in elementary, secondary, and higher education; public broadcasting; and state agencies for technology and telecommunications.

As always, we welcome feedback from readers about the report. Please let us know about information you would like to see presented in the future.

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An Overview of Educational Telecommunications

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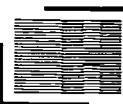
AN OVERVIEW OF EDUCATIONAL TELECOMMUNICATIONS, 1996-97

INTRODUCTION

What an exciting time to be caught in the confluence of education and technology! At no time in the 20th century has education been poised for such monumental changes. Rapid technology development is either pushing education change or vice versa. Attribution of cause and effect is not as important as the phenomena themselves.

Telecommunications plays a more central role in education than ever before. Major instructional and support services are delivered to schools and students via video and the Internet such that, without them, students, especially rural students, are at a serious disadvantage. School and college administrators have generally recognized the importance of telecommunications in the academic life of their students, and they are now pressing for the installation of basic systems or upgraded systems for distance learning and Internet service.

In K-12 education competitiveness among schools to assure that their students have the best opportunities for advancing to quality colleges and then to high paying jobs and careers has driven teachers and administrators to seek instruction and information resources through the use of telecommunications. Students in those schools are learning to seek the latest, just-in-time information through the Web, a skill that teachers hope will transfer to later information-seeking opportunities.

At the higher education level, it is competitiveness among institutions to attract students and tuition that drives some of the use of telecommunications, particularly for distance education. The demographic shift presented in the form of the "baby bust" and the consequent reduced enrollment by traditional aged students is ending, but it has sent college admissions officers scurrying toward new markets of students, such as older students, high school students, and students from beyond the college's traditional geographic service area. Telecommunications, administrators have found, enables the colleges to reach students in their own territory at their own time, and that flexibility increases the market potential for higher education.

THE GROWTH OF TELECOMMUNICATIONS AND DISTANCE EDUCATION

The assertion that telecommunications is more widely used in education is based in part on qualitative data gathered for this report, as well as on quantitative data gathered by Hezel Associates and others. For example, in a 1994 study Hezel Associates found that about 20 percent of K-12 schools were then involved in distance learning efforts.[1] The finding was corroborated by a study by the National Center for Education Statistics (NCES), which showed that 18 percent of schools were involved.[2] Hezel Associates' study also showed that planned investment in distance learning technol-

ogy was likely to grow at a rate of about 15 percent per year to about $950 million in 1996.

NCES also estimated that 35 percent of *schools* had Internet access. Judging by the number of states planning for Internet access in schools, and the number of states building or using a statewide infrastructure for ease of access, the Internet and access to it has been the major impetus in the growth of educational telecommunications. According to NCES, however, only three percent of all *classrooms* had access to the Internet.

At the post-secondary level, one third of all colleges and universities are estimated to be engaged in some form of distance learning. Growth of the Internet has advanced the development of asynchronous learning networks along side synchronous distance learning, furthering the goals of anytime-anyplace learning. Advancement in networking technology has reduced the barriers to entry in educational telecommunications and higher educational institutions are finding cost effective methods to adopt distance learning.

LEADERSHIP AND GOVERNANCE IN TELECOMMUNICATIONS DEVELOPMENT

Educational Telecommunications: The State-by-State Analysis, since its origin in 1987, has examined leadership, collaboration, governance, and coordination of telecommunications at the state level. The hypothesis behind the initial study—and the finding of the study—was that the better the coordination, the more likely the development of useful telecommunications infrastructures for education. The hypothesis has been borne out in each analysis: In general, better planning, coordination, and management leads to better, longer lasting educational solutions.

Statewide telecommunications has always been the focus of this report for several reasons. First, most network development in 1987 was undertaken and coordinated by state agencies, and the coordination of telecommunications planning was also occurring at those agencies. Second, education generally operates within state boundaries and is governed by state agencies; therefore, educational telecommunications tends to serve those state agencies and the institutions they represent within the state. Third, some of the most innovative development of educational technology has been observed at the state level. Fourth, states, unlike the federal government, have invested very sizable funds in the development of educational telecommunications networks. Fifth, the states have become major supporters of the use of technology and telecommunications in the schools.

Since 1987 Hezel Associates has studied the leadership and coordination of telecommunications infrastructures and policies, and the coordination of distance learning. In the late 1980s leadership from governors was identified by Hezel Associates as critical

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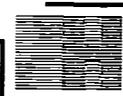
to the development of sound telecommunications infrastructures for state agencies and education. The importance of gubernatorial leadership is no less evident in the mid- to late-1990s, and recognizing the centrality of telecommunications and information technologies in the economic well-being of the states, more than four of five currently sitting governors have advocated for statewide development and coordination of telecommunications.

The role of legislatures in funding and policy leadership regarding educational technologies has been documented in the Hezel reports. In 1987 only a few legislatures, California and North Dakota among them, were involved in new initiatives in information technologies for education. Now nearly every legislature faces bills on distance education or, more broadly, information and telecommunications.

Governors and legislators in a few states are building new organizations and agencies to oversee the intelligent development of technology in the state. Two types of agencies are visible: the administrative division of telecommunications for the purpose of acquiring networks and equipment at state contract prices (Florida, Minnesota, California); and information technology boards to supervise the planning and design of information systems (Maryland, Connecticut). Those organizations usually assist the collaboration toward the planning and development of high speed, high bandwidth digital networks for end-to-end communication intrastate and interstate. In a few states, however, despite the presence of information technology planning bodies, a dominant university can establish its own network independently of coordinating agencies.

THE CHANGING QUESTIONS: EFFECTIVENESS OR COST?

In the early 1990s it was not uncommon to be asked by legislators and administrators, "Does distance learning work?" That question has been addressed by numerous evaluations demonstrating, at worst, little difference in outcomes between traditional and distance learning. Such findings suggest that distance learning, in general, works as well as in-class face to face instruction, and in turn, the findings have led to increased recognition and acceptance of telecommunications as a valid means to deliver education.

A more common question asked by administrators in the mid-1990s is: "Is distance learning worth the cost?" That question is more pressing as administrators attempt to review the costs, potential revenues, and likely bottom line or profit to be obtained by delivering instruction via technology. Distance learning systems can require a substantial investment of capital for start-up, in addition to annually recurring operating costs. Funding is still ranked first by educators as a barrier to the use of telecommunications, according to a survey by the National Center for Educational Statistics.[3] Administrators need to determine in advance the source of funding for systems and

what are the desired outcomes for the system.[4] It is evident that grants alone cannot support distance learning beyond the start-up phase, and administrators need to plan on alternative sources of operating funds, mostly through budget reallocation. Several Star Schools funded projects have had considerable difficulty maintaining services— or have closed down—after they were rejected from later funding cycles.

At the higher education level, the issue of productivity of the college or university work-force, including faculty, is quietly being raised by administrators. In fact, several administrators have observed that, unless productivity levels are discussed, agreed upon, and increased, entire campuses are likely to be closed in the next 10 years.

TELECOMMUNICATIONS: AN ESSENTIAL SOLUTION

Efficiency of education delivery is closely related to productivity and cost, and in some states distance learning presents the only reasonable remedy for addressing the education needs of a state. Ten years ago when the University of Maine System was charged with increasing the availability of college programs throughout the state and thereby increasing the college-going rate, its administrators developed what is now its highly-regarded distance learning program, now called the Education Network of Maine. A $13 million investment in distance learning systems obviated the need for far more expensive "bricks and mortar" campuses in remote, less populated areas of the state. The Western Governors' Virtual University is similarly directed.

States such as California and Texas are bracing for a major surge in the college student population. Expecting 250,000 more students in the next five years, Texas higher education officials foresee that telecommunications and distance learning will offer the only reasonable and rapid solutions to the lack of classroom space.

Despite the demonstrated ability of distance learning, teacher acceptance has been highly variable. In general, teachers in less populated, highly rural states have more rapidly embraced distance learning as a means of importing resources to students than have teachers in more populous states where teachers' unions tend to be stronger. Teacher associations tend to write position papers that reveal a cautious, even tepid, posture on distance learning.

The stated cautions of union representatives notwithstanding, teachers at the grass-roots level are becoming more knowledgeable and expert in the use of telecommunications and technology in general. Teacher comfort with distance learning has increased and teacher use of the Internet has skyrocketed through several factors: ❶ teacher colleges have done a somewhat better job of preparing pre-service teachers to use technology; ❷ schools have invested in staff development in technology to complement investments in hardware; ❸ teachers understand that technology is an essen-

tial part of their delivery of instruction and an essential tool of student knowledge development; and ❹ technology-literate students are pressing teachers to catch up on technology.

THE TELECOMMUNICATIONS ACT OF 1996

For the first time since the Communications Act of 1934, Congress in 1996 rewrote the legislation that governs the telecommunications industry. The Telecommunications Act of 1996 deregulates much of the broadcasting, cable, and telephone business by encouraging competition through open entry into telecommunications businesses. It is expected that competition will bring about lower prices and higher quality services along with the more rapid deployment of new technologies. A key to opening the industry to competition is equal access to carrier networks by all providers and interconnection among networks.

The act will have a major impact on access to telecommunications by education insofar as the new universal service provisions will cover K-12 education, health care, and libraries. Universal service means that those institutions must now be included as sites to receive basic services, however that might be defined in the future. Congress charges the Federal Communications Commission with establishing a board that includes commissioners and state utility regulator representatives. The FCC will also need to establish regulation on many other elements of the act.

Inter-LATA carriage has been a barrier to many local and regional distance education administrators. Local carriers have been prohibited from handling the inter-LATA hop, and that prohibition has driven up the cost of inter-LATA distance learning. The new legislation permits local carriers to provide the service, so terrestrial service prices should decline considerably.

STATE TELEPHONE RATE REGULATION

Even without the Telecommunications Act, the Regional Bell Operating Companies (RBOCs) have been participating in the development of distance learning. Participation has come in three forms: outright grants to educational institutions for equipment, and sometimes training, in schools; development of the terrestrial infrastructure for educational telecommunications; and development of the general infrastructure, which enhances the availability of telecommunications for other RBOC market segments. Deregulation of the telephone companies in Texas provided the incentive to obtain major funds for education. The Georgia excess earnings case settled in 1992 in tandem with the state lottery continues to bring good fortune and development in Georgia's educational telecommunications. The GSAMS terrestrial compressed video system is now reaching over 300 locations, and Georgia Public TV has installed some 2200 satellite downlinks.

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In Maine, NYNEX had collected $20 million in excess earnings, which the PUC agreed should be shared with education over the next five years. The fund will be used to connect schools to the Internet via a 56 Kb line.

In particular, Ameritech and Bell-Atlantic have aggressively pursued the education market, Ameritech with its "Opportunity" programs in states within its territory and Bell-Atlantic with its fiber to the school in Maryland and Delaware. Bell-Atlantic is also working with Virginia Tech, Old Dominion University, and several Virginia community colleges on the implementation of an ATM pilot project.

Depending on the state, educational institutions pay wildly varying prices for distance learning transport. Attempting to become a profit center, the Florida Distance Learning Network has a flat charge of $300 per hour for all educators and agencies. Iowa charges $5.00 per hour per site for full-motion video on the network. On the high side, North Carolina, which originally charged each school more than $4,000 per month for access to 64 hours of video on its ATM network, has revised it pricing structure. Prices are declining on full-motion video networks. Maryland schools can have three DS-3 lines for $1,365, and New Jersey schools have a wideband network for $1,050.

STATE NETWORKS, TECHNOLOGIES AND OUTLETS OF DISTANCE EDUCATION

Broadcasting, particularly via PBS stations, continues to be the most pervasive means of delivering instructional materials to both K-12 and college students. Since the development of ITV services in the 1950s and 1960s, public television has evolved as a medium of educational telecommunications. Although many public television stations have relinquished their broadcast day to more general audience programs, most still offer some form of ITV programming destined for K-12 classrooms, either during the school day or during overnight block feeds from the station to the school VCR. In addition to K-12 programs, many PBS stations are broadcasting college telecourses, such as those produced by the Annenberg/CPB project and the Telecourse People. The telecourses reach scores of thousands of college learners in their homes and workplaces.

The second most dominant provider of educational programs is cable television. Approximately 75 percent of K-12 schools have a cable feed into the school building. Not only does cable permit the delivery in schools of the PBS station and other local stations, but cable networks as well. Cable in the Classroom, a project established by the cable industry, has aggregated the services of several education-oriented channels into a package of programs with ancillary materials for K-12 teachers. PBS, C-Span, CNN, A&E, and Discovery are examples of the networks that participate in Cable in the Classroom.
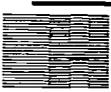
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One-way video and two-way audio continues to be a method of delivering synchronous distance education that the greatest number of schools have adopted. National, state and local distance learning organizations continue to employ satellite, broadcasting, and ITFS for the delivery of live instruction to the classroom. K-12 Star Schools projects, such as SERC, TEAMS, and the Northwest Partnership, and postsecondary programs, such as the National Technological University and California State University, provide nationwide coverage with live distance learning courses.

Satellite technology is very much alive and growing for distance learning, in part due to the development of new statewide satellite services. Georgia, Louisiana, and Florida have all begun to use one of the Telstar series of digital satellite transponders for distance learning. They join Oregon, Nebraska, and South Carolina as robust users of satellite technology.

Other technological advancements that are evident in states include adoption of ATM switches for delivery of voice, video and data. Penetration of ISDN across states, however, is uneven and where phone companies have chosen to pursue the technology aggressively, educational projects have been prolific.

The development of integrated state networks, first observed in Virginia and reported in our 1987 analysis, continues to advance. Many states, including Idaho and Iowa, are bringing collaboration of education, health care, and numerous state agencies to their networks.

It appears that the era of state-owned network development has ended. No state has built its own network since the Iowa Communication Network began service. A phenomenon of the 1980s and earlier, state-ownership of networks, once the envy of telecommunications planners, has faded from the trends. Even Iowa in 1995 considered selling its remarkable network.

A variety of factors make state ownership less attractive. The capital and interest costs are excessive for most states. State-owned networks reduce business opportunities for private enterprise. Both factors are politically sensitive issues. Furthermore, the maintenance, replacement, and upgrade of the networks are seen as burdensome and costly. Finally, education and state telecommunications officials have an interest in assuring in-state and out-of-state interconnectivity to various organizations, a feature not ordinarily guaranteed by state networks. Although some states such as Washington, Maine, Nebraska, and South Carolina continue to make improvements on their infrastructure, those modifications tend to be incremental.

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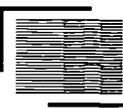
FUNDING OF EDUCATIONAL TELECOMMUNICATIONS

What is the source of funding for educational telecommunications? According to Hezel Associates' 1994 study of funding and the economics of distance learning, less than one-third of the $1.6 billion spent on distance learning in 1994 was supported by external grants. Most of the funding came from the institutions' operating funds. State governments contributed about half of the external funds, and the federal government and foundations contributed the remainder. While the federal government contributes only about 15 percent of the funding for distance learning, it has become an important segment of funds, in part because the funds signal the value of educational telecommunications within the government. Furthermore, federal funding has been a critical source of start-up funds for distance learning by helping education institutions acquire important resources, equipment, and instructional support.

Unfortunately, in the struggle over the federal budget reconciliation, many sources of funding have been threatened. PBS, a major distributor of college telecourses works with a steadily shrinking federal allocation. The National Telecommunications and Information Administration (NTIA), a major funder of infrastructure development in public broadcasting and education, was nearly extinguished, along with its entire parent agency, the Department of Commerce. NTIA's Public Telecommunications Facilities Program for nearly 20 years has assisted in full coverage of the USA by PBS and NPR stations. In the 1990s PTFP has been a major supporter of the distribution of distance learning hardware. PTFP's younger sister program, the Telecommunications and Information Infrastructure Assistance Program (TIIAP), has enabled education institutions to develop integrated information systems for distance learning and information. Despite the wrangling, it appears that PTFP will continue at a reduced amount of $12 million in FY 1996, and TIIAP at $26 million.

Other programs threatened in the budget reside in the US Department of Education. The Star Schools program, a $20 million per year fund which since 1988 has giver birth to SERC, TEAMS, the Northwest Partnership, FarView, and other distance learning projects, survived the 1995 chopping block, as did the Department's Challenge Grant program.

Goals 2000 funding from US Department of Education is having a considerable impact on educational telecommunications as states and local schools look to technology and telecommunications as an integral tool in reaching the goals. In addition to the Goals 2000 initiative, the Department of Education has also made Challenge Grants to schools for the integration of technology and telecommunications in the development of improvement-oriented partnerships with other schools.

The National Science Foundation makes major grants to universities, colleges, and schools for the testing and use of advanced telecommunications technology in learn-

ing environments. As such, the NSF-sponsored projects tend to be on the leading edge in the exploration of technology applications to education.

On the state level, countervailing trends are apparent in funding of educational tele-communications. On the positive side, Texas, in the most ambitious educational tele-communications funding plan yet, has found a way to bring $95 million into infra-structure development and training. Georgia appears to have found a stable method of funding through a BellSouth excess earnings fund and the state lottery. The Iowa legislature approved the second phase of funding the state's network. On the negative side, some states have allocated no new money to telecommunications or they have reduced funding. Alabama and North Carolina are examples.

Perhaps the most exciting call to change in higher education is the Virtual University initiative of the Western Governors' Association. The governors of the 15 western states have supported the development of a new university, relying on the resources of exist-ing postsecondary institutions, to deliver programs across state lines. The staff of the Western Governor's Association (WGA) has created a design team and organized plan-ning for the Virtual University Project. The governors and staff, along with higher education representatives have established a rigorous agenda and timeline. The West-ern Interstate Commission for Higher Education (WICHE) and its Western Coopera-tive for Educational Telecommunications provide key workplan components on policy and technology issues. Workplans address governors' issues on competency based education, access, and cost containment, and they must rely on existing educational providers.

EDUCATION POLICY ISSUES
Numerous policies regarding education and telecommunications are yet to be drafted. Most states have ignored the issue of postsecondary education, whether regionally accredited or not, crossing state borders. Ignoring the discussion will most likely re-sult in the development of an open marketplace of higher education. Articulation agree-ments, particularly on core courses, among in-state colleges remain to be stated in most states. Assignment of credit and tuition payments remains loosely defined in most states. Sometimes policy is defined in action, often with disastrous results. The chancellor of the University of Maine System resigned when faculty failed to support a plan to establish the Education Network of Maine as a credit-granting campus of the University.

CONCLUSION
The summary of trends in educational telecommunications is an attempt to provide the reader with an overall sense of the widespread development of technology and the issues that arise in the planning, coordination, and use of technology. Upon reading of

the discrete activities in the states, the reader might arrive at other conclusions. Still, one cannot but be impressed with the enthusiasm and persistent effort of the hundreds of educational telecommunications leaders who are effecting change in the US educational system.

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[1] *Hezel Associates, The Market for Distance Learning in K-12 Schools.* Syracuse, NY: Hezel Associates, 1995.

[2] National Center for Educational Statistics, *Advanced Telecommunications in U.S. Public Schools, K-12.* Washington, DC: U.S. Department of Education, 1995.

[3] NCES, 1995.

[4] Based on the number of inquiries on that question, Hezel Associates has prepared a software product, *An Economic Model for Distance Education Planning,* which allows administrators to project costs and revenues for technology-based distance learning programs.

PREDOMINANT TELECOMMUNICATIONS TECHNOLOGIES EMPLOYED FOR EDUCATION

	Satellite	Microwave	ITFS	Broadcast	CATV	Fiber	T-1	ATM	ISDN	F/Relay	Internet
Alabama	X			X			X				
Alaska	X	X		X		DC		X			X
Arizona	X	X	X	X							X
Arkansas	X	X		X		DC		X	X		X
California	X	X	X		X	DC	X	X	X	X	X
Colorado	X					DC, A					
Connecticut	X		X		X						
Delaware					X	DC	X				X
Florida	X		X	X		X					X
Georgia	X			X		DC	X				X
Hawaii	X	X	X		X	DC	X			X	X
Idaho	X	X	X	X		DC	X			X	X
Illinois	X	X	X	X		DC		X			
Indiana	X*		X			DC	X				X
Iowa		X	X			D	X				X
Kansas	X					DC, A			X		X
Kentucky	X	X		X		DC	X				X
Louisiana	X*			X		DC	X		X		X
Maine		X	X			D,A		X			X
Maryland				X		DC	X			X	X
Massachusetts	X								X		X
Michigan	X	X	X	X	X	D, A					X
Minnesota	X	X	X		X	D, A					X
Mississippi	X			X		DC	X		X		X
Missouri	X	X	X	X		DC					

A=Analog
D=Digital
C=Compressed

* denotes digital satellite

It is assumed that all states have access to the Internet. Only those states, however, have been checked which reported significant formalized educational initiative over the Internet at K-12 or higher education level.

2G
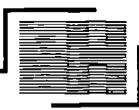
	Satellite	Microwave	ITFS	Broadcast	CATV	Fiber	T-1	ATM	ISDN	F/Relay	Internet
Montana	X					DC	X				X
Nebraska	X	X	X	X		DC	X				X
Nevada	X					DC					
New Hampshire				X		DC	X				
New Jersey	X		X	X	X	D		X			
New Mexico	X*	X	X			DC	X		X		
New York	X		X	X		DC	X		X		X
North Carolina	X			X		DC		X			
North Dakota	X	X	X	X	X	D, A	X			X	
Ohio	X	X				DC		X			X
Oklahoma	X			X	X	D		X			
Oregon	X*	X	X			D		X	X		
Pennsylvania	X			X	X	DC	X				
Rhode Island	X			X	X					X	X
South Carolina	X*		X	X			X	X		X	
South Dakota	X*					DC	X	X			
Tennessee						DC	X	X	X		
Texas	X		X			DC	X	X	X		X
Utah	X	X*	X	X		DC	X				X
Vermont	X					DC	X				X
Virginia	X*	X				DC	X	X	X		X
Washington	X*	X*			X						X
West Virginia	X					DC	X				
Wisconsin	X	X	X	X		D, A	X				X
Wyoming		X		X		DC	X		X	X	X

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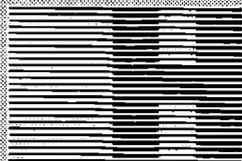
27

The

State-by-State

Analysis

HEZEL
ASSOCIATES

ALABAMA

KEY PLANNERS
- Alabama Public Broadcasting
- Department of Education
- University of Alabama

RECENT DEVELOPMENTS
With last year's Republican sweep, Alabama now has a new governor, and more Republicans in the legislature. Seven of the nine state board of education members are also new. With the newly elected government, the governor has a definite direction about education. Currently, the Department of Education (DOE) is returning to Goals 2000 money. The higher education budget has been cut by 7.5 percent for the 1995-96 fiscal year. The new budgetary emphasis in K-12 education resulted in a cut of higher education support.

The governor signed an executive order putting into place a planning commission for technology, under which there will be two committees: one for K-12 and higher education technology planning; the other for government and state needs related to the telecommunication infrastructure. The two committees will be responsible for addressing academic programming issues including writing the major learning objectives for K-12 and-higher education.

The governor has appealed several portions of the equity lawsuit that the DOE supported. The governor also sought to have the judge who ruled from the prior suit dismissed, and a new judge has taken over. The judge in the original ruling voluntarily stepped down. The legislature passed a foundations bill and an accountability bill that addresses of some of the inequities.

STATEWIDE AND LOCAL PLANNING
The University of Alabama produces distance learning programs, which are used by the K-12 arena. Plans are being considered to upgrade bandwidth to accommodate the increase in Internet traffic, although funding has not been made available.

In Alabama, distance learning is a centralized activity. The DOE has focused on networking each school first, then networking each system to the central office, finally networking the central office to the DOE. The DOE is developing a course and the requirements on what students should know in terms of technology before they can graduate from high school. These course would provide students with a working knowledge of word processing, spreadsheets, databases, and telecommunications. Currently, the highest priority of the DOE is to develop an adequate state technology plan which the legislature would fund.
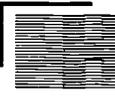
STATEWIDE AND LOCAL NETWORKS

Operated by the state, the Alabama Research and Education Network, formerly known as the Alabama Supercomputer Network is a fiber backbone of T-1 extending from Huntsville to Mobile. The network is funded from the education budget; the recent budget resulted in a 25 percent cut for the network. The network, which is partly used for complex mathematical and scientific calculation, reaches all research universities in the state as well as 20 high schools. Network users also have free access to other the Internet, educational institutions, and state agencies within Alabama. Commercial time is available for private and industry use. An increase in bandwidth is anticipated in 1996 for the network, which also provides informal advice on staff development.

Through its Center for Communication and Educational Technology (CCET), the University of Alabama at Tuscaloosa offers certified distance education classes in foreign language and science to middle and high school students in approximately 20 states. The university produces teacher in-service programs and is no longer associated with SERC. The university's Japanese I and II and Integrated Science 6,7, and 8 courses are delivered on a one-week delayed basis to teachers. CCET students of all classes can send questions to their teachers on a computer bulletin board system through the use of a modem and toll-free lines. The Japanese courses were named the best distance learning courses at the Telcom Conference and the nationally recognized Integrated Science program has met the National Science Standards for curriculum.

Regarding interstate collaborations, the DOE is involved in the Southern Regional Educational Board Technology Consortium. The group is organized through committees which are developing plans on how to improve educational technology, not only in their own state, but also in other states within the consortium.

HIGHER EDUCATION

The Education Department has begun its third year of the scholarship program for teachers. The DOE has developed three graduate level courses for teachers. If a teacher does not have a master's degree, the state will pay for a third of the degree in their specific teaching area, provided that three graduate level courses are included. The department met with various individuals in local school systems, higher education and in teacher education programs to design a program based on a vision of what teachers ought to know. The program has already trained more than 2,000 teachers and another 2,000 teachers are currently enrolled in the courses.

K-12

Alabama has the largest one-way distance learning program in the nation in the Integrated Science 6, 7, and 8 from the University of Alabama. Approximately 50,000 sixth, seventh, and eighth grade students participate in this program. About 85 to 90 percent

of the students are viewing the satellite delivered programs on a time-delayed basis on Alabama Public Television (APT). The highly regarded program is funded by private groups such as Alabama Power, AMSOUTH Bank, and the Russell Corporation.

Approximately 2,000 teachers are using the Internet in the classrooms, and the education department expects that to double at just about every school year. In some schools Internet access may be limited to e-mail, other schools may have access to America Online, Prodigy, and CompuServe, while others are hooked directly into the supercomputer network with direct access to the Internet via Georgia Tech in Atlanta.

No participation in satellite-delivered instruction is evident in the state. The DOE has 175 dishes, 55 of which are proprietary dishes for TI-IN alone.

FUNDING
No funding for K-12 distance education has been earmarked at the state level. With the two committees still deliberating on state needs and educational enhancements, a clear policy may not emerge until a technology plan has been developed. Decisions on a specific delivery mechanisms will be taken only after once a policy is articulated for educational technology in the state.

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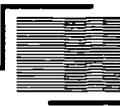
ALASKA

KEY PLANNERS

- University of Alaska (UA) System
- Alaska Public Broadcasting Commission
- Department of Education (DOE)
- Department of Administration
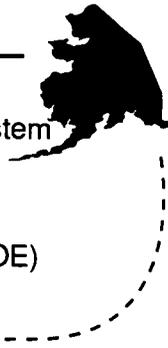
RECENT DEVELOPMENTS

In Alaska an increase in awareness of telecommunications issues has been observed and groups, including the governor, have been working together to advance technology at all levels. The University of Alaska (UA) is a major player in advancing the state infrastructure and has formed partnerships with school districts, state agencies, and the state for videoconferencing and Internet connections.

The Alaska Public Broadcasting system has been involved in a strategic planning process that has developed the framework for a satellite interconnection project, which is currently being implemented. Decisions were made to deploy technology, interconnect stations to allow them to share programming, and provide resources to insure service to local communities. The process is being funded by an NTIA grant.

The Telecommunications Information Council (TIC) is currently implementing the first phase of the state agencies' master plan for telecommunications. Part of the plan includes digitizing television signals to create four TV services, one of which has been reserved for educational use.

The lieutenant governor is now leading the TIC which includes commissioners or deputy commissioners from all of the state agencies. This council has been a catalyst for all agencies having their own Web pages and planning how the agencies will serve clients of the state via telecommunications.

House Bill 106, which establishes the Alaska Educational Technology Program in the Department of Education (DOE), is still pending and is believed to have made it through the financing committee and the House. The Alaska Educational Technology Program is expected to provide technical assistance and training to schools and libraries, as well as providing a plan for coordinating and expanding existing networks and investigating the development of new networks for educational use.

The regional radio interconnection groups have formed names and identities. The southeast stations have formed an organization called Coast Alaska; the interior group of radio stations has formed the Interior Express; and the statewide public television stations have formed the Alaskan Public Broadcast Service.

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The recently established Goals 2000 Technology Task Force, represents K-12 public education, UA, the long distance carriers, the cable association, legislatures, the governor's office, and the state library.

The Public Utilities Commission (PUC) has been conducting a study and has recently issued a modernization plan called 2001 Telecommunication Study, which was prepared by both formal and informal groups.

The Distance Delivery Consortium(DDC) in Bethel, has expanded in the last year and is continuing to expand as a result of the NTIA grant.

STATEWIDE AND LOCAL PLANNING

Educational telecommunications planning in Alaska is conducted by the Department of Administration and the Alaska Public Broadcasting Commission. Distance education activities for the university system are centrally coordinated through the system-wide Office of the President. The DOE works with local districts in planning telecommunications and oversees Alaska's participation in the Pacific Northwest Star Schools Partnership. The Division of Information Services is becoming an umbrella organization for public broadcasting as well as other services.

The DDC in Bethel serves the learning and information needs of area residents. The consortium includes four school districts, the UA-Kusokwim campus, the Yukon-Kusokwim Health Corporation, the public radio and TV stations, the Alaska National Guard, and several telecommunications providers.

STATEWIDE AND LOCAL NETWORKS

The University of Alaska Statewide Office of Network Services, formerly known as the University of Alaska Computer Network, provides school districts across the state with access to the Alaska Teleconferencing Network, commercial services, and the Internet. Through frame relay, this network provides direct connected circuits for school districts in Anchorage, Juneau, Fairbanks, Delta, Denali, Matsu, North Slope, and soon the Pribilof Islands.

The Statewide Library Electronic Doorway (SLED), a cooperative effort between the Alaska State Library, Rassmuson Library, and UA, offers a free network access point for all rural and urban Alaskans to connect online with local, state, and federal government, libraries, and the Internet. SLED is funded by the state library, and the university provides staff and support. Telecommunications costs, especially for SLED have increased significantly due to heavy use. The legislature has appropriated $300,000 for SLED.

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Although Alaska does not have ISDN lines available, ATM is available in a few locations. Microwave is used in certain parts of the state, including telephone companies. Fiber is used in the more populated areas, such as Anchorage, Fairbanks, and Juneau, but most of the state still uses satellite transmission. In certain parts of the state, the movement from satellite to fiber as a medium for delivery has already taken place. It is questionable whether such a migration would be possible in rural areas.

Alaska has only one LATA, and deregulation has not taken place. The local phone company in Juneau recently paid for a 56 kilobyte line and the connection to link the school district to the Internet. Alaskcom has been acquired by AT&T, and is now called AT&T - Alaskcom.

Regarding community networks, the North Slope network began as a school district network and expanded to include the community. Fairbanks also has a community wide network. Juneau has an integrated school network, which is considering including the community. The DDC in Bethel has received some NTIA money to create a regional network. An NTIA supported network also exists that provides wider access to the Internet in South East Creed.

The four publicly funded telecommunication networks include Alaska One, Alaska Two, Alaska Three, and Alaska Four. Alaska One includes a statewide public broadcasting feed from Fairbanks. Alaska Two which is modeled after C-Span, provides coverage of Alaska's legislature in a partnership of cable systems. Alaska Three is presently in reserve for future development.

Alaska Four, formerly, the Rural Alaska Television Network (RATNET), has changed its name to the Alaska Rural Communication Service (ARCS) and is carrying more educational and public materials in addition to some commercial programming.

The Alaska Public Service Commission discontinued access to the University of Alaska Statewide Office of Network Services in favor of its own Internet access, which offers the same service at a better price. The DOE is using the Star Schools infrastructure for the delivery of in-state teleconferences.

HIGHER EDUCATION
As recipient of a Goals 2000 planning grant, the University of Alaska is in the process of finishing an educational technology plan. The plan was developed by a 25 member Goals 2000 Technology Task Force, which included long distance carriers, local cable association members, and educators. The task force met several times face to face, as well as by video and audio teleconference to complete this task.

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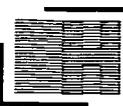
The University of Alaska system offered more than 220 courses at a distance via satellite, broadcast, audioconference, e-mail, fax, and print. More than 250 audio sites support statewide distance education, with bridging facilities in five of the locations. The University of Alaska Learning Cooperative fosters cohesiveness among the members of the system. The Cooperative publishes a combined course schedule for each semester.

Working with PBS, the university system conducted broadcasting and compressed videoconferencing to offer a course for students throughout the state with student-instructor interaction. Communities with which UA has direct connects have been upgraded to digital facilities and have worked with AT&T-Alaskcom to look at means of upgrading areas that had ALASKANET.

The University of Alaska Southeast Juneau campus develops and coordinates the national delivery of several continuing education courses and in-service training programs as well as a distance delivered Master's of Public Administration program. Distance education efforts at the University of Alaska Fairbanks depend primarily on audio conferencing technology with audiographics, electronic mail, and videoconferencing being used to supplement live face to face instruction. Materials can be delivered via high-quality satellite video with lower-quality videoconferencing return.

The LiveNet system, managed by the University of Alaska Anchorage (UAA), uses satellite-delivered one-way instruction enhanced by audioconferencing. UAA is exploring interactive technologies for its satellite classrooms.

Centers for distance education exist at the three main University of Alaska campuses in Anchorage, Fairbanks, and Juneau. All of the centers are involved in a university-wide planning effort to enhance the delivery of higher education programs throughout the state.

The University of Alaska received one of the initial NTIA grants to improve its network infrastructure. The grant helped to upgrade distance learning delivery capabilities and provided pilot projects for interconnecting school districts.

University of Alaska Fairbanks Campus Library has a joint program with the Alaska state libraries which provides Internet access to librarians throughout the state.

K-12
Alaska is a relatively local control state with no state curriculum or state mandated textbooks. The DOE's highest priority includes providing more teacher training and networking within schools.

Alaska is currently involved in the Northwest Educational Telecommunications Consortium, which is funded by a Northwest Regional lab grant in order to develop a regional technical assistance center for technology. The state is also involved in the Pacific Northwest Star School partnership which is a telecommunications network with the capability to transmit voice, data, and video. Thirty-seven school districts throughout the state take part in the Star Schools initiative, while 151 schools in the state have satellite downlink capabilities. More than 1500 secondary students are taking courses for credit through Star Schools, and several local school districts and consortium efforts are producing and delivering long distance education courses. The school districts and consortia are instrumental in developing the infrastructure of technology and distance education in the state.

Alaska's North Slope Borough School District (NSBSD) established a compressed videoconference network and computer wide area network (WAN) to serve the nation's geographically largest and northernmost school district, which includes 2075 students in eight villages. Through a five-year contract with AT&T- Alaskcom, the district has leased bandwidth with provisions for 448 Kbps dedicated links to the seven outlying village schools. Three schools and two district facilities in Barrow are linked to the hub at the district's central office over a fiber optic network. The NSBSD provides full Internet access to all of its schools. The NSBSD also maintains a fully operational TV studio and cable channel with satellite uplink and downlink capabilities.

Many of the schools in Fairbanks have connections to the Internet, all schools in Juneau have direct connections, some schools in Anchorage have connections, and schools in the North Slope also have a connection to the Internet. Juneau has several programs, including an alternative high school program that includes approximately 180 students freshman through senior, who learn using technology and use the Internet for their research and other school work. The agreement between the DOE and University of Alaska to allow an unlimited number of K-12 students, teachers, and administrators access to the Internet is no longer in effect due to lack of funding.

FUNDING

To digitize ARCS, money is allocated from the state legislature. No laws have been formed to fund educational technology, which continues to be a stumbling block in the development of distance learning in the state of Alaska. Funding for distance learning traditionally comes from oil royalties and the state and federal government.

UA, Fairbanks North Star Schools, and PBS have formed a partnership and received a $612,506 NTIA grant, along with matching funds from UA, PBS, and Fairbanks North Star Schools. The funds have been used for libraries, a satellite digital receivers for the university system, and a satellite interconnection project for ARCS.

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ARIZONA

KEY PLANNERS
- Arizona Board of Regents
- Northern Arizona University
- Arizona Department of Education (DOE)
- Arizona State University—KAET-TV

RECENT DEVELOPMENTS

Changes in the shape of legislative initiatives have brought Arizona at the forefront of its educational technology implementation. The legislature appropriated $750,000 to connect every school in Pinal County to the Internet for the purpose of transmitting administrative information to and from the Department of Education (DOE) until December 1996. The results of the pilot study will be presented at the January 1997 legislative session as part of a request for $7 million to link every school in the state.

The Telecommunications Act of 1996 supports and promotes competition among private sector entities including cable television, telephone and wireless communications companies. These entities are either restructuring or merging themselves to provide greater access, service and educational programming. The result of this initiative could provide greater access and interactive capabilities at a lower cost.

Early in the 1996 legislative session, House Bill 2168 proposed a coordinating board that would exercise telecommunications planning authority for postsecondary education. The Arizona Commission for Postsecondary Education (ACPE) was given the responsibility of promoting coordinated comprehensive instructional and capitol planning between and among public and private postsecondary education.

HB 2168 also created the Information Technology Authorization Committee (ITAC), which is responsible for reviewing and approving all information technology projects over $1million ITAC is comprised of legislators, private sector representatives, and state agency heads.

Another stipulation of HB 2168 calls for the Arizona Board of Regents and the State Board of Directors for Community Colleges to establish centralized information technology review processes and submit a report on the processes to the governor, the president of the senate, the speaker of the house of representatives and the joint legislative budget committee by July 1997.

HB 2372 states that in 1998 the Extended University at the University of Arizona, the college of Extended Education at Arizona State University (ASU), and statewide academic programs at Northern Arizona University (NAU) be subject to the Program Authorization Review (PAR). The programs are extensive users of telecommunications academic program delivery systems. The PAR process includes developing strategic plans and self evaluation of those plans.
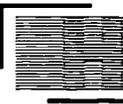
The Arizona Education and Information Telecommunications Cooperative (AEITC) office has closed due to lack of funding. The operation was transferred to Arizona State University, but to this date there have been no formal meetings. Institutions and entities still meet informally, but activities are not coordinated. The three AEITC universities and the Board of Regents conducted an informational technology assessment which resulted in the formation of a Regents level task force comprised of two members from each higher education institution and two staff members from the central office. The group is developing an information technology plan.

The task force is also examining the regional Virtual University concept recently adopted by the Western Governor's Association (WGA). The WGA is setting up a group to present a final work plan in June 1996. Virtual University students will receive credit for learning outside of the university, whether it comes from private companies or through assessments of competencies.

STATEWIDE AND LOCAL PLANNING
The Department of Administration is no longer active in educational technology planning. Upon the Governor's recommendation, the legislature approved a $250,000 appropriation to establish the Governor's Telecommunications Policy Office. The new group, housed in the Governor's office, received a $25,000 appropriation to study universal service, coordinate grant requests, and recommend telecommunication laws to the legislature.

A statewide university information technology plan was requested by the Arizona Board of Regents as part of its strategic planning process. The plan, which the Technology Task Force has been working on, will come to the board in late 1996.

The statewide Technology Integrated Educational Delivery System (TIEDS): A K-12 Master Plan for the Infusion of Technology into Arizona Schools in the Teaching/ Learning Environment is no longer in effect.

STATEWIDE AND LOCAL NETWORKS
The NSF-supported Arizona State Public Information Network (ASPIN) is a statewide inter-network protocol (IP) of users from K-12 school districts, community colleges, universities, hospitals, libraries, and private industries. Jointly operated by Arizona State University (ASU), Northern Arizona University (NAU), and the University of Arizona (UA), users provide their own connection to the nearest ASPIN node.

The three Arizona universities are also interconnected by the Tri-University Network, a leased-line backbone that serves ASPIN and other data services. The universities have a major access point into WESTNET through which the universities gain Internet access.

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UA operates a on-way microwave link to deliver courses to its Sierra Vista campus. In addition, the university has a Ku-band uplink and C-and Ku-band downlinks. The university and a wireless cable company jointly operate a 32-channel ITFS system in the Tucson area. The system is used by public schools, Pima Community College, and UA. Although ITFS is well established at UA in Tucson and ASU at Tempe, university officials, in preference to expanding with ITFS, await new commercial developments in technology, especially digital technology.

For financial reasons the State Department of Education has canceled its 800 number for K-12 educator access to the Internet through EDLINK. Teachers are now receiving services from America On Line (AOL) or Prodigy.

Northern Arizona University (NAU) manages NAUNet, an interactive voice, data, and video network connecting NAUNet's Flagstaff campus with electronic class-rooms at community college sites in Yuma, Kingman, Holbrook, Lake Havasu City, Bullhead City, Prescott, Litchfield Park, Coolidge, Thatcher, and Tuscon; high school or district sites in Kayenta, Tuba City, Keams Canyon, Ft. Defiance, Tucson and Nogales; and state capital sites in Phoenix shared by the Arizona DOE and the Arizona Supreme Court, and a hearing room jointly shared by House, Senate, and Executive offices. The network also extends to campus facilities at ASU, UA, and the UA College of Medicine.

The Arizona Telecommunications Community Computing Network (AzTeC) is a freenet started by interested people collected at ASU. The traffic on this network has increased considerably recently.

HIGHER EDUCATION

Higher education institutions use microwave and ITFS for distance education. Maricopa Community College offers courses and videoconferencing to 11 locations and Mohave Community College offers over 20 courses per week to its three campuses, all over microwave. ASU delivers courses to over 3000 campus students over a microwave network and four ITFS channels. As a member of the National Technological University (NTU), ASU operates a Ku-band uplink and C and Ku-band downlinks. NAU delivers college courses to over 4000 students via NAUNet and cable distribution.

The University of Arizona's video-based graduate program in library science, which started in 1992 with support from the Western Cooperative, has added students from Alaska, California, Colorado, Delaware, Idaho, Iowa, Maryland, Montana, Nevada, New Mexico, North Dakota, Ohio, Oregon, Pennsylvania, South Dakota, Utah, Wyoming, Washington, and Mexico.
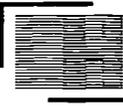
As part of PBS Math Online, KAET-TV presents comments from teachers on their experience with the application of MTCM standards in their classroom.

K-12

Arizona School Services through Educational Technology (ASSET) is a non-profit corporation at Arizona State University and KAET-TV, transmits telecourses to K-12 districts via videocassette recordings. The ASSET board of directors consists of participating school superintendents and curriculum administrators.

A strong charter school movement is taking place in Arizona. If state-board approved, these schools will be eligible for the same amount of legislative funds per student as the public schools. About 52 schools are and 50 await approval. Arizona leads the nation in number of state-board approved schools.

Arizona State University (ASU) continues to deliver more than 100 video telecourses to schools in 135 districts through ASSET (Arizona School Services through Educational Technologies), a non-profit corporation participating in PBS Math OnLine, Star School Project TEAM, and a math and science program geared for 4th, 5th and 6th grade students. ASSET is located at ASU and transmits courses via KAET-TV. The University has a circulation master tape library for those schools that cannot receive a broadcast signal or cable.

NAU has C- and Ku-band up- and down-link capabilities which deliver direct instructional services to 54,000 elementary students at 282 schools in 27 states.

FUNDING
Higher Education
ASU recently received funding for a new southwest regional technology consortium that will cover the six southwestern states, Hawaii, and Guam. The five-year OERI grant is for assisting multicultural groups, "low wealth" groups, and Title One students in the effective use of available technology.

Northern Arizona University (NAU) received funding approval and a $1.3 million appropriation from the Arizona Board of Regents and legislature to extend NAUNet to four additional community college locations in Page, Payson, Show Low, and San Luis during 1996-97.

K-12
Federal courts have ruled against the state of Arizona in a capital funding equity suit. In response, the legislature has developed a plan for infusion of capital throughout rural Arizona. Some urban areas would be eligible as well.

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Currently various agencies and programs spend about $20 million on educational tech-
nology programs each year. Local school districts spend at least additional $10 million
annually. A recent study completed by the Governor's Task Force Educational Tech-
nology Planning Group reported a need for $15 million in more federal, state, and
local funding for K-12 education.

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ARKANSAS

KEY PLANNERS

- Department of Computer Services
- Arkansas Educational Television Network Commission
- Department of Education

RECENT DEVELOPMENTS

Telemedicine, infrastructure, distance learning, and staff development continue to be driving forces in the state of Arkansas. In early 1995, the legislature established Act 737, which created the Governor's Telecommunications and Information Technology Advisory Committee to look at statewide telecommunications infrastructure and a statewide telecommunications plan that goes beyond educational technology planning. The board is made up of 17 state agency and private sector representatives. The board is responsible for developing legislation in technology and telecommunications, including distance learning and telemedicine to present before the governor including constructing a telecommunication infrastructure plan for the state by July 1; developing a complete applications plan which will include state government, education, and libraries; and establishing and funding various types of telecommunications projects.

The Act also established a joint committee on Advanced Communications and Information Technology.

The Arkansas Public School Computer Network (APSCN) is currently constructing a statewide network which will interconnect the schools in the state. All school sites will be connected for administrative purposes and to the Internet by July 1, 1999.

STATEWIDE AND LOCAL PLANNING

Arkansas Higher Education Telecommunications Consortium determines which credit telecourses will be delivered and distributed by the Arkansas Educational Television Network (AETN). The consortium has 11 active participants and between 5 and 9 members that receive courses. AETN, a full service PBS affiliate, receives a state allocation of $1 million to broadcast four or five college courses each semester. AETN and the Department of Education (DOE) work together to offer telecourses to the states' high schools and higher education institutions. They also share responsibility for SERC courses.

A facility is in the midst of construction at AETN, which will allow them to work with the University of Central Arkansas in broadening their telecommunications involvement, including developing graduate programs and expanding staff development. Funds were released from the governor's office for this project. This year, AETN built a second studio for distance learning, and also has a satellite uplink trunk that is used for training for state employees and educators.

The University of Arkansas Medical School's Committee recommended that distance learning become a line item in the higher education budget. The goals of the committee include establishing a campus wide committee to recommend policies to the chancellor regarding distance education and telemedicine. Each college in the medical school has one member on the committee.

Several pilot projects in the state include a compressed video network comprised of higher education and area health education centers. Southwestern Bell is also conducting a pilot project in Arkadelphia using ATM technology.

The State of Arkansas Interactive Video Network was created to facilitate collaboration on future telecommunication developments related to distance learning and telemedicine. The Technology Summit, a statewide think tank that studies telecommunications issues, draws in all levels of technology representatives and interests to deal with planning, backbone network, pricing, and bandwidth issues.

In 1995, a statewide planning document called, "A Guide to School District Technology Planning" was developed and published. The document is the result of collaboration among state agencies including the DOE, a private, non-profit group, the Science and Technology Authority, the Department of Higher Education, libraries, regional education service centers, and representatives from local districts.

The Ozarks Unlimited Resources (OUR) Educational Cooperative in Harrison, was one of 33 Rural Electrification Administration (REA) grant recipients in 1994. The $450,000 grant helped fund several OUR projects including the connection of five classrooms to the local community college and the local cable company. Plans are being made for additional classrooms to be connected during the 1996-97 school year. Local industry has also participated in funding the project by donating $60,000 for the purchase of computers for classrooms. OUR is also connected to the statewide network and provides service for 1000 Internet accounts in the Harrison community.

The Arkansas State Technology Planning Group, which was an ad-hoc committee originating in the governor's office and staffed by the Department of Computer Services to look at broad-based statewide telecommunications, is no longer in service.

In 1994, a Southwestern Bell/State Planning Group and the Public Service Commission (PSC) agreement provided excess earnings as a means for funding part of the statewide infrastructure. Southwestern Bell is spending $231 million through 1998 to lay the lines and make other state infrastructure improvements. SW Bell, which serves 70 percent of Arkansas, installs digital switching into all company offices, as well as installing fiber in the ground. SW Bell has also been working on connecting higher
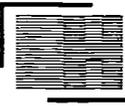
education and public education institutions, and medical facilities in their region with fiber. The PSC authorized the use of $3-5 million from the allocation of the overearnings fund for ATM fiber projects in Little Rock, Arkadelphia, and Fayetteville. A pilot project is currently being developed in the Arkadelphia community, where Henderson State University and a local high school are linked by ATM

STATEWIDE AND LOCAL NETWORKS

Established in 1990, ARKnet is a data network operated by and on behalf of all Arkansas colleges. Along with the Arkansas Public School Computer Network (APSCN) and the Department of Computer Services, ARKnet has formed relationships with medical and health care providers in the state. ARKnet is a data network that all colleges and universities in Arkansas for Internet services.

APSCN is a statewide networking organization which provides Internet access for K-12 education as well as administrative services. Housed in the DOE, APSCN links all public schools with the DOE. APSCN was initially funded from a $20 million state appropriation for connecting all public schools to pass administrative data back and forth. Currently there has been more education related traffic conducted on the connection than administrative work.

The Department of Computer Services and Southwestern Bell, along with other interlinking national networks, have been acting as "access ramps" to the information superhighway for industry and business. The department has a multi-line, multi-drop SNA network in Arkansas which is currently moving to a routed network.

Area Health Education Centers have a computer network that connects offices and universities for health training and consultation throughout the state.

Among the current transmission technologies in use in the state are the microwave, ATM, fiber, satellite, and some ISDN. All public schools and higher education institutions are connected using a frame relay system via fiber or copper lines. There is just one satellite uplink at AETN that is receiving more programming than it is transmitting. AETN is trying to form a dual platform so it can distribute programming over fiber, and then connect it to cable TV stations. Bell is promoting ISDN in the state as an intermediate step toward ATM. The University of Arkansas Medical Center will deploy ISDN throughout the state during 1996. Microwave transmission technology is expected to migrate to fiber.

State network sites with video capability include the University of Arkansas for Medical Sciences, the University of Arkansas at Little Rock, Arkansas State University, and the University of Central Arkansas. There are two K-12 network related organizations,

IMPAC and APSCN that will have computer and telecommunications based projects in all 311 school districts by 1998. Fifty percent of the school districts are already connected to the Internet through APSCN's wide area network. The IMPAC local area networks develop technology programs and bring computers to classrooms for a variety of applications.

HIGHER EDUCATION

The Department of Education expects legislation in 1997 in regards to which college gets credit when a student takes a course by distance learning. This is becoming a problem because funding depends on student semester credit hours a school generates.

The University of Arkansas Medical Center receives masters level health care administration courses from Tulane University in Louisiana.

K-12

In September, IMPAC announced expanded programs to school districts and continues to be involved in statewide planning through the Governor's Telecommunications Task Force activities. IMPAC works closely with all technology providers in planning, organizing, and conducting staff development of teachers.

Arkansas has incorporated microcomputer based instructional programs affecting 80,000 students and 4,000 teachers. The Arkansas Commission on Microcomputer Instruction approves computer programs to be implemented by IMPAC Learning Systems, Inc. During Phase I of its activities, IMPAC installed computer-based instructional programs to 269 Arkansas school districts and developed a program of services, business partnerships and contracts that saved 43 percent of projected vendor cost, or $16 million. IMPAC is now in the fourth year of Phase II which consists of replacing programs, conducting research, and developing procedures for the effective use of managed networked interactive learning systems that also accommodate third party software and Internet applications.

Arkansas currently claims to have more schools and buildings with physical Internet connections than any other state. The state is in the process of connecting 311 districts and 1,400 school sites within those districts. Every instructional unit will be hooked up in the next two years.

About 60 Arkansas schools receive satellite-delivered instruction from SERC, Oklahoma State University, STEP, TI-IN, and Kansas State. Through a project sponsored by the Arkansas Rural Electric Corporation (AREC), about 275 school districts have satellite downlinks.

AETN established the Adult Education Television Center (AETC) as a supplement to the Adult Education Centers located throughout the state. AETC delivers open broadcasts to adult students in its GED course and some of its literacy improvement courses.

Along with specialists in APSCN, AETN and IMPAC, technology specialists are being deployed, with the help of state funding, in each of the 15 regional educational service centers in the state. There is a great need and concern for technology planning, coordination of the work of technology specialists, and training for school staff. More than 40 school districts have full time technology specialists and an additional 30 districts have part-time specialists.

FUNDING

Currently various agencies and programs spend about $20 million on educational technology programs each year. Local school districts spend at least another $10 million annually. A recent study completed by the Governor's Task Force Educational Technology Planning Group reported a need for at least another $15million in federal, state, and local funding for K-12 education.

CALIFORNIA

KEY PLANNERS

- California Planning Commission for Educational Technology
- Education Council for Technology in Learning (ECTL)
- California Technology Project
- California State University System
- California Department of Education (CDE)
- California Post Secondary Education Commission (CPEC)

RECENT DEVELOPMENTS

The California Master Plan for Educational Technology has been terminated. To replace it, the Superintendent of Public Instruction established the Educational Technology Task Force to prepare recommendations for strategic action plans.

Assembly Bills 1519 and 1302 were combined to establish the Educational Technology Grant Program of 1996. The program is funded by a Public Utilities Commission (PUC) assessment on Pacific Bell, the amount of which has grown to $50 million. More than $17 million of this fund is allocated for telecommunications development in public schools, $12,250,000 to the Technology Trust Fund for telecommunications, and $5,250,000 to the California Department of Education (CDE) for staff development technology grants.

The Governor proposes to increase Educational Technology funding by $100 million in 1996. This money will be for the School Based Educational Technology Grants program for planning, curriculum reform using technology, and staff development. About 30 percent of the funds will be allocated for staff development. The California Assembly has appropriated $279 million for one-time block grants to K-12 schools during 1995-96 for deferred maintenance, teaching materials, and technology. The Kern Educational Telecommunications Consortium in Bakersfield, CA has received a $834,704 distance learning grant to provide instructional programs to the rural Mojave/Ridgecrest regions of the state.

The Governor's Council on Information Technology released its 1995 report with recommendations to: achieve cost-effective government, make government accessible, focus on learning, and promote modern telecommunications. The report stressed the importance of increasing availability of information by out-sourcing to the competitive private sector for access and the necessity for deregulating telcos to achieve competition.

The California State University (CSU) system recently launched the Integrated Technologies Strategies Initiative to examine how to make the best use of information resources systemwide. As a parallel, the commission focused on infusing technology into the learning and teaching process (CLRIT). For the planning initiative the chan-

cellor, the executive vice chancellor, and the 22 institution presidents agreed to lever-age information resources as a strategic resource in support of CSU's mission and goals. A primary CSU goal is to become the premiere teaching and learning institution in the world. The first phase of the initiative is the strategic planning integration process, for which CSU has hired consultants to develop a strategic business plan focused on technology, funding, and particularly on organizational structure which may include private and public partnerships. The chancellor recently established a commission for using information technology in institutional management and another for telecommunications infrastructure.
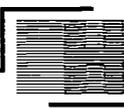
An initiative of Sun Microsystems and KQED businessmen in San Francisco resulted in Net Day 1996, in which the CDE and a group of private and public utility and technology firms, unions, and utilities companies enlisted volunteers, including President Clinton and Vice President Gore, to help wire all California schools to the information superhighway. Pacific Bell prepared a wiring kit to distribute to sites. About 8,800 volunteers, 465 sponsors, and 1,005 organizations joined the effort. The Educational Technology Task Force anticipates a series of similar integration activities over the next two years.

Funded by SB 1510, Building the Future is a project begun in 1995 to advance telecommunications information and accessibility in schools. The project consists of two components: Building the Future-Connecting the Schools and Building the Future-Connecting the Community. Connecting the Schools received $115,000 for schools to share knowledge about school networking and the effective use of technology in the classrooms. Connecting the Community, a $100,000 planning grant awarded to Santa Clara County Office of Education and its partners in Silicon Valley, is to design a network site for community residents to access communication technologies for telelearning, telemedicine, and teleshopping.

The National Science Foundation awarded a grant to the Southern California Coalition for Education in Manufacturing Engineering (SCCEME) to expand educational opportunities such as the degree program in manufacturing engineering in California. Five higher education institutions and ten corporations are involved. Compressed video, ITFS, desktop video, the Internet, conference calls, and multimedia systems deliver and support instruction.

STATEWIDE AND LOCAL PLANNING
The Educational Technology Task Force in the Department of Education (CDE), consists of representatives from industry and education across California. The group has discussed planning, strategizing, and the use of technology to improve education and will issue a report by the end of March 1996. The CDE expects this report to set the

pace for the coming years. The superintendent's major goal is that all classrooms should have the appropriate level of technology, such as equipment and software, with access to the Internet by the year 2001.

The Educational Council for Technology in Learning (ECTL) will very likely take a proactive role in coordination with the Educational Technology Task Force, which will disband after submitting its report to the superintendent. The Education Council is part of the provisions of SB 1510; one of the members is appointed by the governor and five by the legislature and the superintendent.

SB 1510 requirements are being implemented through ECTL which is responsible for the use and integration of educational technology in the public elementary, second- ary, and postsecondary schools. Working with ECTL is the Industry Council for Tech- nology in Learning (ICTL), a non-profit corporation with representatives from educa- tion, government, businesses, foundations, and non-profit organizations throughout the state. ICTL's mission is to improve lifelong learning opportunities in California by collaboratively guiding the state in a unified technological direction. .

The California Technology Assistance Program (CTAP), formerly the California Tech- nology Project (CTP), has moved from CSU to become a state and county cooperative venture providing resources to California schools. The project is now much closer to the existing delivery system. In May 1994, the host agency was shifted to the Orange County Office of Education.

Major activities of CTAP include California On-line Resources for Education (CORE) for K-12 educators and CSU faculty and students, and the Graphical Interface for Net- work Access (GINA), a software application which provides Internet access and famil- iarizes educators with electronic information services. The program is supported through a central coordinating council made up of representatives of the 11 involved regions. CORE and GINA are no longer supported by SB 1510 funds. Presently the council and the DOE are working together in staff development, obtaining equipment, and providing proper instructional materials. Each of the 10 regional affiliates has prepared a technology plan with a list of requirements and the estimated cost.

The CSU Technology Steering Committee was formed to address policy because of overlapping responsibilities of various groups. The committee is made up of univer- sity presidents who serve as the chairs and vice chairs of the chancellor's commissions on technology in learning and teaching institutional management and infrastructure, CSU's executive vice chancellor, and CSU's assistant vice chancellor for information technology.

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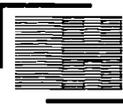
Ninety-four of California's 106 community colleges now have satellite downlink installation sites as part of a statewide community college system for distance education. The Chancellor's Office of California Community Colleges has received a two-year $614,000 NTIA planning grant for a statewide distance learning network capable of voice, video, and data interaction among the state community colleges.

The Alliance for Distance Education in California (ADEC) works to unite organizations in developing new plans, committees, and advisory groups, and to prepare a new master plan. During October 1995 ADEC held its first statewide videoconference of 40 participants in eight locations.

The 380 K-12 through higher education schools connect to the Sacramento Educational Cable Consortium that serves 230,000 subscribers. These educational institutions cooperatively program educational channels that run 24 hours a day and seven days a week. The consortium conducts distance learning through two way audio, one way video. Future planning is directed to using the Internet for distance learning and developing a local network to link Sacramento community colleges.

STATEWIDE AND LOCAL NETWORKS
The computer-based Learning Solutions Network (LSN) established by CSU at Sacramento (CSUS) reaches 4,500 students at 30 public high schools. CSUS's satellite dishes capture coursework developed at the University of Illinois at Urbana. Secondary schools use computers and telephone lines to access the information.

The University of California's Intercampus Telecommunications Network (ITN), an e-mail library networking service, connects all nine campuses to the San Diego Supercomputer Center (SDSC).

The Educational Telecommunications Network (ETN) telecasts via satellite live, interactive staff development and parent programs of instruction to school districts statewide as well as throughout the U.S. ETN also produces and transmits information to county health professionals as well as adult vocational training in health care professions. ETN plans a transition from analog to digital compression technologies. This will lower the cost of receiving the signal and increase participation.

The Direct Enhancement of Learning Through Technology Assistance and Alternatives (DELTA) is a project of the Commission on Learning Resources and Instructional Technology (CLRIT). The latter recommends policy to the CSU Executive Management. DELTA encourages the use of alternatives to traditional delivery of instruction through telecommunications and is investigating the efficacy of using this technology to solve population growth problems in California.

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The three major goals for the CSU distance education system are to expand distance education capabilities and applications, implement CLRIT recommendations, and determine organization and delivery of library and media services across the state. The system distributes courses to high schools and training to businesses and government via satellite, 14 regional ITFS systems, and compressed video via CSUnet.

Funded by NSF, the California Education and Research Foundation Network (CERFNET) in southern California and the Bay Area Regional Research Network in northern California connect the two university systems, private colleges and community colleges.

As the largest university-based provider of televised graduate engineering and computer science courses, the Stanford Instructional Television Network (SITN) has 153 technology-based industrial partners worldwide. For over 25 years, SITN has delivered distance education credit and non-credit courses to technical professionals in the workplace.

The CDE has produced a K-12 Network Technology Planning Guide which describes the standards and recommendations for local school infrastructure, district wide area networks, and how districts should connect through the county offices of education for Internet access. The county offices are providing at least three quarters of the 58 county offices with Internet access.

CSU operates the statewide CSUnet which links all 20 of the university campuses as well as many community colleges, school districts, county education offices, some libraries, and two Mexican universities. The digital network has the capacity for voice, data, and video integration as well as videoconferencing. The Chancellor's Integrated Technologies Strategies Initiative commission for telecommunications infrastructure is studying the future evolution of this network.

While California uses microwave, fiber, satellite, and ISDN, CSU uses primarily a T-1 network. Supported by a grant from Pacific Bell, CSU is experimenting with ATM technology at several locations. The grant is part of the California Research and Educational Network (CALREN) project in which Pacific Bell provides two years of free ATM bandwidth. Through ATM technology, CSU is able to teach one of the few remaining master's in library science programs from the San Jose campus to the Fullerton campus in southern California. The university also uses microwave and is working with Pacific Bell and Cross Country Wireless (acquired by Pacific Bell) to build a fiber ring in the Los Angeles basin to deliver programming to the cable wireless head end. CSU has negotiated a satellite lease for use of a dedicated portion of the transponder. This provides two full time channels of programming simultaneously.

The California Public Utilities Commission (PUC) approved the proposal by Pacific Bell's Education First Initiative to offer ISDN to K-12, libraries, and community colleges free of charge for two years. In January 1995 the PUC ruled on Pacific Bell's request to provide an education rate for the use of ISDN after the two years. The actual cost of the rate is still in negotiation. By the end of 1996, the project is expected to link about 1000 schools with ISDN.

TECHNET, a 20-campus CSU network, connects faculty and students to the businesses.

HIGHER EDUCATION

CSU's highest priority for distance learning is to build the appropriate infrastructure to serve the access needs of all faculty, staff, and students, regardless of where they reside in the state.

Academic planning is addressed in CSU's new satellite initiative within which a committee of vice presidents of academic affairs formed to deal with programming before any program delivery occurred.

There are several initiatives concerning staff development at CSU, including the Commission on Learning Resource and Instructional Technology, which focuses on distance learning and technological mediated instruction. The major thrust of the commission for the next two years is faculty development in educational technology. The Council of Library Directors, in conjunction with CLRIT, developed a plan for library faculty and staff development.

INTELECOM is a consortium established by 42 southern California colleges to develop, distribute and acquire college credit telecommunication-based instructional materials. Courses are distributed through PBS, commercial TV, cable, ITFS, and satellite. INTELECOM also produces national and internationally distributed college courses.

K-12

Through Pacific Bell's "Education Initiative" all schools, libraries and community colleges will be connected to ISDN by 1996. Pacific Bell requests that schools and libraries desiring connection have the equipment to utilize the digital service and know if they want to use the service for data, videoconferencing or both. Once that is done, Pacific Bell will work out a schedule to wire and activate the service.

About 245 Los Angeles area high schools receive live satellite and microwave-delivered instruction from California State Polytechnic University in Pomona. The Educational Telecommunications Network (ETN) offers over 380 live instructional, staff de-

velopment and parent information programs to over 1000 school districts. The Internet is finding its way into the schools with strong support from the L.A. County Office of Education.

TEAMS Distance Learning/Los Angeles County Office of Education, through local and Star Schools funding, provides educational resources and instruction via live satellite telecasts to 20 states, the District of Columbia, and the U.S. Virgin Islands. These programs are produced and transmitted by ETN to elementary-level students, teachers, and parents in support of the national mathematics and science reform goals. TEAMS offers mathematics and science instruction to grades 4-7 and social science and language arts to grades 4-6.

FUNDING
Higher Education
Pacific Bell awarded CSU a CALREN grant to install ATM on a 45Mb line to connect two more CSU sites. The telco has allocated $100,000 for 1995-97 to connect California schools, libraries, and community colleges for high-speed voice, data, and voice transmission. The California Public Utilities Commission has committed $37 million from a rate-payer settlement for educational technology and telecommunications infrastructure in public schools.

CSU received a $980,000 NTIA grant which, with matching CSU funds, has added about 40 video codecs to all of the CSU campuses. CSUS recently received a multimillion dollar literacy-based NTIA Net of Two Rivers grant.

CTAP has consolidated all of its regional services programs, including the instructional television network which exist separately in the past, into one budget. CTAP now is receiving $10 million, compared with the $1.2 million CTP funding in 1994.

K-12
The Education Initiative is a $100 million project by Pacific Bell to inter connect schools and libraries for video and the Internet. It will also help the state's 107 community colleges to meet anticipated enrollment demands through educational technology. The project includes communications services and the installation of T-1 lines. Pacific Bell also negotiated discounts ranging from five to 50 percent for various types of equipment, hardware, software and services with over 20 vendors.

The CDE presently has $14.3 million in educational technology funds for K-12, made available through legislative appropriations. In addition, the governor proposed a $10 million appropriation for refurbishing equipment and $100 million for computers in the K-12 sector, which averages about $19 per student.

The State Board of Education approved $6.5 million for the 1996 School-Based Education Technology Grants Program. At least 30 percent of these SB 1510 funds must be used for staff development, planning, and/or evaluation.

The Information Resources Service Project received $1.2 million for staff development and research. Telemation is a statewide teacher training program now in its third year.

COLORADO

KEY PLANNERS

- Northeast Alliance of the Colorado Learning Network
- State College System
- Colorado State University System
- Colorado Community College and Occupational Education System

RECENT DEVELOPMENTS

The Colorado Department of Education (DOE) prepared a Technology in Colorado Education Strategic Plan for 1994-2004. The plan is designed to provide equity of access to modern information sources and a mechanism for instructional reform. The requirements are: ❶ Technology should support curriculum and learning; ❷ Technology planning should be an ongoing process; ❸ Technology training should be ongoing and integral to all areas; ❹ A support infrastructure must be created, strengthened and maintained; ❺ The state of Colorado should create, maintain and support an effective statewide electronic network; ❻ Colorado school districts should have management systems in place that facilitate electronic information transfer; ❼ Statewide policies for evaluation and purchasing of management hardware and software should be developed; and ❽ Funding for technology should be adequate, equitable and stable.

In an agreement with the Public Utilities Commission (PUC), US WEST agreed to pay a base amount of $2.5 million into funds plus, for every day of substandard service, a maximum of $8,000 per day. This agreement is the result of US WEST's inability to meet the required schedule of line construction. As of January 1996, these funds contain $5.5 million. The money has recently been released for use in telelearning and telemedicine.

The House Majority Leader introduced a bill that would provide $50 million for distance learning, telecommunications, and technology. The bill calls for the establishment of a revolving loan program and grants for school districts, libraries, and higher education institutions for classroom equipment and connection to the network. Other legislation will establish a telecommunications commission to oversee the work of all these individual groups.

In 1995, the Colorado state legislature passed House Bill 95-1316 which stated that any local exchange carrier may provide discounted phone rates for any interactive video applications for distance learning, remote arraignment, or telemedicine. This has led to the establishment of several fiber optic and telephone networks.

The legislature recently appropriated $14 million to set up a videoconferencing room for institution and state agency use on each of the community college campuses. The allocation represents the amount to be saved by agencies in travel alone. Since admin-

istrative conferences will constitute only 10 percent of the usage, the new facilities can be used frequently for teaching.

Connect Colorado is the coalition of Colorado's public higher education, K-12, library, and state government agencies who are collaborating on the development of a state-wide telecommunications network plan. The plan calls for a high-speed OC3 back-bone with ATM hubs with layers of interconnections eventually extending to every school, library, not-for-profit hospital, and state office.

STATEWIDE AND LOCAL PLANNING

Colorado has a variety of both operational and planned distance learning projects. For K-12 and the Board of Cooperative Education Services (BOCES), nine projects are in operation, 12 are planned, and one is under construction. Postsecondary education projects include 11 operational and three planned initiatives. Colorado's Division of Corrections conducts remote arraignment over the statewide Cooperative Interactive Video In Colorado State Government (CIVICS) network, with sites in several of the state prisons and county court houses. Plans are also being formulated for the Division of Corrections' interactive video network to operate over the CIVICS by August 1996. The University of Colorado Health Sciences Center is currently connecting to health education centers throughout the state via the network. The healthcare community also has two large telemedicine compressed digital video networks, which are not connected to CIVICS as yet, although the state would like to see that develop in the near future.

The Colorado Learning Network (CLN), a non-profit organization developed in 1993, established the Higher Education Telecommunications Alliance (HETA), an alliance among the state's six public higher education systems. HETA is responsible for system planning, program sharing, and cost effectiveness in distance learning. CLN is a consortium of state educational telecommunication users. Representatives come from the state DOE, the Colorado Commission on Higher Education, The University of Colorado System, Colorado State University, the University of Northern Colorado, the University of Southern Colorado, and the State Colleges in Colorado.

As of January 1995, 18 Goals 2000 grants were awarded to local communities for the development educational reform plans to meet state and national goals for content standards, performance measurement, and staff development. Teaching remote learners and revising instructional strategies are the most important staff development issues in Colorado.

The DOE continues to implement regional telecommunication networks and provide assistance with distance learning programs. These networks will be interconnected via a proposal statewide infrastructure.

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STATEWIDE AND LOCAL NETWORKS

Colorado delivers distance education interactively by satellite, computer, audiographics, ITFS, T-1 compressed digital video, cable television, and fiber optics networks. Many networks are of local or regional origin in design and funding. The primary goal in Colorado is to connect the systems to achieve a statewide network. One local telecom cluster which is leased from three local exchange carriers is 150 miles long and costs $50,000 a year to operate.

The Colorado Telecommunications Advisory Council (TAC) was disbanded in 1995. As a result of TAC efforts, CLN and CIVICS were established. The CLN represents higher education, K-12, and libraries in the business community. Members meet frequently to develop partnerships and collaborations. The collaborations currently in place include favorable lease rates under HB-1316, where rural, local exchange carriers give reduced rates to school districts for use of the fiber optic networks. The State Division of Telecommunications operates CIVICS, a compressed video digital network that runs over the statewide microwave system and works collaboratively with HETA. HETA, a driving force behind distance learning, operates compressed video digital sites in its institutions for classes and meetings. There are approximately 15 to 20 HETA sites throughout Colorado. CIVICS, the Colorado Commission on Higher Education (CCHE), and the DOE support the development of a statewide telecommunications network and the delivery of distance education to, from, and among Colorado communities.

Various school districts and higher education institutions are using ITFS. The University of Colorado at Boulder, Pikes Peak Community College, and the University of Southern Colorado each have an ITFS system with a wireless cable partner. In southeastern Colorado, an ITFS system is currently under construction. Colorado's higher education institutions propose to construct a network with an ATM backbone and DS-3 and T-1 extensions to the rural areas of the state. Approximately 30 school districts in Colorado are currently receiving programming via satellite. The state also originates some teleconferencing via satellite for staff development from the DOE.

The Digital Data Network (DDN) is a microwave network operated by the Department of Administration's Division of Telecommunications for state agency use. Although there are more than 30 Internet service providers in the state, Colorado SuperNet is the state's primary link to the Internet. The network provides the people of Colorado with network access and support as well as access to on-line data resources. Colorado SuperNet collaborates with the state library project, the Access Colorado Library Information Network (ACLIN).

HIGHER EDUCATION

Higher education institutions plan to reach more clients and enhance educational opportunities through the use of technology. Red Rocks Community College's compressed

video network connects four sites. The system offered 23 courses per academic year through a 1991 Title III grant. Income for system maintenance is generated by businesses that use the network. The college successfully designed new instructional approaches through the use the technology. Three rural mountain school districts have been connected for the delivery of courses. Because the Title III grant expired, school districts and the community college are now sharing the cost of the telecommunication lines. They will in turn receive upgraded equipment through one of the US WEST grants.

Colorado is home to three national oriented educational telecommunications services. From Fort Collins, the National Technological University (NTU) delivers business and engineering graduate programs to individuals in companies throughout the U.S. NTU increased its number of available programs by moving to digitally compressed video. A Denver suburb is host to the Mind Extension University and the Education Network, offered by Jones Intercable, Inc. The third nationally oriented service that Colorado offers is the Colorado Electronic Community College, which is a partnership between the community college system of Colorado and the Mind Extension University. The partnership, which received state money last year, concentrates its efforts on offering a complete community college education in a two-year degree program nationally over cable.

Although the Telecommunication Cooperative for Colorado's Community Colleges (TELESCOPE) is not active in planning networks or delivery, it is very active in faculty development opportunities for its members, including holding an annual faculty development event. TELECOOP allows two-year colleges to provide educational and telecommunications/distance learning services to students. All 12 community colleges have C- or Ku-band downlinks.

The University of Colorado operates a fiber network that links four of its campuses. The University of Colorado's Health Sciences Center School of Nursing is currently expanding its graduate nursing program from one site to three hospitals across the state. The program has been in place through the past eighteen months over a compressed video network. Most of Colorado's public institutions of higher education are connected to the CIVICs network via leased T-1 line delivering compressed video. The University of Northern Colorado has a distance education technology training center and is expecting to further develop, refine, and expand its network.

Colorado State University's (CSU) SURGE program and the University of Wyoming exchange courses via point-to-point microwave system to supply videotaped instruction. Front Range Community College is instructing students over the Internet throughout the county as well as in the former Soviet Union.

K-12

K-12 schools have various programming sources for distance learning. Oklahoma State University, TI-IN, and Kansas State University offer satellite programming. Districts originate and receive programming by terrestrial networks including LANs, audiographics, ITFS, T-1 compressed digital video, and fiber optic networks. Most school districts in the state have at least one dial-up connection. There are approximately 50 Internet providers in Colorado, including the Colorado SuperNet, which provides roughly 85 percent of connectivity to local providers. Instruction originating from Red Rock Community College is delivered over dedicated phone lines. The courses are transmitted to rural mountain high schools via the Colorado Technological Education Association of Colleges (TEACH), and the Communities and High Schools Network.

The Boulder Valley Internet Project is experimenting with networking a large K-12 school district to the Internet. So far, teachers are integrating the Internet tools and resources into the existing curriculum and utilization patterns vary by grade level and connectivity. The project shows that this technology offers many features, such as readily available expertise and real- or near-time knowledge, on which learning-models such as Global Exchange should capitalize. The opportunity for two-way interactive exchange offers a powerful learning vehicle as well. The network permits improved and easier access to both local and distant resources.

Efforts to extend Internet services in classrooms continue with the implementation of the Boulder Community Network, which was developed with the aid of the University of Colorado. The successful network, which was a recipient of a NTIA grant, ties into all the Boulder Valley schools.

Colorado continues its work with the Pacific Mountain Network (PMN), a regional organization of public broadcasting that, through a Stars School dissemination grant, to assist K-12 educators in Colorado, Utah, and Nevada in distance education planning and implementation.

MAGGnet is a collaborative effort of Colorado Springs Pikes Peak Library District and MCI. This is the first program in use as part of the MCI Library Link initiative. All libraries in the Pikes Peak District are eligible for the project.

FUNDING

The PUC/US WEST fund is used for projects that improve telecommunications in the US WEST region, which is 50 percent of the state. Projects can include schools, libraries, health care education, and government applications. For example, a library received $40,000 to receive Internet access and the health care community received
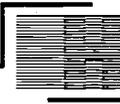
$600,000 for a large regional interactive video network for telemedicine. Twenty-three grants totaling $4.3 million were administered by US WEST and are presently being distributed.

In 1994, the Colorado Department of Local Affairs established an Energy Impact Assistance Program (EIAP), administered by the Colorado Department of Local Affairs, distributes funds to local communities. This funding source is related to the resources areas of the state, such as oil, gas, and silver.
State excise taxes on the export minerals are invested in EIAP and given back to the communities and areas where there has been an impact because of the mining operations. Schools districts may apply for distance learning projects and receive money through EIAP.

The state of Colorado appropriated roughly $2 million to higher education for technology incentive grants under House Bill 1196 to increase educational effectiveness in three categories: self paced learning and instructional software networks; interactive distance learning facilities and equipment; and faculty professional development or training in the use of educational technology. The grants are administered by the Colorado Commission on Higher Education.

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CONNECTICUT

KEYPLAN:
- Joint Committee on Educational Technology (JCET)
- Connecticut Public Television
- Connecticut Community-Technical Colleges
- Department of Education (DOE)
- Connecticut State University System
- University of Connecticut (UConn)

RECENT DEVELOPMENTS

Last spring, the state legislature appropriated for the University of Connecticut (UConn) $1 billion for capital improvements as part of the UConn 2000 plan that is both state and privately funded over 10 years. Goals 2000 legislation is a capital investment in the flagship university for all its campuses. Part of this amount is devoted to distance learning data, voice, and video infrastructures that must be built.

Concurrently, a university strategic plan, which includes distance learning and infrastructure, has been approved and is moving toward implementation. Part of the UConn 2000 money will also be used by UConn to increase its distance learning initiatives.

The Joint Committee on Educational Technology (JCET) has been working with a consultant in developing a statewide educational technology plan for K-12 and creating a document of standards for K-12 with regard to educational technology. The purpose of this document is to implement the construction of wiring standards compliant with EIA TIA standards, as well as to make sure it ties in their plans for funding, construction, and renovations.

The Connecticut Education Association, a large group made up of teachers, has become part of the debate in the Department of Public Utilities regarding how excess earnings of local telephone exchange providers should be redirected.

A legislative task force has been established as a result of smaller separate telecommunications bills in the last legislative session to study the potential for educational telecommunications. The task force is expected to report to the legislature on its findings in the spring.

STATEWIDE AND LOCAL PLANNING

The Connecticut Community and Technical College (CCTC) System has moved into the bonding phase with the legislature, which has granted $500,000 to construct a system wide network for the colleges' Compressed Video (CV) Project. The CCTC system is a member of the State Compressed Video Evaluation Council which, in cooperation with the Office of Instructional Technology and State Department of Purchasing, have drawn up RFPs, received and analyzed bids, held product demonstrations, and awarded
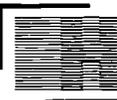
the contract. In addition to the colleges, award participants include the Judicial Department, the Department of Corrections, and the Department of Administrative Services. The new CCTC-CVN network will be used for courses, teleconferences, staff development, face-to-face meetings, and providing intra-agency instructional services.

The Connecticut Distance Learning Consortium, a business-higher education organization, is still active. In 1993, the consortium conducted a survey to identify barriers to distance education within the business community, created an inventory of existing distance education technologies in the state, and developed a five-year implementation plan. In the report it submitted to NTIA, the consortium stated that its goals following the NTIA award period include conducting on-going monthly meetings and facilitating collaborative distance education activities within the state and region.

STATEWIDE AND LOCAL NETWORKS

The statewide ITFS network, Knowledge Net, which is licensed by the Department of Education and operated by Connecticut Public Television, has gradually expanded and transmits 400 hours of educational programming, staff development courses, and in-service training to K-12 schools and state agencies. Four Connecticut State University campuses use Knowledge Net's ITFS system for delivering telecourses and deliver telecourses to hospitals for continuous education.

The CCTC system is a 17-site network incorporating the state's 12 community -technical colleges. The system has 8 satellite downlinks and is developing a compressed video network to link all campuses.

The statewide Community Technical College Cable Network, operates 24 hours per day on 17 cable systems throughout the state. In 1995, the colleges took part in the video dialtone project with SNET in West Hartford where customers were able to obtain instructional video on demand. SNET has since ceased operation and has applied for a statewide cable franchise. For the CCTC, the training of staff, faculty, and supporting personnel in the use of compressed video technology will be the highest priority for 1996.

HIGHER EDUCATION

Campuses at UConn in Storrs, and five regional colleges are linked together as a one-way video, two-way audio full broadcast fiber base. Plans are underway to implement ATM to a fully active audio and video system to link the main campus, five regional campuses, the health center, and the law school. UConn has eight interactive compressed video systems and a 16-port bridge operating at the main campus and the five regional campuses.

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UConn is now linked with Knowledge Net as a receive site and a broadcast site. The university will be working with CSET and JCET on statewide planning efforts primarily for K-12 with a higher education component. The UConn Strategic plan suggests that the university take an active role in integrating with the state and other state agencies to develop distance learning systems for voice, data, and video.

FUNDING

As part of the university system $15 million Telecommunications Improvement Fund, $1 million has been used for compressed video equipment and plans to use T-1 connections between campuses, partly for video, data, voice, and various other services.

Individual colleges fund their own equipment costs, including purchasing satellite dishes.

K-12

Bonds have been issued to equip schools with antennas and decoders to receive courses through Knowledge Net.

SNET's Telecommunications Incentive Grant is the primary source of funding for various projects at the K-12 level.

DELAWARE

KEY PLANNERS
- Office of Telecommunications Management
- The Delaware State Instruction Technology Team

RECENT DEVELOPMENTS

While the state of Delaware has been known in the past to show reluctance in financially supporting telecommunications initiatives, the Governor has made a $30 million commitment for wiring infrastructure to each classroom.

Bell Atlantic in Delaware is looking at a fiber optic, full motion, two-way live interactive system for K-12 beginning in September 1996. Each location is connected to a full rate SMDS line.

In 1995, Delaware connected all high schools, middle schools, and district offices to the state's wideband network.

STATEWIDE AND LOCAL PLANNING

The Department of Public Instruction (DPI) has formed an instructional technology team at the Department to work with teachers and to study aspects of statewide instructional technology. Technical training of teachers is a high priority issue with the DPI.

In June of 1995, the state legislature passed a bill to create the Delaware Center for Educational Technology (DCET) to wire school buildings and classrooms for computer technology with a fiber and copper combination over the next three years. The bill provides $10 million each year for schools, however, schools must have matching funds from outside sources for the second and third year. The initiative will allow Internet access and meet the goal of having every school in Delaware wired. The first $10 million will be used to conduct an engineering study to connect 31 high schools and 13 district offices. The DCET executive director will submit a strategic plan at the end of the fiscal year for the adoption of widespread educational technology in the state.

STATEWIDE AND REGIONAL NETWORKS

Inspired by the Delaware Telecommunications Technology Investment Act of 1993, Bell Atlantic has pledged to invest at least $250 million for a fiber based network linking schools, hospitals, and government offices at no cost. This will be accomplished over the next 5 years through the Basic Education Connection program, which was established by Bell Atlantic in 1995. Part of this program is to have all these entities' central offices linked to the network as well as to have ISDN available to all customers in 1996 and digital switches deployed to all Delaware telephone offices by 1998.

Bell Atlantic has provided a subsidized service model that provides 32 T-3s into the school for $1500 per month.

ISDN tariffs are on a metered basis, and unlike other services in Delaware, ISDN implementation has not been widespread.

The state's Criminal Justice System currently has a 6 node videoconference service in New Castle County. The compressed video system is installing eight more nodes in Sussex County.

HIGHER EDUCATION

The Flexible Options for Continued University Studies (FOCUS) is the delivery system for distance learning and is fully funded by the tuition of University of Delaware students who receive credit through the videotaped courses at the undergraduate and graduate level. The university offers 90 credit and 30 non-credit courses via videotape to more that 1700 student registrations per year. The university also produces and uplinks graduate engineering courses for the National Technological University.

A fiber optic link between University of Delaware sites in Newark and Lewes allows the College of Marine Studies to deliver courses and meetings via two-way video. The Georgetown Higher Education Building has recently linked to the Newark campus. Graduate education and nursing courses are offered on the Georgetown-Newark link through two-way video. Satellite is no longer used for graduate nursing courses.

Supported by an IBM and Unidel Foundation grant, the University of Delaware now has an instructional television classroom with extensive multimedia capabilities connecting to southern Delaware through the two-way instructional television (ITV) link to the Georgetown Higher Education building and other locations on the campus cable system.

In collaboration with Mind Extension University, the College of Human Resources has been working on a new distance learning initiative by offering an undergraduate degree in Hotel, Restaurant, and Institutional Management (HRIM). Courses are available on cable and videotape.

Three of the four campuses at Delaware Technical and Community College, the only community college in Delaware, offers distance learning. The College, which hosts non-credit teleconferences, now has a DS-3 network operating in three campuses to teach credit courses. Telecourses are purchased through PBS and converted to a videotape format. The College also works with seven higher education institutions to support bachelor level courses on behalf of corporate clients. The campuses provide down-

link site capability, video distribution, and e-mail access. Corporations with headquarters in Delaware such as DuPont are seeking assistance for the College for Internet training and the construction of Web pages.

K-12

The University of Delaware has created a web site called Technology Outreach in Education to support K-12 educators, students and schools. K-12 members can use the web site link to gain access to information from the DPI and the University of Delaware College of Education. Sites include the University of Delaware Network Partnership Program, which assists schools, public service organizations, and local government agencies to use and develop services on the Internet. Also included among these sites is a Mentors for Teachers program for instructor support.

While the Internet is not in every classroom, access is made available to all high schools in Delaware by the state. All libraries have 24 stations for access, and teachers gain free dial-up access to the Internet. Training of teachers and administrators is funded with local money; one district has two technical specialists for Internet training. Teachers have initiated projects through the Internet to the DPI. Usage of Internet is not yet widespread, but the infrastructure is rapidly progressing to completion.

Fifty-two high schools have satellite downlinks provided through Cable in the Classroom and Channel One.

All middle schools and high schools have routers and T-1 lines and through Office of Telecommunications Management (OTM), have Internet access. Elementary schools are planning to have T-1 lines run to each school within the year. The primary distance learning network is a Bell Atlantic fiber optic system connecting four high schools, three of which are located in the New Castle County Vo-Tech District. Seven high schools in Delaware have distance learning capability.

A curriculum development group with representatives from all school districts has been working for almost a year to incorporate technology into the classroom. Learning resource centers have been provided with access to videoconferencing and the Internet.

DCET, Delaware State Instructional Technology team, and the Delaware Educational Network are all involved in teacher and staff development and curriculum development. OTM won a grant to train technology coordinators at the district level.

FUNDING

DPI has received a Goals 2000 grant in the amount of $1.2 million for 1996. DPI also allocated $480,000 for technological related professional development. Each school

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district must have a plan for teacher professional development in technology, as well as a decision as to how they are going to use the money given to them.

Tuition and fees of University of Delaware students support distance education initiatives.

At this time, there are no state allocations for distance learning or educational technology.

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FLORIDA

KEY PLANNERS
- Florida Community Colleges
- Florida Public Broadcasting Services
- Florida Board of Regents
- Department of Education

RECENT DEVELOPMENTS

As a result of intensive restructuring, Florida continues to maintain its role as a leader in statewide telecommunications. The Florida Remote Learning Service (FRLS) has been terminated and in its place the Florida Distance Learning Network (FDLN) was established. The state legislature was also able to allocate funds for school district technology use. A portion of these funds were used for training in the K-12 area in order to promote the use of technology in education.

The governor also appointed a Distance Learning Board for the FDLN. The board consists of members of the state government, a member of the Division of Community Colleges, as well as representatives from higher education, private industry, and rural hospitals. Three subcommittees; Technology, the Transponder Committee, and Needs Assessment are working under the directive. A request has been made that another subcommittee be established to address intellectual property rights and copyright issues as they relate to distance learning. The board is a broad-based group with a transponder on TELSTAR 40. The transponder time is managed by the Division of Management Services.

Out of Senate Bill 26, the Florida Learning Network Council was created in order to develop a strategic plan for the use of technology in improving the delivery and access of education as well as coordinating a cost effective system for statewide distance education. The Council is comprised of members from the higher education sector, public and privates schools, as well as representatives from the cable, local and long distance telephone companies, and the computer software industry. The Council is required to meet at least four times during the fiscal year and submit reports and recommendations to the appropriate committees of the House and Senate.

STATEWIDE AND LOCAL PLANNING

The Distance Learning Board has met several times to discuss educational, government, and private industry use. They are currently considering charging business and industry full fare for use of the system, as well as have educational and government agencies pay 70 percent of the commercial rate. The board decided that the legislature can use the system free of charge, while all others pay a rate of $300. The education entities can pay $300 if they meet their criteria concerning credit courses and, or professional development.

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In terms of the shifts in statewide technology, there have been some changes in tele-
communications legislation. While FDLN was designed to perform similar tasks as the
now defunct FRLS, FDLN enjoys greater legislative authority. Before terminating op-
erations, the FRLS was a statewide network that provided and delivered educational
materials and programming to educational institutions, businesses, community facili-
ties, homes, libraries, and prisons through the use of voice, video, and data.

The legislature's allocation of funds for school district technology use and training
was significant in the K-12 area in promoting the use of technology in instructional
areas around the state. The retrofit funding that was available for school districts
through grant programs in recent years was also a significant endeavor from the
state.

The Higher Education Post Secondary Education Planning Commission conducted a
study on distance learning and identified the fact that the public television stations in
the state have up to six hours of unused capacity per day that could be used for the
delivery of regular telecourses. Another issue that was addressed was the fact that
many students do not watch the telecourses during their regular air time. Students are
more likely to set their VCR's and watch them at their own convenience. As a result
there is some questioning as to whether these telecourses should be programmed dur-
ing the out hours of 12 a.m. to 6 a.m. and schedule programming that would address
the general audience during a regular time.

STATEWIDE AND LOCAL NETWORKS

The Florida Information Resource Network (FIRN), a dial up, leased phone line net-
work, which is based on the existing state university system's network and other re-
sources, added several new server sites. These sites include Project GeoSim, a joint
research project of the Departments of Computer Science and Geography at Virginia
Tech, which is creating models for introductory geography courses; the Satellite Ac-
tive Archive, which is a digital library of real time and historical satellite data from
NOAA's Polar Orbiting Operational Environmental Satellites (POES); and the Text
Project, whose purpose is to generate hypertext books to teach various subjects over
the network.

An ITFS system will be operated out of the Distance Learning Office, which was orga-
nized by the Florida's Public Broadcasting Service (FPBS). FPBS has also been working
with industrial engineering groups on the East Coast to connect them to stationary
ITFS uplinks.

HIGHER EDUCATION

The new University at Fort Meyers will serve those Florida counties that had been

served by the University of South Florida (USF). USF will close the campus at Fort Meyers and the new institution will become operational as early as the fall of 1997.

The 28 community colleges are active in distance learning, primarily through ITFS. A few community colleges are affiliated with stations, including Pensacola , Daytona Beach, and Brevard. The community colleges have three ITFS systems and are applying for a fourth. Currently, 6,000 students are enrolled in telecourses that are produced by the colleges and distributed through PBS.

The ITV - Instructional Television is a consortium among the community colleges that covers six districts and intends to share experience and information in telecourses.

K-12

Through the efforts of the Department of Education, the Center for Educational Technology the Public Schools Council, nine operational test sites, the Leadership Council, the Policy Advisory Council, the DOE Planning and Resource Committee, and the Systems Integration Team (SIT), and the Florida School Year 2000 Initiative have been developed. The initiative is targeted toward increasing the output of Florida students through developing, testing, and implementing a technology support system of schooling. There has been $7,200,000 allocated for this model project.

FUNDING

Higher Education

The state university system offered approximately $9 million for distance learning projects. The money was earmarked for consortiums only so that individual school districts would be encouraged to collaborate.

K-12

Fifteen percent of the schools in the state were retrofitted from the funding program established by the legislature. A number of schools have found money themselves to continue retrofitting schools that did not get fitted through the state allocation.

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GEORGIA

KEY PLANNERS
- Department of Administrative Services (DOAS)
- Georgia Public Telecommunications Commission
- Board of Regents
- Department of Education

RECENT DEVELOPMENTS

Educational technology activity continues to flourish in Georgia. The $50 million allotted for the Georgia Distance Learning and Telemedicine Act of 1992 (SB144) has increased to $70 million. Georgia Public Television (GPTV) has been producing programming for national distribution and is formulating a plan to integrate the various technologies to serve their different audiences. The Georgia Public Service Commission has approved the Classroom Communication Service Plan of Southern Bell to give Georgia schools service rates 40 to 80 percent lower than business rates.

STATEWIDE AND LOCAL PLANNING

The Georgia Distance Learning and Telemedicine Act of 1992 (SB 144) continues to strongly influence distance learning in the state. SB 144 now has $70 million from an additional $20 million previously withheld by the Public Service Commission (PSC) to reimburse independent phone companies for revenues lost due to competition with the state. Since the amount requested by these companies was nominal, the bulk of the $20 million was reassigned to funding for projects in distance learning and telemedicine, as designated in SB 144. As of late 1995, $65 million had already been committed to a Universal Service Fund for these projects. The Distance Learning and Telecommunications Governing Board oversees the expenditures of this fund.

Formal and informal groups continue to form and address distance learning issues in the state. The Office of Information and Instructional Technology (OIIT) plans and coordinates telecommunications for the university system of Georgia which includes all 34 state funded institutions of higher education. The Information Technology Policy Council addresses short-range and long-range planning policies for the educational component of statewide telecommunications. The Distance Learning and Instructional Technology Committee was formed to examine grade transfer, costs, and territorial issues for higher education. The group is not yet Regents approved as an acting committee.

STATEWIDE AND LOCAL NETWORKS

A recent agreement between ACTV, Inc., and the state calls for the installation of the ACTV interactive distance learning system and software in eight of the Georgia Statewide Academic and Medical System (GSAMS) sites. ACTV is in partnership with Geor-

gia State University through the $275,000 phase I of this project to allow teachers to develop their own televised programs.

GSAMS, a fully interactive videoconferencing system, includes a distance learning network and a telemedicine network funded by the 1992 Distance Learning and Telemedicine Act to improve access to education and medical care. The combined network is managed by the Department of Administrative Services (DOAS) to serve K-12 public schools, colleges, universities, technical schools, hospitals, prisons, Georgia Public Television, and ZooAtlanta. The distance learning network includes at least 206 sites, and the telemedicine network includes 57 sites. The Distance Learning and Telecommunications Board has agreed to fund an additional 125 sites and the Board of Regents will fund about 40 sites.

The distance learning and telemedicine networks are expected to be combined in the future. As of March 1996, distance learning network usage included an average of 330 conferences each week at more than 900 different locations. To date, 20,000 classes have been taught with a current monthly average of 10,000 hours of instruction. The 10,000th GSAMS videoconference in December 1995 demonstrated the ability of technology to provide true signals as a renowned violinist in California listened and provided instruction to three students located at the Georgia Center for Continuing Education. The GSAMS distance learning network operates at half T-1 and the telemedicine network at full T-1.

The Telecommunications Division of the DOAS defined a new telemedicine site in the distance learning database. This provides network physicians with ready access to educational institutions. Through the GSAMS telemedicine network, a rural physician can connect with any of the 57 network locations for consultation with a specialist who is not available locally. Physicians on this network can make educational presentations to students and respond to school emergencies to a limited extent. Medical students in rural areas receive medical education credits based on their network consultations with physicians.

Through the Academic Program Committee, all GSAMS installations can take place with data communications connectivity. As a result, GSAMS can be enhanced through data communications access to e-mail and the Internet.

The Georgia Public Telecommunications Commission (GPTC) delivers public broadcasting and instructional television to K-12 and higher education institutions over PBS. Daytime programming for K-12 is selected, purchased and scheduled by GPTC. The DOE receives audio and video services through GPTC and coordinates planning of two-way transmission of data via microwave. Over 300 sites were connected with two-way video capability in 1994.

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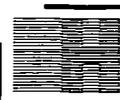
Georgia Public Television (GPTV) is a subset of GPTC. Through partial funding by the Distance Learning and Telemedicine Act, GPTV provides programming to every K-12 public school, college, university, community college, technical school, regional library, and regional service agency in the state through nearly 2100 satellite downlinks. The downlinks were funded jointly by the Distance Learning and Telemedicine Act of 1992 and the state lottery. To be completed in the fall of 1996, this system includes a full transponder on Telstar 401, and will provide six to eight channels with MPEG 2.

GPTV has a number of initiatives on its new PeachStar satellite system. In addition to programming, the station collaborates with Galaxy, Scholastic Magazine, and others in co-production. GPTV is also purchasing the rights to programming from other distance learning providers on their satellite network. For example, the GPTV transponder now carries the University of Alabama Integrated Science 6,7, and 8 program. The transponder also carries programs from IdeaNet, Distance Learning Associates, and all the major distance learning providers in the country.

By September 1996, GPTV will have installed at least two integrated receivers and decoders (IRD) at every site with a satellite dish which can also receive digital satellite programming. GPTV will then have a transparent, seamless system of integrated terrestrial and satellite technology.

The OIIT operates PeachNet, a data network, which connects all 34 state-funded higher education institutions and links them to the Internet. This network provides functions for administration, instruction, research and business services. Through PeachNet, educators and administrators have access to the Georgia College Educators' Network (GCEduNet) for e-mail, conferencing, file sharing and on-line databases.

K-12 schools also enjoy Internet access through PeachNet. For citizens access, the Distance Learning and Telemedicine Act funded a pilot project to connect eight regional libraries to PeachNet. The 1995 state legislature voted to expand the project to regional libraries in all counties. The Department of Public Library Services will hope to expand this project to all libraries in the state with the next legislative session.

PeachNet provides access to the Galileo (Georgia Library Learning Online) Project, a statewide initiative to create a single virtual library for the state. The initiative allows access to holdings records for all higher education libraries, as well as full-text abstracts of articles in their databases. The goal of the project is to provide complete access to resources and library materials, regardless of where the database is accessed.

The DOE operates Genesis, a telephone-based data network that interconnects county seats and schools.

HIGHER EDUCATION

Atlanta-area colleges and universities collaborate to provide distance learning instruction through ITFS. Other schools are considering this technology as a cost effective solution for rural area access to education.

The Georgia Center for Continuing Education at the University of Georgia offers non-credit programming in areas such as medicine and law via satellite to the university system's 34 institutions and other organizations and agencies. There are proposals for the university to deliver for-credit courses to different institutions in the state.

The Georgia Distance Learning Project, formerly the Georgia ClassConnect, has become part of GSAMS. This project transmits courses, workshops, in-service training, and videoconferences to higher education sites and four high schools over a T-1 copper wire system and involves Columbus College, Georgia Institute of Technology, Morris Brown College, and the University of Georgia.

K-12

Many K-12 students receive programming through the multi-state SERC consortium. With satellite downlinks at every school in the state as a result of the state lottery, participation in satellite delivered instruction is from GPTV is expected to increase. In addition, the state is producing many hours of original programming.

FUNDING

The Georgia state lottery provides funding for educational projects and services in the state. In addition to satellite downlinks for every Georgia school, lottery money funds the full-tuition Hope scholarships for B-average high school and technical school seniors desiring higher education in Georgia. Lottery money also pays for computers, satellite dishes, other hardware and software, as well as maintenance and usage costs for these systems at all educational levels. The lottery funds a pre-K program for all children in the state. Through a $45.3 million appropriation for technology in schools and capital projects in 1994, the GPTV will build a state-of-the-art production facility for distance learning applications.

Approved by the governor in 1993, lottery earnings allocated for technology in the first year totaled approximately $250 million. While the state has not earned that much in subsequent years, it continues to receive large amounts of funding for scholarships, technology and other programs, and the program is slated to continue.

The Distance Learning and Telemedicine Board oversees the expenditures of the Universal Service Fund. Among other things, this one-time fund supports staff development and student instruction in technology. The Board has committed approximately

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$65 million of the $70 million Universal Service Fund. So far, $39 million of this has been spent on GSAMS, a cable project, a desktop video project, and an initiative to provide Internet access through public libraries.

SB 137, passed in 1995, requires Tier One telecommunication service providers who have spent an average of $500 million per year on infrastructure to continue to spend that amount per year over the next five years to improve infrastructure in Georgia. While this is not a legal obligation, it has encouraged the development of distance learning and telemedicine infrastructure within the $500 million framework.

Student fees are used to support a number of distance education projects in Georgia.

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HAWAII

KEY PLANNERS

- Department of Education (DOE)
  Office of Information and
- Telecommunication Services

RECENT DEVELOPMENTS

During a legislative session, HB 471 was passed which stipulates that providers of telecommunication services must enter into negotiations governing interconnection, unbundling, and resale. The agreements may be reviewed by the Public Utilities Commission (PUC). HB 471 is expected to foster greater competition and bring in more telecommunication providers to the state. As part of this legislation, PUC is investigating infrastructure for deployment and use of technologies and services to ensure affordable consumer access to high quality services. Further, all service providers are required to contribute to a Universal Service Fund from which public institutions may receive discounted rates for basic service.

As a result of a partnership with the Maui High Performance Computing Center, the Department of Education (DOE) is now connected to the Internet via T-3 lines. At present, the department has an Internet service, available to all K-12 teachers and students, free of charge. The DOE requires that teachers go through the appropriate technology training. The DOE offers a program on policy training that is available via broadcast or videotape. Teachers are also required to train students before assigning them an Internet account. Each school in the state has received its own IP address and in turn registers its own school coordinator. The students at home who are using the Internet via a dialogue system must be under the supervision of their parents.

STATEWIDE AND LOCAL PLANNING

The Statewide Telecommunications and Information Coordination and Policy Advisory Council, consisting of public sector telecommunication providers, users, and private providers, was created to address technology issues. PICHTR received a $175,000 NTIA grant with matching state funds to deal with issues of the above council.

A plan is underway for a distance learning connection between Hawaii and California.

Through Goals 2000, the DOE completed the Hawaii State Educational Technology Plan.

STATEWIDE NETWORKS

As a joint project of the University of Hawaii, DOE and East-West Center, the goal of the Hawaii Educational Networking Consortium is to implement full network connection between all of the islands. Full connection of the education and research community will allow access to educational services, communication services, li-

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braries, and information resources in the state. The consortium is also considering a public policy pertaining to educational related issues, and works with other groups to encourage use and understanding of information technology for research and education.

Hawaii has two statewide networks, Hawaii Wide Area Integrated Information Access Network (HAWAIIAN) and Hawaii Interactive television System (HITS).

HAWAIIAN has been set up by the state to provide public access to technology and to provide state agencies effective ways of setting up video networks. HAWAIIAN is an umbrella network consisting of several components, including the Institutional Network. Managed by the Information and Communication Services Division of the Department of Budget and Finance, the network consists of a digital microwave communication backbone and a SONET system. SONET carries voice, data and T-1 speed digital videoconferencing. Available on HAWAIIAN is a videotext gateway service called Hawaii FYI which allows access to educational, government, and some private information services.

Currently, HITS is a point-to-point analog microwave system that carries full motion video from Oahu to other islands. Local ITFS distribution is available to some schools and hospitals. HITS has been transferred to the University of Hawaii to improve operating efficiencies and facilitate further system development and modernization. The transfer was successful and the university is currently trying to digitize HITS. The university is seriously seeking funding for this digitization to address the needs of the community. The network provides services for the University of Hawaii, DOE, state agencies, and others.

Maui Community College developed and operates Skybridge, a one channel, two-way interactive video network which is based on analog point-to-point microwave technology. The college is a campus of the University of Hawaii and serves Maui, Molokai, and Lanai. Although there are no plans to expand Skybridge, there still are needs between Molokai and Maui. The Information and Communication Services Division (ICSD) has been negotiating with a number of groups who want to connect with both Molokai and Lanai. At the present time there is a pilot program with GTE Hawaiian Tel for video conferencing in Molokai. The DOE pays for the heavily used video conferencing connection between Molokai and Maui.

The cable television industry in Hawaii is regulated by the State Department of Commerce and Consumer Affairs. Cable television companies must provide support for Institutional Networks through part of the cable franchise agreements. The Institutional Networks connect state facilities, schools, and government buildings using vari-

ous technologies. Education currently uses SONET, uncompressed digital video, and Ethernet-over-CATV within single cable franchise areas.

Oahu's cable company, Oceanic Cable recently purchased one of the three cable companies on the northern side of the island. As a result of the purchase, the DOE is expecting to see the Internet develop on that part of the island. Oceanic has also been in talking plans for buying out Jones Cable. If the purchase were to materialize, an increase in connectivity could be witnesses around the state.

Hawaii currently uses almost all the transmission technologies including satellite, microwave, fiber, and frame relay. According to GTE Hawaiian Tel, ATM has not yet reached the state, although there is interest evident in the state. INET covers some medical institutional sites in the state.

HIGHER EDUCATION

The University of Hawaii system uses interactive video and cable to offer distance education classes throughout the state. New facilities are under construction on various campuses to offer two-way video, which is the preferred medium.

The university system is also working on two international projects. PEACESAT is a satellite-based low speed data and voice network serving the entire Pacific Basin. PACCOM is a high speed research and education network that provides Internet services to Japan, Korea, Australia, New Zealand, Hong Kong and Guam.

The DOE and the University of Hawaii have enjoyed a positive partnership since their involvement with the KOMAMA server project. The server is housed and maintained by the university in combination with various DOE affiliates. The project had been a pilot for a few years and provided the DOE information on the kinds of inservice required, the need for teachers to see the relationship between getting connected and learning, and what to do with the technology once the connection had been accomplished.

The DOE entered into a consortium with two other members, each from the University of Hawaii and the East-West Center. This consortium formed what is called the Hawaii Educational Network Consortium (HENC). Out of this organization came a grant proposal to NSF called Hawaii Educational Research Network (HERN), which received $2.1 million for staff development. HERN started its first boot camp this past summer with 120 DOE teachers. The purpose of this camp was to train these teachers, who would then go back to their schools and train their own faculty. The East-West Center deals with all the international education leaders in the various political groups that come into town and foster a lot of multi-cultural exchange.

K-12

Almost all public schools in the state receive live, direct student instruction and teacher in-service programming through public broadcasting, cable access, or HITS. The DOE offers statewide classes such as Advanced Placement Calculus and KidScience. Cable offers a Homework Hot Line as well as in-service training programs to teachers and administrators.

Seven more videoconferencing classrooms are operational around the state. Some of the sites use fiber optics with full bandwidth, others use T-1 compressed digital video. These classrooms have been established through the DOE and their Instructional Technology Centers around the state.

Most of the schools in Oahu are connected to the Internet through the wide area network and many schools have a local area network. GTE Hawaiian Tel offered a $2000 educational grant to those schools on the neighboring islands who do not have the same cable companies as Oahu. Consequently, all schools in Hawaii have been able to get onto the Internet via frame relay services coming to Oahu and then out to Maui.

In September, the DOE deliberately cleared the distance learning channel schedule in order to address the needs at the high school level, such as providing a virtual school through television and on-line. Schools would offer courses outside of the school day to allow students to take the courses that they want in school and take a required course at home.

The DOE is also piloting a guidance course and a telecommunication course this semester. The intent is not for the state to develop the courses, but to encourage teachers at the site to initiate and design courses for broadcast or on-line. The DOE had five or six teams come together and propose a number of courses to be offered in September, including AP Social Studies, Hawaiian history, geometry, and a Shakespeare course.

The DOE has also decided to pursue an accelerated course study program. For example, students in 7th and 8th grade, who excel in math, may need a greater challenge such as an accelerated course. The superintendent of schools agreed that the students should receive the credit for the accelerated courses.

The DOE has also unveiled two projects simultaneously. The first project, called Virtual View, is an attempt to produce a statewide student newspaper. The DOE felt that for each school to have their own newspaper is restrictive in the sense that each paper is a product of an individual schools' writing class. The problem in that is there may be a gifted writer in the school who does not have the time to take a writing class. The DOE felt that by opening up Virtual View to any student who wanted to publish, the

schools would then become bureaus, with either teachers or students as editors. Depending on how much the teachers valued this kind of communication, they would allow their students to get involved in this. The intent is to have all the schools contribute to Virtual View on the home page on the Web site.

The second project that is being presented to the superintendent is more in line with math, science, and economic education and is called a Virtual World Trade Center. Through the program, the DOE expects students to follow national and international trading on the Internet. The project is in its initial proof-of-concept stages.

FUNDING

The main source of funding for educational technology comes from the state legislature. The DOE funds Internet access for schools through the state general fund. The legislature also appropriated funds for the network upgrade.

Additional funding is now being realized in partnerships with local and national corporations, businesses and non-profit ventures. Labor is often provided by members of the educational community, parents, and military service personnel.

IDAHO

KEY PLANNERS

- Telecommunications Council (TELCOM)

RECENT DEVELOPMENTS

The governor recently convened the "Info-Tek '96" task force of 30 agencies and the Superintendent of Public Instruction to leverage technology investment in telecommunications and to integrate the rural health care, education, public safety, and economic development communities into a statewide telecommunications infrastructure. The approach will be less expensive than building an infrastructure for each community. In response to the task force recommendation, the legislature established the 16-member Information Technology Resource Management Council to be appointed by the governor and representing all educational entities.

Since infrastructure to rural parts of the state must still be constructed, the state will provide the incentive to common carriers to provide this last mile by acting as an anchor tenant for the system. The project is anticipated to spur economic development in these rural areas and provide a justification for the common carrier investment.

The state legislature, under the Idaho State Technology Act of 1994, allotted approximately $14 million for educational technology in 1994-97. The K-12 sector received $10.4 million, most of which is allocated at $55 per pupil. Higher education received the remaining $3 million. The governor has appointed a 15-member Idaho Council for Technology and Learning to establish state guidelines and oversee distribution of funds, for which school districts must provide plans for their technology applications. The council, responsible to the State Board of Education, consists of the State Superintendent of Education, four legislators, and representatives of various state educational agencies. Six Regional Technology Advisors support the council in its work. The 1996 Legislative Joint Finance Committee voted to allocate part of the public school appropriation for council expenses and a full-time networking/telecommunication specialist.

Eastern Idaho Technical College (EITC) has a distance learning center with a two-way compressed audio/video network. The center offers high school vocational and college courses to eight rural area high schools across northeastern Idaho. EITC hopes businesses will use the network for professional development.

The Public TV Microwave Task Force emphasized that the state should form partnerships and use public switches network and buy service rather than infrastructure. Idaho has been facing the problem of crossing its three LATAs with T-1 lines as it moves forward in expanding telecommunications.

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STATEWIDE AND LOCAL PLANNING

Having guided the evolution of Idaho's telecommunications infrastructure, the Telecommunications Council (TELCOM) is now a policy and scheduling committee specifically for higher education. Membership consists of agency representatives and executive academic officers of represented institutions. TELCOM coordinates and approves regional network expansion according to the Master Plan for Telecommunication Development. The plan calls for the expansion of the intercampus microwave backbone to all colleges and universities, increasing backbone capacity, using the open broadcast channel, and developing policies and procedures for backbone utilization. As part of its role in policy making for Idaho's telecommunications, TELCOM has proposed the formation of subcommittees in the areas of academic library and computing services. A TELCOM distance learning subcommittee has formed which attends to scheduling, faculty training, and policy issues related to distance learning delivery.

The Idaho Council for Technology in Learning (ICTL) was established by the legislature to develop technology and infrastructure in public schools. The 15 member board reports to the legislature and the State Board of Education and administers an annual budget of $10.5 million in technology grants to public schools that have submitted their own technology plans. All non-institutional requests for funding must be approved by ICTL. To date, $28 million have been granted to public schools and higher education institutions.

As a result of competition and reduced prices of digital circuits, the Shared Use Institutional Networks was established. Several colleges and universities are buying their own circuits to offer instruction via compressed video to off-campus centers. The University of Idaho and Boise State University have begun leasing compressed video circuits or purchasing dial-up services to deliver instruction to off-campus centers.

The Information Technology Advisory Committee (ITAC), formed as a result of the Telecomm '92 Planning Team Report and was involved in advising the Department of Administration on technology issues. ITAC was reconstituted in to the Information Technology Resource Management Council. There are now 14 standing technology committees in Idaho.

Public meetings are currently being held for suggestions on a state technology plan, which will be completed by mid-1996.

STATEWIDE AND LOCAL NETWORKS

The Idaho Educational Telecommunication Systems (ETS) is a TELCOM-coordinated and centrally operated video microwave backbone for a group of networks operated by Idaho State Board of Education agencies to improve delivery of education to Idaho

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citizens. The seven networks include the Higher Education Microwave Network, IPTV Analog Microwave Network, Educational Satellite Network, IPTV broadcast channel, regional networks, Learning Link, Internet, and the Shared Use Institutional Networks. TELCOM, through a $450,000 legislative appropriation, added a channel of compressed video that rides in the subcarrier of the analog signal, so there is now a full-time, dedicated, point-to-point compressed video component off the main state microwave.

The University of Idaho (UI) has a two-site compressed video network connecting the UI Engineering Program in Boise with the Moscow campus. The UI Engineering Outreach program is for unlimited use and is expected to be used for approximately four hours a day. The program is transmitted on a dedicated half T-1 line for $450 per week.

Idaho Public Television (IPTV), formerly Idaho Educational Public Broadcasting System (IEPBS), operates a state microwave network that links North Idaho College (NIC) in Coeur d'Alene, University of Idaho (UI) in Moscow, Lewis and Clark State College (LCSC) in Lewiston, Boise State University (BSU) in Boise, College of Southern Idaho (CSI) in Twin Falls, Idaho State University in Pocatello, and University Place in Idaho Falls. IPTV is also connected to the University of Idaho Center in Boise; the university also has its own connection to this center. The system includes the heavily subscribed IPTV/Higher Education Microwave network. Class transmission occurs on a compressed video system which does not affect microwave broadcasts. Along with courses in engineering and teacher in-service training, the network offers primarily health care programming for nursing, pharmacology, and physician/primary care training.

The Learning Link national consortium no longer exists and Idaho-Link, established in 1987 as a computer-based information system providing bulletin board and electronic mail access to educators and students statewide, will be terminated on June 30, 1996 due to the high cost of providing Internet service to teachers through IPTV.

U.S. WEST and Micron Technologies are offering schools either frame relay or 28.8 dial-up access; Micron offers Internet access and gives Idaho schools a 40 percent discount. Internet connectivity is estimated to increase from 3 to 50 percent by the end of the 1995-96 school year. Internet connectivity for more remote sites is being explored through a combination of cellular and DSS satellite services. US WEST, at an estimated cost of $13 million, has replaced a 392-mile copper cable with fiber optics between Boise and Twin Falls; over 40 southern Idaho communities will have access to these lines.

HIGHER EDUCATION
The IPTV/Higher Education Microwave Network is utilized by all state institutions. Moreover, Idaho State University (ISU) uses compressed video to distribute courses
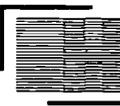
via dedicated T-1 lines. Currently, ISU offers 21 distance learning classes. ISU has established its own compressed video service to Boise, Idaho Falls, and Twin Falls which includes high schools in those areas. The University of Idaho has satellite uplink capability as well as downlinks on campus and in 42 counties. A microwave network interconnects the University of Idaho and Washington State University.

The Simplot Micron Instructional Technology Center, a network center for higher education located at Boise State University, manages many different telecourses, teleconferences, and vocational training services. Simplot provides a satellite uplink, IPTV microwave distribution, and ITFS capabilities. The center was the origination site for a series of teacher in-service programs produced by the Department of Education (DOE) in conjunction with Boise State University's College of Education.

The College of Southern Idaho operates an independent interactive microwave system which expanded its services from outlying communities to the Sun Valley area. Various equipment and facilities are available at telecommunications centers at Lewis and Clark State College and North Idaho State College.

Eastern Idaho Technical College opened a new distance learning center in May 1995. Students in rural eastern Idaho can take vocational and technical classes offered at EITC.

K-12

Internet connections are being rapidly deployed throughout the state's school districts. Several school districts connect through the University of Idaho and Boise State, while others connect through AT&T, Micron Internet Services, and other Internet providers.

Micron Internet Services, a subsidiary of Micron Communications, has recently signed a contract with the Boise School District to provide full Internet services to all 48 schools in this district. Micron Internet Services will provide frame relay services between schools and to the Internet service provider. Installation has begun with completion slated for the end of 1996.

The DOE and the Regional Technology advisors will host seminars on classroom management, the computer classroom, integrating technology into curriculum, networking, software selection, and Internet use.

Idaho, along with Washington, Oregon, Montana, and Nevada, is a member of the Pacific Northwest Star Schools Partnership since the DOE discontinued the Idaho Rural Delivery System.

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IDEANET, a network serving more than 700 schools in the northwestern United States, has been disbanded.

High school students in Idaho Falls are able to take bi-weekly televised courses at ISU.

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ILLINOIS

KEY PLANNERS
- Department of Central Management Services
- Illinois Board of Higher Education
- Illinois Community College Board
- Illinois State Board of Education

RECENT DEVELOPMENTS

The Illinois Department of Central Management Services (CMS) has implemented its Network 2000 Telecommunications RFP. The leased line telecommunications network, is a combination of fiber and copper, carries voice, data, and video services to major nodes in 20 Illinois cites. The network, which is funded by the savings it generates, has joined with Illinois universities and state agencies to provide students, faculty, and state employees access to the National Research and Education Net. CMS is currently working with the higher education sector to look at how the state can bring further cost savings to the educational community for distance learning initiatives.

Through a new partnership with the Champaign County Network (CCNet), Ameritech has introduced ISDN and a high speed Internet access service in Champaign County.

Ameritech recently signed a $3.1 million contract with the College of DuPage to provide a network with local video, data and voice connections between the college's main campus and satellite locations in west suburban Chicago. The seven year contract with a three year option will provide the college with a high speed, private network for transmission of video signals. The network will allow students in outlying areas to partake of educational programs at the Glen Ellyn campus via a live, two way video network. Students will be able to participate in classroom activities through a video camera and two high resolution television monitors. A link is expected with the College of DuPage to satellite locations at Westmont, Glendale Heights, Addison, Lombard, and Naperville.

The State Board of Education, through its Education Service Center, conducted a survey of its directors and technology specialists regarding the use of technology in schools in order to determine a policy direction. The survey showed that less than 10 percent of Illinois school districts are making use of technology as part of its restructuring plans; technology is a resource for only 45 percent of students and teachers; 16 percent of school districts are making use of technology in any form; and a high percentage of districts are using technology for management purposes, rather than for teaching and learning procedures. The State Board of Education conducted its own study to remedy the situation and came up with the following recommendations for schools districts: establish a coalition of business leaders, technology providers, local district educators, and representatives of state government to provide a forum for technology planning,

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communication, collaboration, and advocacy; with the assistance of this coalition, develop a plan for the use of technology in the state school system; identify and modify the laws, policies, rules, and practices that inhibit the use of technology as a resource for improving student learning; develop a statewide telecommunications system serving elementary and secondary schools; continue efforts to incorporate technology in the state education agency and the administration of its programs; and support federal actions that supplement and support the state's technology initiatives.

The Board of Higher Education and Community College Board also conducted technology surveys to determine access and availability of technology in higher education institutions.

STATEWIDE AND LOCAL PLANNING

Illinois is a charter member of the Midwestern Higher Education Commission (MHEC), which has recognized the need for common standards for video codec operation. In cooperation with the commission, the state established ITUH 320 standards. The contract with the vendors and the MHEC is due to expire at the end of August 1996 and a renewel is expected.

The Illinois Board of Higher Education has been working with higher education, elementary and secondary education, libraries, community colleges, and CMS, in trying to remedy high operating cost issues. The CMS has been discussing the effectiveness of creating one cohesive statewide video network. Distance learning has been used successfully to provide video conferencing statewide where library continuing education programs are being offered through downlinks to approximately 30 different sites in the state.

Through the combined efforts of community colleges, universities, and K-12 schools, legislation was passed that allowed phone companies the ability to offer preferential rates for video distance learning. Senate Bill 210 was signed into law this past summer and several local phone companies are currently rolling out new tariff proposals. The state legislature did not provide any new capitol funding instruction moneys this past year.

By June 30, 1996, 277 distance learning, two way interactive video sites in colleges, universities, high schools, businesses, and prisons is expected throughout the state of Illinois. The sites are funded exclusively through the higher education budget.

STATEWIDE AND LOCAL NETWORKS

AT&T has joined with Sprint and Ameritech in contracting with the state to provide network services for Network 2000. Through the contract, distance learning rates have
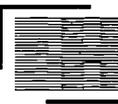
been negotiated that will lower the cost for users. Part of the negotiations include a local access tariff that Ameritech has filed and will be offering and inter-LATA links that Sprint provides on the state backbone where people can take advantage of pricing.

The terrestrial based Network 2000 has nodes in every major city in the state, including multiple node sites in Chicago, multiple DS-3 lines between Chicago and Springfield, as well as nodes representing every major LATA in Illinois. The network carries voice, video, and data for state agencies, state boards, and state commissions. CMS also oversees the procurement of all telecommunication devices for these customers. State agencies in the statute include state universities as well. Although CMS does not have statutory responsibilities for community colleges, private colleges, and institutions. Those entities may take advantage of the CMS pricing and network services.

The Illinois Video Network, operating at one quarter T-1 consists of numerous interconnected sub networks. For example, the Department of Transportation has ten sites, CMS has sites in Springfield and Chicago, and the state forensic lab has nine sites. CMS is currently working with the Department of Corrections to install eight sites. The Western Illinois Education Consortium is located on the statewide network.

The Board of Higher Education is currently funding an ATM test in conjunction with Northwestern University, Oakton Community College, and Ameritech. IBM has held several ATM related workshops for college and university personal.

A number of hospitals have been included in the video networks of the state and grants were made by Ameritech for several demonstration projects. Carle Memorial Hospital, SIU Medical School, and the Unified Regional Medical schools were among the video demonstration sites.

Most communities in Illinois are linked to free nets; for example, some communities use the Heartland Regional Network, the Cleary Net, Sinnissippi Valley Information Network, and Lincoln Link, which is the link for the Heartland Regional Network.

In Illinois, distance learning is restricted to a degree for use essentially for video. Illinois continues to have more LATA boundaries than any other state. The state used microwave to get across the LATAs. There is extensive use of ISDN in the metropolitan areas.

In terms of business and industry, the state has sites at such businesses as the Caterpillar Tractor Company, State Farm Insurance, Maytag Corporation, and PepsiCo.

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HIGHER EDUCATION

There are approximately 277 operational two-way interactive video sites in higher education that are delivering instruction. The Western Illinois Educational Consortium is aggressively using the statewide network to conduct its work.

Community colleges are continuing to be added to the Illinois Satellite Network. Higher education continues to move aggressively, within budget limitations, with distance learning video, data, and satellite technology. Most of the colleges have been active in using the voice conferencing and phone system.

K-12

CMS is currently working with the State Board of Education to install a frame relay network for transmitting administrative data, for teacher certification programs as well as providing Internet access to schools throughout the state.

FUNDING

The state library has funded Internet connections for each of the twelve regional library systems in the state. There was an allocation of $1.8 million in state funds for fiscal year 1996 for library technology initiatives which included adding records to electronic card catalogs, implementing Internet connections and undertaking telecommunications studies within the regional library systems.

HIGHER EDUCATION

The Board of Higher Education administers the Higher Education Cooperation Act (HECA) funds, which provides technology assistance to colleges. Fifteen million dollars was the first appropriation in 1994 and the second $15 million was released this past fiscal year 1995. Higher education institutions may use the grant for purchases of equipment, construct distance learning rooms, or dedicated classrooms. Higher education institutions can not use the money to offset their line charges. Both higher education institutions and multi-partner organizations using distance learning are eligible for the HECA funding.

This past year the Illinois Board of Higher Education funded a training center at a local community college as well as giving each of the ten regional consortia operating money for the purpose of staff training.

An additional $6 million of state funds was spent ton support technology operating costs.

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INDIANA

KEY PLANNERS
- Indiana Higher Education Tele-communications System (IHETS)
- Department of Education
- Commission for Higher Education
- Partnership for Statewide Education

RECENT DEVELOPMENTS

In July 1994, the governor of Indiana initiated Access Indiana, a public-private partnership to provide for a variety of telecommunication services for public sector entities. Ameritech, Sprint, and INTELENET are providing connectivity, beginning with Internet access to be available to all K-12 schools and public libraries in the state by fall 1996. Other components under development are start-up grants for community networks and a contract to provide public access to government databases. Access Indiana will eventually develop a range of voice, data, and video services. The goal, so far achieved, is to avoid large investment of state capital and at the same time work toward economic development goals by providing incentives for the private sector to deploy infrastructure.

STATEWIDE AND LOCAL PLANNING

Access Indiana has been the focus of most statewide planning, with active involvement of representatives from higher education, public libraries, K-12 education, and state agencies and coordinated by INTELENET, but it has also served to stimulate local planning in dozens of communities for development of community networks. Education planning for uses of technology has moved forward in two areas: ❶ through major strategic planning within higher education for the Indiana Higher Education Telecommunication System (IHETS) and the Indiana Partnership for Statewide Education, and ❷ through involvement of K-12 schools and the DOE in both Access Indiana and Project Athena.

STATEWIDE AND LOCAL NETWORKS

IHETS, a consortium of all public and private colleges and universities in the state, operates statewide voice, data, and video networks. The TV network recently completed a three-year migration from fiber and ITFS to satellite, using digital compression technology to deliver eight channels on a single transponder. There are seven uplinks, one each at Vincennes University (shared with the University of Southern Indiana), Indiana State University in Terre Haute, IU in Bloomington, the IU Pudue campus in Indianapolis, Ball State University in Muncie, Purdue in West Lafayette, and Ivy Tech State College in South Bend. Other IU campuses can transmit via the IU campus network to reach an IHETS uplink, and there are multiple connections with schools in the Vision Athena Project. IHETS Television counts nearly 300 direct receiving locations, one-third of which are K-12 schools. Other locations include hospitals, businesses, county extension offices, public TV stations, and state facilities as well as

college and university campuses. One of the satellite channels is designated for program delivery to cable and wireless cable access channels throughout the state, providing in-home instruction from all the colleges.

IHETS' voice network, SUVON, links all college and university campuses, carrying some 19 million minutes of traffic each year. The associated audioconferening service, ICON, includes a 29-port bridge heavily used for administrative meetings and occasionally for professional developments conferences.

IHETS' data network, INDnet, provides a primary Internet backbone for most colleges and universities in the state as well as some libraries and agencies which have not migrated to Access Indiana. IDEAnet, a dial-up service operated by the Department of Education, provides a variety of K-12 educational resources as well as Internet linkage through INDnet.

Indiana University operates a multi-way video network among its nine campuses, using quarter T-1 compression. Used for administrative meetings as well as instruction, the network accounted for some 400 credit enrollments in 1995-96, its first year of operation. Most other colleges and universities have various ad hoc uses of dial-up videoconferencing. Vincennes University has a small MCU used occasionally by others, and IHETS foresees the need for a shared bridging service in the near future.

With encouragement and funding from Access Indiana, 21 community networks began operation in 1996 to provide Internet access and local information services. The largest system of local networks, however, is operated through the Vision Athena Project. Through a commitment to the Indiana Utilities Regulatory Commission, Ameritech has donated $30 million to the Corporation for Educational Communications to make equipment grants and conduct training and planning activities for K-12 uses of local analog, full motion, two-way video networks. Several college and university campuses have also been linked to those local networks as content providers for schools in the region. Ameritech also committed to spend another $120 million between 1995 and 2000 to provide fiber links to schools, hospitals, and government agencies in all Ameritech service areas (approximately 60 percent of the population base). Discussions are under way among Ameritech, IHETS, and Access Indiana about how to best link the extensive group of local networks for statewide connectivity.

HIGHER EDUCATION
Use of the IHETS satellite network is primarily for college credit and non-credit programs, with 13 degree programs (associate, bachelor's, and master's) available entirely via distance education from different member institutions. The network also regularly delivers eight advanced high schools and AP classes to schools throughout the state.

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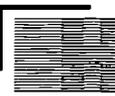
The Indiana Partnership for Statewide Education, the academic arm of the consortium of which IHETS is the infrastructure arm, collaborates on inter-institutional curriculum planning and development, marketing, faculty and staff development, student services delivery, cost analysis, and evaluation. Although enrollments fluctuate from year to year, the overall trend has been up for the past several years, with between 11,000 and 13,000 enrollments annually.

K-12

There is no state-mandated participation in educational uses of technology, though the DOE has been especially active in 1995 with helping school corporations plan appropriate uses of new Internet access. The state also allocated $3 million for grants to Indiana school corporations for hardware, software, and connectivity to take advantage of Access Indiana services. The primary K-12 uses of video are either through IHETS or, increasingly, through the Vision Athena Project. There is no state funding allocated for either of these video connections. Typical uses of the Vision Athena Project include both electronic field trips, presented both by museums and universities, and localized exchanges of upper-level high schools courses for inter-school programs for gifted students.

FUNDING

IHETS is funded for infrastructure operation, administration, and utilization by Indiana ($5.8 million for 1996-97 for both capital and operating expenses); the colleges and universities absorb production and reception costs within their operating budgets and pay a modest share of network costs. Vision Athena is funded initially through Ameritech with moneys in lieu of rate-payer rebates; after the first three years, schools will pay hourly to use the networks.

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IOWA

KEY PLANNERS
- Iowa Public Television (IPT)
- Iowa Telecommunications and Technology Commission (ITTC)
- Iowa Public Utilities Commission
- Department of Education (DOE)
- Department of Administration (DOA)
- State Public Policy Group
- University of Northern Iowa

RECENT DEVELOPMENTS

Under House File (HF) 461, the 1995 legislature created a task force to study the feasibility of selling the controversial state-owned Iowa Communications Network (ICN). The results of the study were given to the Iowa Telecommunications and Technology Commission (ITTC), which in turn recommended to the legislature that the state retain current ownership, funding, and usage restrictions. The completion of the ICN is slated for 2000; the backbone and regional switching centers are completed now.

The Statewide Technology Commission submitted its report, "Technology for Education in Iowa: The Report of the Technology Commission" to the state Board of Education. The report has had no significant impact on K-12 technology advancement.

The Iowa state legislature passed HF 482 to provide $95 million over the next four years to connect over 400 libraries and public schools to the ICN.

STATEWIDE AND LOCAL PLANNING

State planning for telecommunications centers around the ICN, whose vision is to connect every K-12 school, college, and university in the state, and selected libraries and area education agencies. Operational since 1993, the ICN is a full-duplex DS-3 fiber optic telecommunication system. The state decided not to sell this controversial network to private telephone companies, choosing instead to retain ownership and usage rights, despite pressure from private telephone companies to force the state to discontinue ownership of a competing utility. In spite of the fact that the original plan for the network did not call for state ownership, a state-appointed task force study of the state's options suggests that it maintain ownership and operations without expanding usage to the general public, thus keeping the network from falling under regulation of Iowa Code as a public utility.

The House File 461 task force was assembled to give a non-biased review of ten scenarios, particularly with regard to usage and cost issues, concerning the possible sale of the network. The study considered options ranging from total sale of the network with no assurances that current users would retain their privileges, to retention of the network by the state as a state-owned public utility. The results of the study were

presented to the Iowa Telecommunications and Technology Commission (ITTC) which governs the ICN. The ITTC then recommended to the legislature that the state retain both ownership, funding and current usage restrictions, citing possible legal problems with the sale and recommending that the network be completed to enhance its value before considering a sale. A State Public Policy Group survey shows that current and potential ICN users prefer state ownership of the network to keep the rates down. The state legislature voted on this recommendation.

As authorized in the network's governing statutes, the ICN may now be used by state agencies, school corporations, public libraries, accredited non-public schools, non-profit institutions of higher education, and hospitals. The base of authorized users may expand to include city and county agencies. Currently in its third and final phase, ICN's plan calls for the network to include approximately 800 sites, most of which will be in K-12 schools, by 1999. As of 1995, there were well over 100 sites, one in each of Iowa's 99 counties, plus sites at each of the three state universities, as well as sites at several state agencies. Most sites are at educational institutions.

In addition to the ITTC, the ICN is managed by the Department of Administration (DOA) and the Department of Education's (DOE) public broadcasting division. The DOA oversees construction, connection and maintenance of the network. The public broadcasting division of the DOE, Iowa Public Television (IPTV), manages support functions such as scheduling of video classrooms in coordination with individual sites; design, preparation and support of interactive classrooms; development of a central information source on the Internet regarding the network; and coordinating the work of the Education Telecommunications Council.

The Narrowcast Advisory Committee advises on programming, fees, and educational uses of Iowa's telecommunications systems. It sets standards for the quality of equipment and selects sites for educational telecommunications.

STATEWIDE AND LOCAL NETWORKS
The ICN, a 2800 mile fiber network based on SONET, anticipates a migration to ATM in the near future. The network point of presence in each of the 99 counties provides full motion video via DS-3 signals over 24 T-1 lines. Voice and data transport and Internet access are available through a bandwidth overhead of four T-1s. Two state universities as well as several commercial organizations offer Internet access.

The ICN is used for all voice, video, and data applications of state agencies and their qualified users. The network now delivers nearly 100,000 hours of educational programming per academic year. The standard ICN classroom has two-way video capabilities, with three large-screen television monitors and overhead cameras. The instruc-

tor controls the classroom camera as well as remote site switching by using a touch screen on the lectern.

Most of the 129 sites now connected to ICN are educational institutions. Several state agencies are connected and 62 National Guard armories are scheduled for connected by September 1995. The ICN connects to the state's Emergency Operations Center (EOC) for coordination of emergency procedures in all 99 counties. ICN's primary hub and the EOC are housed at the Iowa National Guard Armory at Camp Dodge in Johnson. The Federal Emergency Management Agency provided financial support for the EOC. The ICN provides services for 105 colleges, 3 hospitals, 3 prisons, and a National Guard Armory.

The Iowa Research and Education Network (IREN) is a not-for-profit corporation designed, through the collaboration of its member institutions, to enhance the effective use of computer networks and other information technology. Member organizations include Iowa's public and private colleges and universities, community colleges, public libraries, the State Library of Iowa, or any other agency or organization that promotes the purposes of IREN. As of July 11, 1995 IREN had 70 member organizations and institutions, ranging from a public school district to community libraries, private universities, and state university departments. IREN is governed by a voluntary 15-member Board of Directors and resolves issues by membership voting. A specific goal of IREN is to help educational institutions and libraries develop and enhance communication on the Internet. IREN facilitates this through an Internet discussion list called IREN-L.

Libraries selected to receive ICN points of presence must establish a video room. Libraries that do not have their own rooms could receive their data connections through ICN. There are currently 1500 libraries, 396 K-12 districts, 29 private colleges, 3 public universities, and 16 community colleges in the state. Those connected to the ICN include 102 sites: 15 regional hubs (community colleges), 3 regions (IPTB), and 84 county sites at the high schools. Some 474 new sites are scheduled for completion by 1999. The state legislature is considering appropriations of $50 to $100 per student, or $15 to $30 million, for technology, training, computers, and peripheral software.

HIGHER EDUCATION
Community colleges in Iowa have been leaders in the state and the nation in the development of postsecondary educational telecommunications. Kirkwood Community College in Cedar Rapids, Iowa Lakes Community College and Iowa Central Community College all operate duplex microwave networks. Kirkwood has seven remote locations that can originate and receive and offers Instructional Television-Fixed Service (ITFS) to a seven-county area. Iowa Lakes operates its network between the Estherville

and Emmetsburg campuses and offers ITFS programming to a six-county area. Iowa Central delivers courses via ITFS to a nine county area around Fort Dodge. Some of the Fort Dodge area high schools can originate programming. Hawkeye Community College in Waterloo and four county area high schools offer ITFS programming in their five county area.

Eastern Iowa Community College District has regional duplex microwaves links between its three campuses in Davenport, Bettendorf and Clinton as well as ITFS capabilities at the main campus at Davenport. Southeastern Community College and Iowa Western Community College work together to offer ITFS programming on their five transmitters in southwestern Iowa. These transmitters reach a thirteen county area.

The University of Northern Iowa and Drake University conduct staff training which is partially funded through a Star Schools grant. Approximately 4,000 teachers have received hands-on ICN training.

K-12
Iowa's basic philosophy encourages schools to plan carefully how they will use technology and to consider their own funding as an investment rather than a cost. Schools can get on-line to ICN according to Area Education Agency (AEA) regions and are eventually put on an accepted list. Once cable is connected to the school buildings, the schools pay about $20,000-$25,000 for the basic classroom installation, either through a Star School grant or other resources.

There has been considerable use of computer-assisted instruction in ICN-connected K-12 classrooms. Drake University has been putting a Macintosh with a modem and an Internet connection into those classrooms for college level, on-line searching of databases. Some satellite programs have been downlinked and distributed over the ICN.

In 1994, approximately 80 percent (349) of the state's schools were using distance learning. By 1996, the number should increase to 95 percent.

FUNDING
HF 578 asks the Iowa legislature to allocate $18.5 million to connect 474 sites to the ICN over 4 years. These sites include all high schools, selected libraries, and additional state agencies. Currently, individual schools must move forward at their own expense. The second phase of implementation will cost approximately $94.7 million, which covers the cost of connections, leases, and the installation of 105 sites in 1996, and 130 sites in each of the following three years.

By the end of the 1995 fiscal year, Iowa spent a total of $118 million on the construction of the ICN. This construction was funded through the issuance of tax-exempt bonds

sold by the state. ICN currently receives $17 million yearly funding from revenue and appropriations. Part of this is allocated to maintenance, operations, staffing, and to repay the certificates of participation (bonds).

HF 482 allotted $250,000 for the 461 task force study and $18.4 million in funding for fiscal year 1996. The state legislature also allocated $250,000 to public broadcasting for network support functions including scheduling video classrooms and the preparation and support of interactive classrooms.

The legislature will allocate $1.2 million to regional telecommunications councils for staff development, educational use of the Internet and other on-line services, and technical assistance for the installation of network classrooms. Another $250,000 will be provided to the University of Northern Iowa to coordinate staff development for educators using educational technology.

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KANSAS

KEY PLANNERS
- Board of Regents
- Board of Education
- Kansas Information Resources Council
- Division of Information Systems and Communications (DISC)

RECENT DEVELOPMENTS

Maintained by the Kansas Regents Network (KRN), TELENET, a statewide network on which over 47,000 students have taken courses, is migrating from an audio-only network to desktop video on ISDN. There are 28 sites from which students can take courses from Emporia State, Fort Hays State, and to Kansas State University.

TELENET 2 is an ISDN based desktop video network, funded by a $200,000 Bureau of Justice grant and a $40,000 Rural Utility Services grant through the U.S. Department of Agriculture. Each of the 28 network sites have desktop video capabilities. In addition, TELENET 2 has two MCU bridges, each with eight ports. One bridge will be in 913 LATA, one in 316 LATA. Of the 16 ports, two will be used to link the bridges and 14 for the sites. The sites include the Regents institutions, 13 community colleges, one educational service center, and five school districts. The school districts purchased their own equipment and pay their own line charges. The other sites each contributed $3,000 or more to this effort. With ISDN circuits, an annual savings of about $50,000 in transmission costs is anticipated.

As part of the Bureau of Justice grant, Kansas State University is looking at new clients and programs, specifically working with the two other TELENET network member Regents institutions, Wichita State University, and Washburn University to develop the first statewide baccalaureate degree completion program in criminal justice. Thirteen of the 19 community colleges are partners in this project; the remaining six community colleges may be added within the next two years.

The state legislature enacted a statute creating the Kansas Information Resource Council (KIRC) which has hired a chief information architect to conduct strategic planning for telecommunications in the state government. KIRC members are the heads of the major state agencies.

The Internet Task Force has been formed to provide an equitable and cost effective solution with regard to access to the statewide Internet among K-12 schools and libraries. The task force is funded by discretionary funds between $15,000-$20,000 that have been allocated by the Board of Directors of the Information Network of Kansas.

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STATEWIDE AND LOCAL PLANNING

While no new legislation directing the funding, development, or implementation of distance learning or telecommunications was introduced in Kansas, the state's regional two-way interactive television (ITV) networks continue to provide distance education at the K-12 level across the state. Consisting of 10 regional networks, each funded internally at the district level, the network of networks is overseen by the Division of Information Systems and Communications (DISC). DISC provides local ports and system requirements to ensure compatibility between regional networks.

KANS-A-N is the state government's digital telecommunication network operated by DISC, which delivers voice, data and video communication statewide. The network is used by the University of Kansas Medical Center as its backbone network for telemedicine and education via compressed video. Connection of Regents institution computers to KANS-A-N is through KARENET. There are also 40 compressed video sites connected to KANS-A-N that are used by higher education for distance learning. The courses are transmitted throughout the state as well as to Kansas City, Missouri.

The Regents Educational Communications Center (RECC), a teleproduction facility at Kansas State University, offers fixed and mobile satellite uplinks with downlink sites to 125 locations in Kansas. RECC offers teleconferencing services and manages projects across the United States using compressed video.

The Systemwide Telecommunications Task Force, created by the Board of Regents, has been superseded by the Telecommunication and Information Technology Committee (TELIT), a Regents-wide group with non-Regents members. The committee was established to devise a statewide telecommunications plan now in the form of a proposal entitled "Kansas, a Learning Community." This a comprehensive three-phase plan integrating existing and proposed information technology infrastructure and programs. This includes plans for interconnecting 304 public school districts, higher education institutions, government agencies, and every Kansas citizen.

The Kansas Senate Telecommunications Strategic Planning Committee (TSPIC) worked with a consultant during 1995 and a final report was submitted. The report describes deregulation and competition among telcos as a driving force for telecommunications in libraries, schools, and hospitals in Kansas.

As a result of the TSPC's efforts, the 1996 state legislature considered a resolution containing a vision for telecommunications and several bills to move the state toward a more competitive telecommunications environment.

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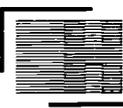
STATEWIDE AND LOCAL NETWORKS
Business or industry may use the state network only in collaboration with a state agency. Business-to-business use through the network is viewed as competition with private vendors providing videoconferencing services.

The Kansas Regents Network has 30 desktop conference sites that all use ISDN Basic Rate Interface. There are two videoconferencing units with eight port MCUs which are linked via a dedicated partial T1 line.

ISDN is used to extend video and data services, rather than replacing them. The technology was adapted by telemedicine in hospitals, nursing homes, and patient homes. Kansas is upgrading its switches for the implementation of a digital system in the state network. Other transmission technologies that are in use include microwave, satellite, and fiber optics. Southwestern Bell is providing ATM through their TeleKansas 2 project. Schools, libraries, and hospitals can sign up for the ATM service, but most may not be able to afford it yet.

In the southwestern part of Kansas, a telephone company is offering full Internet access to all exchanges at $19.95 per month. The company is in partnership with the ITV network. So far, there are only approximately 200 subscribers. Four community colleges are seriously considering developing their own regional ISDN networks for distance learning and Internet access.

HIGHER EDUCATION
The Southwestern Bell Foundation provided $400,000 to Fort Hays State University for a faculty chair for telecommunications and other projects.

The Kansas City Metropolitan Smart Cities Network is an economic development effort involving Kansas and Missouri. There are 1500 ISDN lines and 200 desktop video units in the metropolitan areas, mostly at the chief executive level. The network is focusing on institutions such as Kansas State, to provide distance education directly to company personnel in business, engineering, software engineering, and agribusiness to the metropolitan area via ISDN.

The Director of Academic Affairs of the Board of Regents conducts academic planning for the Regents institutions and the 4-year state universities. The state Department of Education does this for the publicly supported community colleges.

Each of the six Regents universities has its own service area within which it can offer academic extension courses or program at their own discretion. Outside their service area, the institution requires approval from the Board of Regents except for distance

learning courses which are exempted from the approval requirement. It is anticipated that the course approval requirement will be eliminated. The six publicly supported higher education institutions operate under a single Board of Regents. Training sessions on the use of the Internet and World Wide Web have been completed using compressed video for 600 participants.

Kansas State University is preparing classrooms, laboratories, conferencing, and libraries in multimedia for individuals and groups, including the use of World Wide Web on Internet. On-campus networking, fiber optic lines are being implemented in the state. KSU installed equipment for direct dial for users not on the state system. As a self-sustaining telemedicine project, the center funded by users, is driven by those living in the rural areas of the state. Many people in rural areas do not have personal computers, so access to the Internet for medical education is limited.

The center of telemedicine in Kansas is at the University of Kansas Medical Center. ISDN is currently being installed for facility use at UK.

Through a federal grant, there has been an extensive effort at Colby Community College for Internet access to the northwestern part of Kansas.

K-12

Increased interest is evident in access to the Internet than in any other form of distance education. All of the Regents institutions in the state provide some limited distance education via the World Wide Web. Goals 2000 educational committees have formed to provide Internet access, including teacher training and software at the classroom level for teachers.

The K-12 system has a 40 site compressed video network and a 10 cluster fiber optic system delivering full motion analog signals. The analog sites are compatible with the compressed sites through the use of codecs in the analog system. There are 10 two-way interactive fiber-optic clusters in Kansas, all of which have increased their capacity. Nearly 100 schools are now using full-motion, two-way interactive video.

During 1995, as result of deregulation, the legislature passed the TeleKansas 2 Bill, which provided that over a two year period Southwestern Bell will invest no less than $64 million for two-way interactive video for schools. The telco has begun bringing on these sites, using ATM technology. The funds are being used to upgrade the backbone between company offices as well.

The State Board of Education is working with institutions and foundations to fund a computer for every K-12 teacher in Kansas. The board will recommend to the state
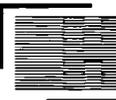
legislature to have a surcharge on video rentals to help fund infrastructure, equipment, and training.

FUNDING
Kansas State University received a $25,000 TIIAP grant to provide an 800 number SLIP access to the Internet for students in distance education courses. Kansas State and 7 community colleges are part of the Western Kansas Community Service Consortium.

Regional two-way interactive ITV networks request and receive their own funding. State government networks, however, are funded through the state.

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KENTUCKY

KEY PLANNERS

- Department of Education (DOE)
- Kentucky Council on Higher Education
- Kentucky Educational Television Authority

RECENT DEVELOPMENTS

The State Board of Education approved an update the state's Education Technology Master Plan, which covers the entire education technology system for the K-12 education institutions. The plan was expanded to include professional development cooperatives around the state, vocational schools, family resource youth service centers, as well as a federal Star Schools grant to provide a two way video conferencing system called the Kentucky Telelinking Network (KTLN). The state will receive a second year of federal funding for this program.

The implementation of the Master Plan continues with the expectation of complete implementation by 1998. The plan is two thirds of the way through the implementation and will have accomplished about one third of deployment objectives by June 30, 1996. The local level is adding another 40 percent investment to technology.

The first year of the T-1 based KTLN expansion is in place and there are now 48 sites in total, including the universities and the 24 K-12 sites. The network expansion will cost approximately $16 million dollars over the two years. The Division of Information Services (DIS), the universities, and the Department of Education (DOE) have all been working closely with Kentucky Educational Television (KET) on this project.

Because the Kentucky constitution requires the legislature to provide an efficient system of public schooling for every child, the state has become a leader in the use of technology in education. The equity requirement led to the development of the Kentucky Educational Reform Act (KERA) in 1990. Kentucky views technology as a way to facilitate restructuring schools and delivery of quality education to all children in the state. KERA has site-based councils for curriculum and instructional decisions at the school level, with state coordination and planning to assure equity and balance of control.

The state government has developed a statewide, high speed integrated digital backbone with 12 nodes, all operational at the T-1 level, across the state. A contract to develop and operate the public access high speed backbone has been awarded. A consortium of telecommunication vendors headed by Bell South and GTE was formed to provide services. From this contract, special education tariffs are based upon capacity of the line, whether 56 kb or T-1. The statewide T-1 rates are fixed at a $685 per month point to point, and 56 kb is $250 per month.

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STATEWIDE AND LOCAL PLANNING
The Council for Educational Technology is no longer active, with the department staff reporting to the State Board for Elementary and Secondary Education. The implementation of the statewide network integrated backbone, was managed by the state's Department of Information Systems.

KET's highest priority for action in terms of distance learning continues to be the shift of the philosophy from teacher-centered learning to student-centered learning, where interactive technologies will empower students. For teacher training KET has a team of advisors from the DOE, the universities and public schools, who develop staff development activities. In regards to instructional television that is delivered to all of the elementary schools, KET also conducts needs assessments. KET proposes its plans for instructional programs to the DOE, and the plan is implemented only upon the DOE's approval.

STATEWIDE AND LOCAL NETWORKS
The 1990 General Assembly authorized the development of the Commonwealth Integrated Network System (CINS), which is a component of the state communications infrastructure. The network was developed to stimulate county, state, national and international communications. Many state agencies and public universities are developing projects, which are dependent on the continual growth of the network.

KET, which runs across Kentucky's integrated backbone, recently became a node on the Internet as well as having its own home page. The page provides extensive information to schools on what is available from KET. KET has a satellite downlink on every school building, public library, institutions of higher education, and most state agencies. Beginning in the summer of 1996, KET will convert its satellite signal and all 1700 analog sites to digital communications. The conversion will permit KET to use these channels.

Approximately 300 of the 1375 schools in the state have full LANs in the classrooms which are deployed as part of the wide area network and are connected in real time to the integrated backbone. By the end of 1996, Kentucky hopes to have over 680 classrooms with fully deployed LANs and wide area network connections to the integrated backbone. Ninety percent of all traffic on the network is instructional. Internet use has increased in the schools, the entire system is integrated and shared by administration e-mail. As every school comes on line with the integrated backbone, Internet access is provided as part of the service.

Kentucky's Work Force Development Cabinet has been collaborating with statewide networks. Currently, KET has been working with them on various literacy projects,

such as GED preparation and adult literacy programs. The latest project involves the investment of a portion of cabinet funds in KET in order to develop a televised series on workplace skills. The project is expected to be supported by other kinds of outreach efforts including print material and a telephone number for people to call if they require help while watching the program.

Technologies used by KET and the state of Kentucky for program delivery include broadcast television, microwave, fiber, and satellite. The major satellite network has 1700 receive sites and an uplink at KET. KET is connected to all of the state universities by microwave, where universities can develop programming in their studios. Studios then may microwave classes to the network center at KET, where they can either be broadcast or uplinked to sites around the state.

For live interactive programming, KET is migrating from interactive response keyboard units to the Internet for responses to its broadcast programming. Keyboards will be replaced by Internet and e-mail response, because capability is broader for unstructured responses. The shift will start during the 1996 school year. Keypad phaseout is in response to the deployment of networks in public schools. Several technologies are integrated including broadcast, Internet and e-mail response.

A significant interest is evident to develop ATM and ISDN networks, particularly in Northern Kentucky and Louisville, yet cost continues to be an issue. Under the argument of equal access, widespread application of the technology is not likely when access to the medium is limited. A frame relay system that has been implemented in two districts has been performing well into its first year of deployment.

The state has worked hand in hand with the telephone companies to make the best of its resources. For instance, the state backbone which connects schools with two way video and computer linkages was originally envisioned as a state developed system. It was quickly determined to be more economical to have the system developed in the private sector. In this way, the private sector develops the system and offers it to the state at a low cost in the form of an educational rate.

All of the universities are part of the KTLN network by mostly fiber with some T-1 lines. Each of the sites at Murray State University, the University of Kentucky, the University of Louisville, Western Kentucky University, Eastern Kentucky University, Kentucky State University, Morehead State University, and Northern Kentucky University have two way video rooms and are connected to the state backbone.

The Center for Continuing Education and Academic Outreach is managed by the West Kentucky Interactive Telecommunications Network (ITN). This land-based network

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connects two high schools, three community colleges, the Telecommunication Research Center at the University of Louisville, and other resources throughout west Kentucky. The network is also connected to the state's capitol via T-1 lines which allow for delivery of compressed video.

K-12

KET has developed several projects including a live field trip by television to a coal mine where students called in and asked questions of coal miners and other experts on coal. The question and answer period was followed up with discussion groups on the Internet. All school districts are connected to the satellite network. Over 40 schools are also connected to KTLN.

FUNDING

KET's funding is largely allocated from the state, legislature, and the federal government. As an agency, about two thirds of KET's funding is from the state government and the other third is split evenly between corporate, private contributions, federal government, and sales or leases of programs that KET produces for parties outside the state.

At the state level, much of the effort to obtain funding is through the Education Reform Act, which was passed in 1990. KET offered plans and worked with the DOE and others and formed partnerships to convince the state to put money into certain educational technology programs. The legislature meets every two years to determine state funding. The state legislature has authorized the funding for the digital compression for KET. The conversion is expected to be completed by September 1996.

Higher Education

The Kentucky Council on Higher Education forbids four-year colleges to offer freshman and sophomore courses to high schools within 30 miles of a community college without securing permission from the community college. In violation of this, Morehead State University offers calculus and English composition to two high schools, and Prestonburg Community College has protested. The Council will meet in July to revisit the policy.

Each college and university funds its own initiatives for telecommunication and distance learning. Several institutions have developed partnerships with Murray State University and Paducah Community College, along with local phone companies to build a point to point link.

K-12

KERA has invested significant sums enhance school technologies. The original plan consisted of $400 million over a five year period.

Currently in its third year, the $1.2 million five year grant from the U.S. Department of Education provides interactive satellite teacher training seminars two to three times a week. The universities are also conducting teacher training using the KTLN system to service schools which are connected via T-1 lines.

Funding for K-12 is made possible through the development of the KET's Education Communication Network (ECN) and the Education Information System (EIS).

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LOUISIANA

KEY PLANNERS

- Louisiana University System (LUS)
- Louisiana Instructional Satellite and Telecommunication Network (LISTN)

RECENT DEVELOPMENTS

During the summer of 1994, the governor and the superintendent of education announced the creation of the Louisiana Learn Commission. The commission is responsible for creating a vision for education in the state, and delineating specific strategies, action steps, and timelines to turn the state's vision of education into a reality. The commission was established as a result of the Goals 2000: Educate America Act that was signed into law by President Clinton in 1994. The law provides monetary incentives for states, school districts, and local schools to develop and implement School Improvement Plans that address the National Education Goals.

Louisiana received $2 million in Goals 2000 funding to support state and local plans. The state plans to use 40 percent of the funds for developing its long range plans for education and to administer Goals activities. The remaining amount will be used to award competitive subgrants to local school districts and school districts that are in collaboration with higher education institutions. Subgrants will be awarded for the development of Local Improvement Plans within school districts, professional development activities, and preservice teacher training. The state will also receive $77,000 for the development of a state technology plan which will be integrated into the state's School Improvement Plan.

The Louisiana University System (LUS) is now moving into the final implementation of the compressed video system. The system expanded from a nurses-only application to an interactive compressed video network which will link seven sites, including medical institutions and university campuses. Currently, three satellite campuses exist in addition to the main campus, including one in Shreveport, where the nursing school is located. The intention is to locate the new network at the satellite campuses. As a result of the project, schools will be able to teach continuing education programs, as well as bachelors and masters programs.

STATEWIDE AND LOCAL PLANNING

The Telecommunication Task Force is primarily focused on higher and public education. The purpose of the group is to act as a clearing agency such that if a university wants to begin, plan and organize a distance learning class or project on campus, it would require permission from the task force prior to the implementation of the project. Typically, within the K-12 sector, the Department of Technology deals with distance learning, as well as telecommunications. The Office of Technology

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has several representatives on the Telecommunication Task Force. Individuals affiliated with colleges and higher learning are also found on such task forces, either as consultants or advisors.

STATEWIDE AND LOCAL NETWORKS

Louisiana State University (LSU) is currently using ISDN for low-cost desktop video conferencing. The campus is beginning to see that this is not the right type of application for large group instruction. The application in now thought to be more effective for providing one-to-one support to students, faculty, and administrators on distance learning related issues. Desktop video units will be distributed campus wide to provide widespread access.

Presently, the LSU network is a restricted system that does not interact with the healthcare sector. However, video compression networks are expected to expand the networking services. For example, LSU's Medical School, at Shreveport and New Orleans has a video conferencing network for both diagnosis and training in the medical field. The nursing program at Louisiana is in the process of purchasing approximately $850,000 in video compression technology that will provide nursing completion programs to rural hospitals. This will allow the network, which currently has seven sites, to connect to the LSU medical program and many charity hospitals across the state.

Presently there is limited collaboration with business and industry, but greater participation from the business community is anticipated.

With regard to transmission technology, there is still much satellite delivery, and interactive one way video, and two way audio. The largest audio graphics network in the U.S. is also based at the Louisiana School for Math, Science and the Arts. It serves about 110 rural schools with high school classes using audiographic technology, common screen, tablets, and computers that hold compressed video files for information transfer. Desktop video confrencing is conducted through compression over T-1 telephone lines. While there has been a shift from satellite technology to compressed video using T1 lines, the infrastructure for fiber is not as extensive, although there is a move to reverse this.

Bell South members sit on task forces regarding technology for both K-12 and higher education. They were involved in the planning stages for the compressed video network, bringing fiber to the campus. Bell South has been helpful in establishing a special rate for T-1 lines in the state. Right now the national average is around $2000 per month, but Louisiana University's is $365 per month.

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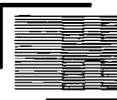
Currently, approximately 20 private phone company operators within the state are expressing interest in setting up cable networks for distribution of video signals in local communities. An interest in wireless cable also exists in rural areas. Smaller companies are not as actively involved in larger state networks as Bell South, but they are active in local concerns, particularly in how they can relate to local education institutions. Such a cable infrastructure holds great potential for affordable, real-time videoconferencing.

Southwest Educational Development Labs (SEDL), which is a group compiled of five states including New Mexico, Oklahoma, Louisiana, Texas, and Arkansas, facilitates collaboration between the states.

The Louisiana Public Broadcasting (LPB) has 6 stations that have converted from microwave to digitally compressed satellite. The networks and its courses are delivered through a transponder on Telstar 401.

K-12

Northwestern State University (NSU) received foundation grants for the installations of Internet connections to classrooms. The Internet is available in high schools as well as in elementary schools. NSU was able to set up a network with NSS funding which enabled college campuses to get involved in the Web. Approximately 45 percent of all high schools have access to the Web.

HIGHER EDUCATION

The College of Engineering at Southern University (SU) established a state-of-the art SU-Engineering/East Baton Rouge Parish School System Connection. Through this relationship, the college can provide the school system with a high speed connection to its computer backbone network. Southern University's Lab School is connected via dial up, but once funds are made available, the dial up service will be replaced with high speed fiber optics.

Currently, the state is concentrating on staff development and is beginning to allocate dollars in order to train teachers on the use of this technology. With the help of the Telecommunication Task Force, Louisiana University requiring all grants to include 20 to 25 percent for staff development and training in the area of technology.

SU's network, the Louisiana Educational Satellite Network (LESN) offers interactive video programming to 16 sites. The Louisiana School for Math, Science and the Arts operates Telelearning, and Louisiana State University has a network for continuing education.

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FUNDING

Higher Education

Gradually, Louisiana will require approximately 20 percent of all grants issued to schools or universities set aside money for technology training. This will ensure that not only the equipment is put to proper use, but that the users are properly trained. However, at the present moment, there are no budget items geared towards training, but there is certainly a new level of consciousness that training is important.

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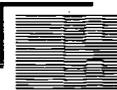
MAINE

KEY PLANNERS
- University of Maine System
- Department of Education

RECENT DEVELOPMENTS

The state legislature has approved LD 1939, which is a $15 million bond issue that will provide equipment to schools which will allow them, for $24,000 per year, to connect ATM to every high school, regional technical school in the state university system, and the Maine State Library. The network will provide two-way interactive video over wideband ATM lines to all locations. The target for the ATM network completion is two years.

The state Department of Administrative and Financial Services sent out bids for the ATM network. A preliminary agreement was signed with NYNEX, which is currently the only bidder. Bonds will be sold in mid-1996. The $15 million is for the installation of equipment to hook up schools and libraries to the network. An advisory committee has been formed to assist in the implementation of ATM project. If the NYNEX proposal is accepted, the expansion will have significant impact on education and economic development, bringing large capacity technology into rural areas. The first pilot project will be implemented in the next 12 months.

Last year, the Public Utilities Commission (PUC) found that NYNEX had excess earnings in the amount of $20 million. The PUC decided that, over the next five years, $4 million will be redirected towards the construction of the statewide data network based on a 56 kb line minimum. This means that every public high school, approved private school, applied technology centers/regions, and public libraries, about 1,300 sites, will be connected free of charge to the Internet service. Part of the NYNEX settlement also includes $500,000 for training K-12 teachers and libraries.

The PUC implemented a rate cap for NYNEX, which allows NYNEX to be more flexible in adjusting prices in order to be more competitive within the context of the rate cap.

The Maine Science and Technology Foundation, an independent technology and economic arm of the state of Maine, has developed a training program for school districts and libraries. The Foundation has raised $2.1 million in public and private funds for training so that every school district will have a technology training plan, with an evaluation procedure for further research.

In 1994, the University of Maine System and Maine Public Broadcasting received an NTIA grant from the U.S. Department of Commerce to conduct statewide planning

which has been completed. From this plan, an NTIA construction grant in the amount of $1,750,000 was given by the U.S. Department of Commerce for the implementation for a community network for the state of Maine. The federal share of this grant amounted to $850,000. The planning group included telecommunication providers and users.

STATEWIDE AND LOCAL PLANNING

In 1994, the University of Maine System (UMS) separated the Education Network of Maine from the University of Maine at Augusta (UMA) and is now a systemwide service unit. An attempt to make the network a degree-granting institution. was aborted after faculty resistance led to the UMS chancellor's resignation.

STATEWIDE AND LOCAL NETWORK

UMA leases a fiber trunk from NYNEX connecting the seven UMS campuses with two-way, full motion video. Each campus has at least one classroom equipped for simultaneous reception and transmission of courses. From each campus, courses are distributed to multiple sites via point-to-point microwave and ITFS channels.

URSUS, the university system's on-line library catalog, allows students to access information from each off-campus center and site. UMServe is a statewide database that provides information about public service capabilities at each campus.

UMServe is a statewide database that provides information about public service capabilities at each of the University of Maine campuses.

ME-LINK, part of the Maine Computer Consortium, links several of the public schools in the state.

HIGHER EDUCATION

The Education Network's highest priority is to continue to expand the number of degrees offered via the ITV system, and, through a grant, begin to offer courses leading to degrees over the Web. The board of trustees mandated that the UMS must achieve a two percent productivity gain each year, or the system's budget will be cut by two percent.

The Education Network is the arm of the UMS that delivers distance learning courses and degrees across the state. The Network offers four associate degree programs and a range of support services. Enrollment continues to increase each year; 177 courses are now delivered yearly to more that 90 locations in Maine. UMA also delivers courses to the Maine State Prison, the Veteran's Administration, and to corporate sites.

The Education Network was awarded a private foundation grant of $450,000 to expand distance degree programs and offer alternatives to its present instructional use of live interactive television. The Network also received an $812,000 NTIA grant for a fourth ITFS system.

Faculty members of the seven-campus system have requested a greater voice in the expansion of the Education Network. The professors are concerned about the quality of network education and recommend further study of the degree-granting authority of the Network. As a result of this, there is state-level legislation pending to put "a moratorium on further development of the Education Network of Maine as a degree-granting entity of the University System."

The University System Board of Trustees reaffirmed the role of the Network in Maine as well as to their commitment to distance learning. The Board has recommended continuing dialogue with the Chancellor, President, and faculty of the UMS to study and develop recommendations for the Network and to strengthen the role of the Academic Council which oversees the network. The Board did not authorize academic accreditation of the Network. In fact, the controversy regarding separate accreditation of the Education Network resulted in the chancellor's resignation.

The Education Network's Office of Academic Support coordinates all off-campus centers, which are linked via work stations and the telecommunications system. Academic Support handles all distribution of course materials.

K-12
The legislative approval of Bond Issue 1939 will provide all public high schools, a few libraries, and regional technical schools (grades 9-12) with the equipment for two-way interactive video.

MARYLAND

KEY PLANNERS
- University of Maryland
- Maryland Higher Education Commission
- Office of Information Technology
- Maryland State Department of Education

RECENT DEVELOPMENTS

Maryland has gained considerable attention because of its work in creating the Maryland Distance Learning Network. In addition, Maryland has come to the forefront of electronic communication by executing a pilot program called the Maryland Electronic Capitol (MEC) in Annapolis and Anne Arundel County. The program, which will be expanded to include the entire state within the next three to five years, links state, county, and local governments and provides access to federal government information. The MEC also plans in the future to provide World Wide Web access to public libraries, shopping centers, and various other places.

The Office of Information Technology was established in order to report on information technology to the Secretary of Budget and Fiscal Planning. In conjunction with the Information Technology Board, the office is presently drafting a State of Maryland Information Technology Master Plan. At the present time, there is a draft circulating among members of the board.

The Maryland Higher Education Commission recently created user groups in each of the four LATAS in the state. The Commission also established a statewide advisory council on distance learning made up of deans and directors of telecommunications at four year colleges and community colleges, as well as instructional media coordinators for public school systems.

STATEWIDE AND LOCAL PLANNING

The state is continuing its work with the Information Technology (IT) Board, which reports to the governor. Created in 1993 by executive order, the board was mandated by the Governor to serve the needs of citizens through the Department of Education, higher education, and all state government agencies. A top priority for the Board is to spur economic development for the state through advances in the information technology capabilities of state government.

STATEWIDE AND LOCAL NETWORKS

The Maryland Distance Learning Network (MDLN), which has also been called the Maryland Interactive Distance Learning Network, is a full motion video, fiber optic network with DS-3 services, which in the last year has grown from 20 to 60 operational sites. A contract was signed between the state of Maryland and Bell Atlantic of Mary-

land in September 1994 for local access and delivery. Inter-LATA service, however, particularly to areas outside the Bell Atlantic region, remains a problem.

METNET, the Maryland Education Technology Network, is part of the national LearningLink consortium and operated by the Division of Planning, Research and Information Management, a part of the Department of Education. METNET is a computer based service for K-12 educators, as well as other interested individuals in the state. The network provides free e-mail, bulletin boards, file transfer, conferencing and forums.

Most of the counties in Maryland have a frame relay system that provides access to an Internet provider.

The telecommunications system on the University of Maryland's campus includes 70 T-1's, DS-3's, and 28 Internet interfaces.

HIGHER EDUCATION
The Maryland Higher Education Commission (MHEC) is developing a coherent coordination and planning structure for distance education. The commission now supports and encourages use of the Maryland Distance Learning Network. In order to coordinate the explosion of distance learning sites, the commission will devote about 6 months or more developing appropriate state wide coordination and planning structures. As a first step, MHEC has hired Hezel Associates to assess other states' coordination structures and to develop strategic recommendations for Maryland.

Although a dedicated state training program for distance learning does not exist, the Higher Education Commission has included training as a component of the development of each new site on the Maryland Distance Learning Network. The University of Maryland is also conducting ongoing training for its faculty and staff. The commission is in the process of creating a group to discuss program quality issues.

While the Maryland Distance Learning Network in high schools, colleges, hospitals, and the University of Maryland includes an interactive video network, the University of Maryland Video Network provides campuses video instruction interaction, as well as elaborate information management capabilities. The information, which is transmitted over T-1 lines, includes research capabilities such as e-mail and Internet access for all participating campuses.

The Department of General Services (DGS) installed 30 sites for the University of Maryland, which is the largest user of videoconferencing in the state. Between 3,000 and 5,000 hours of classes and conferences are transmitted per year. The network

uses a standards-based 20-port MCU and a 14-port bridge that is accessed via dialup ISDN.

The University of Maryland acts as a consultant to state agencies seeking information on Internet access. To avoid competing with private Internet service providers (ISP), the university only negotiates contracts for these agencies, rather than provide Internet service itself. Currently, the university is issuing RFI's to determine connection cost for agencies affiliated with the university and posting replies on a Web page. Interested agencies may browse the Web sites for service costs.

The highest priority of the University of Maryland in regard to educational technology is to make easy and accessible videoconferencing on campus The university has plans to execute more projects, such as linking Maryland with Michigan, Arizona, and Indiana. The university is also conducting a monthly seminar between microbiology and aquaculture scholars around the world.

The University of Maryland is preparing to purchase a new standards-based video switch for the Baltimore area. The switch will provide the entire state of Maryland with international and national dial up connectivity and expand interactivity. More importantly, the switch will establish a network to support the university's New Institute for Human Virology, and will connect those clinicians in France, India, and Italy with their colleagues at clinical laboratories in the U.S. and specifically at the University of Maryland.

The university is also collaborating with Indiana University and the University of Arizona in projects involving portable compressed video equipment at group video and personal video levels. The University of Maryland also conducts engineering courses through compressed video mainly to private industry.

The University of Maryland plans to link healthcare personnel at the medical center with homebound terminally ill patients. Through telecommunications, physicians will be able to monitor patients 24 hours a day and communicate with them through live videoconferencing.

For the past three years, the University of Maryland at College Park has been using compressed video for teaching services. Classrooms are linked at the university with the University of Michigan at Ann Arbor via compressed video in order to instruct graduate master's courses and survey methodology.

The Department of Communications at the University of Maryland at College Park is a self supported group that handles all of the telecommunications for the campus.

Although the department is fairly new, it installed its own PBX's about five years ago and has the largest single site installation AT&T has ever done, including approximately 20,000 lines and 15,000 voice mail boxes.

K-12

Maryland school districts are continuing to develop partnerships with local cable and telephone companies to create interactive classrooms and programming. Bell Atlantic, in collaboration with the state, has agreed to install DS-3 capacity fiber and full motion video to any public educational institution that requests such service. Part of the agreement stipulates that the first 270 schools that take advantage of this offer are eligible to receive $50,000 worth of equipment, including a NorTel DS-3 32 Mbps codec, which was donated by Bell Atlantic. At the present time, only high schools have taken advantage of this offer. Each school is able to receive and transmit full-motion image to and from three other schools at a cost of $1365 per month.

Maryland Public Television offers approximately 20 educational programs daily to all K-12 schools in the state.

FUNDING

Funding for the MEC project has been mostly by public and private partnership. Much of the equipment, software, and executives were donated. The only cost to the state was the renovation of the office facility which headquarters the Maryland Electronic Capitol.

The Maryland Technology College was also completed with the help of donated efforts from the Maryland Higher Education Commission, the State Department of Education, and the University of Maryland System, as well as businesses providing the equipment, and the Internet providers donating the Internet access.

Money for the university's telecommunications is funded through the Maryland University System $500,000 budget. The campuses pay for services based on their size and budget, from a minimum of $20,000 to a maximum of $140,000 based on a percentage of student fees. The University of Maryland is trying to form partnerships with other campuses and institutions to provide telecommunication services among the campuses. The various institutions and campuses pay for the hardware and the Telecommunications Department at the University of Maryland put the contracts together. The department runs the infrastructure and coordinates all purchasing for the campuses and institutions. Additional funds are also acquired through grants, federal and private, which are all based on the state budget, including the campuses state budget.

MASSACHUSETTS

KEY PLANNERS
- Department of Education (DOE)
- Massachusetts Telecomputing Coalition
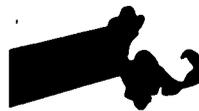
RECENT DEVELOPMENTS

In the past two years, the Department of Education (DOE), the Executive Office of Education, the Massachusetts Corporation for Educational Telecommunications (MCET), the Higher Education Coordinating Council, and the Office of Information Management, a division of the Office of Finance and Administration, have been working together and have formed a structure to make the technology plan for the state a more cohesive and cooperative matter, including areas concentrating on distance learning. As a result of this collaboration, there is now an executive committee consisting of the heads of these five agencies—the commissioner of education, the secretary of education, the executive director of MCET, the chancellor of the Higher Education Coordinating Council, and the executive director of the Office of Information Management.

The actual strategic planning will be conducted by a steering committee, which is the staff of the five agencies. The committee, which has met every week since 1994, is focusing on advocating a $60 million Education Technology bond bill, which was filled in late 1995. Out of this bond bill, $30 million dollars is planned to be given in a matching grant program to school districts with the understanding that the local school districts must have their technology plans — including how they will interconnect the communities and the schools — approved by the DOE before they can receive funding. The DOE has selected 40 educators, mostly technology coordinators from various schools, to review and evaluate local technology plans, according to the DOE criteria.

DOE has contracted with a consultant to assist schools with planning assistance, workshops, a toll free help phone line, a Web site, e-mail support, and is also willing to conduct previews of technology plans to be viewed by the schools before they submit them to the DOE.

Twelve million dollars from the bond bill will be given to schools for community service and pre-submission technology planning advice. Some of the money will also be put into infrastructure building and at this point the state already has a statewide network called Mass Ed Online Learn Net (MEOL).

STATEWIDE AND LOCAL PLANNING

As a model community effort to establish local connectivity, The Berkshire Chamber of Commerce has within it the private non-profit QUEST (Quality Educational Scho-

lastic Trust) with responsibilities to serve K-12 education Through QUEST, Lockheed Martin engineers provided technical and managerial support in establishing connectivity between schools.

STATEWIDE AND LOCAL NETWORKS

In 1995, the first year of the MEOL, the DOE gave free Internet accounts to all school superintendents in the state, principals, business managers, district technology facilitators, as well as building facilitators. Accounts were also provided to school teachers, one for every 500 students. This year, because of a decrease in funding, the teacher accounts will no longer be offered. The accounts are purchased from MCET by the DOE for $100 a year at 20 hours per month for each account. These accounts are for both terminal connection as well as PPP connections.

MCET works with NYNEX to provide ISDN connections to schools. At this point, MCET has developed a plan with NYNEX of $89 for the first six months of connection. MCET is spending nearly $1 million to migrate from analog to digital signals.

MEOL, which is administered by MCET, uses the Massachusetts Education Computer Network as its Internet provider. Currently there are 23 dial up lines and is expected to increase to 167 by the end of the school year.

UMass K12, run by the University of Massachusetts, is a UNIX-based system that serves 1,500 educators and students. It is the successor to SpaceMET, a FIDOnet BBD that has served the state's teachers for many years.

HIGHER EDUCATION

UMass is involved with the Amherst campus in providing a distance learning infrastructure for Continuing Education Programs in Nursing and management. UMass coordinates the project and provides technical support and training. Two nursing courses will be taught during the fall of 1996 at Amherst and two remote locations,. Classes include students at Amherst, Springfield Technical Community College (STCC), and the Berkshire Medical Center (BCC). Each course will be taught via interactive video from Amherst to STCC and BMC.

The University of Massachusetts, the Higher Education Coordinating Council, and Middlesex Community College are three major users among 30 state departments and agencies in Massachusetts using or considering the use of videoconferencing.

The Massachusetts University System has a complex program with engineers conducting off site training and delivering live broadcast classes.

K-12

Created in 1990, MCET's Mass LearnPike (MLP) provides more that 600 hours a year of live, interactive television to approximately 3,000 public and private schools around the state, via a satellite network. Another responsibility of MCET is administering the Mass Online Learn network system.

The Merrimack Valley Education Center continues its work as service providers in the northeastern part of the state. The center has also begun providing an Internet service for school districts and has already signed up and began installations for approximately 30 districts.

UMass K-12 was originally funded by NSF through a grant that has now ended. The program was sustained through membership which most often by the school districts. The program has 2,000 active accounts, most of which are teachers, classrooms, and students.

FUNDING
Higher Education
If the $60 million bond bill is passed, part of the money will be used to interconnect college and university libraries as well as to provide some connection to K-12 schools.

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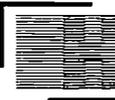
MICHIGAN

KEY PLANNERS

- Michigan Information Technology Network (MITN)
- Michigan Collegiate Telecommunications Association (MiCTA)
- Michigan Department of Education (DOE)
- Michigan Information Network (MIN) Advisory Board
- Office of Michigan Information Network

RECENT DEVELOPMENTS

The Public Service Commission (PSC) ordered Ameritech (formerly Michigan Bell) to apply $10.5 million excess earnings, recently grown to approximately $13 million with interest, to a "ratepayers' fund" administered by the PSC. The three-member Michigan Council on Telecommunications Services for Public Education was charged with devising criteria for grant award decisions, reviewing proposals, and making recommendations for grant awards to the PSC. Eight grant recipients share $10.5 million of the ratepayers' fund. By executive order, $2 million of the fund was given to the Michigan Government Television (MGTV).

The PSC also required Ameritech to match the ratepayers' fund. This money is administered by Ameritech with final oversight resting with the PSC. There is no formal agreement that the eight grant recipients from the ratepayers' fund will benefit from the matching dollars, though some of them—or their K-12 and community college participants—appear to be beneficiaries.

The Office of the Michigan Information Network (MIN) was recently established in response to the increasing economic importance of telecommunications, computing, and other information technologies. MIN seeks to provide Michigan citizens efficient access to local, state, national, and international networks through multiple providers in a competitive environment. MIN is planning to develop a system which will connect K-12 schools, community colleges, universities, and libraries with an integrated video, voice, and data network. The office is formalizing a process of identifying the needs of user groups and finding ways to meet those needs with technology. It is also looking at what user groups are doing now, and ways to integrate existing and new activities according to the national model of "network of networks."

Two amendments have been introduced to the Michigan Telecommunications Act of 1991. The first amendment removes the long term incremental cost standard used to develop bids for telecommunication services to educational institutions. The second amendment permits educational institutions, other than higher education, to resell up to 25 percent of their excess service capacity which may help these institutions recoup costs for services they use themselves and help defray costs for educational networks they will be putting in their districts.

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The Michigan Information Technology Network, Inc. (MITN), a private nonprofit group focusing on the improvement of access to education through distance learning technologies, is providing $300,000 in grants plus staff assistance to the Detroit PBS station, WTVS; Ingham County Intermediate School District; and Western Michigan University.

The Michigan Department of Education (DOE) is collaborating with other distance learning organizations in a review of distance learning as it affects agency initiatives. This includes a review of teacher certification requirements, with participation from three educational technology organizations in Michigan.

The Michigan Government Television (MGTV) Network, working in cooperation with the Michigan Cable Television Association to provide access of state government to all Michigan citizens, has been completed and is operational. This multibranch initiative was funded by a $2 million Michigan Bell shareable earning grant.

The Michigan Alliance for all-Region Cooperation (MARC), composed of grant recipients in the excess earnings case plus the Library of Michigan, are charged with sustaining the forward movement established by the excess earnings program. This includes efforts to secure additional funds to develop a state K-12, public library and community college network, reaching agreement on technical standards for video and data standards, and negotiating with vendors for statewide licensing of software.

STATEWIDE AND LOCAL PLANNING

In response to Public Act 335 of 1993, the Department of Management and Budget completed a plan for the creation of the Michigan Information Network (MIN). The plan, which was presented to the Michigan legislature, explores ways in which K-12 schools, community colleges, universities, and libraries in Michigan can link via a high quality voice, video, and data network built on infrastructures of providers already in Michigan or who might be coming to the state in the near future. MIN is not state-owned or operated and its formation was based upon consultation with education, library, business, medical, and state and local government officials. The Michigan Information Network Planning Committee assisted in examining MIN-related issues. In August, Governor Engler appointed a 15-member Governor's Michigan Information Network Advisory Board, composed of representatives from education, telemedicine, libraries, and business.

The Michigan Telecommunications Act (MTA) of 1991 permits educational institutions to own, construct, and operate a telecommunications system. The act encourages institutions to use existing commercial systems, which may provide special tariffs for education.

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The Michigan Collegiate Telecommunications Association (MiCTA) continues to work out advantageous licensing and collective agreements with interexchange carriers for Michigan. MiCTA managed to implement a 50 percent reduction in monthly charges from SPRINT. MiCTA, composed of members from Michigan colleges and universities, was established to resolve telecommunications issues and provide a clearinghouse for research and development in telecommunications products, services, and policies. MiCTA has compared codecs and negotiated a special T-1 tariff for member institutions.

The DOE anticipates initiating an update of the 1992-97 Michigan State Technology Plan in early 1997. This plan provided initial support for a statewide voice, video, and data network linking schools in the state. In addition, the DOE plans to review and better understand how MIN will apply to education and how schools, parents, teachers, and students will benefit from the network. Finally, the DOE is reviewing the impact of distance learning on a number of department initiatives, including teacher certification.

The Upper Great Lakes Educational Technologies, Inc. (UGLETI) coordinates telecommunications between education, health care, and others in the upper peninsula of Michigan. The group is increasingly active designing distance learning systems, installing distance learning classrooms, staff training, and managing a telemedicine network in Michigan's Upper Peninsula.

STATEWIDE AND LOCAL NETWORKS

In transmission technologies, Michigan is and will continue to be a hybrid state which uses microwave, fiber optics, satellite, and ISDN. A number of commercial and nonprofit carriers in the state offer telecommunications connectivity using the currently available technologies.

Michigan has been developing statewide Internet connectivity for over thirty years, primarily through the efforts of Merit Network, Inc., a non profit organization founded in 1966 and owned by eleven of Michigan's four-year publicly supported universities. Merit operates MichNet, a statewide computer network that provides access from computers and local area networks in Michigan to the worldwide Internet. MichNet currently provides direct Internet attachments to well over 200 organizations in the state. In addition, MichNet dial-in sites in over 50 Michigan cities and Washington, D.C., allow computers equipped with modems to access the network through local phone calls.

Michigan has launched a significant statewide, regional, and local effort to improve telecommunications services for educators, librarians, and students. The settlement of

a ratepayers' rebate case against Ameritech made money available for the state to fund two statewide and six regional grants. One statewide grant was awarded to Merit to increase the number of MichNet dial-in sites across the state. The project is designed to provide local-call access to the Internet in over 120 of Michigan's local calling areas, so that educational users can reach the Internet without incurring long distance phone charges. The service will be available to over 95 percent of the state's population, and the remainder will have access to a low-cost 800 number service. The grant provides the ability for K-12 schools, community colleges, and public libraries to have no-charge dial-in access to MichNet through the end of the grant period in August 1996.

Libraries, through the Michigan Library Association, have extended services through the Internet to public libraries, school libraries, and media centers. The Department of Education has successfully assisted educational groups to establish their own Internet presence, and, using its gopher and World Wide Web servers, provided resources to many user institutions. The service continues today. Since March 1994, the servers have been accessed more than 1.5 million times. The Department of Education plans to provide continuous 24-hour service using information resources now available.

The DOE is updating its 1992 inventory of Instructional Telecommunications Systems. The new edition will be designed for electronic dissemination via the department's WWW server, making it an easy document to both supplement and update.

MITN operates the satellite based Business Network (BusNet) with twelve downlink sites and the K-12 Ednet with 38 downlink sites serving 59 schools. The latter provides customer support for integrating the Satellite Educational Resources Consortium (SERC) into school curricula, marketing programs to teachers and students, and determining the appropriate satellite system needed to receive programming.

For WTVS in Detroit, MITN has funded Work in the 21st Century, which offers a career exploration curriculum designed for middle school students. Ingham County ISD provides an interactive satellite Internet training course for K-12 teachers, and Western Michigan University offers a Construction Management Project series to 15 downlink sites. MITN plans to market these three plans across the nation through SERC and the Internet. Additionally, MITN markets and sells executive training through the Executive Education Network. MITN is now considering compressed video systems as an alternative delivery system, due to the cost of transponder time and the development of digital signals for satellite uplinking.

MITN, in cooperation with various other organizations, continues to be active in managing and developing the Michigan Intellectual Highway. MITN has spent the $10
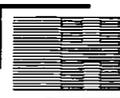
million allotted for five uplinks and one mobile unit for the satellite video network which links higher education institutions, K-12 schools, and homes.

MICHNET, a statewide data network based in nine of Michigan's four-year publicly supported universities, is located at the University of Michigan at Ann Arbor. MICHNET manages and operates the National Science Foundation Network (NSFNET) in cooperation with corporate partners. Dial-in numbers in 23 Michigan cities, as well as Boston and Washington, D.C., allow computers with modems to access the network through local telephone calls.

Merit Network is a non-profit organization run by the public universities of Michigan, that provides both networking access within the state of Michigan and until recently, played a role in development of Internet and operation of NSFnet.

The School of Veterinary Medicine at Michigan State University employs on-line, Internet-based services such as X-ray transmission and consultation to practicing veterinarians.

HIGHER EDUCATION

While the state has no authority in academic programming, colleges and universities form consortia to determine what, how, and when courses are taught in distance learning. The Michigan Community College Telecommunications Network (MCCTN) is a consortium of all 29 of Michigan's two-year college. The network uses a satellite system to reach its members. Several of the community colleges participate in local consortia with universities and K-12 schools. The community colleges of Michigan have taken new initiatives by completing T-1 access for 28 colleges for both Internet access and two-way interactive digital video using codecs at half T-1 bandwidth.

The Michigan Community College Association has applied for a $4 million grant from the W.K. Kellogg Foundation. The money will allow teachers and students release time to redesign curriculum for technology and build teams of expertise to construct learning circles which will go on a directory on the Internet.

MITN is the delivery system for graduate engineering and management degrees and programs from the University of Michigan, Michigan State, Wayne State, Western Michigan,, Michigan Technology University, and National Technological University. From those universities and business management institutes, courses on various management and business topics are transmitted to corporate sites in Michigan.

The Educational Teleconsortium of Michigan (ETOM) consists of members from 27 community colleges. ETOM is involved in compressed video, two-way transmission, and cable and satellite delivery systems.

K-12

Staff development, a continuing priority in Michigan, is funded through competitive grants, private sector funds, and local funds. In 1995, it became mandatory for teacher preparation institutions to assure that program graduates have computer and other modern technology skills. MITN offers staff development programs for teachers and administrators.

Academic programming is regulated either by individual districts or through a consortia of districts. Instructional video programming is assembled through the 22 Regional Educational Media Centers (REMC), which purchase program license rights to more than 55 educational programs.

EdNet brings high quality education to Michigan schools through satellite television and videotape. MITN also brokers programming from major K-12 distance learning providers, including SERC. MITN is the state representative for Star Schools funded programs from SERC and Mass LearnPike, and it develops statewide contracts for programs from Kansas, Virginia, NASA, National Diffusion Network and LERN in Louisiana and Arizona.

A number of independent fiber optic networks involving K-12 systems now exist in Michigan, such as the ones in Lansing, Grand Rapids, Shiawassee, Detroit, and the Gratiot/Isabella region. The Providing Academics Cost-Effectively (PACE) project is a cooperative venture involving 41 school districts, three post-secondary institutions, and various vendors. The Upper Great Lakes Educational Telecommunications Incorporated (UGLETI) project is an upper peninsula-wide effort to develop telecommunications for 65 school systems, eight post-secondary institutions and all regional hospitals.

Michigan has reduced its involvement with the Whittle Communications Channel One program.

FUNDING

By executive order, $12 million from the ratepayers fund was used to create the Michigan Government Television Network (MGTV). Eight grant recipients share the remaining $10.5 million of the ratepayers' fund. Approximately $4 million were issued to the non-profit Merit Network, Inc. to develop statewide infrastructure for local call dial-in access to the Internet for K-12 schools. It is anticipated that this initiative will spur K-12 schools to make their own investments to continue this service. Two million dollars will fund connection of community colleges across the state to the Michigan Intercollegiate Telecommunications Association compressed video network. The grant money will pay for the necessary equipment and one month line charges. Community
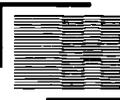
Colleges must fund continuing service. The remainder of the ratepayers' fund is for six regional grants to the upper peninsula, upper northeast, southeast, upper northwest, south central, and southwest areas for K-12 access to the Internet. Grant amounts range from $100,000 to $3 million for the projects.

In March 1994, Michigan voters approved an increase in the sales tax from four cents to six cents on the dollar. The increase helped in funding education at a minimum of $4200 per pupil in 1994-95, which increased to a minimum of $4506 per pupil in 1995-96.

MINNESOTA

KEY PLANNERS

- The Minnesota Education Telecommunication Council (METC)

RECENT DEVELOPMENTS

As a result of further legislation initiatives, the Minnesota Education Telecommunication Council (METC), which was formed in 1993, is now focusing on fully integrating and connecting all of the K-12 school districts and public libraries, as opposed to last year's focus on higher education. As a result of this new emphasis, the 22 member council has been restructured to accommodate new representation. The major goal of the project is to eventually create one network, connecting both higher educational institutions, public libraries, and K-12 school districts across the state.

The Learning Network of Minnesota (LNM), which is a two way interactive video network that interconnects six regional digital networks is currently operational. The sixth and last region, the metro region, is now in the process of being connected and METC expects the network to be fully operational by winter quarter. The network is delivering some instruction now. The goal of the network has been accomplished in that every public post secondary institution has two way interactive video con activity with every other public post secondary institution.

A new change in the overall complex of higher education in Minnesota has to do with the merger between the community colleges, technical colleges, and the state universities. They are now merged under one administrative body. This means that where there were four public higher education systems, there are now two major public higher education systems in the state. One of the systems is the University of Minnesota and the other is what is called Minnesota State Colleges and Universities (MNSCU). Each of these systems has three members who sit on the METC and coordinate on educational telecommunication plans.

STATEWIDE AND LOCAL PLANNING

Although the METC focuses solely on the educational telecommunication needs of the state, the legislature does encourage collaboration with the healthcare community. Particularly at the local level, there has been encouragement to get school districts to collaborate with county seats or hospitals, in order to share infrastructure whenever possible.

STATEWIDE AND LOCAL NETWORKS

With the LNM, there are digital exchanges across the six regions which allows regional networks to interconnect. Predominately, three of the regions are analog and

the other three regions are predominately digital, yet there are mixtures of both technologies in all of the regions.

The LNM, an interactive video service that will connect all public education institutions and public libraries in the state, is entering its second phase which involves connecting K-12 to the network. The state legislature allocated $5.5 million in fiscal year 1996 and $100 million in fiscal year 1997 to fund this portion of the project which will connect all K-12 schools and public libraries in the state. The legislature also appropriated $3.05 million for each of those fiscal years for higher education institutions for operating costs and capacity expansion.

With the recent METC's focus on K-12, the funds allocated by the state to connect the school districts is targeted to connect them to the MNET backbone, which has hub sites in approximately 12 locations throughout the state. Traditionally, all of the infrastructure construction has been mandated to go through the state networking agency, MNET, originally known as the Statewide Telecommunication Access and Routing System (STARS), which is responsible for statewide telecommunication networking. For the last two years, in dealing with higher education infrastrucutural needs, MNET has acted as a contractor to the METC. However, from the school district origin to the MNET hub the schools are not required to use MNET itself; they can go through a private vendor.

HIGHER EDUCATION

Both the University of Minnesota and MNSCU offer credit courses, adult education, continuing education, and community education programs via analog and digital video technology. In addition to offering its own courses, a number of higher education institutions are involved in K-12 activities.

The University of Minnesota system has an ITFS system in the metropolitan area that is entirely related to serving the business community. Approximately 35 corporate sites in the metropolitan area provide courses, particularly in engineering. There is significant interest in the several experiments and in the use of ATM technology. There have been some applications and uses of ISDN technology.

Minnesota's connections consist of microwave, copper and fiber. In addition, there are three satellite uplinks in the twin cities area. The University of Minnesota has one satellite uplink, used mostly for its connection to NTU. Minnesota Satellite and Technology (MNSAT) operates an uplink to serve government, education and for-profit and non-profit organizations. The public broadcast station in Minneapolis also has an uplink.

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FUNDING

The higher education portion of LNM relies on a recurring grant of approximately $3.05 million a year targeted towards higher education. The legislature appears to be interested in integrating LNM funds into general funds so that the network will be regularly funded by the state rather than on a year to year grant basis.

There is also approximately another $15 million per year available to connect and operate the network of the K-12 school districts and libraries in the state. The money is actually being funneled through the Department of Children, Families, and Learning, although the actual grants are approved and disseminated by the METC.

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MISSISSIPPI

KEY PLANNERS
- Mississippi State University Television Center
- Bureau of Instructional Planning
- Mississippi Department of Education

RECENT DEVELOPMENTS

Two years ago, the Mississippi legislature passed Senate Bill 3350 which established the Office of Educational Technology and the Mississippi Council for Education Technology. One of the responsibilities of the council was to develop the Mississippi Master Plan for Education Technology as well as to coordinate services to provide better instructional services to K-12 through the five educational agencies: Mississippi Department of Education, Institutions of Higher Learning, the State Board for Community and Junior Colleges, the Mississippi Authority for Educational Television and, the Mississippi Department of Information Technology Services.

The council developed the Mississippi Master Plan which was approved by the Mississippi State Board of Education and implemented in October 1995. According to the plan, each school district is required to draw up its own technology plan in which a minimum of 20 percent of funding must be set aside for training. As part of the plan, teacher training activities are being conducted at three levels. The fist level of training is a basic technology introduction, including how to access a computer and how to use basic software. Level two deals with higher level skills, integrating technology into ongoing classroom activities, and how to use resources from the Internet. Level three concentrates on train-the-trainer activities and advanced technical skills.

Out of the Council for Education Technology a state telecommunications subcommittee has been developed. The subcommittee developed a plan to establish a common state network backbone and to set telecommunication standards for connectivity among agencies. The plan is to interconnect them through a combination of frame relay and ATM technology, along with some fiber optics that are already present.

STATEWIDE AND LOCAL PLANNING

The Mississippi Authority for Educational Television (ETV) and the Department of Education were recipients of a Star Schools grant for approximately $8 million to expand FiberNet 2000, including providing each of the 92 counties in the state with a compressed video electronic classroom. Approximately 40 classrooms in the state are on line with an anticipation of adding 35 more sites next year. These centers are also geared towards providing teacher training, staff developments, and administrative and school board training.

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The Office of Educational Technology was a recipient of an $800,000 U.S. Department of Commerce NTIA grant to be used for selected schools and libraries in a pilot program for two years called Connecting Communities: Mississippi Family Math and Family Science Network Project. Participants in the program include local school districts, local school libraries, as well as private partners and the State Department of Education (DOE). The goal of the grant is to establish local community access to worldwide resources through connection to the Internet and to provide an educational context for that connection through the Family Math and Science Program.

The Bureau of Instructional Services has studied providing inservice at the DOE through video conferencing compared to the cost of on-site training potential. The comparison appears to favor videoconferencing.

Statewide and Local Networks
The Community College Network is a compressed video system of 17 sites that are tied together through a T-1 network, which connects the community colleges within the state, the University Medical Center in Jackson, and Mississippi State University. The Community College Network is a private agency, funded by a grant from the Community College Rural Health Corporation. This system provides programming related to credit bearing courses, some graduate level courses from Mississippi State, and health initiatives.

FiberNet 2000, previously described as a DS-3 fiber based connection system, has been converted to a T-1 network due to budgetary factors and transmission costs. The network has also been expanded to 20 sites, including 13 high schools, the DOE, Mississippi University for Women, etc. FiberNet 2000, a digital, two-way audio and video network, is primarily used for education. For the 1994-95 school year, the system was used over 2000 hours. It is room based, T-1 system, though there is some scattered use of ISDN.

The Department of Informational Technology Services has been looking at Internet activity for statewide connectivity, which relates to the state's frame relay network currently being constructed. The Internet service provider will tie into the Internet node, then each of the community colleges and universities will be pointed back to the Internet service providers. This system would be more efficient in that it would create a statewide access environment and deem it unnecessary to have separate contracts with the schools.

Although ISDN is mostly restricted to the cities, the Department of Information Technology Services has been contacting the public carrier and giving the number of sites and making sure that no entity is penalized because of its location. The department

received a flat rate price for the Internet service so that no matter where an entity is located, Internet access is cost effective. The department also signed a frame relay contract with Bell Atlantic which is now being implemented and is available for both educational and governmental entities.

Bell South has several distance learning transport services exclusively for educational entities, including reduced rates on educational telephone services and reduced pricing for T-1 connectivity.

Mississippi ETV is using video conferencing and is currently conducting a course strictly on the Internet.

HIGHER EDUCATION

The Institutions for Higher Learning Board has formed a group to develop a technology plan for higher education. Although funding has not been established, many proposals have been brought forth to develop a high speed ATM backbone for the state that would access to the supercomputing resources and be a pipeline for distance learning applications.

Mississippi State University's highest priority lies in the coordinating resources in program activities to develop a statewide infrastructure, as well helping to establish the high speed backbone. Although Mississippi State is no longer working with TI-IN, it has been producing a number of programs for PBS Adult Learning Satellite Service.

K-12

Interest continues to grow in connecting schools to the Internet. A model project that Mississippi State has been working on with NASA and the State Department of Economic Development is the Tri-State "Natural Partners" Project. This project is part of the Tri-State Initiative that was an outgrowth of the NASA educational program. The demonstration project involves bringing technology to the northeastern part of the state and interconnecting the resources of NASA, Mississippi State and the world through the Internet to that region. Interactive classrooms are being constructed at the schools and at the NASA facility in the northeast region. Connections to all of the various networks are provided to the selected schools in the region. There are eight sites that will be connected in the tri-state region made up of Tennessee, Alabama, and Mississippi. These sites will have Internet access, interactive video classrooms, and connectivity to resources at Mississippi State.

Mississippi State has conducted a demonstration project of Internet access at Aberdeen where Mississippi State provided the link for Internet access to a school in a very small town in Mississippi.

FUNDING

Higher Education

One of the main efforts of the Distance Learning Coordinating Committee is to identify funding for teacher training in terms of educational technology. The committee is exploring the options of using state and federal grants, as well as foundations as a way of funding.

The legislature passed Senate Bill 2945 focusing on the community colleges. The bill sets aside approximately $29 million for the 15 community colleges in the state; over half of the fund is to be used for the construction of a campus infrastructure in preparation for the statewide network and $13 million used for the universities' infrastructure.

K-12

SB 3350 appropriated $30 million to disseminate to school districts. Out of this $30 million, $900,000 was given to the Office of Educational Technology for training activities. Also out of this $30 million, $2 million was set aside for infrastructure activities, so that each of the 153 school districts can connect to the state backbone via a router and DSU. The schools themselves will be responsible for connecting to their district's hub. The state will be divided into 29 regions, each to be given a router and CSU/DSU.

SB 3350 also gave the Office of Educational Technology $60 million in bonding authority which cannot be used touched until after the dissemination of the $30 million dollars. School districts have until June 1996 to submit their local technology plan, which will be their application for those technology enhancement dollars. These applications must be developed by a local technology planning team that consists of teachers, administrators, parents, community leaders, and students. These plans are not to address just computers, but must include all educational technology aspects, which incorporates plans for distance learning and training activities.

The Community College Network was funded through rural health money as well as funds from the state.

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MISSOURI

KEY PLANNERS
- University of Missouri
- Department of Elementary and Secondary Education (DESE)
- Cooperative Board for Higher Education

RECENT DEVELOPMENTS
With Goals 2000 funding, the Missouri Department of Elementary and Secondary Education (DESE) is developing a state technology plan, which will affect all of K-12 education. DESE is working to connect all department personnel on the internal network and the external network with the school districts. Already DESE participates in an electronic data exchange with schools.

The University of Missouri (UM) has been leading the development of educational telecommunications in the state. UM - Kansas City's Interactive Video Network (UMKC-IVN), in particular, has been active in establishing links with various regions of the state. In the next year, the University of Missouri's highest priority will be to establish a standard for educational technology and provide better designed and produced programs that meet multiple applications.

STATEWIDE AND LOCAL PLANNING
The Video Instructional Development and Educational Opportunity (VIDEO) program continues to provide grants to LEAs, IHEs, and PBS to supplement educational opportunities through telecommunications technology and satellite broadcast instruction. In 1980, the state legislature enacted the Video Instructional Development and Educational Opportunity (VIDEO) program encouraging all public educational institutions to supplement educational opportunities through telecommunications technology and satellite broadcast instruction. The VIDEO program was extended in 1992 and 1994. Much of the VIDEO program is expected to stay the same through 1999. A 29-member advisory committee, comprised of representatives from education, state government, public television, and regional consortia meets quarterly to oversee the program's progression.

STATEWIDE AND LOCAL NETWORKS
IVN has installed a link to Missouri Southern State College for the delivery of a master's degree program in nursing program to that campus. Within Kansas City, IVN has expanded through ITFS. IVN installed ITFS receive systems at nearly all junior and senior high schools in the Kansas City Magnet Schools where students can receive freshman level college classes. IVN has also established relationships with the city of Nevada, MO, where a dial up videoconferencing system was connected to the Nevada Technical Center. The video link offers college programming and teleconferencing for business and industry.

IVN hosts educational technology training sessions for faculty from the University of Missouri and neighboring schools. IVN is planning on setting up a SONET link between the Hospital Hill facility, which houses the nursing, medical, and dental schools, as well as several pharmaceutical schools, for linkages with various other sites on the Voker campus.

Southwestern Bell, which is Missouri's RBOC, offered, and IVN accepted, ISDN lines for the network. IVN is providing opportunities whether it be business teleconferencing or students calling through their own ISDN facility and take classes via the ISDN system.

A model telecommunication community resource center was constructed in Poplar Bluff, where interactive video, satellite and computer networks are used. The center, which is fully operational and staffed, is a community partnership between the public school district, the University of Missouri Extension, and the town of Poplar Bluff. The project is funded by the University of Missouri.

MOREnet, the Missouri Research and Education Network, which is a statewide data network established in 1989, and ShareNet, have both expanded. MOREnet, which was established in 1990 as a network for higher education services, is an Internet access system for public state services and the K-12 community. MOREnet, together with the Office of Administration, has been working to provide the state government with Internet access. Dial up access is available in the capital and a state Internet server recently came on line.

In conjunction with the state Office of Administration, the Missouri State Library connected 21 public libraries through a pilot project called Project REAL - Remote Access for Libraries. If funds are approved to connect all 136 libraries, the projected training services will be implemented through DESE.

The University of Missouri continues its work with the two-year old telehealth project which conducts remote diagnosis and consultation with rural clinics. The University of Missouri has allocated resources for an Institute for Instructional Development. Through a competitive internal grant the institute. has funded about 35 projects. The institute also produces product for technology integration, including distance education.

The state utilizes many broadcast and airwave technologies including microwave, ITFS, and satellite. Missouri also employs terrestrial technology. Although there is interest in ATM use, the state is waiting for the technology to improve and for the state infrastructure capabilities to expand. Some technology migration is evident: The University of Missouri, for example, is moving from microwave to fiber.

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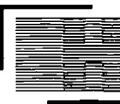
HIGHER EDUCATION

The Coordinating Board for Higher Education has established a committee comprised of various representatives from state and private universities to discuss academic programming issues and set guidelines for programming.

The University of Missouri produced several Internet related programs. UM-St. Louis has approximately four college credit programs on the Internet. The University of Missouri uses the Internet for course handouts, supplements to programs, and class tests.

IVN provides more than 40 hours of college credit courses per week and links four of the University of Missouri campuses. IVN has expanded its partnership to other universities by establishing an interconnecting system. Central Missouri State University offers industrial safety and criminal justice degree level programming into the Kansas City area. IVN also developed a joint program in software engineering with Kansas State University. At the time, neither school had sufficient faculty to execute a full degree program independently, but through collaboration the universities were able to satisfy the requirements of the accrediting organization.

K-12

For the last four years, the DESE has been working in the area of distance education. DESE anticipates that by the end of 1996, more than 400 of the 525 school districts will be connected to the Internet. In addition, several schools have been forming interactive television clusters.

The University of Missouri's video advisory committee comprises K-12 and higher education representatives from various school systems around the state. The committee recommends how income from the video tape rental tax is spent on educational programs and equipment.

FUNDING

K-12

In 1994, the state legislature appropriated $7.1 million over a three year period to connect all schools to MOREnet. The DESE is also trying to move from a dial up access to connecting all of the school districts on a dedicated line in three years.

State legislators continue to appropriate $5 million annually for technology grants to public school districts. In 1995-96, the legislature allocated another $5 million to the DESE and the schools from lottery revenues. For 1996-97, the governor has encouraged the legislature to appropriate an additional $20 million to further advance school technology, networking, and connectivity to MOREnet and the Internet.

MONTANA

KEY PLANNERS
- Department of Administration (DOA)
- Office of Public Instruction (OPI)
- Office of the Commissioner of Higher Education

RECENT DEVELOPMENTS

The Montana Telecommunications Advisory Network has been replaced by the legislature-funded Governor's Blue Ribbon Task Force on Telecommunications. The new group defines the state's obligation in developing telecommunications, keeps track of federal government activities, and discusses universal access, universal service, and basic service. The 19-member task force must make recommendations by October 1996.

The Montana University System, the Office of Public Instruction (OPI), and the Department of Administration (DOA) are partners in SUMMITNET, a statewide implementation of a network backbone, of 56 Kb and T-1 circuits throughout the state. The state is planning to have telephone companies maintain and support it, while the DOA will guarantee a certain level of usage. The legislature has approved the system for education and state government use. Among the technologies that will be used are microwave, copper and fiber. SUMMITNET will replace the old bulletin board systems and part of the Montana Educational Network (METNET) bulletin boards.

The university system units are striking out on their own in telecommunications through federal grants, such as the NSF. Network Montana is a new initiative funded by a NSF grant of $2.5 million for 3 years beginning in October 1995 for the successful integration of telecommunications in schools.

STATEWIDE AND LOCAL PLANNING

METNET, the state's compressed video, educational telecommunications network, is a cooperative venture involving the DOA's Office of Telecommunications, the Office of the Commissioner of Higher Education, and the OPI. The DOA administers funds and technical decisions, while the Commission on Higher Education and the OPI resolve curriculum issues.

Under the METNET system, the Commission on Higher Education coordinates the statewide use of telecommunications technology for postsecondary education. Higher education plans to develop advanced placement courses for high school students, plan in-service programs for teachers, work with vocational and technical schools throughout the state, and assist in the use of telecomputing in public schools. Higher educa-

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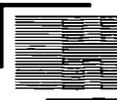
tion entities are concentrating on developing both curriculum for college and graduate level credit courses and also non-credit programming for local governments and outreach.

The Department of Education (DOE) is in a partnership with the technology assistance centers of the Northwest Regional Lab. Northwest Lab set up a two-way video system in each of the state departments for Alaska, Wyoming, Washington, Oregon, Montana, and Idaho. The DOE has been talking with the Northwest Lab on further collaborations concerning teacher training, technology assistance, and purchases.

STATEWIDE AND LOCAL NETWORKS

Big Sky Telegraph is a well-established educational affiliate of the National Public Telecomputing Network (NPTN) which supports over 50 FreeNets and 100 FreeNet organizing committees. The free dial-in system links rural schools to information resources, establishes mentor relationships among teachers, and provides a basis for community development projects. The system is used minimally and no longer accepts subscriptions. In 1993, Western Montana College Foundation was awarded a major grant of more than $800,000 from the Annenberg /CPB Math and Science Project and the US West Foundation for supporting math and science reform for rural teachers through telecomputing.

METNET expanded its two-way compressed video from six sites to twelve. New sites include Great Falls, Dillon, Warm Springs, and Helena. METNET bridged into Eastern Montana telemedicine in Culbertson, Sidney, Scobey, Glasgow, Great Falls, Cut Bank, Shelby, and Baker. The state is no longer funding the METNET system which is supported by the DOA. METNET includes 11 sites of compressed video, a one site with the computer-based bulletin board system, computer-based electronic mail, and a component providing equipment grants to schools.

Twenty Intel Proshare systems are increasing the use of desktop videoteleconferencing across the state. These systems will be used in teacher training and technical support. The systems provide one-on-one capability and with the assistance from grants and TCI, provide multi-site conferencing, support, and training through cable based ethernet and the TCI the infrastructure in Missoula.

Network Montana will link the tribal colleges with the University system. The network provides: ❶ access, wires, and connectivity for schools; ❷ backbone network design, support and management; ❸ training for administrators and teachers; and ❹ curriculum development. The network will rely on state funding after three months. In collaboration with industry, the network will develop an administrative course for the tribal colleges, K-12, and the university system. These entities will also learn how

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to manage an Internet accessible wide area network. Teachers will be trained on how to use the Internet efficiently in the classroom, and administrators will learn how to train in curriculum and school applications. The network will work with NASA, NSF, and the state Department of Energy to develop curriculum that optimizes the use of current scientific data sets on the World Wide Web, building large information access archives, and facilitating identification of sound resources that can be used in education. The network administrators are considering how Internet resources can be used at specific grade levels, for curriculum content, and in finding Internet and curriculum sites that facilitate implementing a thematic orientation.

RFPs to manage SUMMITNET with a TCP/IP backbone have been sent to telephone companies. The plan is for K-12 schools to link up at $195 per month for a 56 Kb line and $595 per month for a T-1 line capacity from their site to the nearest point of presence from SUMMITNET.

The Hughes satellite program has become popular in Montana. The program offers a school $500 per month to obtain T-1 capacity and routers to the Internet. The program allows schools to sell off a portion of the connection and the bandwidth to parents, who will in turn, receive a $25 rebate on their monthly charge.

MSU hosts a Ku-band uplink that delivers graduate level instruction and provides videoconferencing services for state agencies. The METNET Video Network is connected to the satellite uplink, allowing origination of satellite video programming from any compressed video location in the state.

Network Montana uses a microwave system as well as fiber and satellite for the state network.

HIGHER EDUCATION
Microsoft is instrumental in implementing the integration of advanced software into all five state colleges of education and in teacher training. Microsoft donated over $1 million in product and licensing to Montana in the last 2 years, helped in curriculum projects, supported licensing for writers and development staff, and supported over 40 teachers who will become technical facilitators in the state. Microsoft is also assisting in the development of network administration.

Desktop video is used to deliver a Masters in Education programs to Helena from Missoula.

A $1.2 million grant from NTIA/PTFP is used to interconnect the state's public television facilities between the University of Montana and Montana State University (MSU).

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The University of Montana at Missoula uses the METNET Video Network to offers Masters degree programs in Business Administration, Education, and School Administration to students in Billings. The dial-up, two-way compressed video network employs the state's voice and data telephone network to provide bandwidth on demand.

K-12

Montana is a local control state in which 490 school districts make their own decisions on software, networking, and technology expenditures. Since there are no state standards, districts are funded on a per student basis and are currently searching for grants. The Internet is not widespread in classrooms yet and many schools are supplementing curriculum with satellite broadcasts or two-way video. Districts share teachers or trade teacher time.

TCI Cablevision distributed a free Prime Star dish, including set up and service, for any school not able to receive cable. Telephone companies are helpful in setting up ITV systems and USWEST is helping with teacher technology training. Although funding has been cut by 50 percent, Montana is still involved in the Pacific Northwest Star Schools partnerships.

Western Montana College's "Reach for the Sky" project is one of five funded jointly by the Annenberg/CPB Math and Science project and the US WEST Foundation in a $2.5 million initiative to help rural elementary and secondary educators learn how telecomputing can bring new resources to their classrooms. The project is aimed at ending the isolation of rural math and science teachers to enable them to use available computerized human and data resources for learning. This rural telecomputing initiative will give teachers the technical skills, hands-on experience, and ongoing support to incorporate the resources of the Internet and other computer networks into their own classroom and curriculum.

Rural telephone cooperatives are bringing Internet service to the subscriber, including rural schools which now have local access to telecommunications without making a costly long distance call. The schools are no longer dependent on METNET's 800 number. The cooperative initiative is said to be having an impact on education in rural Montana. Nine regional school superintendent groups work with telephone cooperatives to put together interactive networks using fiber lines.

Western Montana College of the University of Montana, as the state's public Internet access testbed, promotes citizen teleliteracy and lifelong learning by offering free public access to Big Sky Telegraph (BST) resources. BST, funded by the U.S. Department of Education, is currently conducting the "K-12 Electronic Model Congress" project in collaboration with a Salmon Fisheries Environmental project. These projects involve

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high school teachers from the United States, Finland, and British Columbia and focus on the electronic communication and dissemination of environmental debate, electronic information gathering, and advising elected officials on policy. BST offers this online course to 140 teachers and is the result of BST's partnership with the Columbia Education Center of Portland, OR.

Schools in Montana employ more that 200 C- and Ku-band downlinks to receive programming from sources such as Washington, Oklahoma, the National Diffusion Network, and C-Span.

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NEBRASKA

KEY PLANNERS
- Nebraska Educational Telecommunications Commission (NETC)
- Department of Education (DOE)

RECENT DEVELOPMENTS

Nebraska continues to broaden its educational telecommunications system and satellite outreach programs using the Nebraska Educational Telecommunications Commission's (NETC) telecommuting network.

The Educational Technology Association, the Association of School Boards, and the Educational Technology Consortium completed a study to develop an overall plan for K-12 education. The Collaborative State Plan for Technology in Nebraska Schools outlines five priorities: collaborative implementation of the state plan; the dissemination of technological information; the establishment of training service guidelines; the development of a compatible infrastructure; and universal student access.

Metropolitan Community College (MCC) is conducting a distance learning project with a company where 900 employees receive on site instruction. The college is currently trying to implement microwave links into the factory for teaching. MCC now offers campus-based classes on local cable TV, in which students who are taking the live classes can call in and interact with the instructors. Peru State College now offers courses at MCC in Omaha through the NETC satellite system.

STATEWIDE AND LOCAL PLANNING

In 1993, Nebraska enacted legislation requiring regional educational service units to provide Internet access to member schools. The State Division of Communications, along with local telephone companies developed a backbone network to assist schools in obtaining reasonable prices for Internet access and additional on-line computer services. The bill allows service units to raise tax levels to pay for the cost of the initiative.

The State Division of Communications recently implemented a statewide infrastructure planning project which includes K-12, higher education, health sciences, state government, and libraries. Every school in Nebraska has ready access through regional education service units (ESU), although all connections have not been made yet.

NETC is the coordinating body for statewide public broadcasting and educational telecommunications. A number of services are distributed throughout the state via the statewide Nebraska ETV, the Public Radio Networks, and NEB*SAT, Nebraska's multiple channel satellite.

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STATEWIDE AND LOCAL NETWORKS

The fact that TV production is not adapting to school restructuring plans in line with Goals 2000 has been a major stumbling block for distance learning in Nebraska. The state is starting to integrate T-1 and computer technology with satellite delivery, which is the primary transport mode in Nebraska. State funds are available for equipment for rural communities.

The NEB*SAT system provides a comprehensive and coordinated network of originating and receiving sites across Nebraska. The Nebraska Coordinating Council for Educational Telecommunications, composed of representatives from all sectors of Nebraska public and private education, has developed the NEB*SAT satellite and fiber optic system which is the first state-owned, dedicated multiple-channel transponder for statewide educational use by all sectors of education. NEB*SAT has two full-motion video channels for public television and instructional services, 12 compressed video channels, and public radio distribution. There are individual and adjacent school districts interconnecting through the fiber optic system.

The Nebraska ETV Network offers a variety of specialized services through its nine television stations and 17 translators. Four government agencies contribute to the network. The University of Nebraska at Lincoln Television provides instructional and public television programming, and production services. ETVs station, KUON-TV, serves as the originating station for the statewide network. The University of Nebraska at Omaha Television produces programs for broadcast statewide. The DOE, in cooperation with NETC, offers elementary and secondary instructional television programming through the Schools Telelearning Service (STS).

Other ETV services include the Hearing Impaired Video Information Service (HI-VIS), a descriptive video service (DVS) to assist sight-impaired residents, and newly implemented closed-captioning production capability. In addition, ETV provides EduCable, a continuing education cable television service, through a dedicated channel provided by participating Omaha and Lincoln cable systems.

NETC is the home for the Agricultural Satellite Corporation (AG*SAT), a collaborative effort of 43 land-grant universities in 40 states funded by the Department of Agriculture. AG*SAT provides agricultural information and instruction. In addition to the satellite network, AG*SAT affiliates are developing a computer network to facilitate the exchange and coordination of ideas and programming plans of faculty, staff and administrators. NETC subscribes to the concept of developing a "teleplex" of multiple telecommunications services through a single agency. Few states have succeeded as Nebraska has in offering access to broadcast, ITFS, satellite, microwave and fiber optic networks through one agency.
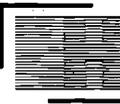
HIGHER EDUCATION

The Metropolitan Community College system interconnects with NETV's NEB*SAT system for statewide distribution. The college system has a six-site, two-way interactive classroom system interconnecting the college's three campuses with three other classroom facilities. The learning system, which has been in operation since 1989, includes microwave links between its sites and operates a four-channel ITFS system to reach businesses and other education locations. Funding is provided from local property taxes. Presently, the system offers a respiratory therapy course via distance learning to two sites in central and western Nebraska. The college is negotiating with local businesses to install classrooms and offer courses on-site.

Nebraska Educational Telecommunications (NET) is a partnership between the University of Nebraska and the State of Nebraska, which provides noncommercial television, radio, satellite, multimedia production, audio and video production, and computer facilities within and outside Nebraska. NET now provides distance learning to inmates and correctional institution staff through the Correctional Training Network (CTN) as a joint effort with a consulting group. There are 11 participants, with an additional 30 expected within this first year. Courses in occupational and vocational training, GED, adult basic education, and post secondary education are delivered via one-way video and two-way audio.

The University of Nebraska-Omaha manages the Knowledge Network, a consortium of Omaha area public and private schools that programs four cable channels. Programming includes for-credit and non-credit courses and information services provided by the University of Nebraska-Lincoln, Creighton University, University of Nebraska at Omaha, Metropolitan Community College, Mind Extension University, and various public schools.

Since 1966, the Nebraska Educational Television Council for Higher Education (NETCHE) has produced and distributed more than 900 instructional programs to supplement classroom instruction for its state members and the national market. NETCHE assumes a facilitating role with its Nebraska affiliates as they begin to utilize the NEB*SAT satellite system for information exchange.

Plans are no longer underway to interconnect Peru State College, Wayne State College, Northeast Community College, and 3 campuses of Nebraska Indian Community College via land-based technology.

K-12

Funding from a 1992 NSF Nebraska Math and Science initiative (NMSI) continues to provide K-12 schools with Internet access. The Educational Technology Center in the

Department of Education (DOE) coordinates the process. Nebraska received a five-year, $4.7 million award, part of which will be used to initiate distance learning projects. Various projects will employ educational TV, video disc technology, and electronic networks to support mathematics and science education, with emphasis on rural Nebraska schools. Money from the state lottery also supports this.

The Schools TeleLearning Service (STS), a partnership between the DOE and the Nebraska Educational Telecommunications Commission, broadcasts more than 150 instructional programs five hours per day. STS identifies and acquires programming, promotes effective utilization techniques, and distributes associated materials. Other STS services include direct satellite-to-school and computer-assisted and interactive videodisk instruction. Currently, 135 high schools in Nebraska are equipped with satellite-receive dishes.

Nebraska ETV and the DOE are founding members of SERC. From the Nebraska Educational Telecommunications Center, beginning and intermediate Japanese language distance education courses are produced and distributed via satellite to schools in 24 states.

The course-sharing project implemented by four western Nebraska high schools and Chadron State College is still operating, although the high line charges make the project expensive. The project uses compressed video via T-1 lines. Five schools in central Nebraska share instruction via an analog fiber optic system originally installed by a telephone company. Both groups can feed and receive the compressed video Network 3 of the NEB*SAT satellite system. The system is not compatible with the rest of the states' systems. A regional group in the Cambridge area is operational now. Two groups in the northeast and southeast regions of the state are in the initial stages of planning for telemediated instruction.

FUNDING

The higher education system is funded through the state. Community colleges receive funding through a variety of venues including property taxes; 22 percent from state funding, 60 funding from property taxes, and the rest from tuition. The percentages varies among districts.

Funding for K-12 initiatives in educational technology are funded through legislative appropriations and the state lottery.

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ERIC

NEVADA

KEY PLANNERS

■ Nevada Department of Education
(DOE)

RECENT DEVELOPMENTS

Nevada has continued its work of increasing the use of telecommunications in the state with the passage of SB 204. SB 204 consists of three sections. The first allocates $5 million to the university and community college system of Nevada to increase its telecommunication capabilities with the caveat that they must link it to the public schools. The second section allocated $400,000 to expand the Nevada School Network to all schools. Presently, there are more than 2000 users on the network but some rural areas have yet to connect. The third component allocated $1.8 million for the development of an automated student record transfer system (SMART). This initiative promotes the development of the system, as well as piloting it in at least four school districts.

Of the $5 million, the university chancellor set aside $800,000, together with the $400,000, to assist with connecting public schools. The Nevada Department of Education (DOE) is riding on the universities backbone to get out to the rural communities. The chancellor set aside the money to help increase capacity and enable the system to reach to more sites so that DOE may use it. Of the $4.2 million, the chancellor accepted only applications that were collaborative between one of the universities or community colleges and the K-12 public schools located in their geographic areas.

The legislature also established a technology trust fund in which DOE can receive funds from private business or other entities specifically for technology. Presently there is $7,500 in the fund as a result of the first donation. Currently, DOE is trying to get Nevada Bell, through the Public Services Commission (PSC), to put $1.6 million of its excess profits into the trust fund.

The PSC recently approved a telephone company regulation which calls for minimal government involvement in telephone company competition, price freezes for basic services, encouragement of new companies, the development of new products, and increased competition between companies.

The legislature also set aside $33 million dollars into a pool of temporarily available money. Seventy-five percent of the money automatically went towards classroom related materials, such as textbooks, lab supplies, and computer equipment.

STATEWIDE AND LOCAL PLANNING
The state has been continuing its work with Farview, the Star Schools dissemination project. The project provides general information and training primarily for building

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principals on distance learning hardware basics, satellite downlinks, costs involved, and an understanding of distance learning programs available.

Other staff development efforts include an initiative from the $5 million allocated from SB 204. The University of Nevada -Reno's application included training for the Internet as well as instructing teachers to change their teaching style to adjust to the changing technology. The state also has Eisenhower money targeted toward training, with an emphasis on math and science, but still focusing on the use of technology.

The university and community college system, the DOE, and the Department of the State Libraries, Museums, and Archives were collaborators on a $530,000 Telecommunications Information Infrastructure Assistance Program (TIIAP) grant that is designed to develop resource personnel in ten locations. The grant is designated to help schools, libraries and communities with technology.

Through an NSF grant, the Clark County School District is currently designing a training center within the district and has been working with Kodak and other major companies that might provide equipment.

STATEWIDE AND LOCAL NETWORKS

The university system has a two-way interactive video network to all of its community colleges. There are proposals to expand the network into a number of the state's high schools. The university is looking at distributing not only courses in advanced math, science, and foreign language from the university to the high schools, but also transmitting them from one high school to another.

Through the Nevada Student Network, the DOE is optimistically targeting to have every school in the state connected within a year. If all schools connect within a year, schools will avoid enormous long distance charges for on-line time. The network will also enable the schools to get onto the Internet.

The Nevada Bell Telephone Company in Reno helped arrange for a connection of a live feed, two way interactive video by satellite from its offices to Finland, where students could interact with each other.

HIGHER EDUCATION

Two University of Nevada campuses use videoconferencing for administrative purposes. The compressed video system began delivering instruction during the spring of 1993. During 1992, the University of Nevada at Reno joined the AG*SAT network and, in 1993, installed a Ku-band uplink and four downlinks.

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K-12

Silver High School in Las Vegas has a connection with an environmental protection agency so that it can collect radon samples from several places in the U.S. and Europe. These samples are shipped in sealed containers to the school. With the help of UNLV labs, the samples are analyzed and the high school students are then able to conduct reports and studies on these samples.

A project within the Clark County School District has developed a software program called Interact. This program is essentially a graphic way of accessing information on what is going on in the county. The United Way has also joined in by offering information on social services.

FUNDING

Telecommunications activities at Nevada's universities, community colleges, and K-12 schools are funded through SB 204, a $7.2 million allocation.

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NEW HAMPSHIRE

KEY PLANNERS
- University System of New Hampshire
- New Hampshire Public Television (NHPTV)

RECENT DEVELOPMENTS

The Public Schools Interactive Communication System Study Committee, which was established in 1994, recently conducted a Statewide School Technology Survey in partnership with the state legislature, the Department of Education, and Center for Resource Management. Last year, the Committee evaluated testimony concerning objectives, barriers, funding, planning, and technical issues from representatives of several grass roots telecommunications networks in the state. The Committee's recommendations include taking steps to develop New Hampshire's Information Infrastructure for the benefit of all sectors of the community.

The Committee's recommendations identify the Internet as a primary source of governmental information for New Hampshire citizens. The Committee suggested charging the Office of Information Technology Management (OTIM) with assisting state agencies incorporating the Internet into their technology plans and reporting progress to the legislature. The Committee further recommended that the Department of Resources and Economic Development examine and report to the legislature on the role of advanced telecommunications in economic development and job growth for New Hampshire, with the goal to encourage private investment in affordable high bandwidth information infrastructure.

In addition, the Committee recommended support for a professionally-facilitated Action Planning Day for voice, video, and data infrastructure development with participation by interested public and private organizations. Finally, the Committee suggested charging the Public Utilities Commission (PUC) with modifying existing state telecommunications service regulations to allow for reduced rates for educational institutions in the development of a competitive and consumer-oriented marketplace for services, and a reduction in the number of calling areas for efficient use of the upcoming state telecommunications infrastructure.

The Wide Area Interconnectivity for Networking the Granite State (WINGS), which is made up of public educators and private sector groups including NHPTV, MCI, Northern Telecom, and Cabletron, made an unsuccessful attempt for a grant from NIIAP through the Department of Commerce. The group is now developing a statewide awareness program to educate the education community, the business community, and hospitals in the values of having an affordable state-of-the-art telecommunications infrastructure.

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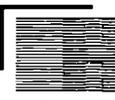
The voluntary New Hampshire Telecommunications Consortium, made up of tele-communications providers and users has formed to determine what it will take to facilitate and drive an agenda to develop an advanced telecommunications infrastructure and services statewide. The mission of the consortium is to provide leadership for supporting, guiding, and expediting the deployment of and access to advanced tele-communication infrastructure and services throughout the state. The consortium pursues goals related to statewide access to affordable telecommunications infrastructure and services, public policies and regulations affecting telecommunications infrastructure and services, influencing state and local economic development and educational policies to recognize the critical role of telecommunications infrastructure and services, and becoming an informal resource for supporting local and regional efforts that implement telecommunication applications.

The Governor's Task Force on Telecommunications, which was established to provide guidance and assistance in the development of the statewide network, NHNet, is no longer active.

STATEWIDE AND LOCAL PLANNING

Educational telecommunications activity in New Hampshire is concentrated in the state's university system. Last fall, the New Hampshire Educational Television Network (NHETN) delivered 11 courses, one professional development course for land surveyors, a New Hampshire Department of Health and Human Services employee training on "Security in the Work Environment," a video conference on distance education, and several PBS Adult Learning Satellite Service workshops.

The University System of New Hampshire's Instructional Television (ITV) Steering Committee provides policy guidance to the four-site University System interactive distance learning network. Sites at the University of New Hampshire-Durham, University of New Hampshire-Manchester, Keene State College, and Plymouth State College are available for use by the College for Lifelong Learning which offers its own programming. The 11-member Steering Committee develops policies for collaboration, access, governance, programming, administration, and funding for instructional television. The Steering Committee recommended and made two unsuccessful applications for an REA grant for the expansion of the interactive television network to serve rural communities in New Hampshire's North Country.

STATEWIDE AND LOCAL NETWORKS

The University System of New Hampshire operates an interactive ITV network with sites at the University of New Hampshire-Durham, the University of New Hampshire-Manchester, Plymouth State College, and Keene State College. Using T-1 compressed two-way video, each site on the system is capable of both receiving and originating programs.

Post-secondary educational telecommunications activity in New Hampshire is con-
centrated in the state's four-site university system interactive television network which
is a digital, two-way room based network transmitted by terrestrial means.

NHPTV delivers both instructional and professional development programming over
its statewide broadcast network. About 43 percent of New Hampshire's K-12 students
and teachers have access to the NHPTV Knowledge Network. The network is also
involved in bringing affordable access to broadband telecommunications for interac-
tive distance learning and providing network programs on the World Wide Web.

New Hampshire College has chosen a vendor to build an interstate library network
that will allow students, faculty, staff, and business users to access LAN-based library
facilities and the Internet.

ADULT AND HIGHER EDUCATION

The university system's greatest challenge continues to be able to accommodate all
entities wishing to transmit courses during the prime, after-work (5pm-9pm) hours.
Proposals for ITV reconfiguration include weekend programming.

The NH Net links businesses to human and information resources throughout the
university system of New Hampshire. In addition to NHNet, the university system
maintains networks that provide educational data to local K-12 schools.

The University of New Hampshire, Keene State College, Plymouth State College, and
the College for Lifelong Learning (CLL), through the New Hampshire Educational
Television Network, have provided instructional programming since the fall of 1992.
These institutions deliver traditional college courses, continuing education, and K-12
staff development over an interactive two-way audio, two-way video distance learn-
ing system. During the fall 1995 semester the network delivered 11 courses, a land
surveyor professional development course, a "Security in the Work Environment "
employee training course for the New Hampshire Department of Health and Human
Services, a video conference on distance education, and several PBS Adult Learning
Satellite Service workshop. As requirements for professional certification or licensing
becomes more stringent, distance learning networks of this type will become more
useful to people seeking continuing education.

K-12

Distance education in elementary and secondary schools in New Hampshire is avail-
able through the NHPTV Knowledge Network. The Knowledge Network offers full
K-12 service to over 74,000 students. The instructional television service includes more
than 800 hours of ITV programming over 4.5 hours per school day and a 2 hour over-

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night feeding Tuesday through Saturday mornings during the school year. The public television network is funding the service with a combination of federal and state funds, and enrollment fees from participating schools.

The public television network also offers professional development courses for teachers and administrators, including a live interactive monthly program called *Education Exchange,* satellite video conferences, Mathline, the National Teacher Training Institute, Character and Citizenship Education, the Christa McAuliffe Technology Conference, taped professional development programs, utilization workshops, and conferences and professional meeting workshops.

FUNDING
Funding for the start-up and continuance of the NHETN has come from the university system.

NEW JERSEY

KEY PLANNERS

- New Jersey Network (NJN)
- New Jersey Department of Education (NJDOE)
- New Jersey Intercampus Network (NJIN)
- Office of Telecommunications and Information Systems (OTIS)

RECENT DEVELOPMENTS

In 1995, the New Jersey Department of Education (DOE) proposed the Strategic Plan for Systemic Improvement of Education in New Jersey to coordinate the uses of technology in education and information management. The framework includes the following strategies: ❶ work with state agencies, professional organizations, higher education institutions, business and industry, and the New Jersey Statewide Systemic Initiative (NJ/SSI) to implement *Educational Technology in New Jersey: A Plan for Action* and the recommendations of the Ad Hoc Council for Technology; ❷ make DOE information available on-line to schools statewide by implementing database, networking, and communications technology at DOE; ❸ expand the use of technology to support the public information process, particularly fiscal monitoring and reporting; and ❹ continue and expand the ongoing grant program for the establishment of interactive full-motion distance learning sites.

The State of New Jersey Division of the Ratepayer Advocate is a member of a task force set up by the governor to look at telco/cable issues. The president of the state Board of Public Utilities, a member of the task force, is looking at cable and telephone regulations that affect consumer services. The Cable Telco Task Force consists of six subcommittees to address consumer issues, legislation and regulations, health care, deployment and interconnection, universal services, and education. The education subcommittee has surveyed the major telecommunications providers in New Jersey, including Bell Atlantic NJ, AT&T, cable companies represented by the Cable TV Association, and New Jersey Network . The subcommittee has submitted a phase one report to its executive committee for review prior to submission to the public utility commission.

In April 1995, the Board of Public Utilities (BPU) approved county and regional rates filed by Bell Atlantic for Interactive Distance Learning Service (IDLS). This is the first interactive distance education tariff in the nation. The service consists of one transmit and three receive audio and video paths which allow sites to interact with other sites either within their community of interest or Local Access and Transport Area (LATA). The system provides four locations, one classroom sending and three receiving, working together over the network. Rates are limited to public and private educational institutions, libraries, cultural institutions, and non-profit organizations using the system for distance learning. The monthly five-year, term-based rates for one transmit,

three receives are $1,050 (countywide) and $1,350 (LATA wide) with rates of $995 and $1,295, respectively, for districts with special needs.

Seven county-wide distance learning programs that provide live, full-motion courses to students and teachers over fiber optic cable have signed contracts with Bell Atlantic of New Jersey. Several other counties plan to establish similar networks.

The New Jersey Association for Instructional Technology (NJAIT) has been established from counties that have in place or are building county networks. The purpose of NJAIT is to explore and advocate for the effective use of instructional technology for distance learning in counties, and to address infrastructure issues related to instructional TV.

Bergen, Morris, Hudson, Burlington, Somerset, Mercer, and Union counties have established distance learning programs that deliver live, full-motion courses to students and teachers over fiber optic cable. Several other counties have similar plans. The Vocational-Technical Schools of Warren, Sussex, and Morris Counties are linking for distance learning.

The Commission on Business Efficiency of the Public Schools - Education Technology Task Force has been organized by state legislators to propose educational technology policy recommendations to be presented to the state legislators.

The new AT&T Learning Network is a $150 million nationwide commitment to education. As part of this, AT&T will offer private and public schools in New Jersey access to a wide variety of telecommunication services by the year 2000.

Assembly Bill A1860, introduced in April 1996, requests funds for competitive grants to establish multiple training sites.

STATEWIDE AND LOCAL PLANNING
The New Jersey Telecommunications Act of 1992 enabled the New Jersey Board of Regulatory Commissioners to act upon alternate methods of telephone utility regulation. Under incentive regulation legislation, Bell Atlantic of New Jersey filed its Opportunity New Jersey plan for the modernization of New Jersey's infrastructure. This $1.5 billion initiative explores ways in which fiber optics, digital switching, and other technologies can be applied to health and human services, government, industry, and education.

STATEWIDE AND LOCAL NETWORKS
The New Jersey Network (NJN), a founding member and partner with NJDOE in the

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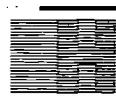
Satellite Educational Resources Consortium (SERC), is the public television network for New Jersey. NJN offers telecourses for K-12, college, and adult students. Through a partnership with New Jersey colleges, NJN participates in the "Going the Distance" program which allows students to complete 2-year degrees entirely from NJN telecourse broadcasts. NJN also provides the PBS Mathline which includes the Middle School Math Project (MSMP) for professional development of middle-grade math teachers.

New Jersey Public Broadcasting uses broadcast, ITFS, satellite, cable, and fiber optic technologies to offer instruction throughout the state. Each semester NJN broadcasts 15 college telecourses from participating institutions in New Jersey, Delaware, New York, and Pennsylvania. In addition, NJN delivers over 100 K-12 instructional programs each year.

The New Jersey Intercampus Network (NJIN) operates a three-phase plan for the development of an intercampus network that will augment the receive-only satellite downlinks existing on many New Jersey campuses. Phase one began in 1994 with the connection of the New Jersey Institute of Technology (NJIT) to William Paterson College. This phase has recently been completed with the linkage of William Paterson College to Richard Stockton State College. NJIT is now in phase two of the NJIN plan to connect higher education institutions to critical areas of the state via a two-way, primarily digital video network, using two-way videoconferencing. Phase three will add channels and institutions to the system. NJIN evaluates, selects, and purchases equipment for 39 colleges and universities. This equipment will enable New Jersey colleges to exchange courseware and pre-colleges programs with each other and with corporations. As the first stage of this statewide effort, NJIN has begun implementing a videoconferencing delivery system, a two-way video and audio data exchange over phone lines between Newark and the Technology and Engineering Center and between Newark and Ramapo College in the north.

NJN and NJIN have exchanged memberships and will collaborate in future activities.

The Cable Television Network (CTN) of New Jersey, Inc. a statewide channel owned by the state's cable television industry, reaches more than 1.7 million households and offers 60 half-hour blocks of for-credit programming from 17 institutions of higher education each week. CTN broadcasts telecourses for participating colleges and universities.

Two examples of the seven Instructional Television (ITV) county projects in New Jersey are the networks in Bergen and Hudson Counties. The non-profit, fully interactive Bergen ITV fiber optic network, coordinated by Bergen County Technical School and

funded by local schools, was established in 1990. Schools share programs whose course content is determined by the schools. The network has added middle and elementary schools through state grant money.

Bergen County has received a class B Internet license housed at Bergen County Technical School (BCTS) which plans to deliver Internet access to the county schools. BCTS participates in the North Jersey Public Information Exchange, initially a freenet and now a community network which includes the North Public Library, Elizabeth Public Library, Bergen County Technical School, Bergen County Cooperative Library Services (BCCLES), Elizabeth Public Schools, and the Morris Automated Information Network. Bergen County Technical School's highest priority for action in 1996 is to bring Internet access to all county schools and interface data with other audio and video distance learning projects.

Bergen Community College and Ramapo College of New Jersey are connected by fiber to the Bergen County Instructional Television Network for two-way interactive instructional programs. NJIT has an ITFS link to this network.

The ITV network continues to grow in Hudson County. Members are discussing a county-wide data network, which may become a county-wide web site on the Internet rather than a separate network specifically for a geographic area. The question is one of justification to build a separate network or provide access to the Internet. In New Jersey there is an initiative to put the Internet into all classrooms, but the infrastructure to gain Internet access still must be installed. Hudson County School of Technology is currently providing 20 staff members with Internet accounts, with the expectation that these people will make recommendations for curriculum positions for integrating the Internet into the curriculum. There are also seven colleges in Hudson County that are ITV members.

Hudson County School of Technology is installing its first ISDN. ATM is not yet in use. Microwave, satellite, and fiber are all in use in Hudson County. In the coming year, Hudson County School of Technology plans to complete all existing locations of ITV, to build a more content-rich environment, get more classes, programming, and more activities in general over ITV.

One of the classroom locations of the ITV network of Hudson County is the University of Medicine and Dentistry of New Jersey. The university is the allied health training facility for the state and its focus is on allied health programs in vocational schools and hospitals. One of ITV's goals is to bring hospitals into the network.

The governing body of Hudson County has bonded funds to pay for an ITV class in every high school in the county, several colleges, and government locations. County

bonds pay for all hardware to put each classroom on the network and the institution signs a five-year network contract. There are now 17 schools on the network with 13 locations to be added during 1996. A search is on for corporate involvement.

CamNet, an interactive system linking Camden County schools to Camden County Library resources and to worldwide databases, is an Ethernet WAN with its center on the library's Digital computer system. It is connected via a Garden State Cable TV broadband network to the schools. A T-1 line provides access to the World Wide Web and other Internet resources. CamNet is available for both teacher and student use.

HIGHER EDUCATION

The Consortium of Distance Education (CODE), a non-profit membership-supported group hosted by Burlington County College, is an organization of 28 two- and four-year colleges and universities devoted to expanding telecourses. In 1995, over 13,000 students enrolled in telecourses through CODE. Some of the members are conducting 35 telecourses a semester, a large increase attributable to student demand.

NJIT operates ACCESS/ NJIT, a network offering video and data communications for learners who are home-based, at work, or in primary and secondary schools. Virtual classes produced by ACCESS/ NJIT are delivered through ITFS linkages, satellite re-lay, cablecast, VHS tape circulation, and compressed video transmission. All courses are supported by electronic interaction, such as e-mail, fax, and computerized conferencing. NJIT produces 98 percent of its courses and offers about 50 courses per semester to undergraduate, graduate, and gifted high school students. NJIT is on the last year of a three-year grant from the Sloan Foundation to develop a complete under-graduate degree program through ACCESS/ NJIT. In early 1996 NJIT offered two undergraduate and two master's degree programs and five certificates through the system.

ACCESS/NJIT manages a distance learning service for gifted and talented high school students, including Hudson ITV and Bergen ITV recipients. A member of the National Technological University (NTU), ACCESS NJIT plans to explore international distri-bution of its academic programming with its partners.

NJIT has begun to use the World Wide Web to distribute some of its distance learning materials. Some faculty members have created home pages with course materials and students can participate in class conferences through the Internet. NJIT is working on using the Internet as a multimedia tool in the near future.

Atlantic Community College, Burlington County College, Brookdale Community Col-lege, County College of Morris, Cumberland County College, NJIT, and Thomas Edison

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College are part of the PBS sponsored Going the Distance program. Students can complete associate degrees through Brookdale Community College, Burlington County College, Cumberland Community College, Atlantic Community College, County College of Morris, and Thomas Edison College and can complete four-year degrees through NJIT or Thomas Edison College. New Jersey Network is the Going the Distance provider for PBS in New Jersey.

K-12

During 1994 Bell Atlantic began the Opportunity New Jersey Grant program which, in partnership with the New Jersey Association of Superintendents and Administrators (NJASA), awards grants to K-12 institutions that develop significant models that integrate and use technology in accomplishing their educational objectives. The project is establishing a successful model that can be shared throughout New Jersey and the nation.

The New Jersey Statewide Systemic Initiative (NJ/SSI) is a new partnership formed to achieve excellence in mathematics, science, and technology education statewide. The eight primary activities of the program include DOE's *Educational Technology in New Jersey: A Plan for Action* and an in depth, school-based initiative for fundamental, structural reform to be adapted and implemented throughout the state. As of December 1995 approximately 500 schools and 14 school districts are actively in partnership with institutional sites such as NJDOE, County College of Morris, Education and Informational Resource Center (EIRC), Fairleigh Dickinson University (FDU), Kean College, Liberty Science Center, Merck Institute for Science Education, Montclair State University, NJIT, New Jersey Marine Sciences Consortium, Rowan University, Rutgers University, Seton Hall University, Stevens Institute of Technology, and Trenton State College.

As of December 1995 there were 108 K-12 school districts with satellite-fed distance learning capability. This was a result of the partnership of NJDOE and NJN in the Satellite Educational Resources Consortium (SERC). Districts have installed additional satellite dishes. Professional development courses in math/science/technology will be offered free-of-charge during 1995-96 through funding by NJDOE.

NJN broadcasts 25 hours per week of K-12 instructional programming through its statewide television broadcast network. Over 35,000 NJN Educational Resource Guides are distributed annually to New Jersey schools.

FUNDING

The NJDOE has developed a "Comprehensive Plan for Educational Improvement and Financing." A goal of New Jersey's budget for fiscal year 1996 is to expand equal

educational opportunities to all students in the state. The state has put more money into "special needs" districts and is cutting aid to districts that spend more than 30 percent in excess of the median for administration. The state is giving monetary incentives to districts that realize the cost savings through consolidation and regionalization. The New Jersey FY 1997 budget recommendation includes $10 million for school district technology grants. Through this funding, each school district receives an entitlement of a set per-pupil amount of $8.50 in non-lapsing but dedicated funds to be used for the purchase of software and hardware and for retrofitting of school facilities for access to voice, video, and data transmission that facilitate information retrieval, telecommunications, multimedia, interactive distance learning and home/school linkages.

NJIN, the distance learning coordinator for higher education, is administering a $7.5 million Equipment Leasing Fund (ELF) from the New Jersey Commission on Higher Education and $400,000 from the legislature to provide NJIN institutions with video classroom facilities and multimedia workstations for distance learning. The $400,000 is used to provide staffing, training programs, to help implement and continue planning for statewide networking, and to help purchase equipment through ELF. The $400,000 is also used for NJIN collaborative efforts with K-12, industry, state government, and state library. NJIN anticipates becoming the focal point for collaboration on networking for education in New Jersey.

New Jersey has appropriated $500,000 for fiscal year 1995 and $800,000 for fiscal year 1996 for educational technology initiatives in distance learning. From 1995 through June 1996 the DOE's Classrooms Connections to the Future program awarded 11 grants for unique distance learning projects for grades 3 to adult. New funding for fiscal year 1996 includes nine $35,000 regional awards for classrooms located in each LATA; a $75,000 award to a distance learning demonstration site and resource center; and a $150,000 award to each of two educational technology consortia with at least one urban special needs district.

New Jersey has received $2.9 million over 36 months from NSF to develop Internet activities. As part of the statewide systemic reform in science, mathematics, and technology for K-12, the Networking Infrastructure for Education (NIE) testbed has been formed with the goal of providing an infrastructure of high quality content that can be captured and shared electronically throughout the state. DOE's *Educational Technology in New Jersey: A Plan for Action* guides NIE activities, the ultimate goal being to provide an infrastructure of high quality content that can be captured and shared electronically throughout New Jersey. NJIN, as part of a very successful effort in K-12, receives $150,000 per year to run Internet training programs, help develop curriculum, and run connectivity seminars.

The Mercer County consortium (MercerNet), with $700,000 of a $2. 6 million award from the U.S. Department of Commerce's Telecommunications Information Infrastructure Assistance program, is beginning to establish an interactive video classroom at Mercer County Community College, each county library branch, the Invention Factory Science Center in Trenton, and at one high school in each Mercer County district.

Bell Atlantic has provided technology grants to eight schools in the Newark School District and, in partnership with the Newark Board of Education and Research for Better Schools, has been successful in two NTIA grant applications. Through grants awarded through Bell Atlantic - New Jersey's Opportunity New Jersey School Grant Program during 1995, 11 recipients developed high speed networks for information sharing and prepared collaborative models for learning with schools throughout the nation.

NJ/SSI activities are supported by an annual $2 million award to New Jersey from the National Science Foundation (NSF) for 1994-99, matched by $ 1 million per year from the state.

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NEW MEXICO

KEY PLANNERS
■ New Mexico Council on Technology and Education
■ Commission on Higher Education

RECENT DEVELOPMENTS

In 1995, the state legislature approved a proposal for the New Mexico Commission on Higher Education to coordinate planning for post-secondary distance education. The proposal established an Extended Learning Fund (ELF) for the development of distance learning in higher education. The Commission recommended to the legislature that $2 million ($1 million for capital funds and $1 million for operating funds) be put into ELF for 1996. Currently, there is no money in the fund.

The State Department of Education's Council on Technology and Education has replaced the Educational Technology Coordinating Council. The new Council has statutory responsibility for disseminating funds to all school districts in the state.

The 1994 Technology in Education Act was funded for three years 1994, 1995 and 1996 at $3 million for each year. The act requires school district strategic planning for integrating educational technology in the learning process.

STATEWIDE AND LOCAL PLANNING

Distance education planning is coordinated by the Council on Technology and Education and the Commission on Higher Education. The former coordinates statewide planning efforts for K-12. Members represent two-and four-year post-secondary institutions, K-12 institutions, state libraries, national laboratories, the Department of Children, Youth and Families, the Department of General Services, public broadcasting stations, parents, and private industry. The Commission includes a distance education planning group for higher education. A high priority for the Commission is to build up funding for ELF.

STATEWIDE AND LOCAL NETWORKS

The Electronic Distance Education Network (EDEN) has implemented a statewide video network using satellite and a Ku-band compression technology at 3 Mbps. EDEN is a consortium consisting of the University of New Mexico (UNM), New Mexico State University in Las Cruces, New Mexico Institute of Mining/Technology in Socorro, and Western New Mexico University in Silver City. Uplinks are located at UNM and New Mexico State University. The other two EDEN universities are connected by data lines using the same compression technology. These four universities provide instruction to 30 receivers including community colleges, businesses, hospitals, and community centers across the state. EDEN is installing another 15 receivers.

T-1 video lines link UNM with New Mexico State and New Mexico Institute for Mining/Technology while a smaller bandwidth line connects Western New Mexico University. More than 600 students each year take courses in electrical engineering; computer engineering and computer science; mechanical, chemical, nuclear, and civil engineering; physics and mathematics. Language courses, including Japanese and Russian, are popular among professionals.

EDEN has also constructed a video bridge at the UNM. Videoconferencing units are in place- - two at UNM, one at New Mexico State, and one at the Silver City and Deming sites of Western New Mexico University. UNM will install four more in northern New Mexico to complete the two-way videoconferencing system.

The Manufacturing Engineering Project Network (METNET) has been disbanded. Operating from New Mexico Inc., METNET was a liaison for the state's manufacturing sites and educational institutions. New Mexico Inc., facilitates requests from manufacturing entities for training from higher education institutions and is a clearinghouse for courses from many sources.

The Consortium for Higher Education Computing Services (CHECS) developed a computing network for the state that now includes public school members. This voluntary consortium obtains low rates for statewide computing networks and leads the state in providing Internet access for higher educational students. New Mexico continues to utilize microwave, fiber, and satellite technologies. Several schools, including UNM, use ITFS for course delivery. State government is the only ISDN user in New Mexico. Use of this technology may increase upon completion of the State Corporation Commission review of US West's recently announced ISDN rates. ATM is not in use in New Mexico.

Rural telephone cooperatives have donated fiber connections for education. The Eastern New Mexico Rural Telephone Cooperative donates DS-3 lines, connecting approximately six to 10 communities in that part of the state.

The Connect New Mexico group of the governor's office is preparing a statewide inventory of technology to be placed on the World Wide Web.

HIGHER EDUCATION
UNM continues to use the eight-channel ITFS system to deliver 60 to 65 interactive courses per semester in professional engineering development, mathematics, and foreign languages.

UNM transmits 150 credit courses per year throughout the state in engineering, nursing, business, languages, earth science and public administration courses. The univer-

sity plans to expand its delivery of courses via satellite. The university also transmits 55 engineering, science, and technology courses per semester to local high tech laboratories and industries as well as courses in civil engineering to the State Highway Department.

The University of New Mexico Health Sciences Center is active in telemedicine and has an allied health sciences program designed to get health sciences students to the rural areas of the state. Students use technology to communicate with each other and the medical school.

The university downlinks over 200 nationally distributed video conferences per year for faculty and staff. UNM transmits about 20 uplinked videoconferences per year. The school provides videoconferences and training to lawyers, dentists, accountants, and other professionals by live interactive satellite workshops. UNM's Special Education and Assistive Technologies program offers training to teachers working with the disabled.

UNM converted its Media Technology Services Center into a Distance Learning Education Center.

The University of New Mexico and New Mexico State are part of the National Technological University (NTU) based in Fort Collins, Colorado. NTU is a consortium of about 40 universities that contribute courses toward a common set of engineering and technical graduate degrees. Both UNM and NMS contribute about two or three courses a semester.

A collaborative project called Waste Engineering and Research Consortium (WERC), which involves the University of New Mexico (UNM), New Mexico State University, and the New Mexico Institute of Mining and Technology, delivers environmental engineering courses to high tech industries in Albuquerque over T-1 fiber optic and digital satellite systems.

Western New Mexico University has three off-campus education centers. During 1995 the university installed videoconferencing equipment at its Demming site and has connected to the UNM-NM State- NM Institute for Mining/Technology system for interexchange. The Luna Vocational Technical Institute (LVTI), a new player in the use of technology, is experimenting with multi-media supplemental materials over T-1 lines. San Juan College uses local cable television to deliver courses to the northwestern part of the state. Santa Fe Community College uses local cable channel access to deliver courses to Santa Fe area.

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Currently 17 of the 24 New Mexico campuses provide off-campus instruction. Ten of the 17 are delivering courses via technology. For example, Clovis Community College (CCC) provides curriculum coordination and postsecondary instruction for school districts over T-3 infrastructure provided by the Eastern New Mexico Rural Telephone Cooperative. CCC, in partnership with the NM Department of Labor, provides JTPA counseling on weekends. Eastern New Mexico University, delivering instruction since the late 1970s, provides upper division courses in business and education over ITFS and public television.

The recently formed Lea County Distance Learning Consortium members include the public New Mexico Junior College and the private College of the Southwest which deliver instruction to local schools via two-way interactive videoconferencing. An anonymous donor provided start-up money and General Telephone provides transmission funds for this successful system.

New Mexico State continues to conduct staff development workshops across the country. Academic programming is done at the local level. New Mexico is a member of the Western Interstate Cooperative of Higher Education (WICHE).

K-12
Approximately 100 of the state's 650 K-12 schools use satellite downlinks to receive programming. This is expanding with compressed systems to about 25 high schools.

The DOE has obtained state funding for computer networking in K-12 schools for the second consecutive year. Several schools have joined clusters to receive courses from local colleges, such as Clovis Community College, New Mexico Junior College, and the College of the Southwest.

FUNDING
The state formula funding for higher education allows campuses to receive lower rate formula funding for distance education courses based on student enrollment. The formula is such that several types of instruction at different levels have varied costs associated with them. For instance, graduate level courses generate more dollars than lower level courses.

Funding for new efforts in distance learning require a special legislative appropriation, or purchases are made through a contract or grant. The temporarily empty ELF is intended to provide start-up dollars for state level projects.

New Mexico continues to analyze costs for distance learning via technology compared to on-campus instruction.

NEW YORK

KEY PLANNERS
- State University System
- Board of Regents
- State Education Department (SED)

RECENT DEVELOPMENTS
The New York State legislature has amended an education law in telecommunications public access and learning sites by adding Article 16-A. This article underlines the legislature's finding that these technologies will improve the state's economy and delivery of education, health care, and government services.

Along with the Telecommunications Act of 1996, New York, through its Public Service Commission, is aggressively encouraging telecommunications competition to attract the critical private investment needed to upgrade the state's telecommunications infrastructure, spur new technologies, and foster economic growth and job creation.

The State University of New York is also planning on establishing a new virtual distance learning network based on both basic and primary ISDN standards. This new initiative would allow campuses to have "smart" classrooms which are connected to both data LANs and video LANs. Through this connection, "smart" rooms could be connected across SUNY's 64 campuses or with other sites equipped with standards-based video compression equipment to deliver education and training where needed, including schools, hospitals and businesses.

MFS Network Technologies will build a fiber-optic system for high-speed, digital voice, data, and video communications along the New York State Thruway. Financial support will come from leasing excess line capacity to communications companies.

STATEWIDE AND LOCAL PLANNING
The State Education Department (SED), under direction from the Board of Regents, is developing a legislative proposal to connect 7,000 educational institutions in the state to an "electronic learning community" by 2001. Included are all K-12 schools, colleges, universities, most public libraries, and the major museums in the state. The long term goal is to connect all 10,000 institutions in the state with an educational or information delivery system. This Omnibus Technology in Education Act of 1996 is the highest priority for action. The new commissioner of education, the Board of Regents and SED see this statewide learning community being built under the principles of the open marketplace. They are working with telephone companies and the Public Service Commission (PSC) on policies for reduced rates, open architecture, interconnection, interoperability, and quality assessment of networks. The SED assumes that as the local exchange market is deregulated and competition begins, the education commu-

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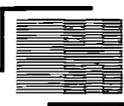
nity can use its size to negotiate favorable rates for telecommunication services. In preparation, the SED is asking companies to respond to an RFI on infrastructure design and pricing for all institutions in the educational community.

As a result of an overcharge settlement, a five-year, $50 million NYNEX Diffusion Fund Program was developed to further the deployment of advanced telecommunication services in economically disadvantaged areas of the state for the following sectors: health, education, local government, and small business.

The 32-member Governor's Telecommunications Exchange has been dissolved. A new Task Force on Information Resource Management was established in the governor's office to coordinate the use of technology, including telecommunications in state government, and to develop a strategic plan that encompasses all state agencies.

The new Commissioner of Education and the Board of Regents are continuing to look at a statewide learning network using the public infrastructure. The Board of Regents has authority over all levels of education in the state. The SED is rewriting the Long Range Plan for Technology in Elementary and Secondary Education in New York State. The New York State Technology Network Ties (TNT), which was formed to integrate technology by 1995, has been dissolved. The Board of Cooperative Educational Services (BOCES) has many regional learning networks, some fiber optic based, analog video, multi-channel, and other technologies. There is a move to include these networks in the Board of Regents initiative to create a statewide learning network. A SUNY goal is to deliver college credit courses to high schools; SUNY has proposed distance learning as a means to do this.

The New York State Distance Learning Consortium has formed to continue the work of the Distance Learning Working Group (DLWG), which was originally developed to construct and implement partnerships with industry, design technical and programming standards for distance education initiatives, and establish goals in conjunction with other New York State educational telecommunications planning bodies. The consortium is managed by BOCES.

The new policy direction of incoming trustees at SUNY is expected to have a strong impact on SUNY planning and implementation. The new trustees promulgated a document in December called "Rethinking SUNY," which strongly endorsed educational technology as an agent of efficiency.

Among the new administration activity, the Office of General Services (OGS) is attempting to consolidate and relocate data centers to former IBM plants in the Kingston area. OGS is the state leader regarding the deployment of technology on behalf of the

government, with educational entities as the potential beneficiary. The Center for Technology in Government, a function of SUNY, has been funded by the Ford Foundation for the use of technology application for local, regional, and state government.

STATEWIDE AND LOCAL NETWORKS

All 64 SUNY campuses have Ku-downlinks to receive courses, professional training, and teleconferences for schools, public and private colleges, other state agencies, and state prisons. There are 56 dedicated downlinks at the state county office buildings. These county office downlinks are the result of a program mounted by State Department of Social Services to deliver training to local workers in social services . There are 23 dedicated downlinks in the state Office of Mental Health Facilities. SUNY has formally established a network among commercial broadcasters to deliver New York lottery drawings.

The SUNY system operates two major statewide telecommunications networks, SUNYNet and the New York Network/SUNYSAT. The State University of New York Satellite Network (SUNYSAT) is operated by the New York Network, a division of SUNY. The microwave network formerly provided by the New York Network (NYN) for the state's ten public broadcasting stations to relay daytime instructional television programming no longer functions. SUNY has acquired full period lease of a satellite transponder until early 2000. SUNYNET is a multiple protocol data network serving the academic and administrative needs of the SUNY system. SUNYNET links campus LANs and computers to allow access from any campus in the system. Most campuses have moved to T-1 speeds.

SUNY has signed a contract with NYSERNET, the New York State Educational and Research Network, for SUNY wide Internet service for education and research in the state. In each metropolitan area of the state, SUNY has a node on SUNYNET, which acts as a gateway with NYSERNET, enabling each campus to connect to both NYSERNET and SUNYNET over the same T-1 span using frame relay. SUNYNET connects with NYSERNET and the Higher Education Services Commission (HESC).

NYSERNet is a non-profit research computer network serving educational institutions, government agencies, libraries, hospitals, and other industries involved in education and research. NYSERNet affiliates include more than 200 sites throughout the state and is funded through affiliate user fees and federal, state, and private foundation grants.

With regard to the Internet, schools would like better bandwidth and lower access cost. One of the difficulties in the Telecommunications Act of 1996 is that is does away with monopoly cross-subsidy that allows universal services to be priced relatively the

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same to cross all regions. Recognizing that New York City and the more rural Adirondack regions have divergent needs, the Board of Regents is investigating how to create universal services for all education, and has suggested to the legislature to use investment funds for all schools to have equal access.

An experimental ATM switch beta-test is currently being conducted by NYNEX at Syracuse University and in New York City. Depending on the availability, microwave, fiber, ISDN, and satellite transmission technologies are all deployed in New York. ISDN, however, is not yet universally available in all communities.

SUNY has been working with California State University on distance learning initiatives. Regional Bell Operating Companies tariffs are still too expensive for education, especially public education. The PSC has become more focused on how deregulation of telcos could affect education.

Four of New York's nine community licensed public broadcast stations participate in NYLink, a not-for-profit computer network for educators. NYLink originates at WNET in New York City. WCFE in Plattsburgh, WMHT in the Capital District and WCNY in Syracuse are also public broadcasting NYLink host sites. NYLink now operates as part of PBS on-line.

Many communities are initiating planning efforts for developing local networks to serve education, local government, health care, and business. SUNY co-sponsored the first conference in June 1995 for community networks. The Appalachian Region Commission, active in its support of telecommunications initiatives in the southern tier of New York, is co-hosting with the state a regional conference on telecommunications. The State Archives and Records Administration is in the second year of a project to connect every local government in New York State to the Internet.

HIGHER EDUCATION
The SUNY Office of Educational Technology is funding 12 projects on SUNY campuses in 1996, many of them in distance learning, including the ISDN network which will be the basis of intercampus collaborative efforts to connect campuses and, in some cases, access to homes. The Electronic Reserve Library provides library access for distance learners. Twenty SUNY campuses have a direct or delayed broadcast relationship with local cable companies.

The Sloan Foundation has funded the SUNY Learning Network, a project of SUNY Central, SUNY New Paltz, and several mid-Hudson community colleges. The initiative uses Lotus Notes as a platform for instructional delivery. Hezel Associates is evaluating the first phase of the project.

The governor's executive budget is expected to allocate significant funds for educational technology. SUNY's highest priority is to implement significant technology-based distance education to achieve efficiencies.

The SUNY system has been aiding faculty and professional staff to implement educational technology, particularly as it affects distance learning. New York Net and SUNYSAT offer a four-day seminar in video based training and videoconferencing, which has been well-received. Similar training activities are being conducted at the SUNY Health Science Center in Syracuse.

In the SUNY system, academic issues are resolved by the provost's office. SUNY has been attempting to resolve the question of assignment of distance learning tuition and credits to home or remote campuses.

With the new administration, there are fewer tax dollars available for education which has resulted in a downturn of state funding to the SUNY system. Funding is now below 65 percent of the SUNY operating budget and has been decreasing to 35 percent. Some of this decrease will be made up by increasing tuition and SUNY is looking to expand the sharing of distance learning resources. In addition, SUNY has proposed making hospitals not-for-profit entities, connecting them to community programs, and then contracting with these not-for-profit hospitals for educational and research services SUNY must provide. The proposal is now under review by the legislature.

SUNYSAT provides graduate level instruction in special education, computing for the disabled, science, and a staff development program. In addition, it provides continuing education in medical staff training and development. The SED is heavily involved in the production of video materials and teleconferences for instructional and staff development for pre-school, K-12, post-secondary, and continuing education.

NYN participates in instructional production for K-12 and higher education as well as coordinating videoconferences for state agencies and businesses.

The SUNY system is one of 30 colleges and universities throughout the country that will receive a multimedia computer laboratory valued at $100,000 through AT&T's University Equipment Donation Program for distance learning and community outreach efforts.

K-12
The Nassau BOCES operates a five-year-old T-1 fiber-based telecommunications network integrating data, voice, and video that connects a maximum of three sites at a

time for two-way video instruction. Other BOCES initiatives involve pilot programs in distance education using ITFS, coaxialcable, and audiographics technologies.

Elementary and secondary schools have participated in SERC through the cooperation of the SED and the state's public broadcasters. Four hundred of the 716 school districts in the state use distance learning facilities.

NORTH CAROLINA

KEY PLANNERS
- Office of the State Controller
- School Technology Commission
- North Carolina Information Highway (NCIH) Policy Committee

RECENT DEVELOPMENTS
Educational telecommunications activity in North Carolina revolves around the State of North Carolina's Integrated Information Network (NCIIN), a conglomeration of interoperable networks capable of transmitting data, text, voice, and video to provide services for education, health, medicine, criminal justice, economic development, and government operations. The North Carolina Office of the State Controller is currently establishing a plan that will eventually provide NCIIN access to every school system, community college, university, state and local agency, county, city, medical facility, and library across the state.

The General Assembly passed House Bill 161, which allows competition of telecommunication services. The universal service section of HB 161, which will take effect on July 1, requires that all telecommunication providers contribute to a universal service fund for the financial support of networks.

In 1995, the legislature approved the release of $42 million for telecommunication and technology in the K-12 sector. Money, however, will not be released until the schools develop a technology plan that has been approved by the Information Resources Management Commission in the Office of the State Controller.

The National Information Infrastructure Advisory Council recently released a kickstart report emphasizing the connection of all schools in the U.S. by 2000. For the report, a consulting firm analyzed costs for the report and illustrated how learning was enhanced by connecting classrooms on line.

The Board of Education approved a policy that pre-service teachers entering the classroom in 1997 must pass competencies in the use of instructional technology. The university system president for all 16 campuses mandated that teachers in the College of Education, who are currently instructing pre-service teachers, be able to teach with technology and telecommunications by 1997.

STATEWIDE AND LOCAL PLANNING
State Information Processing Services (SIPS) is responsible for operational management of all networks. SIPS is now promoting a NCIIN. The governor is revising the committee structure to serve both government and private sectors.

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The University of North Carolina at Wilmington (UNC-W) is currently in the planning stages of a program called "Self-Assembling Public Schools." An initial state grant of $3000 will enable parents of school age children to use the Internet to seek other parents with mutual education interests. Upon reaching a critical mass of 300 students, the group may hire a network manager to help them build a virtual school.

STATEWIDE AND LOCAL NETWORKS

The NCIIN was established to provide universal service, equalized rates, shared resources, and public and private partnerships. As well as providing network access to all parts of the state and providing the same rate of service to users regardless of their location, the NCIIN also eliminates the duplication of services. The private sector offers capital outlay while the state proves the usage base for the network. Services that will or are already being provided through the NCIIN are a low-cost dial access service, ANCHOR NET, and the North Carolina Information Highway (NCIH).

Once made available, the low-cost dial access service of the NCIIN will enable any school, municipal government, or state agency with a personal computer and conventional telephone service to access any location that are connected to either the Internet or the NCIH. Through the dial access service, any location can transmit records, e-mail, or access databases. Through contracts with commercial providers, the service is provided at a rate of $34 per month.

ANCHOR NET allows the large computer systems of the state government to communicate with personal computers on a worldwide basis. State agencies are currently using the service as a delivery mechanism such as Integrated Tax Accounting System (ITAS). County governments are also using this service to access state databases. The service, which is offered at $700 per month, is designed to allow any user to migrate to NCIH capabilities whenever necessary.

The NCIH is offered at $2992 per month including an additional $23 per month of video usage and $43 per month data charge. Startup costs for equipment and room renovations are approximated at $100,000 per site. Through the use of ATM SONET technology, users of the NCIH will have broadband capacity for teleconferencing, high-speed data access, distance learning, and multimedia application. Currently 122 sites are operational with another 13 slated for installation in 1996.

A total of 122 sites, including government agencies and education sites, were linked through services provided on the NCIH by a consortium of telephone companies. The NCIH has points of presence in 46 of North Carolina's 100 counties. By academic year 1996-97, all 58 geographically dispersed community colleges in the state are expected to be connected. The NCIIN allows agencies and schools to access the Internet; other

applications of the NCIH are delayed until market and standards catch up with the NCIIN vision. The University of North Carolina also interconnected in NCIIN.

The state's technology system for the NCIH is based on delivery of a OC-3 to every site and the gradual implementation of ATM under a project developed in a partnership between the state and local exchange carriers, as well as other partners in the telecommunications equipment manufacturing sector. The ATM backbone allows North Carolina to interconnect ISDN and frame relay.

The North Carolina Agency for Public Telecommunications, an agency of the Department of Administration, operates two networks via satellite. The Open Public Events network connects more than three million citizens in their homes with state government officials and services through satellite and cable television. The State Services Network provides teleconferences and distance education to more than 250 satellite receive dishes in schools, community colleges, medical centers, and other public buildings across the state. NCIH video applications can be interconnected with NCAPT to reach homes.

Western Carolina University operates WCU MicroNet, which provides electronic mail, conferencing, university resources, data bases, Internet access, and other information resources to schools throughout the state via a toll-free number. In addition, the state Department of Community Colleges has established a satellite-based statewide telecommunications system connecting its 58 campuses. EDNET, the department's network of 58 C-/Ku-band receive sites, provides educational programs, occupational planning, literacy enhancement, and economic development. The community college system has access to fixed uplinks and a portable Ku-band uplink.

Three districts of Guilford County consolidated budgets to obtain $1.7 million to equip the education center and every high school with distance learning labs. This will provide linkage to a community college as well as equal access to educational resources. Guilford County plans to construct a LAN for every high school and link over 100 sites via a WAN over the next five years. Teachers are trained on the new technology during the summer.

HIGHER EDUCATION
The NCIH features interactive, full-motion, video for conferencing. The network is also used for teleconferencing among 10 universities. All state universities offer college credit telecourses and a degree program over the NCIH. Recipient sites include high schools, prisons, hospitals involved in telemedicine, criminal courts, adult learners, and fire departments. Numerous groups of educators have been formed to determine telecourse needs.

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Appalachian State University participates in Impact North Carolina: Twenty-First Century Education, an ISDN demonstration project which involves Southern Bell, AT&T, and three public schools. The project uses existing copper telephone lines to deliver K-12 instructional programming, teacher in-service programs, and other information and services to participants. During 1995, four additional K-12 schools connected with Impact North Carolina's data network. The project delivers in-service teacher training in seven counties via its TEAMS data network.

Impact North Carolina has a new enterprise called Laboratory on Technology and Learning (LTL). The Appalachian State University based enterprise consists of eight active projects including Impact North Carolina, CADRE, Fifth Dimension, Model Clinical Teaching Program, Team Computer Development Plan, Eisenhower Project, and Microsoft Project. The purpose of LTL is to bring together students and teachers from various areas of education to study technology and the many activities that surround it.

The community college system is concentrating on faculty and staff training, exploring partnerships with business and medical communities, and developing telecommunications applications as its involvement in the NCIH continues. In addition to the statewide effort, the community colleges continue to rely on existing resources. Thirteen community colleges have dedicated community cable channels. The community college's 20-member Distance Education Task Force examines the applications, utilization, regional activities, research, training, and technology associated with distance education.

Southwestern Community College (SCC), which is interconnected to NCIH, is spearheading a fiber optics project which involves sites at its four campuses, six area high schools, and Western Carolina University. Community Link, the two-way analog fully operational video system, delivered courses during its trial period which began in February 1994. In addition to programs targeted at students in schools and community colleges, Community Link also serves private industry in the area. The three-county system is funded through the Economic Development Administration, the Appalachian Regional Commission, and the Tennessee Valley Authority.

The statewide University of North Carolina Television Network, formerly known as North Carolina Public Television, is headquartered at the Bryan Communication Center of Research at UNC - Triangle Park. The network works closely with the community college system and other higher education institutions in the state to provide college credit telecourses and adult basic learning programming. Yearly, between 45 and 50 two-and four-year colleges provide for-credit telecourses for almost 10,000 students in the state. The UNC Center for Public Television will be used as a programming

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source on the new information superhighway and is coordinating its activities with the community college system.

Broadcast air time for UNC Television includes 12 hours per week in college credit telecourses and 10 hours per week in adult basic skills, including "GED ON TV." Professional development broadcasts also include a locally produced series entitled "Journey to Opportunity" and "Education Forum."

Wake Technical Community College, Carolina Power and Light (CP&L), and North Carolina State University (NCSU) are cooperating to provide distance education to the Harris Nuclear Plant and corporate CP&L employees.

K-12

In 2000, students graduating from high schools in North Carolina must pass a competency test in information technology and telecommunications in order to receive a diploma. The Board of Public Instruction also stipulates that teachers will be able to use 3-5 hours of recertification time for technology and telecommunications in the instructional process.

A Department of Public Instruction (DPI) goal is to connect each school to the NCIH on NCCIN. The DPI, in administering grants to connect schools, will give preference to the less wealthy school districts which require assistance to meet the $48,000 yearly charge of using NCIH. Fifty-two high schools are now connected the NCIH and are capable of receiving two-way video.

About 8,000 students take PBS telecourses delivered through North Carolina Public Television which uses a mixture of technology as needed.

Two elementary schools and one high school in the northwestern region of the state participate in Impact North Carolina: Twenty-First Century Education, with Appalachian State University, AT&T, and Southern Bell. The project will show how ISDN and existing copper lines can enhance K-12 learning activities, provide better in-service for teachers, and improve teacher training programs. The project includes schools in six counties which belong to Appalachian State University's Public School Partnership. Partners receive distance education courses and in-service instruction via video and data transmission.

UNC Television provides two hours of air time for "School Television". Co-managed by the North Carolina Department of Public Instruction, the program is available to all schools and homes in the state. UNC Television also broadcasts and participates in the Sesame Street Pre-School Education Program (SSPAP) which provides both broadcast

series and on-site workshops statewide. The same service is provided for the "Mr. Rogers" and "Puzzle Place" projects. Preschool projects are directed to childcare centers, cooperative extension centers, and home child care providers.

FUNDING

To pilot the NCIH project, the state legislature allocated $7 million for 1994-95 and $2.5 million for 1995-96. The $2.5 million is distributed as a $2845 per month legislative credit for the 74 sites that have been approved by the 1995 General Assembly. Savings that departments gain from the use of the NCIH will determine the recurrent operating costs and value to the departments.

Although the State Department does not usually issue any competitive grants for K-12 distance education projects, North Carolina's state budget is now offering funding in the form of NCIH grants for distance education in the public education sector.

About $850,000 per year is appropriated to operate the more than 200 satellite dishes in schools. The DPI also received funds for new satellite downlinks from SERC and NTIA grants.

NORTH DAKOTA

KEY PLANNERS
- North Dakota Educational Telecommunications Council (NDETC)
- Department of Public Instruction (DPI)
- Information Services Division (ISD)
- North Dakota University System (NDUS)

RECENT DEVELOPMENTS

The North Dakota Educational Telecommunications Council (NDETC), the principal K-12 education telecommunications coordinating organization in the state, has completed a needs assessment, activity evaluation, and consultant study which provides them with a revised planning strategy based on educational needs and emerging technologies. The study made recommendations on the role of NDETC in telecommunications, grant processing, planning in clustered and non-clustered schools, working with the North Dakota University System (NDUS), and central leasing for the council and the Information Services Division (ISD). The study submitted recommendations on staffing, membership, the formation of user councils, the establishment of a new board with an advisory industry council, and a telecommunications acquisitions coordinator role for ISD. The study recommended that educational agencies review missions and develop appropriate telecommunications strategies.

The University of North Dakota (UND) has implemented an extended graduate degree program in space studies via videotape with student-faculty interaction through the World Wide Web. This is part of Western Cooperatives Brokering project (WICHE) and is UNDs first experience in combining these two technologies, one of which is a computer component. Fifty-one students have enrolled worldwide. UND has approximately 12 degree programs in which some form of telecommunications is used, such as satellite, interactive video network, telephone, and videotape. UND is experimenting with desktop video in a connection between UND and Dakota State University (DSU).

The Center for Innovation in Instruction (CII), a technical assistance organization that provides planning assistance for school districts, has conducted several workshops geared towards technology. CII is governed by a board representing the Department of Public Instruction, Vocational Education, and NDUS. CII is located at Valley City University.

The Governor's Telecommunications Task Force, which included members from education, state agencies, business, and community organizations, has disbanded.

In order to keep up with technology application, the North Dakota Education Technology Council is currently trying to reinstate funding that had been eliminated by the legislature in a cost-cutting measure.

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The legislature has appropriated $1.6 million to ETC for 1995-97 for telecommunications grants to K-12 education.

STATEWIDE AND LOCAL PLANNING

NDETC is an 11-member governor-appointed group supported administratively by the Department of Public Instruction. It is responsible for funding and guiding the development of educational telecommunications in the state. Members represent the DPI, K-12 schools, Prairie Public Broadcasting, ISD, and the NDUS. The NDETC funds K-12 telecommunications and public broadcasting projects almost exclusively. A Regional Advisory Committee to the NDETC advises the Council on grant awards.

The Department of Public Instruction's Goals 2000 Technology Committee has been setting priorities for telecommunication proposals to the legislature. The department has been looking at ways to retrieve funding in the amount of $3 million that was lost due to economizing.

The ISD provides data processing, records management, and telecommunications, including equipment and telephone services, to state agencies.

The Prairie Satellite Network of Prairie Public Television now connects 70 sites, mostly schools, throughout the state.

The legislature and the Board of Higher Education continue their discussions on how higher education institutions must collaborate in order to eliminate duplication.

STATEWIDE AND LOCAL NETWORKS

North Dakota has an array of networks that incorporate satellite, microwave, ITFS, fiber optics, computers, cable, and broadcast television. The principal distance education network is the North Dakota Interactive Video Network (IVN), which is operated by NDUS and ISD. IVN is a digital compressed video network that connects all 11 campuses of NDUS. IVN's mission is to deliver high quality distance education by sharing intercampus resources and cooperation with schools, state agencies, the private sector, and other states. IVN now connects five tribal colleges in North Dakota. IVN is also interconnected with several of the K-12 interactive video clusters.

NDUS and ISD cooperate in the operation of other information and data networks. The North Dakota Information Network (NDIN) is the overarching network operated by ISD, in which several other networks participate. The Higher Education Computing Network (HECN) is a computer network operated for the North Dakota University System.
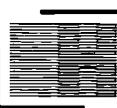
The IVN model involves a series of primary and secondary hubs capable of transmitting audio, voice, and data signals. The Strategic Advisory Committee, composed of one representative from each involved campus recommends programming, scheduling, and training needs related to the network.

Medstar, a satellite continuing education project in the medical college at UND, that links 32 smaller rural communities to hospitals. A bridge for an educational telephone network, which is also located at the medical school, provides continuing medical education over the Educational Television Network (ETN) and occasionally, IVN.

Funded by the NDETC, SENDIT is a network that supports Internet access to classrooms. The network began as a 60-school pilot computer network for southeastern North Dakota in 1990. By the next year it had doubled its size and was a statewide network by 1993. SENDIT serves as the DPI's and the school districts' data conduit, and provides access to the Online Dakota Information Network (ODIN), the statewide library network.

The Prairie Public Television (PPTV) network links seven broadcast stations in the state and installed an uplink in 1992. To complement its own uplink, PPTV installed 60 satellite downlinks to K-12 schools during 1994 through an FHMA grant. PPTV utilizes satellite, fiber optics, and microwave.

Many rural cooperative telcos are quite active in distance learning and telecommunications. US WEST has been active in several areas of the state, but is in the process of selling 60 locations to the independent and cooperative phone companies.

HIGHER EDUCATION
The interactive video network continues to be the most popular type of technology used for degree programs at UND. An executive committee reports to the Council of Academic Officers to advise and provide information on distance learning, as well as acting as a policy and decision maker for IVN.

The Council of Academic Affairs has two subcommittees. The Strategic Advisory Committee is made up of 11 campus representatives which aids in planning and offers advice to the council. The Site Coordinators Committee connects networks and brings together site coordinators and technicians for every IVN site.

UND is exploring a multimedia approach in two ways: ❶ multiple, interlinked technologies to gain experience in the integration of technologies; and ❷ improving the ability to serve students in area such as student services, financial aid, libraries, credit transfers, collaborative efforts among campuses, and registration.

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In terms of staff development, UND provides teachers the opportunity to use the interactive video network themselves before they begin teaching over it. An instructional conference is held each year for computer and multimedia instruction. A special technology conference for K-12 and higher education brings together exhibitors of new technology.

At least one-third of the faculty at UND is involved with distance learning. In addition to students, NDUS also delivers staff development programs to K-12 teachers and training programs to state agency and business users.

Academic programs are offered at the campus level. A council of faculty members at each institution meets to discuss DOE matters.

K-12

Technology planning for school districts is a major priority in North Dakota. The NDETC has divided the state into eight planning regions to share educational technologies. Each region is developing a set of plans, while sharing local and consultant expertise. Nine interactive television clusters are now in operation.

Prairie Public TV offers over 600 hours of instructional programming to elementary schools each year. Member schools receive programs, teachers' guides, over-night program feed service, and in-service training. PPTV delivers Spanish I, II, and III to schools in the state. North Dakota's Spanish III is also incorporated in the SERC lineup of courses.

North Dakota schools receive satellite-delivered instruction from various providers. Nine schools receive SERC programming, four participate in TI-IN, and nine receive instruction from ASTS-Oklahoma State.

NDETC awarded a $450,000 grant to fund a connection between a three-school consortium using interactive satellite transmission. The consortium contributed at least 25% in matching funds.

FUNDING

The legislature has appropriated $1.5 million for telecommunications grants in K-12 education. The NDETC has sent to all K-12 institutions in North Dakota RFP's for planning and for the establishment of systems and programs.

UND and other higher education institutions have imposed a technology fee on students. This is a new source of funding which provides over $1 million a year to meet technology needs. Portions of this money will be used for distance learning and on-campus student needs.

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UND's interactive video network equipment and leasing time is funded by the state. Several degree programs in the NDUS were self-supported by tuition and fees of students who were involved in the programs. Most of these expenses are now being inserted into a university budgeting process where the money will be appropriated for degree program operation. This mechanism will become fully effective in the coming fiscal year.

Education Telecommunications Council has legislatively appropriated funds for project grants, primarily in the K-12 sector.

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OHIO

KEY PLANNERS
- Network Commission (OETNC)
- Ohio Educational Telecommunications
- Department of Education (DOE)
- Higher Education Telecommunications
- Council of Ohio (HETCO)

RECENT DEVELOPMENTS
Ohio recognizes the vital role of staff training in the successful implementation of technology into instruction. The Department of Education (DOE) recently initiated a project called Communities of Practice. These regionally-based groups help the DOE, School Net, and School Net Plus provide the infrastructure and training necessary to help schools and teachers integrate technology into teaching. The Communities also help schools document their needs in their applications which are evaluated regionally. If the application is approved, the state considers the district in compliance with School Net and provides funding.

With the support of the legislature, the governor established Ohio SchoolNet, a $95 million state investment along with a $18 million Ameritech excess earnings fund to bring telecommunications and computer technology to the public school classroom. This initiative will redress educational inequities by wiring every classroom in the state to the information highway. The legislature then set up SchoolNet Plus to provide one interactive work station for every five students in every K-4 classroom. These projects replace Project Equity and the Educational Technology Equity Commission. Committees for SchoolNet and SchoolNet Plus are made up of local rather than state level educators. Districts at different levels of development move forward at their own pace.

The Ohio Educational Telecommunications Network Commission (OETNC), formerly the Ohio Educational Broadcasting Network Commission (OEBNC), set up an ad hoc technology committee to evaluate the future needs of the commission and their 41 program-delivery affiliates. The committee expects to conduct a study of ATV, HDTV, and digital broadcasting in Ohio.

Fourteen of the major state agencies are involved in planning for a $175 million network that utilizes both digital microwave and the fiber backbone. The Multi-Area Radio Communication System (MARCS) project recently received funding for planning.

STATEWIDE AND LOCAL PLANNING
For 1996, OETNC will move forward as a hub and center for programming to meet the expected increase in distance learning in both higher education and K-12. Consistent with this, OETNC plans to migrate from microwave to a fiber optic system connecting 41 of its affiliate organizations. A contract has been awarded to Ameritech and LCI to provide the state with a fiber optic backbone.

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Funds have also been set aside specifically for teacher training which occurs in two ways. The DOE and OETNC have a monthly teleconference that is broadcast state-wide for teachers and administrators. In the same respect, the public television stations that have educational technology agencies and the independent agencies have been assigned the responsibility of teacher training in distance learning and telecommunications. Collectively, there are eight of these agencies in Ohio, with service areas based upon the TV signal coverage of the county.

As part of a regulation case, Ameritech, formerly known as Ohio Bell, agreed to provide $18 million over the next six years for funding to be used by the DOE for telecommunication projects in schools within its service area. The Public Utilities Commission (PUC) is reviewing telephone company regulations in an effort to alleviate the high line charges for distance learning in school districts.

OETNC publishes a master state schedule for distance learning and provides eight supplemental separate listings and schedules for the eight regions in the state. These schedules are coordinated by OETNC, the DOE, and the educational technology agencies.

STATEWIDE AND LOCAL NETWORKS

Ohio has more freenets than any other state in the nation, especially in cities and in rural areas. Cleveland, Akron, Toledo, Columbus, Cincinnati, Lorain, Dayton, and Athens all initiated or expanded freenets in 1995.

Through the LEARNing Works Consortium, Sinclair Community College participates in the LEARNing (Lifelong Education and Resource Network) Works Network which delivers live, interactive programming to remote sites via an ITFS delivery system of one way video, two way audio. The system is currently delivering to eight remote sites, mostly high schools as well as to one correctional institution. Three classes were delivered in the fall, six in the winter quarter, with hopes to increase that beyond six in the spring quarter. The consortium is made up of Sinclair Community College, Wright State University, and Greater Dayton Public Television.

The State of Ohio Multi-Agency Communication System (SOMACS) conducted a study which is the base planning document for present and future telecommunication activity. Almost every public network in the state is connected to the microwave SONIC system and will eventually link with the planned fiber optic backbone system. The fiber optic conversion is slated for completion in April of 1996. Most of the long distance fiber links for SOMACS will be ATM. SONIC is used by most state government agencies, health and human services, public television, K-12 schools, and the highway patrol.

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OETNC operates a microwave duplex system and a satellite uplink/downlink system to deliver instructional programs to public and private schools. The commission delivers programs through its affiliates which include 12 educational television stations, 16 public radio stations, 10 radio reading services, and 8 educational technology agencies. OETNC provides financial support and programming to its affiliated organizations. OETNC provides uplinks and downlinks for worldwide medical programming for Ohio State's School of Medicine. Television stations affiliated with OETNC provide continuing medical education to hospitals. In addition, these stations offer training and services to businesses.

The Ohio Academic Resources Network (OARnet) facilitates and encourages the dissemination of information throughout the state and connects to national and international networks. All Ohio colleges and universities are part of the system and membership is open to for-profit and other non-profit organizations. OARnet, part of the state's supercomputer center at Ohio State University, is transported on the SONIC network. Over 400 private organizations receive Internet access through OARnet. Internet access is at different stages of development throughout the state.

Ohio Link is the computer network of all the college and university libraries in the state, providing on-line searching and overnight delivery of materials. Although it is not on-line yet, the Ohio Public Library Information Network (OPLIN), will connect all of the state's 250 public libraries. By the end of spring 1996, it is anticipated that 61 sites will be connected.

HIGHER EDUCATION

All academic programming must have initial approval through the Board of Regents. How courses are offered and delivered are local institutional decisions.

Although there is no statewide educational telecommunications system or policy for higher education in Ohio, there are opportunities for professionals to discuss distance education organized under Ohio Educational Telecommunications Network Commission. Approximately 30 two-and four-year colleges and universities are members of the Higher Education Telecommunications Council of Ohio (HETCO), formerly the Ohio Post Secondary Telecommunications Council (OPSTC). HETCO is the primary group for exchanging distance learning information and ideas among higher education institutions. The director of Ohio Educational Telecommunications Network Commission is a council member. The Ohio Programming Consortium (OPC), which grew out of HETCO member organizations, permits group discounts for telecourses and videoconferences. Approximately 20 HETCO institutions have joined the OPC.

The Board of Regents has no formal policy for distance learning or telecommunication coordination. OETNC is the repository for telecourses through PBS and other sources. Through the consortium, institutions receive a discount on PBS telecourses.

Sinclair Community College (SCC) installed a fiber connection with Viacom Cable. The Dayton Educational Cable Consortium (DECC) will manage the second educational channel that Viacom has given to the city of Dayton. The consortium is open to higher education and K-12 schools is supported by membership fees. Consortium members can provide programming for the cable channel.

SCC continues to expand its distance learning options and delivery methods. A new building, the Center for Interactive Learning, is currently under construction. In the new center, which will emphasize student-centered instruction, courses will be delivered via compressed video, CD-ROM, World Wide Web and others.

The Sinclair Electronic College, a computer connection for telecourses, connects SCC students and instructors for 14 courses over the Dayton area Free Net. Ohio University is involved with the Free Net for Southeastern Ohio and WCET in Cincinnati is involved with the Free Net there. Nearly all eight of the public television stations are involved in their respective city's Free-Net.

Through a microwave system, Ohio University has been delivering courses to its branch campuses. Akron University is delivering courses in social work to Cleveland State through a two-way video system. Cayahoga Community College in Cleveland is delivering courses over cable systems.

K-12

Ohio SchoolNet is a five-year plan to invest $95 million in the state public schools. Established by the governor with support from the legislature in early 1994, SchoolNet is targeted to integrate telecommunications and computer technology into daily learning for teachers and children throughout the state. A portion of the project calls for $50 million to wire every classroom in the state to the new SOMACS network as well as an additional $45 million to provide educational technology for the 45 percent of the state in low wealth categories. Additional funding will be used to install a DOS or Apple workstation with CD-ROM capability, a modem, and other related equipment in 153 low wealth school districts. Schools must fund their own on-site connection.

Ohio School Net has goals to wire all 100,000 classrooms for audio, video and data for the eventual hook up to the new statewide network and to provide a teacher work station for every classroom within each of the 153 lowest wealth school districts.

As a part of the Ohio Educational Computer Program, which is dictated by the legislature, those schools not connected to the Internet are linked into regional hubs, will provide Internet connection for every school building in the state within the next two years through OARnet, the state's official provider of Internet access. When these schools are equipped, they will receive Internet access through OETNC affiliates, virtually free of charge.

FUNDING

The $18 million Ameritech excess earnings fund is available to bring telecommunications and computer technology to the public school classroom.

Funding for SOMAC is overseen by the Department of Administrative Services Telecommunications Computer Division. SOMAC is funded through the state by bond indebtedness and general revenue. OETNC received $10.7 million dollars to connect their affiliate organizations to the fiber backbone.

In 1989, Project Equity was established after OETNC made a budget presentation to the state legislature, using a minority student from Cleveland city schools who had learned Japanese through SERC. Key legislators saw this as a potential way to equalize access to education in Ohio. The governor proposed the legislature fund School Net with $95 million, and legislature promised to allocate $275 million to School Net Plus.

The School Net Plus package is $400 million, $125 million of it is coming from a general revenue fund, the remaining $275 million is coming through bond indebtedness. This still has to be appropriated through a capital improvements budget that will not go into effect until July 1, 1996. By 2000, the legislature will spend a half billion dollars on School Net and School Net Plus.

HIGHER EDUCATION

New higher education projects are funded primarily through NTIA or NSF grants. Ameritech recently awarded $500,000 to the University of Findlay to develop a curriculum to train teachers in the use of advanced communications technology in education.

K-12

The DOE hires consultants to aid school districts in drawing up technology plans in order to gain funding. Once this plan is approved, the districts can start to make requests for funds.

OKLAHOMA

KEY PLANNERS
- Oklahoma Educational Television Authority (OETA)
- Oklahoma State Regents for Higher Education
- Office of State Finance
- Department of Education (DOE)

RECENT DEVELOPMENTS

There is a strong movement in Oklahoma toward the use of private telecommunications companies to provide services for applications developed by the state. The Corporation Commission, Oklahoma's utility regulator, has begun a series of public hearings for local competition and deregulation of telecommunications in the state. It advocates movement away from the current rate of return regulation to a price cap regulation. Their goal, to have tariffs for local competition on file by August 1996, requires action by the governor and legislature.

The Oklahoma Information Network (OIN) is a legislative initiative to provide public dial-up access to government information. The bill, defeated twice because of legislative concerns for individual privacy, was reintroduced in the December 1995 legislative session.

STATEWIDE AND LOCAL PLANNING

State telecommunications coordination occurs at several levels. The Oklahoma State Board Regents for Higher Education organizes distance education activities, approves course offerings, and designates geographic territories. The Board has established a new electronic delivery policy and must address geographic service area issues among institutions by the time the new voice and video network, ONENET, is in place. The Board is also negotiating with Southwestern Bell for a special educational tariff on 56K and T-1 digital circuits.

By legislative requirement, the Board of Regents actively participates in the development and planning of technology in higher education. The Board maintains the scheduling, operations, and policy for its Televised Instruction Network, Talkback Television, and it oversees the Higher Education Telecommunications Authority (HETA), a consortium of universities serving as a clearinghouse for telecommunications information.

The State Department of Education (DOE) has articulated telecommunications goals, which include building a telecommunications infrastructure based on school-community clusters. Another goal is to link schools, regional service centers, universities, and professional development centers through an education electronic bulletin board. The DOE will develop a telecommunications network for access and transfer of library information, and provide a system for data transfer from schools to the department.

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The Office of State Finance is migrating from analog to digital station equipment that interfaces with the new digital switching system.

STATEWIDE AND LOCAL NETWORKS

The statutory-established Oklahoma Government Telecommunications Network (OGTN) is now known by the trade name ONENET. This Oklahoma wide area network, made available in 1993 through the Board of Regents, provides voice and video Internet connection for all executive branch agencies. The state recently released $8 million of a $14 million bond issue to the Board of Regents and Office of State Finance to construct a statewide infrastructure for the network.

The Television Talkback network, a one-way video, two-way audio system, links the state's public and private colleges and universities, community colleges, technical institutions, and business and medical facilities. It will soon be incorporated into the new (ONENET) as a two-way, fully interactive television service. This Regents' network also connects with the cable systems in the state.

The state of Oklahoma owns telecommunications "pipelines" between Oklahoma City, Tulsa, Stillwater, Norman, and other locations in the state. The state's ATM data circuits between the University of Oklahoma and Oklahoma State University at Stillwater have been in operation since the fall of 1995. The University of Central Oklahoma in Langston, the University Center at Tulsa, and Tulsa University will be added to the network by June 1996.

The Board of Regents feels that ATM offers high speed but expensive data transfer. The state does not employ ATM extensively due to cost and the lack of technology standardization. In addition, the Oklahoma telephone and cable industries, in response to a competitive bid issued by the Office of State Finance and the Board of Regents, have together offered the Board of Regents a rate of $1,425 a month for a DS-3 circuit extending from the Regents ETN facility to anywhere in the state. The companies are also offering clusters of high schools interactive TV over a DS-3 circuit regardless of distance at $800-$1,000 per month. AT&T Network Systems leads this consortium of companies which include TCI, Cox Cable, Dobson Telephone, Pioneer Telephone, Panhandle Telephone, Indian Nations Fiber or Chickasaw Telephone, and Oklahoma Gas and Electric.

The state plans to extend its fiber from Stillwater to Tulsa. In response, a small consortium of private telephone companies offered to construct the fiber to Tulsa and beyond and give the state four strands of dark fiber plus access to building and power facilities for 20 years at a cost of $1. In exchange, the state will give the consortium four strands of its Oklahoma City-Stillwater dark fiber and access to state building and

power facilities. In addition, a consortium of national long distance resellers have offered to construct 12 strands of fiber from Joplin, Missouri, down the Turner and Will Rogers Turnpikes through Tulsa and Oklahoma City, then 135 miles into Texas for a lifetime cost of $1. The state views these projects as a creative way to expand capacity.

The Oklahoma Educational Television Authority (OETA) operates the state's public television system. The ultimate plan of OETA is to replace its microwave and increase connectivity via fiber optic interconnections to all of its transmitters. OETA continues to operate The Literacy Channel for distance learning and the children's Ready To Learn. With fiber connectivity to Tulsa, OETA could distribute programs to the area by cable. OETA is considering satellite technology for the future.

The DOE operates SpecialNet, a computer network for K-12 schools with over 400 users statewide. The system allows the DOE to communicate with schools, Regional Education Service Centers, vocational-technical agencies, and other agencies. SpecialNet enables electronic transmission of correspondence, access to national and state information, and personnel recruitment.
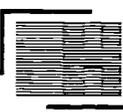
A rural cooperative of eight south-central Oklahoma school districts recently signed a contract to design and construct a 100-mile long full motion video interactive network for distance learning. Single mode optical fiber will link each classroom interactively with each of the other network schools. Murray State College will provide concurrent enrollment courses to district schools through this network. The network will access other distance learning providers through a satellite downlink at each hub. Another rural cooperative plans to build a similar network, pending bond approval.

HIGHER EDUCATION

Oklahoma State University (OSU) continues to deliver programs and courses at a distance. The MBA and four other graduate degrees, including a masters level in engineering, are taught at a distance. OSU supplies programs to educational and corporate sites via compressed video. Engineering professors at OSU and the University of Oklahoma (OU) are team teaching engineering courses.

Through its long-standing Arts and Science Teleconference Service (ASTS), OSU delivers satellite telecourses and nationwide high school instruction. OSU has both C and Ku-band fixed satellites, a mobile Ku uplink truck, and a 35-foot mobile production unit. OSU delivers more than 2,000 hours of programming per year to high schools and to the National Technological University (NTU), and assists NASA in their educational outreach efforts to elementary and secondary schools.

OSU continues as the primary contractor for TNET, the Army's two way interactive satellite-based distance learning network. OSU provides two subcontractors, equip-

ment, satellite time, and network operations while the Army provides the training for TNET. The Army extended this five-year contract which expired in July 1995.

OSU received a 1994-96 Star Schools grant for seven programs to be carried out in collaboration with the University of Northern Arizona. The current Star Schools offers several training modules, including teacher professional development, early childhood education for teachers of children at risk, and professional development courses for science and math.

The primary focus of the University of Oklahoma (OU) is the delivery of satellite training for independent study and advanced degree programs. OU is also concerned with integrating classroom teaching with distance education via CD-ROM and the Internet. Presently, the Internet is used at OU for submitting homework and communicating advice to students, but not for course delivery.

Oklahoma Panhandle State University (PSU) participates in the Shar-Ed Video network, a local cluster-based network, and transmits college credit courses from its own ITV studios. PSU receives graduate courses from other universities via its own satellite dish. Northwestern Oklahoma State University also uses the Shar-Ed Video network to transmit a graduate level class to distant sites in Texas and Beaver Counties. The Board of Regents will soon have a T-1 connection into the Shar-Ed Video Network and a DS-3 connection for full motion, fully interactive video before the end of January 1996.

There are at least three community colleges providing AA and AS degrees as part of their participation in the "Going the Distance" program. Rogers State College, a two-year school in Claremore, offers programs over America Online and recently over the Internet. These courses are certified for credit only outside of Oklahoma.

K-12
The K-12 schools are moving forward in developing telecommunications clusters. Approximately six to eight school clusters have come on-line during late 1995. This activity is supported by the small independent telephone companies consortium. There is no official policy in the DOE for a telecommunications standard to assure interoperability.

FUNDING
As part of a $600 million settlement with the state, Southwestern Bell agreed to give $1 million a year to the State DOE over the next three years for technology grants to schools. Southwestern Bell also set aside $30 million for dial-up access to the Internet for high schools, libraries, colleges, and vocational technical schools. This money pays

only for the long distance charge; each institution must pay for its own equipment. A portion of the $600 million was distributed to the rate payers as $125 cash, $100 in coupons for long distance calls, and $100 for other Bell services, all per access line. In addition, a $1.4 million allocation was provided for an additional 15 electronic community centers in rural Oklahoma, similar to the model funded by TIIAP of the U.S. Department of Commerce. Financing for the south central distance learning network courses is through a $2 million bonded lease/purchase agreement through the Oklahoma Telecommunications In Education Corporation, a non-profit organization assisting rural students in preparing for the information age. Districts must fund network operating costs.

The $14 million Bond Act released $8 million for the development of the ONENET infrastructure. About $6.5 million was allocated for equipment such as the video codecs, computers, and routers. Another $1.5 million was set aside for the Stillwater-Tulsa fiber optic connection.

The Office of State Finance is using $1 million of the state appropriation for higher education to operate the Talkback Television system at no charge to the institutions. With the implementation of ONENET, the subsidy will end and institutions will pay a bandwidth-based fee which takes into account the cost of Talkback TV.

The OETA received an NTIA/TIIAP grant in 1995 which, with a match, totals $630,000. The grant will be used in-house to reduce some routing and switching equipment for digital capabilities and allow connection to fiber optics.

OREGON

KEY PLANNERS
- Oregon State System of Higher Education (OSSHE)
- Oregon Ed-Net

RECENT DEVELOPMENTS
The residents of the state of Oregon recently approved a seven year, $196.7 million general bond obligation. Forty-four million of the amount will be used for the purchasing of computer equipment as well as the improvement of instructional technology for students. The bond will also provide upgrades and repairs to Portland School District schools and facilities.

Oregon continues its work towards upgrading the use of educational technology. The State Board of Education issued a vision statement called Education Unbounded: Oregon Higher Education in the Year 2010 which advocates the increased use of technology to meet the educational needs of the citizens of the state. The statement gave the Oregon State System of Higher Education (OSSHE) guidance on how it should proceed with distance education.

OSSHE recently completed a document called Distance Education Policy Framework, which refers to distance education policy. Although the document does not set a concrete policy, it provides guidance and direction to the system and to the institution in the areas of distance learning. The statement also addresses planning, quality and programming; student services; faculty issues; tuition and student enrollments; and technical standards.

STATEWIDE AND LOCAL PLANNING
In 1994, the governor initiated a group called the Oregon Telecommunications Forum in conjunction with the Rural Oregon Telecommunications Consortium. The group sponsored a number of regional and statutory meetings to focus on future telecommunications needs. The meeting eventually led to Senate Bill 994, which was passed in the 1995 state legislature. SB 994 created the Oregon Telecommunications Forum Council, made up of the governor as the chair, five representatives from consumer groups, and five representatives from telecommunications provider groups. The council is responsible for long term planning and recommendations for telecommunications policy. SB 994 puts all the telecommunication system expansions into the hands of the Department of Administrative Services, excluding pure distance learning applications. The telephone companies were very active in the forum.

Since 1989, the state legislature approved the second phase of an $8 million appropriation to develop Ed-Net. The 1995 legislature appropriated an additional $1.5 million to assist in bridging the gap and to keep the agency operational. From its creation in

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1989, until July of 1995, Oregon Ed-Net operated as a state agency. As of July 1995, it was incorporated into the Department of Administrative Services under the chief information officer, who manages all state telecommunications services. Representation includes the following areas: higher education, public broadcasting, health care, local and state government, K-12, community colleges, independent colleges, and industry. Ed-Net's membership includes more than 250 organizations, primarily within the education, healthcare, and government communities.

Decisions on programs and courses are made by the Oregon State System of the Higher Education and the Department of Education after considering student needs. Quality decisions are made by the Department of Education and the originating college.

Whereas most telecommunication planning occurs at the state level, the local communities and regions are aggressively pursuing their own interests. A need to coordinate the grass-roots projects with the overall state policy is critical to develop synergy in educational telecommunications development.

In terms of staff development, OSSHE, various consultants, and Oregon State University provide advising and workshops on the uses of distance learning. Although no significant fiscal allocations have been made sot far, staff development is an issue that interests state planners of distance learning.

STATEWIDE AND LOCAL NETWORKS
The Willamette Valley ITFS Consortium of two and four year higher education institutions in the Willamette Valley section of Oregon applied for and received 38 channels of ITFS. The Consortium partnered with American Telecasting Incorporated to build the system for the use of time, which should be operational by next fall.

Ed-Net operates two satellite networks. Network I reaches K-12 schools primarily. Network I delivers one-way video, two-way audio instruction at broadcast video quality via Ku-band satellite to downlinks to over 240 subscribing school, colleges, universities, education service districts, libraries, medical centers, state agencies, and local government centers around the state. Network II is VSAT service connecting 37 sites. Ed-Net added a gateway service to Network II that enables Ed-Net to link a satellite network with terrestrial networks.

The Oregon COMPASS computer network, which uses dial-up service to interconnect schools, colleges, libraries, government agencies, and non-profit agencies, has added approximately 25 communities that have local dial up access. Community colleges and higher education institutions are offering over 60 courses using the computer conferencing software from the COMPASS network.

OSSHE has also received ITFS licenses in the Medford area. Through the ITFS network, OSSHE intends to take Ed-Net signals and re-transmit for video distribution in the southern portion of Oregon. The ITFS system will be interconnected by microwave over the transmitters. OSSHE's nursing program uses all three Oregon Ed-Net networks and will eventually use the ITFS system, when it is completed.

Oregon uses ATM, microwave, fiber, ISDN, and satellite transmission technologies. Ed-Net has been deliberating migration from satellite to the terrestrial links, either through ISDN or fiber. Ed-Net has connections for compressed video through land lines using two Sprint networks. The statewide network has a videoconferencing unit at each of the state system institutions and some additional outreach systems.

Network for Oregon Education and Research (NERO) is a fiber network which has been established between the engineering and science related campuses to test desktop to desk-top applications. The network, which uses ATM technology, was funded by a NASA grant.

HIGHER EDUCATION

There has been a rapid movement in using technology on the campuses of the state's higher education system. The movement has been fueled by funding to provide incentives for the use of technology both on and off campus instruction. Many faculty are engaged in Web development, either through full or partial courses. In the past year, Oregon State offered nearly 150 courses that have some use of the Web and ten courses which have full use of the Web. Eastern Oregon State College has over 60 courses taught using computer modem technology.

Community colleges are making extensive use of computer-modem courses where the majority of the coursework is taught over a computer network. At least three community colleges have their own AA transfer degree which they offer over telecommunications. A statewide community college AA degree is being developed.

Within the OSSHE system, new technology councils have been established, including the Interinstitutional Educational Technology Council and the Distance Education Steering Committee.

The Oregon Community College Telecommunication Consortium is now known as the Oregon Community College Distance Education Consortium.

In terms of academic programming issues, OSSHE has been involved in coordinating that with the community colleges.

During the academic year of 1995-96, more than 150 courses were delivered by OSSHE via Ed-Net, predominantly over Network II.

Both Oregon State University and Eastern Oregon State College both have a Ku-band uplink to deliver AG*SAT programming.

K-12
In 1993, more than 170 hours of non-credit staff teleconferences were delivered via Ed-Net. In addition, three student instruction programs in earth and marine sciences were transmitted to middle school students.

ESDs are exerting leadership to have more schools wired for the Internet and other networking services.

FUNDING
Programming is primarily funded through tuition or fees, however, OSSHE does have the approval of the state to fund some through state support. Telephone companies do offer some grants.

Ed-Net was initially funded by the state legislature, with the requirement that it become self-supporting. The ITFS system is well built by a wireless operator for the rights to use the system. Where fiber is used, it is leased from the local telephone companies, mostly funded by the NASA grant.

The state continues its efforts to find a stable funding mechanisms, which would rely primarily on need and recognizing the additional costs of servicing rural areas.

PENNSYLVANIA

KEY PLANNERS

- Bureau of Telecommunications
- Office of Information Technology.
- Department of Education (DOE)
- State System of Higher Education
- Pennsylvania State University

RECENT DEVELOPMENTS

Pennsylvania is moving forward to coordinate and integrate educational technology activity for higher education and rural and low wealth K-12 schools. Governor Ridge announced his initiative for educational reform, the Keystone Initiative for a Difference in our Schools (KIDS). Part of this initiative is to promote distance education to underserved rural areas in the state.

The recently passed Senate Bill (SB) 375 created a $2 million low-interest loans fund from the State Public School Building Authority for schools to build distance learning systems. Schools may rent the facilities to state agencies to recoup their capital expenditure and repay these loans. SB 376, a bill which established a nine-member distance learning commission to formulate a state distance learning policy, is receiving support and is still pending.

The state legislature Act 26 of 1995 provides distance learning grant money in the amount of $1 million to low wealth and rural schools — an 86 percent increase over the 1994-95 amount. The funded projects employed satellite, compressed video, and the Internet. The governor has proposed to spend $1.5 million in distance learning grants for 1996-97.

In 1995, the Department of Education (DOE) awarded 24 grants for satellite equipment and satellite-delivered courses, teacher training, the creation of Internet nodes. The grants provide equipment, connection, line charges, and training and the installation of compressed interactive video systems in schools districts. Connectivity to the of Internet, two-way interactive compressed video, and satellite instruction, as well as teacher training are important priorities of the DOE.

The federal-and state-funded Area Health Education Center (AHEC), which is managed by Pennsylvania State University, is headquartered at the Penn State College of Medicine in Hershey. AHEC involves many teaching hospitals in Pennsylvania such as the University of Pittsburgh, Temple University, and the Philadelphia College of Osteopathy. The project divides Pennsylvania into seven regions to assure equitable distribution of medical education and support services. AHEC has a distance education steering committee which created an inventory of available distance education resources for continuing medical, health care, and public education around the state. The inventory combines Penn State resources of both campus and cooperative extension, Healthnet

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and Keynet services of the Pennsylvania Department of Health, the Pennsylvania Public Television Network Commission, and the data network PENN-LINK.

The Center for Agile Pennsylvania Education (CAPE) is a recently formed non-profit public/private sector project of 25 members to electronically connect 24 Pennsylvania higher education institutions and one K-12 district for distance education and shared information access. The goal is to establish a statewide videoconferencing and data network through which member institutions share resources. The system provides fully-interactive audio and compressed video over high-speed T-1 telephone lines. Funding is from a federal HUD grant. Member institutions have a reduced educational rate for telephone services. Videoconferencing equipment installation has begun.

The governor has proposed Project Link To Learn, a $121 million, three-year initiative for school districts and public higher education institutions. The aim of the project is to invest in computer and telecommunications technology in preparation for the proposed statewide Pennsylvania Education Network (PEN). For public K-12 schools, $100 million will be used to upgrade computers and provide teacher training in the use of computers, software, and the Internet as a teaching tool. For higher education, the initiative directs $21 million to higher education in Pennsylvania to develop PEN. First year activity includes ❶ assessment of current infrastructure, ❷ establishing sites to evaluate alternative telecommunications technologies for integration into a complimentary network , and ❸ developing a strategic plan of action to build PEN. The second and third years will be devoted to building the infrastructure and connecting sites. The governor will encourage telemedicine, correctional institutions, and business usage of the network to support economic development along with education.

Penn State has a new programmatic vision direction established by the Distance Education Advisory Committee. The committee will consider how to use technology and the administrative structure to influence the delivery of education in the state.

The Pennsylvania Information Highway Consortium is a group formed to propose recommendations and encourage the state to take leadership in distance learning.

STATEWIDE AND LOCAL PLANNING

Penn State, the SSHE, and the DOE independently plan distance education activities and discussions among the planning entities. The DOE is now providing leadership to coordinate these activities by developing a master plan for the state.

The DOE is inputting information into the state telecommunications plan, planning for the digital conversion of the state's SERC satellite dishes, giving schools access to digital signals, and planning to increase teacher training and staff development.

Within the DOE, the Office of Distance Learning manages the state's distance education grant-making efforts, participation in Star Schools programs, equipment purchases, and planning of coordinated distance education initiatives. Also within the DOE, an in-house committee has been working with the Secretary of Education to develop a technology plan for the department. The DOE's compressed video system in the Office of Educational Resources and Learning Technologies is used to train educators and conduct videoconferences.

The non-profit Pennsylvania Distance Education Consortium (PEDC) is composed of higher education officials and supported in part by the Center for Rural Development. PEDC is brokering courses for higher education institutions, especially community colleges, and sharing resources for distance learning courses.

All planning organizations at Penn State are coordinated by the Provost's office. The Information Infrastructure and Telecommunications Committee is responsible for planning Penn State information and telecommunications infrastructure. The Distance Education Advisory Committee, composed of president-appointed university-wide members, deals with issues of policy and programmatic vision, including administrative and intercollege academic issues related to distance education. The distance education function of Penn State is a centralized university-wide function in the Division of Continuing and Distance Education.

The new Pennsylvania Educational Technology Conference was organized to help train teachers in technology.

STATEWIDE AND LOCAL NETWORKS
Within Penn State, the cooperative extension service has satellite downlinks connecting 67 county offices and 24 campuses. The service also includes PENN-LINK, a microcomputer network, which provides statewide access on a local dial-up basis to educational databases, accessible from many libraries and any cooperative extension offices. The DOE is considering the distance education potential of this data network since it links the public schools.

The Pennsylvania Cable Network (PCN), a non-profit corporation with 11 cable television company shareholders, distributes educational and public affairs programming. All participating cable companies pay their share of capital and operating costs for the distribution system. PCN public affairs programming includes state House and Senate proceedings, press conferences, and hearings. More cable companies are participating in this programming since PCN migrated from analog microwave to less costly digital satellite. Penn State manages ITV, a joint venture partly supported by PCN. To date, higher education institutions led by Penn State have controlled the extent of

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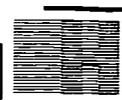
utilization of PCN educational programming. PCN is exploring ways to encourage greater utilization by these institutions.

Regions in Philadelphia, Meadville, and Bloomsburg are currently developing freenets or regional data networks. The Intermediate Units, which is a liaison between the DOE and the local school districts, are working with the DOE to create Internet nodes. The Educational Resources and Learning Technologies Office of the DOE and Commonwealth Libraries are collaborating with Intermediate Units to connect state schools and libraries to the Internet and the DOE is providing funding.

The Pennsylvania Public Television Network (PPTN) links nine public television stations through its statewide microwave system to provide K-12 program development and daytime delivery of educational programming. PPTN is represented on a number of distance education organizations in the state. On the statewide distance education committee, PPTN interacts with cable and telephone companies in planning for distance education.

The Bureau of Telecommunication's private communications network, PANET, is available to all 501 school districts and 29 educational intermediate units. The system links all Commonwealth agencies and offices statewide through trunk lines leased from telephone companies. It also provides a backbone of the state's high-speed computer communications system which, connects the state's research universities.

In Pennsylvania, transmission technologies vary across the state. There is no statewide backbone. In the south central part of the state, a fiber optic network connects schools. T-1 is used in dedicated health networks and by Penn State as. a means of transmitting interactive video between campuses. Penn State accesses ISDN lines for dial-up services.

The Keynet service of the Pennsylvania Department of Health is a broadband interactive video for consultation and training in hospitals.

The cable industry in Pennsylvania is studying ways to extend public television into the public school system.

HIGHER EDUCATION
Penn State has moved distance education into the mainstream of activity for its landgrant mission of the future. The university, in partnership with other universities in distance education, holds distance education conferences, sponsors faculty development programs, hosts a national invitational policy symposium on distance education, and is the location of the American Center for the Study of Distance Education. Penn State will host the 1997 International Council for Distance Education conference.

Penn State's 24-campus system recently installed a dial-up interactive video at each campus, with a multipoint control unit at University Park. The university offers master's degrees in education and engineering to cooperatives and to workplace students within and outside Pennsylvania by satellite and dial-up interactive video.

PCN distributes post secondary educational programming from WPSX-TV at Penn State to about 30 cable companies throughout the state. Approximately 20 for-credit courses are delivered per year, as well as a variety of non-credit and continuing education programs. The programming now reaches the homes of over 1,400,000 subscribers and is expected to increase to two million homes by 1997.

Lehigh University, through its satellite and teleconferencing capability, offers credit and non-credit courses to client organizations, educational institutions, and off-campus students. The university offers master's degree programs in chemistry, chemical engineering, business administration, educational administration, and quality engineering to more than 200 enrollees. Approximately 25 major corporations participate in the program. The distance education program has client organizations and distance students in most of the eastern states.

K-12

The DOE is creating an office of Educational Technology within which distance learning in K-12 will be coordinated. The state has funded projects to offer distance education to rural schools where the need is greatest. Unlike the wealthier districts, many low wealth and rural districts have insufficient resources. The governor's proposed Link To Learn project will address this inequity. The 29 Intermediate Units (IUs) offer a variety of cooperative services to area school districts including technical assistance, such as accessing the Internet.

FUNDING

The legislature has appropriated funds for the construction of infrastructure on the Penn State University Park campus. This will change how technology is used in resident instruction, which will in turn affect how it is used at a distance. Penn State used partnership money with AT&T to fund many interactive video systems and is also using foundation grants for new program models.

Administrators are anticipating an integration of technology for both on-campus and distance education. Each is likely to influence the other.

RHODE ISLAND

KEY PLANNERS
- Board of Governors External Committee on Telecommunications and Higher Education

RECENT DEVELOPMENTS

Rhode Island has taken a strong approach in upgrading statewide information tech- nology with the establishment of the Tech- nology Task Force. The 17-member board formed by the Rhode Island General Assem- bly comprises the Chairman of the Board of Governors for Higher Education, college presidents from the University of Rhode Island (URI), Rhode Island College (RIC), Community College of Rhode Island (CCRI), and Brown University, an official from the governor's administration, executives of communications companies, a banker, and members of the General Assembly. The primary goal of the tack force will be to provide students in the state university system access to the Internet and the World Wide Web. The task force is expected to be a key factor in planning and improving telecommunications and networks within Rhode Island.

Since the summer of 1994, the External Committee on Telecommunications and Higher Education has held 10 meetings and has submitted a report to the Rhode Island Board of Governors for Higher Education. The report addressed the role of higher educa- tion in the state's telecommunications infrastructure and also formulated a set of rec- ommendations for the Board of Governors. Long range goals include providing fac- ulty, staff, and students of all educational institutions with access to telecommunica- tions technologies and information within and outside the institution; establishment of a campus-wide information infrastructure for each institution; finding financial support for these activities; strengthening libraries; training teachers; re-evaluating core assumptions and strategies for long range planning; and positioning institutions to participate in statewide telecommunications efforts of the future with priority given to interconnecting systems of the CCRI, RIC, URI, and the Rhode Island Office of Higher Education (RIOHE). The Board is moving to implement the recommenda- tions. The 14 committee members include telecommunication and information tech- nology specialists from private industry, public and private colleges, and govern- ment agencies.

STATEWIDE AND LOCAL PLANNING

URI has contracted for a study to upgrade the institutions' telecommunications and networking infrastructure. CCRI is the largest provider of educational telecommuni- cations within higher education via cable television. Other higher education institu- tions, such as URI, RIC, Brown University, Johnson and Wales University, and the New England Institute of Technology are also engaged in educational telecommunica- tion and/or telecourses.

STATEWIDE AND LOCAL NETWORKS

In 1996, the state will consider a request for a $40.6 million bond issue for improving the telecommunications/computing infrastructures and workstations/software in the public system of higher education. Phase I is a $21.4 million initiative which would address basic infrastructure improvements to CCRI, RIC, and URI, to be accomplished over 2 years. In phase I, bond monies will be used to expand URI's Ethernet network and will likely be used to expand broadband technologies such as ATM. Phase II, estimated at $19.2 million, is acquiring equipment and software to increase the number and capacity of workstations available to students, staff, and the general public. Phase II is to be completed in two years after Phase I.

RI-NET, the K-12 network for teachers and students, has plans to expand to all districts and communities in the state. RI-NET is a collaborative venture among URI, Brown University, WSBE, the Department of State Library Services, and the Rhode Island Department of Elementary and Secondary Education. The network has five regional dial-up sites with toll free access. Seventeen of the 36 school districts are directly connected to the frame relay system of RI-NET.

Ocean State Freenet, which is operated by WSBE on behalf of the Department State of Library Services, is intended to provide the public with Internet access and state government information. All automated library systems in Rhode Island and the major computer resources in the state government are linked by the Ocean State Freenet.

Frame relay purchased from the phone company continues to be the statewide system of choice in Rhode Island. There is very limited ATM use over single mode fiber and multimode fiber at Brown University and URI. CCRI uses cable TV and satellite TV broadcasts for telecourse offerings. Although the state's cable systems are not interconnected, Interconnect, a consortium of all seven cable systems, offers CCRI's educational instruction on its public access channels.

The DOE and WSBE, the Providence-based public television station, provide free SLIP or Tel-net connections to every K-12 educator in Rhode Island, free of charge. Under the PUC rate structure, NYNEX has waived all line charges to K-12 schools for the next five years, up to an aggregate of $8 million. Rhode Island institutions pay for services, and equipment from telcos. Approximately 80 percent of Rhode Island schools are connected to the Internet. The PUC/ NYNEX agreement for free telco service paved the way for the application of the information superhighway, especially for teachers and how they implement the Internet into the classroom.

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HIGHER EDUCATION

The Rhode Island Office of Higher Education provided three consecutive years of funding, through Higher Education Eisenhower Mathematics and Science grants, to support the "Physics E-Mail Project" at the URI. The project provided hundreds of K-12 Teachers, administrators, and students with training in the use of RINet, the Internet, computer networks, and home page development. The project involved over 600 students.

The Big Picture Company, in association with the Annenberg Institute for School Reform at Brown University, is developing distance learning courses for teacher development to be broadcast over cable across the state.

K-12

A 1994-95 Rhode Island Office of Higher Education Eisenhower grant funded the Teachers in Technology Project in which several educators were brought to URI for intensive training in the uses of the Internet, World Wide Web, telecommunications, and computer networking. These teachers, acting as lead trainers, trained more than 400 teachers in the state.

The highest priority of the DOE continues to lie in increasing local access to the Internet for schools and helping teachers to use it. Brown University and URI, as part of a RI-NET commitment, give technical assistance to schools in gaining access to the Internet.

Through a two-year, $750,000 NSF grant, Project Smart, a collaboration between URI and the DOE, has been training lead teacher teams in each school district in Rhode Island to improve math and science education through the use of the Internet. The grant is just completing its first year and is expanding teacher use of the Internet for research and class instruction through its peer to peer training model.

Through the Teachers in Technology project, two teachers a year are brought to URI for a year long internship which includes intensive training on the uses of the Internet, telecommunications, and computer networking. These teachers then pass on their expertise to other teachers in the state.

The Goals 2000 statewide technology plan, which has been completed and is currently being released, includes three guides for school district use of technology. There is a state Goals 2000 panel to which the technology task force reports. The 66-member panel includes representatives from business, government, education, and service providers.

CCRI offers telecourses via the local public broadcasting station, Interconnect, and a cable television system operated by the Navy. Six high school sites across the state

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serve as alternative campuses for night courses. CCRI also delivers training to business and industry employees.

Bryant College, which houses the designated world trade center for Rhode Island, has been working with several school districts in providing access to various data bases including export opportunities, careers in marketing, and export-import commerce.

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SOUTH CAROLINA

KEY PLANNERS
- South Carolina Educational Television (SCETV)
- State Video Users Advisory Council
- Department of Education (DOE)
- South Carolina Budget and Control Board
- The Office of Information Resources
- State Board for Technical and Comprehensive Education
- South Carolina Commission on Higher Education

RECENT DEVELOPMENTS
South Carolina continues to move to the forefront of educational technology with a new statewide philosophy that calls for cost containment and efficiency. The requirements, along with the need for equal access to educational opportunities through technology, are the driving forces for distance learning in South Carolina. These forces have led to the development of a public services network at Educational Television (ETV) and a hometown satellite network, which is used by the South Carolina Municipal Association to train newly elected municipal government officials.

The recently formed Task Force on Higher Education Information and Communications Technology Infrastructure has met several times to discuss the developing information technology issues for higher education, administrative, statutory, and fiscal to address for the twenty-first century. Task Force members have telecommunications responsibilities in public and private higher education, state agencies, and private organizations.

A new agreement between the state and BellSouth requires the telco to provide frame relay at a 1.5 megabit rate (T-1) for multipoint videoconferencing and data transmission via frame relay among 16 technical education sites in the state. The sites will use half T-1 for video and half for frame relay transmissions.

Pilot studies for the use of ISDN based desktop video units in South Carolina are being conducted. South Carolina is also developing partnerships with foreign countries for student exchanges and economic development. Sixty-six German companies and 64 Japanese companies are investing in South Carolina.

A pilot project in the Rock Hill area has been using ATM transmission technology to form partnerships between business and education. This is being used for full motion, two-way interactive video transmission and LAN connectivity.

STATEWIDE AND LOCAL PLANNING
Together, South Carolina Educational Television (SCETV) and the Department of Education (DOE) deliver most state educational programming. Just over 80 percent of the
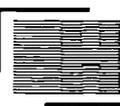
broadcast time is devoted to higher education. In addition to K-12 and post-secondary programming, SCETV offers medical education, legal continuing education, law enforcement training, state agency training, school staff development, and early child-. hood education. The Commission for Higher Education's Committee on Academic Programs makes policy recommendations for the use of video instruction in higher education. The chief academic officers of all four-year postsecondary institutions and technical colleges in the state belong to this organization.

In cooperation with the governor's office, the state Division of Commerce, and the state Board for Technical and Comprehensive Education, SCETV is assembling an interactive video, voice, and data network between business sites, and state and federal government offices. Business sites receive teleconferences and training programs originating from the Department of Health and Environmental Control, the Employment Security Commission, the State Development Board, the governor's office, and several technical colleges.

The state Video Users Advisory Council, created by 1991 legislation for investing in satellite technology for statewide education, is composed of users of educational television. The group advises the SCETV organization and is extremely active due to intense growth in video applications. The council is looking closely at duplication of services in higher education, funding, and how video applies to making resources available statewide.

STATEWIDE AND LOCAL NETWORKS

SCETV is undergoing the greatest technical change in its 35-year history. The new migration from four ITFS channels to 32 digitally compressed satellite channels makes SCETV access more affordable for small users. Dish installation price is under $4,000 for any 2 of the 32 channels and $1,500 per additional channel. SCETV has implemented 16 channels of the multichannel digital satellite network, delivering service to about 250 sites. SCETV owns a transponder and uses compression to split the system into two-16 channels sets, half to be served from the new teleproduction center. The entire 32 channel system will be operational during the summer of 1996. SCETV's ITFS system, which serves K-12 education, is incorporated into the network.

The SCETV system has five production facilities and 11 TV broadcast transmitters providing two channels of service to schools through overlapping signal patterns. Each television station and FM radio station within the system is connected by two-way microwave and satellite. SCETV uses ITFS for last-mile delivery to 350 middle and high schools. Forty of the 102 schools received satellite dishes and two digital receivers and can now receive distance education courses and teleconferences from SCETV. In 1996, the governor requested funds from the legislature to similarly equip the remain-

ing 62 schools. The governor also proposed a $20 million initiative to put technology into rural areas of the state.

SCETV continues to be instrumental in staff development programs for the state employees of all 100 state agencies. The system conducted 700 videoconferences this past fiscal year, and expect an 8-10 percent increase in 1996. SCETV has outgoing and incoming microwave which is directional, ITFS microwave using fiber and is currently considering a less costly way to bring broadcast quality to SCETV master control for redistribution. Microwave will bring signals to Columbia, then signals will go out via satellite.

The ever expanding Business Link of SCETV provides daily programming to satellite dishes, although its main activity has been marketing its services to businesses and planting dishes throughout the state. SCETV also participates in Learning Link, a provider of dial-up courseware for PBS/ETV programs.

The National Instructional Satellite Service (NISS) uses SCETV as its central distribution point. SCETV feeds seven hours of programming per day to schools nationwide. SCETV delivers the statewide video and voice (satellite and ITFS) Health Telecommunications Network of the Medical University of South Carolina in Charleston. Thirty hours of programming originate in Charlston each week and are delivered to SCETV on microwave for retransmission.

Twenty-five regional distribution centers act as tape and delay feed centers for ITFS system programming and serve as production studios for short distance education courses for school districts. Eventually, there will be 42 regional feed centers. The DOE has established a dial-up free e-mail service to educators statewide.

MIDNET, a free community on-line service for the Midlands area, is sponsored by SCETV, the University of South Carolina, and the Richland County Public Library.

HIGHER EDUCATION
In continuing its work with medical education, SCETV's subnetwork called Health Communications Networks is connected to 83 sites, including all Department of Health Offices statewide, all hospitals, and clinics. The network provides live one-way video, two way audio conferencing, and transmits continuing educational materials from the medical University to hospitals and clinics. A total of 1500 programs are transmitted over the network per year.

With funding from grants and private sources, Piedmont Technical College is building an International Conferencing Center for area businesses and industries for the
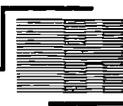
use of video teleconferencing over high speed digital telephone lines and satellite. In addition, the planned Academic Network with interactive audio and video classrooms will link the college with area high schools and Lander University. The Training Network will link centers of seven counties through full-motion, interactive audio and video via a fiber optic system.

York Technical College is involved in the public/private sector collaborative Business, Education and Community On-line Network (BEACON), which will deliver the Information Highway benefits to upstate South Carolina citizens. As an ATM fiber-based network, BEACON will support data and interactive two-way video applications such as education, health care, banking, economic development, and many others.

The South Carolina Technical College System is in the process of connecting the 16 colleges and their multiple campuses via two-way interactive television for distance learning. The system will eventually connect the colleges to K-12 schools, business, industry, medical facilities, government, and other higher education institutions and will be fully integrated with SCETV and other video delivery systems. The plan calls for eventual migration from T-1 to broadband and ATM inter-college distance learning delivery.

The Technical College T-1 will begin programming in summer 1996 with 18 sites. Colleges will share academic programs, courses, and faculty. Short term continuing education, faculty/staff training, and telemeetings will also be featured.

More than 10,000 students receive college credit each year, via SCETV, from five cooperating colleges and universities. Programming includes master's degree courses in business administration and engineering. In addition to the 158 courses delivered weekdays on closed circuit, SCETV transmits 10 telecourses via open air broadcasts during the weekend.

K-12

Through SCETV, more than 600,000 students have access to either open-or closed-circuit instructional television resources. Two channels of SCETV's ITFS system provide programming to middle and high school students. Seventy schools receive SERC courses and approximately 110 schools are equipped to receive Whittle Communication's Channel One. SCETV provides programming and technical support for SERC, which is based in South Carolina. SERC offers high school credit courses and staff development programs to students and teachers in 24 states. SCETV produces three sections of Russian I, two sections of Russian II, and two sections of Advanced Placement Economics each day for the SERC network.
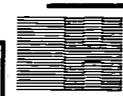
There will be a satellite dish at every public school in the next two fiscal years or sooner, beginning with small rural schools.

FUNDING

The State Commission on Higher Education approved funding for the installation of a satellite dish and site digital receivers at every public higher education institutions in South Carolina at an amount of $18,000 per site.

The states' Video Users Advisory Council make funding recommendations concerning video-based instruction to the state legislature.

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SOUTH DAKOTA

KEY PLANNERS
- The Board of Regents—Public Higher Education
- Mitchell Technical Institute Teleport
- South Dakota Department of Education and Cultural Affairs (DECA)
- Bureau of Information and Telecommunications

RECENT DEVELOPMENTS
South Dakota continues to change the face of telecommunications with the recently established regional analog fiber distance learning network which encompasses the communities of Davison, Sanborn, and Jerauld counties in east central South Dakota. The network consists of nine sites including, six school districts, Dakota Weslyan University, the Queen of Peace Hospital, and the Mitchell Technical Institute. The network has been funded in part by a $430,000 REA grant; the full project amounted to $700,000. The remainder was made up by the sites. The most significant donation in implementing the network was made by the independent telephone company, Sanborn Telephone Cooperative, which donated the use of its fiber optics plant for a period of ten years, free of charge. Six courses have been delivered on the network.

The Rural Development Telecommunications (RDT) Network Governing Board was abolished by executive order. RDT and South Dakota Public Broadcasting are now both part of the Bureau of Information and Telecommunications. RDT, which consists of 19 different sites, is a two way, T-1 digital system, which operates over leased terrestrial lines using videoconferencing equipment. This includes all of the state universities, three of the four technical institutes, a tribal college, two of the major hospitals in the state, and some private universities. RDT also acquired video bandwidth on Galaxy 4. With this satellite addition, RDT is able to offer four high school courses and four dual-credit courses from the state universities. During the unused hours on the satellite network, RDT transmits programming for state employees, health care professionals, judicial hearings, job interviews, and professional association meetings.

STATEWIDE AND LOCAL PLANNING
South Dakota has a strong interest in sharing courses between institutions and using distance learning to provide educational opportunities to people who are unable attend at a university campus.

STATEWIDE AND LOCAL NETWORKS
The state owned and operated T-1, digital uplink satellite system transmitting in MPEG-1, C-band satellite system is expected to expand from 65 communities to 130 communities in South Dakota, North Dakota, Wyoming, and Montana by the end of this year. TECHNET was also brought into the network. The administration and operation of

the network has been transferred from the state and is now the responsibility of the Mitchell Technical Institute (MTI), in Mitchell. The additional sites are exclusively medical sites such as hospitals and clinics. Programs will involve telemedicine, although it will not involve diagnostics. The satellite system itself is for education and administration information dissemination.

Many of the various systems in the state, including the digital satellite network, the RDT network, the Sanborn Interactive Video Network, come together in an information hub at MTI. At MTI, systems can interconnect with various networks. Through microwave, connections can be made to South Dakota Public Broadcasting. Through RDT, MTI can connect to an analog uplink network system that allows it to transmit nationally. In addition to those transmission networks, MTI also has 12 satellite downlinks pointed at various national program providers. MTI brings all of this information together, places it on an information ring, where it can be distributed via several networks.

The availability of ISDN lines in the state is having a significant impact on the use of technology in business and industry. USWEST is undertaking a statewide rebuilding of the telephone network. A recent PUC ruling allows USWEST to offer a rate increase for ISDN service in the state. Through the increase, USWEST plans to implement a distance learning initiative in the school and to provide the upgrade digital switching necessary to provide advanced telecommunication services.

All of the state's major hospitals are now connected using the South Dakota Telemedicine Initiative, a telecommunication system with an ISDN infrastructure, and videoconferencing equipment. Remote diagnostics and consultations are conducted through the initiative.

HIGHER EDUCATION
A two-year initiative to bring the Internet to all the campuses of the public universities and the technical institutes has been implemented. Currently, Dakota State University in Madison is offering several courses over the Internet including object oriented programming; technical report writing; freshman composition; introduction to music; and special topics: artificial intelligence.

The MTI has several high interest seminars in progress which addresses both teaching on a two-way interactive system and on satellite delivered programming. The Institute has several teachers already teaching on the networks and expects that this will become a valuable resource in training other teachers. The North Central Area Interconnects the South Dakota State University, and the University of South Dakota all have experienced distance learning teachers. MTI has announced plans to

begin delivery of in-state produced high school credit courses starting with the 1996-97 school year.

K-12

The Department of Education and Cultural Affairs (DECA) offered high schools courses and teacher in-service training to 35 schools over the RDT satellite system during the 1994-95 academic year. Approximately 160 students were signed up for courses in marine science, astronomy, advanced placement calculus, advanced placement psychology, and sociology.

While DECA continues to operate with K-12, it has taken many of its distance learning initiatives to other agencies. DECA has turned much of its distance learning initiative over to key educational partners in the state, including the Technology and Innovations in Education (TIE) office, located in Rapid City, South Dakota and Mitchell Technical Institute. As part of that transition, MTI will begin in-state production of high school credit courses via distance learning for the 1996-97 school year.

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TENNESSEE

KEY PLANNERS

- Tennessee Information Systems Council
- Tennessee Higher Education Commission
- Tennessee Board of Regents
- Tennessee Office for Information Resources
- University of Tennessee
- Tennessee Information Infrastructure (TNII) Planning Group

RECENT DEVELOPMENTS

To allow competition among local telephone service providers, the governor of Tennessee recently signed into law the Tennessee Telecommunications Act. Applications for competing services made to the Public Service Commission could become operational almost 60 days after approval. The act makes allowances to protect consumers and providers while the transition to a competitive arena is underway. Benefits of the act include establishing fair rules for all local telephone service, assuring customers faster access to new technologies, and assuring customers reasonable rates. The stipulations also permit competition in the areas served by South Central Bell and the Sprint-United Telephone companies, which together provide more than 90 percent of all telephone service in the state.

The executive and steering committees of the Tennessee Information Infrastructure (TNII) are two recently formed groups. The executive committee includes the University of Tennessee, the Tennessee Board of Regents, the Tennessee Department of Economic and Community Development, and the state Office for Information Resources (OIR). The steering committee for the TNII initiative is comprised of the executive committee and representatives for public libraries, local governments, community networks, and the state Department of Education (DOE).

The Tennessee Public Service Commission, a separate entity with statewide elected directors, will soon be dissolved. The functions of the commission will be absorbed by the Tennessee Regulatory Agency. As a result of this change, some deregulation of telephone companies regarding video transmission is anticipated. With the anticipated deregulation, state agencies are reluctant to prepare telecommunication strategies for a period of more than two years.

Five task forces have been formed to focus on higher education administration and instruction, higher education research, higher education outreach and extension, adult basic education, and K-12 administration and instruction. There are also task forces that have been created for health care, public libraries, and local government information.
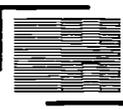
STATEWIDE AND LOCAL PLANNING
In Tennessee, higher education institutions are proactive in working with local school districts to establish pilot distance learning sites. The DOE is primarily focused on satellite delivery of two-way audio and one-way video. Higher education has been more technically progressive in pursuing two-way interactive video.

In late 1994, the state received a $375,000 federal grant from the Telecommunications Information Infrastructure Assistance Program (TIIAAP) of the U.S. Department of Commerce to plan for the development of the TNII. Total moneys include matching funds from the state OIR, the University of Tennessee, the Tennessee Board of Regents, and the Tennessee Department of Economic and Community Development. Joint planning is currently underway and meetings have occurred to decide how the networks may be combined for new applications. TNII is currently compiling an inventory of networks in the state.

The highest priority of the Office for Information Resources lies in ConnecTEN, a project connecting of all K-12 schools with a graphical Internet interface and implementing interactive desktop video capabilities. By September 1996, all K-12 schools in the state will have World Wide Web connections, network consolidation will near completion, and the TNII planning study and grant reports will have been completed. Collaboration with business, industry, and health care is also part of the network planning.

In an effort to explore collaborative research activities, the University of Tennessee, Knoxville campus will soon be connected through an ATM pilot project to the Oak Ridge National Laboratory and Technology 2020, a public-private telecommunications partnership.

STATEWIDE AND LOCAL NETWORKS
The Tennessee Board of Regents has a combined list of networks including 60 sites for distance learning. Through the use of a multipoint control unit offered by South Central Bell, interaction across sites owned by different parties is possible. The University of Tennessee has 16 sites and delivers more than 80 college credit courses annually to 2,100 students.

By August 1996 each school in Tennessee will have the capability for two-way interactive video. By September 1996, the goal of the state is to have World Wide Web access just a local call from all K-12 schools, higher education institutions, local and county government agencies, and communities that wish to participate.

Tennessee now has three statewide government networks, managed by the OIR, the Tennessee Board of Regents, and the University of Tennessee System. Bell South pro-

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vided switching service free, until the Spring 1996. Tennessee is trying to define needs under the new tariff which is to take effect June 1996. TNII will consolidate these networks into a single network to enhance telecommunications capabilities, reduce cost, and establish a point of presence in every county of the state. The point of presence in each county will be closely linked to community partnerships.

K-12

The DOE is still funding 21st Century Classrooms a project which includes the equipping of technology-rich classrooms and 30 hours of teacher training. The 21st Century Classroom is an initiative to promote the uses of technology in Tennessee classrooms.

Membership in the TNII task force for K-12 consists of 21st Century Classroom Teachers, principals, superintendents, school board members, and representatives from the state DOE, PTA, teacher preparation universities, and private sector people. Academic programming for distance learning in the state is determined by partnerships between higher education and local schools.

Within each school district, there is a heavy focus in the use of ISDN. It is expected that the establishment of points of presence will facilitate a logical and cost effective transition to ATM, the technology comes of age.

TEN is upgrading each library in the 1554 public schools in the state to 28.8 modem, full graphical interface, and two-way interactive video. Training began in February for 215 technology coordinators, who will in turn train 47,000 educators.

TEN is also currently developing a curriculum for Internet instruction, and the Teaching and Learning division of the DOE is including technology in this curriculum. The state DOE has established a committee to bring teachers to outline a training program focusing on the use of Internet World Wide Web for instruction.

FUNDING

For the past four years, South Central Bell has invested more than $282 million in programs and equipment for education and advancement in technology for the state. Of the total amount, $2.3 million was used towards education programs and $280 million on advancing technology for the entire state.

Funding for K-12 is being sought for district-wide WANs to provide network connectivity of each school to school district office. This initiative is referred to as ConnecTEN. ConnecTEN currently has $3 million from the state and $1 million in departmental savings, and is now trying to collect $1 million from businesses.

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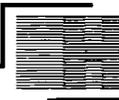
The start-up dollars for building the TNII backbone across the state is estimated at over $6.5 million. The goal is to connect all schools and provide a network point of presence (POP) in each of 95 counties. The initiative will provide desktop video and Internet access, including World Wide Web access, to every K-12 school, all higher education institutions, all local and state government agencies, a public/private partnership for community access, and economic development opportunities. While health care and medicine have already joined, future plans call for the involvement of the community.

A funding model will be established with local school systems to provide them with recurring funds to connect from their county education router to points of presence on a T-1 line. These funds will also allow them to operate ISDN links between their county router to individual schools. Some of the urban and private districts are considering installing fiber optics within school buildings.

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TEXAS

KEY PLANNERS
- Texas Education Agency (TEA)
- Telecommunication Services Division
- Department of Information Services
- Healthnet

RECENT DEVELOPMENTS

The Texas state legislature continues to support educational technology in the state by passing HB 2128, a new telecommunications bill which took effect in September of 1995. Signed by Governor Bush in May 1995, the bill calls for a $150 million per year investment in the statewide telecommunications infrastructure for all K-12 schools, higher education institutions, and healthcare entities. The telecommunications infrastructure fund represents the largest single yearly commitment to educational telecommunications in the country. Half of this investment would be made by cellular carriers and half by local exchange carriers (LECs)and integrated exchange carriers (IXCs). Cellular carriers, however, are challenging their portion of the contribution to the fund—the equivalent of $75 million per year. Should the challenge be upheld, the remaining $75 million would be dedicated to K-12 telecommunication development. Higher education and telemedicine would be in jeopardy.

The legislature also outlined a bill for the deregulation of Southwestern Bell. Bell offered to spend $180 million over the next six years to connect Texas schools, libraries, hospitals, and criminal justice facilities to the Internet. If the bill is passed, phone companies will also establish a $75 million grant fund to support distance learning and telemedicine programs.

The Technology Allotment fund, held at $30 per student, has been transferred to the textbook fund of the endowed Permanent School Fund (PSF). This is expected to increase technology spending by $20 per student and reduce amounts allotted to districts for discretionary spending.

HB 653 granted qualified educational institutions a 25 percent reduction in local telecommunications access rates. HB 2128 extends this benefit to libraries and telemedicine.

STATEWIDE AND LOCAL PLANNING

An advisory committee created under House Bill 85 is developing a master plan for distance learning in higher education for Texas. This undertaking will promote coordination and collaboration among the institutions. The advisory committee members (who represent higher education institutions) are receptive to working together because the Coordinating Board, which will receive and evaluate the master plan, stipulates that coordination is now mandatory, as it is in other states.

Consistent with this trend in coordination, the Health and Human Services Commission is consolidating the state health networks, the Texas Education Agency (TEA) is working closely with school districts and higher education, and the General Services Commission and Department of Information Resources are building the video teleconferencing and data network for agencies, colleges, and universities.

The Texas Education Agency (TEA) has formed a task force to update its 1988-2000 Long Range Plan for Technology. TEA consists of teachers, superintendents, computer industry representatives, and distance learning providers. The original priorities of the plan included the use of technology in the classroom, instructional management, distance education, and telecommunications. Statutes supporting this plan have been passed, among them funding for the implementation of the Texas School Telecommunications Access Resource (T-STAR), an integrated telecommunications system for satellite-based delivery of video and data services to the districts. Distribution within regions and districts is accomplished through terrestrial telecommunications.

Texas has been involved in Star Schools projects from its inception in the late 1980s. The state is now part of the United Star Schools Consortium which includes TI-IN in Florida, North Carolina, Illinois, and Mexico. The consortium shares programs and sites and is expanding receive sites in the five states. Texas also participates in the Southern Education Consortium for collaborative initiatives, which includes distance education.

Since 1990, $462 million has been appropriated for learning technology for the 3.6 million students in Texas. This enormous investment is due to the size and rural nature of the state, as well as a school funding equity suit in the late 1980s.

STATEWIDE AND LOCAL NETWORKS
The Texas Education Network (TENET) now has 50,000 individual accounts (nearly twice as many as in 1994) from school districts all over the state. This network, established in late 1991 as a dial up access system, provides full Internet access, computer conferencing, electronic mail, and on-line resources. TENET also has an on-line job data base called Project Unite on which anyone with Internet access can file an electronic resume. In addition to linking all school districts, TENET links TEA, Regional Education Service Centers, professional organizations, and other state agencies. TEA uses The Higher Education Network (THEnet), a computer network operated by the University of Texas at Austin, as a carrier.

The TEA-initiated Texas School Telecommunications Access Resource (T-STAR) provides one-way video, two-way audio and full data services using both TVRO (television receive only) and VSAT (Very Small Aperture Terminal) technologies. T-STAR
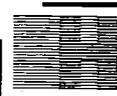
has installed or has grants for the installation of a satellite dish in over 900 of the 1,000 school districts in the state. This initiative will now be funded through the $150 million telecommunications infrastructure fund rather than the Technology Allotment fund. The latter monies will be redirected to the districts themselves. Having nearly reached its infrastructure goal, T-STAR now focuses on training and programming.

The Telecommunication Services Division manages a statewide network used by state agencies, higher education institutions, and educational service centers for school districts. The Division also provides bandwidth for data transfer and video via standard multiplexed T-1 and DS-3 technology for distance learning, telemedicine, and library traffic. The Division is working with the Department of Information Resources (DIR) in implementing SONET technology in 1996 to meet future bandwidth needs on existing networks. The Division, which employs ISDN technology, plans to begin migrating to an ATM environment during 1996.

The Trans-Texas Videoconference Network (TTVN), administered by the Texas A & M University System, offers long distance, digital communications via T-1 circuits and satellite for institutions of higher education, K-12, state government, and other public entities. The major focus is graduate education. This network is based at the main campus in College Station and connects more than 25 Texas cities with about 57 links. TTVN conducts more than 3,000 videoconferences per year, mostly for university telecourses.

STARLINK, the State of Texas Administrative Resource Link, is a satellite-based teleconference network established in 1989 by the Texas Higher Education Coordinating Board. The network connects most of the community and technical colleges in the state and uses live, interactive video teleconferences for the professional development of educators statewide. On behalf of the Board's 72 member institutions, Austin Community College and Dallas County Community College District (DCCCD) manage the network, which is supported by membership fees and appropriations. In addition to its higher education activity, STARLINK produces and distributes programming for a number of state agencies and public entities.

The University of Texas (UT) Systems Office manages a statewide, two-way interactive video network using dedicated T-1 lines. The UT video network connects the 15 UT institutions and is used primarily for academic activities, but the network is now also used for administrative videoconferencing and professional development among the UT institutions.

Texas has a teleconferencing and data transfer network linking 20 regional service centers to TEA. The dedicated T-1 network is used for training and development.
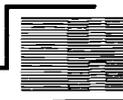
Healthnet is investigating the cost of satellite time for its 110-site network for healthcare providers, and has acquired a full time digital channel on Telstar 401.

Transmission technologies in Texas include microwave, fiber optics, and satellite. There will be an increased use of fiber optics, and microwave use will continue in the densely populated Houston area. TEA is considering upgrading its satellite receive sites for digital signals since many K-12 program producers are switching to digital.

HIGHER EDUCATION

The University of Houston (UH) University Park campus provides the greater metropolitan area with live, interactive junior, senior, and graduate level credit courses via ITFS. UH offers master's degrees in electrical engineering management and recently added eight additional degree programs for the home via its local PBS station, KUHT, and cable. A new infrastructure within the university supports these services. The live interactive broadcasts travel to a network of school, hospital, community, and corporate sites. UH now broadcasts live, interactive courses and degree programs to a network of corporate sites.

The University of Houston System consists of the main campus, the downtown campus, and the campuses at Clear Lake and Victoria. The System implemented a systemwide network for two-way video and data transmission using leased fiber optics and codecs. The UH System, however, in Spring 1996 endured a massive and abrupt change of its entire upper administration. The effect of the shift on technology development remains to be seen

The Texas Association for Educational Technology (TAET) sponsored discussions with statewide university representatives and the State Coordinating Board on collaborative teaching and long-range planning.

The Dallas County Community College District (DCCCD) has helped to increase the perception of distance education as a high priority in Texas. As a national distance learning leader with seven member colleges, DCCCD distributes courses via the PBS station KERA and local cable systems. DCCCD conducts two teleconferences with STARLINK and three college presentations per year through PBS. STARLINK, CCSN, and PBS/ALSS satellite systems disseminate DCCCD teleconferences live.

Dallas Telecourses, the telecommunications arm of DCCCD, produces telecourses for the PBS Adult Learning Service and Canadian networks. The group produces live, videotaped and one-way video and two-way audio courses and also computer-based modem online courses. Dallas Telecourses transmits telecourses to more than 1,200 two-and four-year colleges and universities in the United States and more than 40

foreign countries. More than 160,000 students enroll in Dallas Telecourses every year. Enrollment in Dallas Telecourses represent nearly 40 percent of the national total.

ITFS teleconferences and postsecondary live interactive instruction in Dallas County have improved DCCCD services. DCCCD markets the teleconference services to business and industry and delivers interactive instruction to colleges in the North Central Texas region. This service is planned for high schools as are institutional partnerships for business, industry, and governmental and educational organizations involved in educational telecommunications.

Based in Dallas and operating throughout the North Texas region, the 24-member Alliance for Higher Education operates the TAGER Television Network. Serving distance education since 1965, this network provides graduate level programs in engineering, computer science, and business administration, as well as many non-credit professional development courses to large corporations in the area. During 1996-97 TAGER will increase its eight-channel capacity to more than 20 channels by upgrading to digital fiber and programming will then expand to include health care, law, finance, and telecommunications.

K-12

Internet access for every classroom in the state will probably be addressed through Senate Bill 2128. During 1994 school districts were awarded $1.6 million in grants for direct connections. Some schools have established and are using these connections. Those schools that chose to wait will benefit from the new distance-insensitive rates resulting from Senate Bill 2128. In particular, Southwestern Bell has filed a tariff and now quotes school districts in their service area a flat intra-LATA rate of $260 a month for a T-1 line. Charges for communications between Bell and non-Bell sites are not yet established.

Clustering of schools for telecommunications connections is funded by monies other than the new Senate Bill 2128 fund. The DS-3 lines at the east Texas cluster demonstration site will eventually connect 24 school districts, 6 service centers, and four colleges and universities: Senate Bill 2128 funds will enhance this project even more. The experience gained at this demonstration site will help to establish compatibility standards within school districts.

The approved distance education providers InterAct, TI-IN, SERC, the Oklahoma State University's ASTS network, and the University of Texas Extension College's Educational Instructional Materials Center offer telecourses to about 3,800 K-12 students in Texas. School districts must use local funds to pay for instructional television (ITV) services.

The San Marcos Project in Hayes County is the only full-motion digital interactive video network in the state serving a school district and its community partners. This TeleCommUNITY project explores two-way full-motion interactive video and audio applications for school and community needs. TeleCommUNITY focuses on at-risk students and delivers four courses a day to about 20 students per semester. Half of the network time is used for instructional programs to schools, the remainder to workplace training, adult literacy, and advanced vocational training courses.

FUNDING

The $150 million dollars allocated as part of HB 2128 will be divided into two separate accounts. The $75 million public utilities account is for one-time grants and loans for equipment, local LAN development, infrastructure, and inter- and intra-campus wiring. The $75 million mobile services account may be used for any purpose authorized by the Bill, including equipment purchases, wiring material, program development, training, and installation costs. Telemedicine can apply to mobile services account because it provides a service to the underserved and rural populations. A nine-member board will be appointed by the lieutenant governor, governor, and speaker of the house to oversee this telecommunication infrastructure fund. There is a great deal of excitement in Texas over this allocation.

In addition, the 1992 $100 million legislative appropriation for the Technology Allotment program continues to be funded at $30 per K-12 student. As part of the Statewide Systemic Initiative (SSI) program, Texas is receiving $10 million over a five-year period to use in the Texas Science and Mathematics Renaissance Project. In 1994 the Texas Education Agency awarded $1.6 million in grants for districts to establish direct connections to the Internet. So far, 46 grants have been awarded to 52 districts at various stages of network development.

The Texas Interactive Multimedia Communications Fund Demonstration Program has funds for school districts to acquire multimedia equipment and procure services.

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UTAH

KEY PLANNERS

- Utah Education Network (UEN)

RECENT DEVELOPMENTS

Utah has been a leader among states in several respects: It has advanced a multiple-technology platform, it has a long history of informal and formal cooperation among many institutions, and Utah's governor and legislature have advanced aggressive and positive initiatives on education generally and technology specifically.

In 1995 the Utah legislature approved one-time funding of $6.4 million and $2.5 million ongoing funds for the Higher Education Technology Initiative. Phase one funding is for course/curriculum development, enhanced classrooms for distance learning, and centers for faculty development and assistance.

The state Legislative Task Force on Telecommunications is now called the Instructional Technology Commission and is administered by the Office of Legislative Research. The Commission is focusing on statewide deployment of fiber optics, particularly in the rural areas. The legislature requires that the fiber system not be state-owned.

STATEWIDE AND LOCAL PLANNING

The state recognizes the importance of training, program development, and maintenance. The fair use of materials for delivery, either in a multimedia product or closed circuit television and the accreditation of programs are also issues. Limits on program flexibility and capability, and the establishment of program standards are concerns among faculty and state level education officials. Tenure, faculty retention, coordination of telecourses, and establishing geographic service regions are issues likely to have an impact on telecommunications in Utah.

The Utah Education Network (UEN), a consortium of representatives from higher education, K-12, applied technology centers, and state government, is responsible for planning, coordinating, maintaining, managing, and programming the state's educational technology systems, including EDNET, Utah Link, ITFS, satellite services, and the Utah Learning Channel (KULC-Channel 9) for state government and Utah's Systems of Higher and Public Education.

Utah is looking at strategies for competitive bidding among telecommunications providers that have state access. This approach will avoid control by one prevalent provider. The Bureau of Economic Development has conducted studies on the effectiveness of telecommunications in the economic development plans of the state.
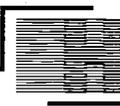
STATEWIDE AND LOCAL NETWORKS

EDNET, an interactive video system for distance learning, operates on fiber, copper T-1, and microwave with switches in various parts of the state. The legislature approved $3.1 million and an ongoing $1.5 million allocation for 40 sites to be added to the current 120 sites in 1996.

The governor's budget includes $2.9 million in ongoing funds and $4.7 million one-time funds to complete EDNET installation in every high school and applied technology centers at the colleges. The money will also be used to increase EDNET backbone capacity to accommodate about 100 more courses. Some institutions are expanding their EDNET systems with their own money. The College of Eastern Utah at Price used Star Schools money to double the capacity of its system.

The Governor's budget includes funds to upgrade the University of Utah's COMNET system for integration into EDNET. COMNET was formed in the early 80s as an audio-graphic distance learning system. It provided an electronic blackboard to 38 sites in rural communities. The system delivers three undergraduate and four graduate level degrees. There are about 7,000 students enrolled in COMNET courses.
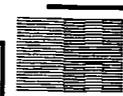
Utah Link, a computer-based data network, delivers Internet access to K-12 public schools and is building up backbone capacity among higher education institutions. Fifty percent of Utah Link Internet traffic is due to K-12 schools. Approximately 140 sites have been funded with an additional 200 expected in 1996. Some 436 middle schools and high schools are on Utah Link, mostly through frame relay T-1 lines. The state funds the secondary education links and transmission, while the districts are required to fund links to their elementary schools.

The Utah Education Network has an RFP to expand capacity to the Internet and is currently trying to establish a management system to monitor the expansion and to keep up with it.

UEN cooperates with the Utah Network for Instructional Television (UNIT) in programming the school-day schedule for KUED Channel 7. The state government network is connected to Utah Link and uses some of the same physical transport lines as UEN. Media Services oversees the UEN mission by working with public and higher education, state and federal government, libraries, and businesses.

HIGHER EDUCATION

The Utah vision for higher education is to provide universal access to programs, services, and resources with "central coordination and local control" and an emerging "import-export" concept for distance learning. The Governor and the Board of Re-

gents require interoperability among higher education institutions working to develop appropriate programs to serve the students. In the future, these institutions will develop their own centers of excellence which they export to a broader network. At the same time, they will import services to supplement their curricula. The Board of Regents is undertaking a needs assessment to determine statewide and regional needs for higher education programs and how to deliver programs efficiently.

Utah State University (USU) currently has several electronic classrooms where site-to-site concurrent enrollment courses are conducted on COMNET, EDNET, and satellite systems. USU, working within the state networks, is considering the addition of on-demand applications with technology-supported instruction, such as electronic servers that will deliver 30-frame full motion video on demand. The school expects the on-demand service to be available within the next year. USU also has Ku-band and VSAT satellite uplinking accessible to any of the state institutions. The university, with offices in all counties, offers a variety of services through its extension network in collaboration with the Utah Education Network.

K-12

A needs assessment study conducted by the University of Utah and the State Board of Education shows that foreign languages are desperately needed in public schools.. The university's regional center for persons with disabilities is developing a lot of outreach and support for special education.

There are currently more than 68 EDNET sites serving public education in Utah with 50 high school and 26 concurrent enrollment courses statewide. The ongoing needs assessments and program development issues are now being coordinated by the Public Education Program Development Committee. The committee has established minimum quality assurance standards for the development of EDNET courses, and annually reviews and approves program proposals from various program providers on the system. In the future the committee will also be granting limited program development funding on a competitive basis for K-12 course development.

VERMONT

KEY PLANNERS
- Vermont Interactive Television (VIT)
- Vermont State Colleges
- University of Vermont
- Vermont ETV
- State Education Department
- Vermont State Technology Council
- Vermont Institute for Science, Math and Technology (VISMT)
- Vermont Education Telecommunication Consortium

RECENT DEVELOPMENTS

One of the early leaders in the use of compressed video for education, Vermont continues to move forward. Although activity remains somewhat uncoordinated in planning and implementation, Vermont telecommunication administrators recognize the need for collaboration among state agencies.

Through a collaboration of the State House, the Vermont Interactive Television System, and the Vermont cable operators, a temporary pilot project link was established to conduct public hearings. Four public hearings were held here in 1995; and citizens could participate either from a VIT site or by calling in from home.

Vermont was the recipient a $2 million IBM Reinventing Education grant for the enhancement of the state portfolio system. IBM will collaborate with the state to develop software to improve the portfolio system. The grant is a combination of $500,000 in cash and $1.5 million in a grant form.

The Department of Communications at Castleton State College received a $54,000 NTIA grant to work on countywide telecommunications planning.

As a result of the increase in activity by the University of Vermont's Continuing Education Department in distance learning and videoconferencing, the state has funded 30 satellite receive sites this last year.

Vermont Interactive Television conducted an evaluation which has become the basis for determining technology related issues for the coming one to four years.

In the past year, Vermont ETV created a private, subscription on-line service, available to the public with information that is accessible by computer through direct dial up or by the Internet.

STATEWIDE AND LOCAL PLANNING

Although activity remains somewhat uncoordinated in planning and implementation, Vermont telecommunications administrators recognize the need for collaboration among state agencies.
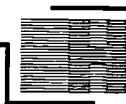
The Internet 96 conference allowed higher education institutions to discuss what sort of content should be delivered on-line. Conferences and workshops were conducted by Vermont Technical College for technology coordinators who are interested in developing LAN connections in their schools, but lack the expertise.

The Vermont Institute for Science, Math and Technology (VISMT), which is a part of the Statewide Systemic Initiative (SSI), is in its third year and was able to pass a science and technology standards document. VISMT also expanded the professional development system at the state level, where a single summer institute developed into four regional summer institutes in 1995 and nine in 1996. The institutes will allow for localized professional development for K-12 teachers.

The Telecommunication Technology Council of Vermont introduced a set of recommendations that have since been delivered to the governor for review. The governor-appointed Council was established a year and a half ago to conduct statewide planning, distance learning, and video conferencing, as well as to advise the governor on telecommunication policy.

While Vermont Interactive Television (VIT) continues to be aggressive in maintaining a high level of service in technical quality and use of the system continues to grow rapidly, it is also concerned with long term stability, both from a funding and expansion perspective. VIT has met with BOCES units in New York State concerning potential interstate programs as well as conversing with New York and New Hampshire about a possible link up among the three states. The New England Board of Higher Education, which is a regional consortium involving all the higher education institutes, is looking at telecommunication issues on an interstate basis.

Although Vermont ETV is not a key player in distance learning marketing, its highest priority lies in positioning itself as an important figure in this field. ETV's goal is to use existing systems as well as connecting with emerging systems in technology. Vermont ETV works with an advisory panel of teachers to cover the K-12 curriculum.

In terms of academic programming, regulations are conducted by each institution, which determines policies on such matters as credit transfers and student fees.

STATEWIDE AND LOCAL NETWORKS
VIT has upgraded its switching system in 1995, making it standard compliant with the capability of running the CLI proprietary compression algorithms. VIT has added three ISDN lines and an inverse multiplex service enabling it to conduct dial up video conferencing or distance learning outside of the T-1 network.

VIT conducts healthcare related programming on its network over ISDN lines, including medical rounds. A year-long LPN program for nurses as well as emergency and RN courses are offered on the network. Although telemedicine is not conducted on the system, healthcare professionals use the system to meet and discuss information and policy issues pertaining to healthcare. VIT delivers a program developed by a consortium of business training organizations in the state, which runs four course sequences for potential entrepreneurs and dislocated workers who want to start their own businesses. VIT also offers out-of-state video conferencing services to businesses. VIT would like to continue to rely on two-way, interactive distance learning and video conferencing.

NYNEX, Vermont's regional Bell operating company, was active in the implementation of VIT eight years ago. NYNEX provides discounts for videoconferencing, including a 40 percent discount on tariffs for VIT's T-1 lines.

K-12 Net is a statewide network that provides the capability of linking all high schools in the state to the Internet. K-12 Net provides 56 kilobyte access to high schools in the state. The schools can hook up to the Internet by paying an annual $5,000 flat fee, which includes a connection and a router support along with technical support.

HIGHER EDUCATION
The University of Vermont is using a microwave link to a commercial TV station to uplink its satellite signal to schools in Vermont and elsewhere and also offers two AP courses free to K-12 schools.

Vermont Interactive Television receives satellite teleconferences and carries them over the VIT network and is also a node on the Army's T-net training network.

K-12
As a result of their Web project, the Montpelier School System, the Enosburg Falls School System, and the Proctor School System were awarded a Challenge Grant from the U.S. Department of Education. The grant enables the schools to connect with other schools across the state for the development of multimedia assessment materials for art. The connection will allow art material from K-12 students to go on the World Wide Web for assessment and appreciation by the public.

Education administrators in Vermont see a great need for Internet training and integration in the classroom. Access is increasing, not only with K-12 Net, but also with local, commercial providers, and several schools now have Web sites.

The VISMT has developed an Internet plan for the K-12 community, which outlines the need for professional development.
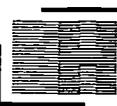
The Department of Communications at Castleton State College received a grant from the state in 1995 to install Internet access using Vermont State Colleges' access point.

A number of schools have set up regional data networks, including a group in the Rutland region, which received a TIIAP planning grant.

FUNDING

During the past four years, VIT has received federal money through the Rural Economic Development grant from the Agriculture Department. VIT is conducting a cost analysis to compare state agency spending for VIT video conferences with spending on traditional methods of conferencing.

The legislature established a joint committee to oversee the latest developments in information technology and state spending. As a result of the increased scrutiny, funding is more difficult to obtain.

K-12

The $10 million grant from the National Science Foundation (NSF) is distributed through the Vermont Institute for Science, Math and Technology (VISMT). The NSF grant, a five-year Statewide Systematic Initiative (SST) in Science, Mathematics, and Technology, will strengthen science, mathematics, and technology education for K-12 students. Telecommunications technology will be employed as part of the grant to allow Vermont teachers, students, researchers, and private industry members to share ideas and collaborate via a telecomputing network. The grant does not provide for the purchasing of hardware.

A part of the capital funding from the legislature last year provided downlinks for 30 schools to allow those schools access to satellite course providers from across the country.

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VIRGINIA

KEY PLANNERS
- Department of Information Technology
- The Virginia Public Telecommunications Board
- The Council on Information Management

RECENT DEVELOPMENTS

The Telecommunications Act of 1996 has helped pave the way for the State Corporation Commission to deregulate several of its rules relating to cable television companies as well as local operating companies. The rules were established to promote competition and to guarantee universal service. Included in the Act, Senate Bill 1956 requires that all local market entrants, including resellers, obtain state certification by showing they have the capability and resources to provide service. SB 1956 also ❶ calls for tariffs, reporting, and other requirements to be made by the state and the commission; ❷ prohibits the resale of switched local exchange service; ❸ requires regulators to establish a financial support system for universal service; ❹ allows price-based regulation of incumbent telephone companies; ❺ requires distinctions between basic and non-basic local service for price regulation; ❻ makes no special provisions for small telcos; ❼ allows no toll service. The idea is to provide and pursue competition, concentrating on those business that do not have competition, such as the cable and local telecommunication markets.

The recently passed HB 1168 and SB 393 created the Virginia Technology Infrastructure Fund, not to exceed $200,000 in each fiscal year, and to be administered by the Council on Information Management (CIM). HB 1097 and SB 407 requires the State Council of Higher Education to establish institutes at three sites for technology training of elementary and secondary school teachers and administrators. Funding will be appropriated by the legislature.

STATEWIDE AND LOCAL PLANNING

The Virginia Technology Council, which continues to push the concept of a broadband network, is not limited to telecommunications. The Council is also exploring other types of technology application, such as main frame models.

CIM, established in 1988, promotes the coordinated planning, practical acquisition, effective development, and efficient use of information technology resources serving needs of agencies and institutions of higher education in the Commonwealth. To this end, the nine-member council is charged with developing a comprehensive, statewide, four-year planning process and is planning for the acquisition, management, and use of technology resources. The plan will be updated annually and a report, the Virginia Report on Planning for Information Technology Resources, will be submitted to the governor each year.

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The Department of Information Technology (DIT) is the state agency designated to purchase and acquire telecommucications services and supplies for state agencies. Through aggregation of users and demands, DIT is able to negotiate favorable prices statewide. DIT is currently working with Virginia Tech, the University of Virginia, and CIM to establish ATM service for voice, data, and video in the state.

STATEWIDE AND LOCAL NETWORKS

TELETECHNET, created through the cooperation of Old Dominion University and the Virginia Community College System, has successfully converted from a C-band analog approach to a Ku-band digital satellite approach. The migration was was spurred by rising costs for analog satellite transponders.

The Virginia Satellite Education Network (VSEN), a statewide K-12 network administered by the Department of Education (DOE), will remain an analog system through 1997. Cost effectiveness of the network will be examined.

DIT has been working with the Virginia Community College System to implement a T-1 compressed video network for the state's community colleges. The Virginia Community College System Office will pay for the hardware via grants, bonded funds, and state funding. The network will cost about $600,000 initially and is expected to expand with the addition of local funding.

The Medical College of Virginia in Richmond connected with two remote sites. The first site is located in a rural area and is used for the training of family practitioners in rural health care clinics. The other site is the Powhatan Correctional Facility, a telemedicine site focusing on the treatment of inmates with AIDS. The Department of Corrections has successfully centralized specific patients at specific prisons. The Powhatan Facility primarily focuses on AIDS patients from all of the correctional facilities. As overcrowding ensued, the facility began to review possible options for alleviating this problem. For these programs, the college has been using T-1 capacity in two way mode and can capture the preponderance of that bandwidth as needed in order to send teleradiology.

The Commonwealth Telecommunications Network (CTN) is a voice services provider for state agencies, colleges and universities, local governments, and local schools. CTN is a utility network aimed at providing inexpensive and highly reliable communication services to all these entities. Over 300 agencies participate in the CTN voice network, generating an average of 8 million minutes per month in long distance usage. In addition, there are over 65,000 Centrex lines serving various state and local government locations. CTN also offers ISDN voice services and equipment, a low cost 800 service, long distance services, and voice mail services.
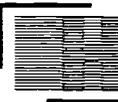
Statewide e-mail is a project that includes the state government and institutions. Another project includes installing a local Metropolitan Area Network (MAN), which would cover the Richmond regional area. DIT hired a consultant to develop an RFP for MAN and would like to get on-line by the end of 1996.

HIGHER EDUCATION

In September 1994, Bell Atlantic began work on an $11.7 million communications infrastructure with George Mason University (GMU). Included in the infrastructure are distance learning facilities, an interactive classroom, and a presentation classroom. Through other features, teachers and students will be able to access and communicate information voice, data, and interactive multimedia.

TELETECHNET is part of the digital conversion the DIT conducted for the Commonwealth Graduate Engineering Program. The engineering program now reaches more than 24 sites. TELETECHNET is meeting a need for a four year degree at community college sites. VSEN is sharing master teachers where none can be afforded in a very rural location. This network is also providing equal access to all students in the state.

Many of the 39 community colleges campuses in the state have been teaming up with local high schools through dual enrollment courses and have established separate physical networks to carry out these courses.

K-12

The DOE sponsors the VA Pen, a service designed as a communication vehicle for teachers and administrators around the state. Several local servers were installed, but rural areas were forced to access this service through toll calling. Cost for the service continued to skyrocket, causing the DOE to limit usage. Users may only access one hour a day, the service is turned off at night, and a limited number of accounts are available. The services are accessible through the World Wide Web.

FUNDING
Higher Education
Bell Atlantic, the largest local exchange carrier in the state operates in the metropolitan areas of Northern Virginia, Richmond, and Tidewater. Bell Atlantic's Educational Technology grant program gives $1 million every year to either local or higher education institutions for the use of educational technology.

WASHINGTON

KEY PLANNERS

- Washington Department of Information Services (DIS)
- Higher Education Coordinating Board
- Communication Technology Center (CTC)
- Office of the Superintendent of Public Instruction
- Washington Interactive Television (WIT)
- Washington Interactive Network (WIN)

RECENT DEVELOPMENTS

In the past legislative term, $42 million was appropriated for K-12 and higher education infrastructure development, and the Telecommunications Oversight Planning, and Policy Committee was established, which will distribute the money for the educational network.

The recently established Governor's Telecommunications Policy Coordination Task Force comprises representatives from the house, the senate, as well as state agencies to look at a very broad spectrum of issues including educational technology, regulation, taxation, and economic development.

STATEWIDE AND LOCAL PLANNING

The Washington Interactive Television System (WITS) which was constructed as a result of the partnership of the DIS, the Office of the Superintendent of Public Instruction (OSPI), and the Educational Service Districts (ESD), operates a cost recoverable service, with the DIS running video conference rooms and the satellite broadcast operation, as well as video production. WITS is the statewide video telecommunication system that offers post-production services, satellite services, cable channel coordination, a broadcast quality studio, and two-way interactive videoconferencing.

The Washington Interactive Network (WIN) is an effort to put state information at users' fingertips through the Kiosk system, which is a state information system targeted towards the public.

Washington has moved from a formalized system of planning to a somewhat less formal operation and, as a result, the Video Telecommunications Advisory Committee (VTAC) has disbanded. The VTAC, composed of representatives from K-12 education, state government, and higher education, had been charged with developing recommendations coordinating the implementation of the statewide system.

Planning oversight for higher education and K-12 has been lodged with the newly created Telecommunications Oversight Planning and Policy Committee, under the Department of Information Services Board.

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STATEWIDE AND LOCAL NETWORKS

A portion of the Washington Higher Education Telecommunication System (WHETS) was upgraded from analog microwave to digital. The link between Vancouver and Seattle is now fiber. WHET serves Washington State University and its branch campuses around the state and is used for classroom purposes as well as for administrative conferences. The system delivers a broad range of programs including graduate courses in business, engineering, education, food science, and speech and hearing science. Undergraduate courses include social sciences, humanities, and nursing.

The Triad Video Telecommunications Demonstration Project was added to WITS. The demonstration project was carried on for a year beyond its general demonstration phase. The operation was then funded by the Communication Technology Center (CTC) for a year along with DIS. When CTC withdrew its funding in the second year, the only entity remaining that was able to fund this project was DIS. At this point, DIS opted to move the project to Olympia to make it more accessible for state agencies. The move was supported by the CTC, and WITS set up the studio site two years ago.

The three primary functions of WITS are satellite broadcasting, interactive video conferencing, and video tape production. In the videoconferencing sector, DIS has partnered with the K-12 community. Of the 13 videoconferencing sites, 11 are staffed with personnel from the education community. WITS delivers interactive videoconferencing to nine educational service districts, the OSPI, the DIS/WITS headquarters, and the Seattle Community College District building. Through WITS satellite broadcasting most of the downlinks that are used for state agencies happen to be at the community colleges.

The University of Washington (UW) has an uplink and a compressed video system which links with its two branch campuses, as well as interconnecting with the WITS system. The UW system is largely employed for administrative purposes to link the main campus to its two branches.

CTC's network, CTCNet consists of a 56K Star network for data applications and in turn rides with the Washington School Information Processing Cooperative (WSIPC) for Internet access.

HIGHER EDUCATION

There have been changes in the way that the higher education sector is viewing distance education by the two research universities and the four regional colleges. These institutes have taken down their district lines and are now orienting planning for distance education around specialization programs. The four year schools and the research universities have a reviewing process for the programs. The community and

technical colleges have set no formal policy, but they are beginning to organize themselves into regions for purposes of understanding the need for distance education and the use of available delivery systems for taped programs.

With the allocation of funds in the 1996-97 budget, infrastructure for the advancement of distance education and increased access will be developed. Design and policy direction has yet to be determined.

Within the community and technical colleges several campuses will be installing videoconferencing units primarily to link to their branches. Campuses are purchasing equipment in order to share classes. Planning to link them is being completed, and purchasing of transmission capability will be finished in summer 1996.

K-12

The legislature's Schools for the 21st Century grant program concluded in June of 1994. The six year project primarily focused on how to implement local decision making models to improve education. The 33 Schools for the 21st Century projects were comprised of 111 schools in 27 school districts. The proposals were developed collaboratively by teams of teachers, parents, community members, and school administrators. The majority of the projects dealt with cooperative learning for students, peer coaching for staff, and team teaching.

Currently 115 out of the 296 school districts have direct connections to the Internet and approximately 10,000 educators have dialup accounts through their local ESD. The Washington Education Network (WedNet) is a cooperative of the school districts and the ESD's through an organization called the Washington School Information Processing Cooperative. The network is also the point of presence for the CTC's access.

There are 185 school downlinks to K-12 through the Satellite Telecommunications Educational Programming network, STEP-STAR. STEP operates from Educational Service District 101 in Spokane, delivering programming to most of the northwest. STEP uses a one way video, two way audio system to reach high school students and teachers in 14 states. The downlinks are paid for through STEP, as well as Star Schools.

FUNDING

Higher Education

Community and technical colleges received a boost in the educational telecommunication arena when the state legislature allocated $17.8 million for communications and computing equipment and related expenditures. Out of this money, $6.2 million was set aside for the acquisition and installation of campus networks. The remaining funds will be distributed through competitive grant awards to colleges.

WEST VIRGINIA

KEY PLANNERS
- Technology-Initiative Planning Team (TIPT)
- West Virginia State College and University Systems

RECENT DEVELOPMENTS

The state legislature continues to look for ways to offer additional services for educational telecommunications in West Virginia. Through Senate Bill 547, the legislature established a program which charged the state college university system to employ a vice chancellor for instructional technology, as well as develop a Technology-Initiative Planning Team with responsibilities including developing a statewide instructional technology plan.

The West Virginia Rural Development Council is presently implementing a statewide network for rural communities to assist sharing information about rural development efforts. The Council will focus on providing access to users in remote areas via the Internet.

CLIN originated in West Virginia's software valley group and received funding from the National Guard to link up several National Guard Headquarters around the state and provide them with on-line access.

Although satellite delivery is expected to continue as a dominant medium for distance education, planners expect the state university systems to focus on campus-wide projects including development of asynchronous materials for use within and outside the state.

STATEWIDE AND LOCAL PLANNING

The statewide instructional technology plan under Senate Bill 547 requires the state to enhance distance learning through TIPT. A report, Instructional Technology in West Virginia Higher Education, has been prepared and submitted to the legislature, pending approval, as recommendations by TIPT on broadening instructional technology in the state. Recommendations made in the report include: faculty development in the use of technology; a structure to provide resources to faculty for the production of multimediated instructional modules, courses, and programs; projects in 1996 for increasing student access to computers; a plan for long term computer implementation guidelines; the development of a full-service, broadband network that is supported through collaborative arrangements for usage and tariff rate structure; an organizational structure for instructional technology which provides the framework for consultation and collaboration with solid leadership and direction; and the establishment of a fiscal model that uses funds to provide for immediate needs of faculty develop-

ment and student access. Based on a total five-year projection, $10.8 million dollars was requested for the first year for infrastructure developments.

Highlights of the recommendations for implementation include establishing faculty development in the State Colleges and University System by July 1, 1996. By year 2001, each institution is expected to integrate technology-based instruction into 20 percent of its courses. A high-speed full-service broadband backbone network is required to connect West Virginia institutions of higher education. The network would include switch service, bandwidth on demand, integrated voice, video, data, and imaging capacities. TIPT has recommended open standards for hardware, and software to ensure connectivity of system and facilitate use of off-the-shelf technologies.

With the help of Bell Atlantic and IBM, the State Department of Education (DOE) has completed its initiative of putting at least one high school in the state on-line.

West Virginia is a participant of the Southern Region Education Board, a consortium of southern states. Planners from West Virginia are represented on a technology committee formed by the Board to identify collaboration possibilities for development of on-line courses which could be used mutually by member states.

STATEWIDE AND LOCAL NETWORKS
The state currently uses a fiber optic backbone through the local phone companies which could be used as the keystone for building educational networks. TIPT is focusing on leveraging the existing infrastructure by developing appropriate program recommendations.

Marshall University has undertaken an analysis of West Virginia Net, which is the computer network for higher education that accommodates public schools and several other institutions in the state. The analysis included a needs assessment of all higher education campuses to assist strategic planning.

Cluster video networks have been developed at Bluefield State College for its off campus sites. WV Graduate College will connect with Marshall University to provide access to remote sites. Marshall University is currently serving six sites through its video network.

HIGHER EDUCATION
Established in 1990, Project Breakthrough, a West Virginia University-based telecourse delivery and student support network oriented toward adults, has made a transition to a new project, Bridging the Gap, which provides higher education opportunities to communities with low rates of college matriculation among their high school students.
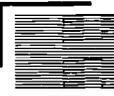
Bridging the Gap, which is in its third year, is directed by the Office of the Secretary of Education and the Arts in partnership with the State College and University Systems.

In a bid to develop faculty skills and an inventory of programs in the state, TIPT will offer faculty members an opportunity to develop instructional programs that may be shared by other sites. The team intends to utilize the $2 million allocated by the legislature for developing the instructional materials. An RFP has been issued with the intent to begin product development on July 1, 1996.

SATNET, the satellite telecommunications system developed by the State College and University systems of West Virginia delivers instruction that supplements on-and off-campus courses. The system currently has 26 higher education receive sites tied to the C-band uplink in Institute, West Virginia. One-way video/two-way audio telecourses are offered to sites throughout the state via SATNET. Approximately 2,500 students are enrolled each year during the academic year. SATNET is funded at $15,000 per course by the WV State Colleges and University System.

To serve the medical needs of rural West Virginia, the Robert C. Byrd Health Sciences Center at West Virginia University has established the Medical Doctor Television (MDTV) a terrestrial compressed video system from its medical school to remote sites in the state. Additionally, the Program to Education Nurses Via Satellite Links (PENSL), a model for offering nursing courses via SATNET, incorporates teaching by video with audio links and on-site faculty. The PENSL project has been a collaborative effort involving 16 public and private nursing education programs in West Virginia.

K-12

Approximately 10,000 students in West Virginia participate in a distance education initiative involving public education and the Educational Broadcasting Authority. Public broadcasters transmit a live and interactive sixth-level Spanish language course throughout the state bi-weekly at no charge to the user. About 1000 students in K-12 schools benefit from a variety of courses supplied by out-of-state suppliers such as TI-IN, SERC, and Oklahoma State University. The West Virginia legislature funds SERC and distance learning programming and equipment through a collaborative project between the West Virginia Department of Education and EBA.

For 25 years, West Virginia EBA has broadcast a full ITV service of 130 series to public and private schools. WVPB maintains a viewership of approximately 200,000 students. About 10,000 students in the state participate in a distance education initiative involving public education and the Educational Broadcasting Authority.

WISCONSIN

KEY PLANNERS
- Wisconsin Educational Communications Board (ECB)
- University of Wisconsin Extension
- Department of Public Instruction (DPI)
- Division of Technology Management
- Department of Administration (DOA)

RECENT DEVELOPMENTS

A number of initiatives are underway in Wisconsin to provide funding, not only for educational technology, but also for other civic organizations. The Department of Administration (DOA) is using its TIIAP grant to link state agencies. The grant focuses on links between state agencies and community networks as both information providers and users. The DOA has considered interface design techniques to assure widespread compatibility with infrastructure systems.

Through the TIIAP grant, the Division of Technology Management is collecting data and analyzing it to advise state agencies regarding information technology plans. A collection of very useful data will factor into the statewide network, BadgerNet.

Local planning efforts are underway, not only for educational communications technology, but also for community networks. Through the University of Wisconsin Extension, a project team has been working closely with local communities in education and telemedicine. The project has the goal of training and empowering community members with the tools and the knowledge that they need to develop community projects in their counties.

Through the Wisconsin Strategic Planning Process, state agencies are required to submit their individual technology plans to the DOA. The DOA then identifies common problems among agencies and puts together teams and tasks forces to address the problems.

The governor plans to launch a $10 million effort to connect all public universities with a computer system and to extend on-line classes to high schools by 1997. The system offers Advanced Placement mathematics and pre-engineering courses to high schools via the Internet as well as nursing courses to working adults.

STATEWIDE AND LOCAL NETWORKS

There are more than 60 distance learning operating sites in Wisconsin with switched, digital, fiber optic technology that provides full motion video and audio transmission. The sites, which include high schools, technical and community colleges, UW campuses, and CESA offices, form seven networks, spanning over 3,000 miles and are capable of reaching more than 12,000 high school students, in addition to the higher education communities.

ACCESS WISCONSIN, a cooperative effort through Wisconsin's local telephone companies, is designed to aid in providing a two-way interactive video service via a fiber optic cable line to rural Wisconsin schools for distance learning purposes. The project focuses on providing real time, two way, audio and video education between two or more schools. The service is used to provide supplementary material to teachers in rural school districts.

Wisconsin ECB licenses the 17 ITFS systems in the state on behalf of educational institutions. An ECB-developed user group operates the system in the community where they are located. ECB has entered a contract with a wireless system in Madison and signed a contract in Green Bay.

BadgerDial is a DOA-distributed system developed to provide a link between infrastructure, school districts, libraries, and governments with the Internet through a state level telephone dial up. This initiative is the major thrust of the TIIAP grant. The money will be used to upgrade the networks by increasing simultaneous log-ons in the four LATAs in the state, increase the speeds, put out a UseNet server, and provide a Worldwide Web server dedicated to K-12 users. Several of the state's educational groups using ITFS frequencies have put in applications for additional channels.

Embarrass River Valley Instructional Network Group (ERVING), is the first digital fiber full motion network in the state. The primary use of ERVING is to expand curriculum for high schools. In the evenings, the network is used for staff development and adult education. In 1992, over 2,000 high school students took advantage of the classes available through the network, which extends over 118 miles.

The Western Wisconsin Instructional Network Group, WestWING, is a switched, digital fiber optics network that provides full motion video and audio technology. WestWING is the first network in the state to use quad split technology which enables four sites to be viewed on one monitor. The network connects 13 sites over 868 miles. More than 4000 high school students have participated in classes over the network.

HIGHER EDUCATION
The University of Wisconsin System is continuing to use technology to deliver its message, information, and to reach clients. The Board of Regents has formed a study of the future for the 21st Century and one of the five task forces involved is distance education. In the last legislative session, $13 million was set aside for the construction of a distance education center on the University of Madison campus through the UW Extension.

Distance education is involved in the majority of the 23 higher education institution networks. The higher education sector is working on the final clarifications of a col-

laborative degree approach whereby a number of the institutions will agree to offer programs towards a specific degree. Having selected a home institution from which the student will eventually receive a degree, students will be able to take courses offered by faculty from the other institutions in the collaborative.

K-12

K-12 schools are moving to full motion video on the fiber optic network through a telephone cooperative. There are 12 schools involved in the analog network that is on a fiber based backbone.

The Department of Public Instruction (DPI) is committed to aiding the state's schools and libraries in accessing the Internet. Its primary goals include every K-12 school and library in the state will have full direct access to the Internet, and every resident in the state will have access to the Internet via a toll free telephone call by the year 2000.

FUNDING

Ameritech and GTE provide much of the funding for equipment and networks in the state. Other funding sources are obtained through a Master Lease Program, which is funded by the Land Trust Program. The program allows schools to borrow funds for technology at a rate of prime minus two percent interest. A $20-$30 million endowment by the Wisconsin Advisory Telecommunication Foundation is also available for infrastructure development. The endowment is gained in part from the state telephone companies due to the incentives regulation from Act 496. The state also contributed $500,000 to this fund.

The state is also a member of SERC and the fees are funded by ECB and DPI. Schools have benefited from Star Schools and NTIA grants through SERC.

K-12

Ten million was relocated from the DPI budget to a new board called the Educational Technology Board to be used specifically for K-12 information technology. Another $15 million will be set aside for loans to school districts. The Public Land Trust and the Educational Technology Board will work together in distributing this money.

The Public Land Trust is an organization of the state government that has a considerable amount of money as a result of land sales. It lends some of this money to K-12 districts, vocational schools, libraries, and municipal governments. Grant application's approved by the Educational Technology Board, enables the organization to receive a loan subsidized by them.

The Ameritech Super School Program granted funds to five high schools, each of which connected with a 'sister' school. For the next two years, Ameritech will provide a full
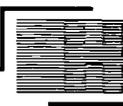
fiber optic distance learning network and studio equipment. Each school was also provided with an automatic library system which allows on-line card catalog access. Through the TIIAP grants, resources are also available through the Cooperative Educational Service Agencies, to train teachers on integrating Internet resources into the classroom.

WYOMING

KEY PLANNERS
- Postsecondary Education Planning and Coordinating Council
- University of Wyoming
- State Telecommunication Council
- Wyoming Community College System

RECENT DEVELOPMENTS

In late 1995, the Wyoming supreme court ruled that the present funding structure for education, including computers and technology, is unconstitutional. While funding is conducted by request, legislatures must develop a new funding structure by July 1997. The object of the impending funding structure is to assure complete and equal access to information for all school districts.

The Goals 2000 Technology and Education Panel is composed of 36 members from education, US WEST, TCI, mining, agriculture, and business. The panel's main objective is to establish and develop a state technology plan, look at how to fund it ,and determine how to distribute grant money allocated through Goals 2000. The panel, which met for the first time last September, has three subcommittees to address state planning, grants, and resources. The panel is distributing the first round of Goals 2000 money to districts for planning, partnerships, and integration of communities with schools.

Informal groups have formed and met over the last six months to discuss partnership arrangements, Internet access, radiology transmission, and continuing medical education via educational technology. Using statewide compressed video, Mountain Regional Services, Inc. (MRSI) successfully implemented a psychological counseling pilot program. The activity provides psychological services to Regional Service Providers in the rural parts of the state. Through the program, licensed psychologists distribute and receive information pertaining to advances in such topics as appropriate behavioral interventions, as well as suggesting ideas in dealing with problem behavior. The program, which is the first of its kind in the country, includes five pilot regions in Powell, Torrington, Casper, Thermopolis, and Rock Springs.

The Superintendent of Public Instruction of the Department of Education (DOE) requested, and the governor recommended, $10 million for technology and staff development for school districts. The request was not approved by the legislature, however, because school districts have yet to develop technology plans, a prerequisite to receiving funds.

STATEWIDE AND LOCAL PLANNING
The state provides agencies and higher educational facilities with Internet access through the state system. When practical, this service is extended to school districts.
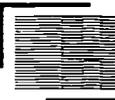
School districts and businesses must also look to private providers for Internet connection. Local school districts must provide funds for their Internet service. Funding for the state system is allocated from inter-agency funds, which are reimbursed by the legislature. Within the last year, Internet access, electronic submission and recovery for homework exchanges, test results, and questions and answers between students and instructors at compressed video sites have been established.

System traffic remains high on the state's compressed video system which is available to K-12 schools, higher education institutions, state agencies and legislative branches, federal government, and private industry. Over the last three years the state government estimated savings of $1.3 million from telecommunications. Currently, there are 31 video sites throughout the state.

Wyoming is a local control state. The DOE is looking at information access availability by using schools and assisting districts in planning efforts for the LANs and WANs. Districts in Green River and Gillette, have completed their own networks.

The DOE is in the midst of addressing access to the state and local networks. In assisting districts in planning, the DOE is facilitating the integration of educational and health telecommunications into community networks. School districts in Powell, Cody, Green River, Gillette, and Jackson are currently collaborating with business and industry.

While staff development remains a critical issue, the DOE's highest priority for action is the completion of a statewide technology plan. The DOE is using Goals 2000 funding for this endeavor. The State Board of Education and DOE are collaboratively working toward implementing the requirement of a district technology plan as part of school accreditation.

Over the next several years, the Goal of the State Telecommunications Division is to implement compressed video capability in all 23 counties with connections to all 49 school districts. The state would also like to aid local communities in developing infrastructure in education, health care, and economic development and public safety.

STATEWIDE AND LOCAL NETWORKS
The Wyoming Libraries Data-Based Network (WYLD), a T-1, 56 Kb network, connects community college libraries with public libraries on one operating system. During 1996, the primary initiative will be connecting K-12 schools to this system. In addition to public access terminals in libraries, the Wyoming Information and Library Link (WILL) provides dial-up access from home, business and schools to WYLD and Ferret, the state's information database. WILL operates on the state telecommunications net-

work and leases lines from USWEST. The state library provides staff training for the system. Funding for WYLD and WILL comes primarily from the state, but federal and local funds are also used.

The legislature recently provided $1.3 million to bring all county library headquarters and community college libraries online to the WYLD public access catalogue simultaneously. This is slated for completion by June 1996. The state library provides a gateway to the Colorado Alliance of Research Libraries (CARL), a network of interactive multi-state libraries . The next biennium, the state library is developing community network for, which would bring all community sites together onto freenets or community nets. LARIAT, one such network, is currently in use at the University of Wyoming.

Switchnet 56 is a relatively new state system which uses a shared network with a T-1 backbone for transfer of data, voice, and compressed video. The system has expanded from eight to 30 sites using interactive compressed video. Business and industry are allowed to use the compressed video if they are sponsored by a state or educational agency.

The 30-site state system has connected interactively to a satellite uplink-downlink at the National Guard site at Camp Guernsey. Through this interconnection, army interactive education may be distributed from its training center at Fort Sill, OK. Discussion is underway to originate army courses at Camp Guernsey as well. Also under discussion is the possibility of delivering army training from the University of Oklahoma throughout Wyoming. The discussions include providing higher education from the University of Oklahoma to enlisted army personnel via satellite, which would then connect to the Wyoming state system for distribution.

The state's public television station, KCWC-TV, which uses microwave transmission technology, is housed at Central Wyoming Community College. Each semester, KCWC-TV and its seven translators offer eight courses to approximately 200 students in the state. KCWC-TV has a satellite downlink to receive interactive programming from outside providers. During 1994-95, duplex microwave capability was added to the Cheyenne to Laramie segment.

Wyoming Public Television expanded its microwave system with the addition of a duplex video and audio from its studio in Riverton to the state capital. Within the next year, Wyoming Public Television will be adding high-speed data and multi-channel compressed video capability. The station also extended its coverage into western Wyoming through installation of a channel 54 transmitter in Evanston.

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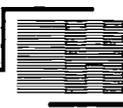
The Wyoming Public Television network broadcasts 14 for-credit classes and, in 1997, will offer a full associate's degree program in conjunction with the state's community college system. In cooperation with the Northern Wyoming Community College District (NWCCD), the network provides tower space for a tri-county distance education network that will be compatible with the state's compressed video network. The network will transmit data, voice, and video among individuals and groups in Sheridan, Johnson, and Campbell Counties. NWCCD is proposing a microwave and ITFS network to connect its outreach center and schools in the Gillette and Sheridan areas. Northwest Community College in Powell is considering a fiber optic network that will connect K-12 schools with NWCC.

Through the use of an inverse multiplexer (IMUX), the state can connect dial-up video to the dedicated state system. Three school districts in the state are using compressed video which can be connected on a dial-up or dedicated basis. Universities such as Regis University in Colorado will also use the state's compressed video system to deliver courses to Laramie County Community College in Cheyenne.

While ATM is not yet available in Wyoming, ISDN is used in Cheyenne and Casper and will soon be available in Laramie. The state is also expected to assess frame relay as an alternative delivery system for digital signals.

Although US WEST has been the primary provider for networks which are leased by state, the legislature is encouraging competition among providers. Telephone companies cooperate with the state, but do not provide funding.

Other Wyoming data networks include: WYNET, which is operated by the DOE; and WCTLN, a compressed video network sponsored by the public schools, the Wyoming School-University Partnership (WSUP), and the College of Education at the University of Wyoming.

HIGHER EDUCATION
The Community College Commission coordinates activities, establishes a funding structure for community colleges, and bases funding on the amount of building space. The Commission is made up of seven members appointed by the governor, and its own computer network which links all community colleges. The Commission is responsible for approving curriculum changes, new programs, and setting operating standards such as equity among colleges for what constitutes a credit.

All seven community colleges are moving forward on a local basis in outreach efforts to public schools in their area. Regional groups have formed to address these opera-

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tions. Western Wyoming Community College is leading the way by forming technology committees and partnerships with school districts.

K-12

The Wyoming University-School Partnership (WSUP), which is supported by a US WEST grant, is the result of a joint initiative between the University of Wyoming, the state government, community colleges, K-12 schools, and private enterprise. The University of Wyoming's College of Education is integrating videoconferencing, the use of the World Wide Web, multimedia, and other technologies in its curriculum for preservice and practicing teachers. The updated curriculum is the result of recommendations from the WSUP Technology Task Force.

Eleven of the 30 public school sites using compressed video have recently purchased equipment allowing them to access the state network. To supplement the state's dedicated 384 Kbps network, the sites now utilize the public dial-up network in a dual switched 56 Kbps configuration deployed by US WEST for videoconferencing. The dial-up video service, which is significantly less expensive to use than the frequently busy dedicated network, will take on at least four additional sites in the spring of 1996.

Internet use varies with district and schools in the state. Access may be achieved through either dial-up or direct T-1 connection to the state network or through Internet providers.

FUNDING

Many districts are reallocating their resources to help fund telecommunications. The DOE has released Goals 2000 money to fund technology planning and implementation in districts. In July of 1996, the DOE will release an additional $1 million from Goals 2000 to implement technology plans.

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➤ Glossary of Interstate Educational Telecommunications Providers and Technological Terms

HEZEL ASSOCIATES

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GLOSSARY OF INTERSTATE EDUCATIONAL TELECOMMUNICATIONS PROVIDERS

The focus of Educational Telecommunications: The State-by State Analysis 1994, as its name implies, is on statewide telecommunications activities. In addition to projects within states, multi-state and national telecommunications activities have been organized during the past several years. The following is an abbreviated list of the regional initiatives, organizations, and major partnerships which have emerged involving educational telecommunications.

AG*SAT
AGRICULTURE SATELLITE CORPORATION

AG*SAT is a non-profit consortium of 42 land grant university affiliates and two government agencies. Credit and non-credit courses as well as agricultural and agribusiness research information are delivered via satellite to sites in 40 states. AG* SAT is funded in part by the Department of Agriculture and is based in Lincoln, Nebraska.

ANNENBERG/CPB PROJECT

Established in 1981 with funds from Walter Annenberg, the Project has been based at the Corporation for Public Broadcasting (CPB). Originally designed to assist in the improvement of and access to higher education, Annenberg/CPB funded numerous high quality video telecourses as well as new technology projects and the New Pathways to a Degree Initiative. Now known as the Annenberg/CPB Math and Science Project, the Project has adopted the goal of implementing widespread reform of math and science education through technology.

ASTS
ARTS AND SCIENCE TELECONFERENCING SERVICE

Oklahoma State University received Star Schools funding in 1988 and created the Arts and Science Teleconferencing Service (ASTS), a non-profit corporation, to oversee K-12 programming. ASTS is a partnership of rural school administrators, the Oklahoma Department of Education, and the College of Arts and Sciences at Oklahoma State University. The service provides live secondary school programming via satellite in math, science, and language to approximately 425 schools and its ad hoc programming reaches more than 900 institutions.

BCSN
BLACK COLLEGE SATELLITE NETWORK

BCSN, headquartered in Washington, D.C., is overseen by the Central Education Telecommunications Consortium and includes sixty-five school districts. The districts participate with historically black colleges and universities to receive programming. BCSN was one of the projects funded in the second cycle of the Star Schools Program.

CABLE IN THE CLASSROOM

Cable in the Classroom is a non-profit service of the cable industry that provides free installation and basic service to all public junior and senior high schools passed by cable. In addition to free non-commercial programming, schools receive support materials and copyright clearances through Cable in the Classroom participation.

CHANNEL ONE

Channel One, from Whittle Communications, is a satellite delivered, 12-minute daily news and information program that reaches almost 12,000 secondary schools across the country. Participating schools receive a fixed Ku-band downlink, two VCR's, a 19" color television set for each classroom, and internal wiring, installation, and maintenance for equipment. Although schools in states hard hit by the recession have welcomed the free equipment, many educators, administrators, and parents have protested the two minutes of commercials contained in each daily broadcast.

FARVIEW

Based at Pacific Mountain Network (PMN) in Denver, FarView received Star Schools funds to assist in the dissemination of information about distance education. FarView also coordinates activities with TEAMS.

IDEANET

A consortium of of educational institutions specializing in distance elarning, IDEAnet offers a variety of K-12 programming via satellite, cable or fiber.

LEARNING LINK

A national non-profit consortium of 22 agencies, Learning Link is managed by the Central Educational Network. Learning Link is an online system permitting access to databases, bulletin boards, and e-mail services for K-12 educators and students. The 22 local sites are responsible for customizing the services to meet the needs of local users.

MCET
MASSACHUSETTS CORPORATION FOR EDUCATIONAL TELECOMMUNICATIONS

MCET is an independent public corporation established by statute in 1982 and funded by the state legislature. MCET produces and distributes K-12 instructional programs through the Mass Learnpike, its satellite network, and the Mass LearnNet, its computer network. MCET has been the recipient of two Star Schools awards, one for science education in New England in 1990, and the other for community organizations in Boston, Hartford, and New York in 1992.

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MEU
MIND EXTENSION UNIVERSITY: THE EDUCATION NETWORK
ME/U delivers educational programming with the cooperation of cable television systems throughout the U.S. ME/U offers for-credit undergraduate and graduate courses from major universities, including two complete degree programs.

NASA
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
NASA developed an education program to build technological competence and leadership begining in the elementary and high-school education. NASA delivers a variety of science, math and technology related programs via satellite.

NII
NATIONAL INFORMATION INFRASTRUCTURE
Stimulated by Vice President Gore, the NII, as it is planned, will merge the nation's existing networks and communications devices into one interconnected high-speed, broadband, interactive telecommunications and information "Superhighway." This initiative will provide Americans with quick and easy access to information.

NDLC
NATIONAL DISTANCE LEARNING CENTER
NDLC serves as a centralized electronic information source for distance learning materials. Materials include detailed listings of teleconferences as well as K-12, Higher Education and Continuing Education Courses.

NETC
NORTHWEST EDUCATIONAL TELECOMMUNICATIONS CONSORTIUM
NETC is funded by a Northwest Regional lab grant in order to develop a regional technical assistance center for technology between states.

NTIA
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
As part of the US Department of Commerce, NTIA acts as the President's principal advisor on telecommunication policies effecting the nation's economic and technological progress and industry regulation. With the Executive Branch, NTIA works toward the effective presentation of policy to the FCC, Congress and the public. NTIA maintain two funding programs Public Television Facilities Program (PTFP) and the Telecommunications Information Infrastructure Assistance Program (TIIAP).

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NTU
NATIONAL TECHNOLOGICAL UNIVERSITY
NTU is a non-profit institution founded in 1984 and based in Fort Collins, CO. NTU includes 45 participating universities across the U.S. Eleven master of science degree programs m engineering and technology related areas are delivered via satellite each year. NTU students are typically full-time employees of corporations or government agencies. More than 100,000 students at 430 university, corporate, and government receive sites participate in credit and non-credit courses.

PBS
PUBLIC BROADCAST SERVICE
The Public Broadcast Service PBS), which operates the nation's public television network, funds and distributes instructional programs for adult learners and elementary and secondary students. Through its Adult Learning Service (ALS) and Adult Learning Satellite Service (ALSS), PBS offers telecourses to more than 1,800 colleges and universities through the cooperation of local public television stations. The PBS Elementary/Secondary Service (ESS)) distributes instructional and professional development programs to K-12 schools throughout the country. In addition to its programming activities, PBS is exploring the expanded use of technology in its services through the recent Telstar 401 and Project VSAT initiatives.

PACIFIC NORTHWEST STAR SCHOOLS PARTNERSHIP
Centered at ESD 101 in Spokane, WA, the Partnership has been funded by the Star Schools program to deliver K-12 courses via satellite to five states in the northwest.

SERC
SATELLITE EDUCATIONAL RESOURCES CONSORTIUM
Located in Columbia, SC, SERC is one of the original four Star Schools recipients. The consortium involves state Public Broadcast System entities and state Departments of Education in 25 participating states. SERC offers satellite-delivered, interactive instruction and programming to schools in its partner and affiliate states. Additional Star Schools funding was provided to SERC in 1992 for further development of instructional and professional programming.

SREB
SOUTHERN REGIONAL EDUCATION BOARD CONSORTIUM
A consortium of southeastern states formed to collaborate on education issues, SREB has established an educational technology initiative to assist in cooperative interstate development of projects.

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STEP

SATELLITE TELECOMMUNICATIONS EDUCATIONAL PROGRAMMING

STEP is a system developed by Educational Service District (ESD)) 101 in Spokane, Washington, to deliver live, interactive instruction via satellite. STEP now concentrates on delivering instruction to its partners in the Star Schools supported, five-state Pacific Northwest Partnership. The Partnership has been the recipient of two Star Schools awards in 1990 and 1992.

STAR SCHOOLS

The Star Schools Program was authorized in 1988 by the Stafford-Hawkins Act. The Department of Education oversees the program, which has awarded $62 million to eight multi-state partnerships in its three cycles of awards. In addition to the partnerships, the 1992 cycle of Star Schools funding included dissemination grants and support for Iowa's statewide telecommunications network. Partnerships which have been funded are: (1988) Midlands Consortium, Satellite Educational Resources Consortium (SERC), Technical Education Research Centers (TERC), TI-IN; (1990) Black College Satellite Network (BCSN), Oklahoma State University (OSU)/Arts and Science Teleconferencing Service (ASTS), Satellite Telecommunications Educational Programming (STEP), Telecommunications Education for Advances in Mathematics and Science (TEAMS); and (1992) Great Lakes St. Lawrence Seaway Telecommunications Collaborative.

TERC

**TECHNICAL EDUCATION RESEARCH CENTERS**

TERC, based in Cambridge, MA, is a first cycle Star Schools recipient which focused on developing hands-on science programs for secondary school students.

TEAMS

TELECOMMUNICATIONS EDUCATION FOR ADVANCES IN MATHEMATICS AND SCIENCE

TEAMS, originating from the Los Angeles County Office of Education, is a unique Star Schools recipient in that it focuses on providing math and science programming for elementary school students. Students in grades 4-6 nationwide, and their teachers, receive TEAMS programming via satellite.

TI-IN

A first cycle Star Schools recipient based in San Antonio, Texas, TI-IN offers high school instruction in science, math, foreign language, and social sciences. TI-IN distributes its courses and other programming via satellite and also through cable television distribution with Mind Extension University.

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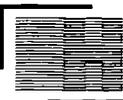
USDLA
UNITED STATES DISTANCE LEARNING ASSOCIATION
The USDLA promotes the development and application of distance learning through electronically mediated instruction including satellite, video, audiographic computer and multimedia technologies. USDLA focuses on K-12 education, higher education, continuing education and corporate training.

WESTERN COOPERATIVE FOR EDUCATIONAL TELECOMMUNICATIONS
Established in 1989 under the aegis of the Western Interstate Commission for Higher Education (WICHE), the Western Coop includes more than 145 universities, colleges, schools, and public agencies from 19 states, and private corporations from throughout the nation. The coop's missions include making information, resources, and expertise in telecommunications more readily available to its members. It is based in Boulder, Colorado.

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ATM (ASYNCHRONOUS TRANSFER MODE):

High-speed packet switching technique suitable for transmitting voice, data, and video over a digital line. It uses cell relay transmission.

COMPRESSED VIDEO:

Digital signals can be compressed by various methods to save bandwidth. Only the changes in the moving frames are captured and transmitted.

COMPRESSION TECHNOLOGY:

A technique that allows transport of multiple video signals within a 6 Mhz (or equivalent) bandwidth.

DATA SERVICE UNIT (DSU):

Simplified modem for the transmission of digital data over a private line, or for limited distance communications over the public switched telephone network (PSTN) where it is not necessary to comply with all the requirements for a high speed modem.

DATA RATE:

The speed at which a channel carries data, measured in bits per second (bps).

DIGITAL:

Information expressed in binary code; digital transmissions are by discrete signals (bits) rather than continuously variable analog waves. Digital processing and transmission allows for very high speed data communications, voice processing and compressed video.

DS1:

Digital signal level 1, a digital transmission format in which 24 voice channels are multiplexed into one 1.544 Mbps channel.

DS3:

Digital signal level 3; telephony term describing the 44 Mbps digital signal carried on a T3 facility.

FIBER OPTIC:

Thin glass through which light beams are transmitted.

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INTEGRATED SERVICES DIGITAL NETWORK (ISDN):
A fully digital communications facility designed to provide transparent end-to-end transmission of voice, data, video, and still image across the PSTN (Public Switched Telephone Network). Standards for this service are set by the CCITT. Access to the service is at one of two rates: The Basic Rate of 144 Kbps is provided as two B data channels of 64 Kbps and one D control channel of 16 Kbps; the second Primary Rate is SD1 or 2,048 Mbps in Europe and 1.544 Mbps in the U.S., Japan, and Canada, and is often referred to as 30B+D.

LATA:
Local Access Transport Area. The geographic area in which a local exchange carrier offer long-distance services.

LOCAL AREA NETWORK (LAN):
A system for linking terminals, programs, storage, and graphic devices at multiple workstation over relatively small geographic areas.

SNA:
Systems Network Architecture. A hierarchical, single-host network structure to support a cooperative-processing environment, whereby remote terminals link up with mainframes as well as each other in a peer-to-peer relationship [termed Low Entry Networking (LEN) by IBM].

SONET:
Synchronized Optical NETwork. A high-speed fiber optic transport network with transmission rates ranging from 51.84Mbps to 2.5Gbps.

T1:
Digital carrier facility used to transmit a DS1 formatted digital signal at 1.544Mbps; the equivalent of 24 voice channels. The European equivalent transmits at 2.048Mbps.

T3:
A 44.736 megabit T-carrier channel that can handle 672 voice or data channels at 64K bits/sec T3 requires fiber optic cable.

TRANSPONDER:
The designation that the carrier gives to the isolated frequency on a satellite. Most satellites have 24 transponders or channels.

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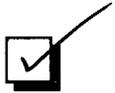
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