

**VERMONT BUSINESS**  
R O U N D T A B L E

**VERMONT'S PLACE IN THE TELECOMMUNICATIONS AGE**

**An Interim Report by the Vermont Business Roundtable  
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## EXECUTIVE SUMMARY

### *The Need for Action*

The advancement of telecommunications in Vermont is as critical to the state's development today as the Interstate and state highway system was to our well-being in earlier decades. Just as road improvements contributed to economic and social progress in the past, continued improvements in today's "information superhighway" are essential for continued growth in a broad spectrum of areas including:

- Consumer/Personal Services: Telecommunications makes a wide range of services in areas such as banking, entertainment, education, shopping, and telecommuting that were technically impossible, into practical realities for every Vermonter at home and at work.
- Business: Telecommunications is essential to the future of Vermont's economy. It can help balance our need for economic growth with our reverence for the environment, and can particularly enhance the competitive posture of our many small businesses.
- Health and Medical Care: Telecommunications tools can enhance the efficiency of our health care system by reducing duplicative investments in medical technology, and at the same time assure state-of-the-art care, even in rural areas.
- Public Safety: Telecommunications has broad implications for public safety, and the systems that currently support our activities and organizations in this area are in critical need of modernization.
- Education: Telecommunications can provide tools for transforming schools and can improve access, particularly for small schools and rural residents, to classes, courses, training programs, and library information resources; and at the same time can lower costs by reducing duplication of resources.
- Government: Telecommunications has the potential to dramatically increase the effectiveness of government services and benefits to the citizens of Vermont while providing access to government information.
- Non-profit and Public Sector Organizations: Telecommunications can provide efficiencies in management as well as providing the opportunity to deliver more efficient services to more people.

Because communications technology is advancing at a break-neck pace, our political leaders must have the knowledge and wisdom to create sound, coherent telecommunications policy in several key areas:

- Since Vermont will be dependent on competing providers to invest in the telecommunications infrastructure, how can we create a climate that will stimulate

investment, allow a reasonable return on that investment, and also meet the needs of the network's diverse users?

- How can policy reflect the new competitive dynamics that will arise as the telecommunications industry brings competition to new marketplaces within the state?
- How can we promote equal access to the network for citizens and organizations?
- How do we ensure their constitutional right to privacy and intellectual property rights?

### *Action Steps*

Vermont must design and pursue a telecommunications policy for its citizens that articulates the social and economic goals it wishes to achieve. The state can best accomplish its telecommunications objectives through a cooperative effort which includes the governor's executive leadership, legislative initiatives, and improved marketing by providers:

- The governor can provide a focus on principles and initiatives being formulated by the Governor's Telecommunications Technology Council and foster cooperation and planning by the Department of Public Service (DPS) as expressed in its ten-year plan.
- Legislators can improve their own understanding of telecommunications issues and applications by increased dialogue with their Joint Information Technology Oversight Committee and other key committees; the committees in turn, must do more to understand the applications needs of Vermonters.
- Marketing efforts by the state can target telecommunications-intensive "anchor tenants," such as financial, insurance, and information service companies, that will increase and enhance network usage and consequent investment.
- Providers of telecommunications can publicize the various private/public partnership applications experiments now going on, as well as educate the public about the benefits telecommunications provides to business efficiency and job creation.
- Regulatory entities can support universal services and the establishment of a climate and framework that allows an open market that will benefit all Vermonters.
- Individual citizens as well as institutions, businesses, and media can become informed and active advocates for the various applications opportunities which will enhance the quality of their lives in their homes, their workplaces, and their communities.

Policy makers can support universal service and work to create a business climate that will attract capital investment from competent providers who will build the infrastructure.

## INTRODUCTION

Vermont is at a critical stage. Just as the development of the state and interstate highway system in earlier decades was necessary for the economic and social well-being of Vermonters, telecommunications is now critical to our continued ability to grow and prosper, both socially and economically, in a rapidly changing world.

It is stating the obvious to say that communications technology is advancing at a break-neck pace. Products and services that were considered break-through only a few short years ago, now are obsolete. Consequently, state policy and regulation of the telecommunications industry cannot be based on past or even current dynamics. They must be built on a sound understanding of -- and planning for -- new applications in communications.

They also must reflect the reality that telecommunications will touch all areas of our lives. Without both sound policy and strong infrastructure, we will be unable to thrive in the increasingly competitive markets that our businesses face, and which are critical to our economic well-being. Telecommunications also will have a major strategic impact on education in Vermont; on health care; on the cost and efficiency of government and access to government services and information by our residents; on our cultural institutions; on economic development; on public safety and consumer services such as phone, fax, and data networks; and eventually, on demand delivery of in-home services such as entertainment, games, educational courses, telecommuting opportunities, and shopping and banking services.

It is crucial for Vermont to establish a vision that not only articulates the benefits of a well-developed and maintained telecommunications infrastructure, but also guides our political leaders in the creation of sound, coherent telecommunications policy in several key areas:

Infrastructure Investment: Who will spend the approximately \$100 million that is currently being spent per year to maintain and enhance the telecommunications network for Vermonters? Since this amounts to one-seventh of Vermont's entire annual state government budget -- and twice its total capital budget -- it is unreasonable to think that the state can carry the financial burden. Business and industry will expect a reasonable return on their investments in telecommunications, so how do we create a climate that stimulates private infrastructure investment and at the same time protects the interests of the network's diverse users? How can we strike the delicate balance that will be needed between micro-management of providers and *laissez faire* telecommunications?

Growing Competition: Competition is coming to many telecommunications markets where little currently exists. Policy must reflect this new competitive dynamic.

Equal Access & Opportunity: There must be equal access and opportunity within our telecommunications system for people and businesses, regardless of income or size.

Privacy: We must protect the constitutional right to privacy of the citizens, businesses and institutions served by the network and recognize the need to respect the intellectual property rights of content providers.

## A VISION FOR VERMONT

The new world of telecommunications has already arrived in Vermont. It is today's world. Thousands of Vermonters are currently using the telecommunications network for advanced applications, and many, many more will be using it in the near future. Vermont must nurture a market and business climate that will attract providers who are willing to maintain and enhance the network to meet the current and future needs of its people, institutions and businesses.

Telecommunications will help Vermont balance its critical need for economic growth with its unyielding reverence for its environment and lifestyle. State of the art communications technology will allow Vermont to compete internationally in business, education, health care, and in government services and information. A public network, whether wired or wireless, is not an intrusive element in the environment. It transports revenue and money at the speed of light to and from information resources and financial centers around the world. Information service businesses often require less space, rarely have toxic effluent, frequently offer improved compensation and benefits and are not constrained by their Vermont location except by limitations in communication (and sometimes transportation) technologies. They also lend themselves nicely to telecommuting applications, reducing the number of cars on our roads.

Telecommunications will enhance the growth and competitive posture of Vermont's small businesses. Ninety six percent of businesses fall under the federal classification of small business, and Vermont has the largest percentage of individual entrepreneurs of any state in the country. A sophisticated telecommunications link enhances the incubation of these small businesses by allowing them access to broader markets and more sophisticated business, data, and revenue transmission services. It levels the playing field between small business and their larger competitors around the country.

Telecommunications will help Vermont meet the health care needs of its citizens with quality and cost efficient care. Our communications network will provide a vital link between major medical centers and the small general practice clinics located in our communities. These primary care facilities will have remote diagnostics, high definition medical imaging, and rapid transfer of digitized medical records to and from the specialized institutions without their immense overheads.

Telecommunications will assist Vermont in offering enhanced educational opportunities to people of all ages, regardless of where they live or the size of their communities' tax bases. A comprehensive statewide distance learning network will be accessible to everyone, either in an educational institution or at home.

Telecommunications will help us build a safer, more responsive society. A state-of-the-art public safety communications system will link the public safety, judiciary, corrections, Department of Motor Vehicles, emergency services, and other appropriate state agencies.

Telecommunications will assure that state government functions as a service organization for its people, institutions, and businesses -- responsive to the requests and concerns of its

citizens. Vermont agencies could become more efficient in processing all forms of licensing, requests for information, and agency services; more cost effective in administration of tax policy; and more marketwise in the provision of travel and tourism information.

Telecommunications will enhance the capacity of non-profits to effect efficiencies in management. At the same time, a comprehensive information system will provide broad access to information and services to all citizens regardless of location or economic status.



## **ACTION STEPS**

Vermont must design and pursue a telecommunications policy for its citizens that articulates the social and economic goals it wishes to achieve. The governor must understand and champion the policy. The legislature must advance those goals through prudent legislation. The regulatory sector must help execute and enforce the policy and oversee the complex relationships that will be necessary between the competing providers who will build and enhance the network and the public and private sectors whose use of the network will help achieve the goals articulated by the legislature and the governor.

### ***Executive Responsibilities (Governor and Agency Heads)***

- Focus the discussion on the relationship between job creation and advanced telecommunications infrastructure.
- Evaluate and implement the policy recommendations of the governor's Telecommunications Technology Council when formulated and incorporate them into the ten-year plan.
- Encourage the Department of Public Service (DPS) to actively expand its outreach to and dialogue with all the telecommunications applications users for comprehensive input to the ten-year plan.
- Require the ten-year plan to quantify the financial investment required to assure the outcome of the goals. Re-enforce to the DPS and the Public Service Board (PSB) that Vermont is going to need continued infrastructure investment and expertise to stay ahead of the telecommunications curve. Investment capital is subject to strong competition from adjacent states and foreign markets. Vermont must compete for that investment by sustaining an environment in which the investors have an opportunity to obtain a reasonable return on their investments.
- Take into account "user and application diversity" (consumer, business, and institutional) in executive appointments to the PSB.
- Encourage DPS to remove itself from the detail of the documents, refocusing on a policy making role.
- Assure accountability by the DPS for the planned outcomes of the ten-year plan and ask it to develop a system for measuring the actual against projected outcomes.
- Charge the DPS with a reexamination of its mission statement to reflect commitments to:
  - (1) An open market policy and competition.
  - (2) A recognition that the state will need to move toward a less regulated environment and that federal and state regulatory purviews are shifting.
  - (3) Creating a regulatory environment that stimulates rather than dissuades

capital investment in the telecommunications infrastructure.

(4) Redefining its role in planning for and protecting the near and long-term needs of all Vermonters, rather than attempting to manage the various competing providers and markets.

(5) Streamline regulatory and approval processes to reflect the dynamics of the market today.

Encourage the PSB to streamline its adjudication process in cases involving telecommunications infrastructure proposals.

***Legislator Responsibilities (Vermont Senate and House Members)***

- Understand telecommunications issues by (1) enhancing the dialogue with its Joint Information Technology Oversight Committee and with key committees in each chamber and (2) holding a "user's night" or similar event to showcase various telecommunications applications from around the state.
- Meet with applications leaders and developers and discuss their needs.
- Encourage legislative leaders to understand the relationship between job creation and communications infrastructure.
- Review all telecommunications related legislation from a strategic perspective prior to taking action on individual bills.

***Social and Economic Development Responsibilities (the state as a telecommunications customer)***

- Better exploit and showcase state government's role as the largest telecommunications user in Vermont, and offer better, more efficient services to citizens by using telecommunications applications. This is an opportunity for the state to be a role model for the effective and innovative use of telecommunications.
- Define and plan for the attraction of telecommunications intensive "anchor tenants" (financial, insurance, and information service companies, fulfillment and call centers) that will increase and enhance network usage and consequent investment.

***Regulatory Responsibilities (Public Service Board and Department of Public Service)***

- Support universal service, recognizing its evolving definition.
- Commit to the establishment of a climate and framework that allows an open market that will benefit all Vermonters, whether they live in our state's rural or more urban areas.
- Commit to implementation of and accountability for the ten-year plan, while recognizing the need to revisit and update it on a regular basis.

- Support a business climate that will attract the capital investment from competent providers to support the development of this telecommunications infrastructure.

### ***Provider Responsibilities***

- Improve efforts to educate consumers and businesses on the social and economic benefits of an advanced infrastructure.
- Improve publicity for the various private/public partnership applications experiments now going on in medicine, education, and other sectors.
- Emphasize and support continued efforts to educate the private and public sectors about the capabilities of the existing network.
- Publicly feature telecommunications applications benefits for business efficiency and job creation.

### ***Vermonters' Responsibilities (individual citizens, institutions, businesses, and media)***

- Engage in direct and frank discussion with legislators personally and in hearings about their specific applications and needs for telecommunications.
- Develop telecommunications planning groups in communities, institutions, and workplaces with an eye on future needs.
- Question campaigning politicians on their policies and plans for telecommunications in Vermont.
- Since telecommunications networks are indifferent to their content, meet with other applications users to see how communities of interest can work together to achieve economies and new applications that meet both their needs, i.e., schools and local businesses, local social service agencies, and hospitals.

## APPLICATIONS

### Consumer/Personal Services

From voice to data communications, the existing network of copper telephone lines provides today's consumers with access to a growing array of services (as detailed below). Currently this \$90 billion national market is being shaken up as potential competitors to the existing local exchange carriers seek authority to enter what was once a monopoly market. In those states that have authorized local competition including Vermont (Illinois, Maryland, Massachusetts, New York, Michigan, and Washington) cable companies have been experimenting with providing consumers local telephone service. In addition to the cable alternative, it is also anticipated that consumers will have a wireless choice that could provide their local telephone service. Some of the services that consumers will be taking advantage of include:

■ On-line services: As millions of Americans have purchased computers in the last decade, the business of providing on-line information for these computer users has soared. Today, Vermonters with a telephone line, a computer, and a modem can choose from a variety of on-line services including:

(1) Internet access -- allowing users access to the global Internet from which users can communicate electronically (e-mail) with other users; access to global databases at libraries, universities, and government facilities worldwide using the World Wide Web; or research products and services offered by participating companies.

(2) Electronic publishing -- provides users with the ability to read periodicals that are downloaded to their computer, i.e., *Business Week* is electronically available on America Online.

(3) Home shopping services -- Whether through the Internet or directly to a department store electronic catalog service, users can browse these virtual malls, shopping for products and services and purchasing them on-line.

■ Home banking and financial services: These services have been discussed for many years but have not been widely introduced. Recently, however, several brokerage firms have begun offering user-friendly software packages that give users the ability to electronically transact business with that firm, including trading, and receiving financial information. In addition, some major banks now allow users with home computers to transact numerous banking activities on-line. In the future, users without a computer will be able to transact the same banking functions through the use of a telephone that incorporates a small data screen.

■ Remote monitoring: By linking various household appliances and household systems (i.e., HVAC, alarm systems) users could manage their houses remotely. With a simple telephone call to their home computer, a user could turn up the heat for their return home (providing energy management), set their VCR to record a show, or pre-

heat the oven. In addition, if a major appliance was experiencing a problem it could automatically call the contracted service center to report the difficulty.

- Remote medical monitoring: Consumers with medical conditions that require hospital monitoring can be released to their homes and monitored remotely for changes in their conditions. With a wireless monitoring device, consumers who are mobile might someday journey from their homes while continuing to be monitored by medical personnel.

- Consumer vehicle management: Linking a vehicle's electronics with a telephone will someday take the guesswork out of maintenance and may even save lives. Integrating a vehicle's computer with a telephone allows the vehicle's subsystems (i.e., brakes, etc.) to call out to a repair facility when the subsystem needs repair. Adding sensors to air bags or other safety equipment and linking these to the telephone would allow the vehicle to call emergency personnel in an accident situation (i.e., when the air bag deployed).

- Entertainment services: Viewed by many as a potentially multi-billion dollar market, entertainment services are a major reason companies are rebuilding their networks. By increasing the capacity of their networks, companies will be able to offer movies on demand, a more sophisticated approach to home shopping, video games that can be played against someone across the country, all while continuing to provide basic voice communication into the same household.

- Telecommuting: Through the use of home computers linked to company work sites, consumers who are telecommuting can work from home or remote offices and interact with their headquarters via telecommunications.

The above list changes regularly as advances in technology make services that were once uneconomic or technically impossible into economic realities. The only constant in today's world of telecommunications is change, and through the next decade consumers should benefit in significant ways from this change.

## Business

A key to growth and prosperity in the late 1990s and beyond is "high speed, high capacity, user definable" access to worldwide communications, information resources, and the global marketplace.

A business located in a rural town in a technologically advanced state, hypothetically, will have the same high level of communications access that a business enjoys in the metropolitan areas of that state, at comparable rates. This is possible in a state whose policy has fostered an investment in a communications infrastructure that provides access, at the local level, to a high speed/high capacity network that covers the entire state, regardless of population centers.

While a business located in rural Vermont currently may have access to telecommunications services that are comparable to those available in Chittenden County, the cost of those services and access may be considerably higher or prohibitive. A policy fostering an investment in a communications infrastructure such as the one described above would "level the playing field" by providing a ubiquitous level of affordable services throughout Vermont.

Vital to the success of any business in today's global marketplace is the ability to access, process, and transfer volumes of information very quickly. High speed/high capacity access is the underlying requirement of all of the following business applications:

### *Basic Business Necessities*

- Electronic fund transfers (electronic banking): When allied with other information processing technologies and techniques, electronic banking gives every business and region access to financial markets and institutions worldwide. Ninety percent of all monetary transactions globally are digital and occur on the telecommunications network.
- Electronic data interchange (vendor data links): These links, which tie suppliers together more tightly with customers, are at the heart of "just in time" manufacturing or restocking systems.
- CAD/CAM/CIM: Computer Aided Design, Computer Aided Manufacturing and Computer Integrated Manufacturing systems and software, the heart of modern product design, development and manufacturing processes, are linked globally or locally, via digital telecommunications.
- Systems maintenance: Sophisticated computer systems, electronic machinery, manufacturing equipment, Local Area Networks (LANs), etc., can be automatically diagnosed and repaired by skilled technicians using data connections without a site visit.

## *Marketing and Sales*

- Inbound/outbound telemarketing: Vermont is a national leader in telemarketing initiatives. Enhanced telecommunications access can have a significant positive impact on the sale of Vermont products, as well as foster the growth of the telemarketing industry in the state.

- Customer leads and orders: The use of the Internet and the World Wide Web as a source of customer contacts is increasing dramatically. These same services will become a major source of direct customer purchases. This new market will develop and evolve quickly making late entry a competitive disadvantage.

## *Travel and Time Savers ,*

- Teleconferencing: Conducting meetings electronically saves time and money, and permits more flexible and efficient use of people and resources.

- Telecommuting: A growing phenomenon in Vermont, as elsewhere, telecommuting permits people to perform jobs from their homes which may be very remote from their "offices". It is made possible by the integration of several communication and computer technologies.

- Corporate training: Telecommunications is becoming a widely used vehicle for the delivery of interactive distance learning. There is enormous potential for corporate training from remote locations.

## Health and Medical Care

Early one morning, in a remote area of northeastern Vermont, an alarmed farmer calls the local medical emergency unit to report that his wife is suffering severe chest pains. An Emergency Medical Technician (EMT) team responds, and as the technicians begin to stabilize the patient they pen critical diagnostic data into a hand-held wireless computer, which transmits it to a cardiologist standing by at the hospital. The EMTs administer additional care as directed by the cardiologist. Upon arrival at the hospital, the patient receives further emergency treatment and is placed in the Cardiac Intensive Care Unit.

The following morning, the local cardiologist transmits a complete medical record, including scanned images of X-rays, EKGs, sonograms, etc., to a team of cardiologists at the nearest teaching hospital. A teleconference is arranged, and the two-hospital team -- together reviewing an electronic copy of the patient's complete history -- decides how best to proceed.

The patient is transferred, further diagnostics are done and an angioplasty is performed, with the full concurrence of the teaching hospital's experienced team and the attending local physicians. Later that week the chief of the cardiac service again retrieves the patient's current medical record, including scanned images of the diagnostic tests, for a teaching session with a group of medical students.

The patient recovers nicely and in a few days is sent home under the care of a visiting nurse. When she picks up some medications from the local pharmacy, (the prescription was electronically sent to the pharmacy from the hospital and her MD), the pharmacist places her health insurance card in a telephone-like machine, which queries another computer, approves payment for the prescriptions, and gives the pharmacist a record of other drugs she may be taking that might cause a negative interaction. The physician is notified electronically of his patient picking up the prescription to ensure compliance.

During the first few days at home the patient wears a 24-hour monitor that continuously feeds medical data back to her cardiologist. At each home visit, the visiting nurse inquires as to any instructions from the physician. She also checks the patient's most recent visit notes, and provides additional data via a hand-held computer that feeds it to the central computer, which updates the patient's medical record (that was opened initially by the emergency medical team which responded to that early morning phone call) and notifies the attending physician of any abnormalities.

Meanwhile, each time a test or billable service was performed by the two hospitals, the physicians, and the visiting nurse, a note was electronically added to the patient's record and a billable charge was created to the centralized billing and accounts receivable system which serves the providers of care. An accumulated record of charges was electronically submitted to the patient's health insurer, where another computer verified coverage, calculated payment due and electronically triggered funds transfers to the hospitals', physicians', and visiting nurses' bank accounts. An excerpted record of the entire medical care episode, stripped of any personal identifiers, was assembled by the insurer and transmitted electronically to a health care data collection agency to be used by both government and private firms for health care planning and statistical analysis purposes. Prescription drug information was transmitted



to a national pharmacy database for, among other purposes, the pharmaceutical company's use in a drug evaluation study.

This lengthy but real-life "case history" illustrates the extraordinary promise that telecommunications technology has for the costly, necessary, and burgeoning field of health and medical care.

Indeed, as illustrated above, advanced telecommunications applications can:

- Dramatically improve acute patient care, particularly in rural communities, by linking remote providers of care and treatment sites to teams of specialists at teaching hospitals.
- Improve rehabilitation and chronic care management by linking visiting nurses, therapists, and other paraprofessionals to physicians and specialists via a common, continually updated electronic medical record for each patient.
- Improve medical education at all levels through on-line exchanging of diagnostic and treatment records, teleconferencing, physician-to-physician interactive video, distance learning, and access to dramatically improved patient management and epidemiological data bases.
- Permit more rational planning and distribution -- and avoid costly duplication -- of health care facilities and personnel by making it possible to safely treat patients at the lowest level of intensity appropriate to their conditions.
- Significantly reduce administrative costs through the electronic interchange of data on patient insurance eligibility, levels of coverage, billing and payment information, and centralized accumulation of necessary health care planning data.

There are other health and medical applications of technology as well. As more and more Vermonters become computer literate and go "on-line" via their household PCs, access to on-line health care information, interactive video, and CD-ROM-based training offers unprecedented opportunities for consumer education about healthier lifestyles and about medical care.

Applications software to accomplish all of this is either already available or in development, and intensive research and development in the field continues. The challenge in Vermont is to assure that adequate communications superhighways are built to handle the traffic that certainly is coming.

## Public Safety

Technological innovations that are used for public safety functions in Vermont require a strong telecommunications infrastructure to support enhanced 911 services, command and control applications, and information processing and retrieval. Enhanced 911 services provide access to emergency personnel for all Vermonters regardless of location. Command and control applications are for the Department of Public Safety (including State Police); Agency of Transportation, Emergency Management Division; Fish and Wildlife Service; Department of Forests, Parks and Recreation; Department of Motor Vehicles; and several other local, county, state, and federal entities. Information processing and retrieval applications refer to the electronic storage and retrieval of criminal, judicial, and human service records. The infrastructure required includes two-way radio communications, microwave carrier service for both data and voice, and a combination of public switched networks and private networks. Public safety applications are as follows:

- Enhanced 911 services: The concept for Enhanced 911 services can provide access to emergency services by any individual in Vermont by dialing 911. A dedicated network would include appropriate circuitry, in conjunction with the public switched network, to route calls to the correct answer point based upon the location of the caller. Information concerning the caller's phone number and location would be automatically retrieved from a data base referred to as an ANI (Automated Number Indicator) or ALI (Automated Location Indicator), and displayed on a screen for the operator.

The ALI database would contain the pointer to appropriate services. From the answer point, a call would be directly dispatched, transferred, or relayed to other dispatch services as required. The Enhanced 911 services should be constructed of equipment which is presently installed and working in other jurisdictions. The system must be reliable and constructed to provide redundancy for information processing and networking. The network must allow for diverse routing and be developed with fault-tolerance in mind.

- Command and control: The Department of Public Safety operates and maintains a statewide communications and telecommunications system for law enforcement message switching; dispatch services for state, local, county, and federal entities; and a record management system.

The system is comprised of two-way radio, analog microwave transmission, and leased telephone lines. The system was state-of-the-art in the late 1960s and early 1970s. However, lack of funding has forced the state to forego systematic upgrades, leaving it with an obsolete system. The system is maintained at present with abandoned equipment from other jurisdictions.

The command and control system needs to be upgraded with a new microwave system that will support digital messaging and mobile data, voice, and imaging. A combination of partnerships with private telecommunications providers and state constructed systems can be used to reach this goal. Private entities with different

constraints and profit motives may be unable to participate in ventures in low population density areas.

■ Information processing and retrieval: Several federal initiatives require the state to upgrade its information processing capacity. These include participation in the FBI's National Crime Information Center (NCIC), the FBI's Integrated Automated Fingerprint Identification System (IAFIS), the Brady Handgun Law, and the National Child Protection Act. These initiatives require internal data collection, database construction, and the development of transaction processing and reporting systems. However, the power of these systems is in the ability, once the data has been captured and stored, to provide it to geographically dispersed agencies. These are telecommunications intensive applications.

These systems will require new telecommunications carrier services that provide greater bandwidth and access to the new command and control systems for mobile voice and data transmission.

■ Emergency services: Emergency services require coordination with the Department of Public Safety, the Vermont National Guard, and other appropriate state agencies. The Emergency Operations Center (EOC) is in need of up-to-date computing equipment that will allow better communication and coordination with other services and access to the required command and control infrastructure. These enhancements would allow the EOC to use geographical information systems (GIS), a geographical positioning system (GPS), and satellite imagery to respond to and manage all types of emergencies and disasters. Access to the proposed command and control system would allow for the EOC, through mobile data, voice, and image transmission, to manage emergency and disaster situations.

The public safety component of the statewide telecommunications/communications infrastructure is under great pressure, operating with obsolete and outdated equipment. Several initiatives to gain funding for improvement of these systems are under way, including grant application for federal law enforcement monies. Because these systems have a major impact on the quality of life in Vermont -- and because of the state's legal and moral obligations to its residents -- support for the maintenance and replacement of these systems must be a high priority. The Department of Public Safety has in the past found partnerships to offset the costs of telecommunications programs. It will continue to pursue public sector-private sector partnerships, recognizing that public safety applications have special needs -- in the areas of reliability, fault tolerance, diverse routing, and redundancy -- not shared by the private sector.

## Education

Telecommunications strengthens access to information and materials, enhances communications among people, and extends the "reach" of both teachers and learners. This reality, and this potential, of the telecommunications revolution can be a powerful force to help meet the educational needs and goals of Vermonters. Interactivity, communication, access to learning resources -- all of these attributes are central to education and the learning process itself.

Educational telecommunications can help Vermont meet several unique challenges. Our scattered rural population needs ready access to quality courses, programs, and information. Our rugged hills and winters make long distance travel challenging at all times, virtually impossible sometimes. Small schools (and even colleges) necessarily have both financial and curriculum constraints that can limit learners. Distance learning in its various forms enhances access for remote populations at all times, permits schools to offer a wider range of courses and programs, and enables employers and agencies to obtain quality training in a feasible, cost-effective manner.

Additionally, telecommunications has the potential to further strengthen learning through access to virtually limitless information resources, and through new forms of collaboration as people make new connections with one another through both picture and word.

The following are examples of some of the applications currently being used:

- Access to library and information resources: Vermonters now have significant access through the Vermont Automated Libraries System (VALS) to state, local, and higher education libraries, as well as other state information services such as legislative and judicial records. This service should continue to expand and diversify over time.
- Access to information about education and training: Individual Vermonters, employers, and others need on-line, quality information on the availability of education and training programs and services and their effectiveness. Now being piloted, InfoVermont provides such computerized, interactive information services in prototype form and needs to become a reality for Vermonters.
- Access to comprehensive databases: Vermonters utilize the Internet, GovNet and other systems of data bases for research, analysis, and learning purposes.
- Distance learning: Vermonters now utilize Vermont Interactive Television (VIT), satellite technology, and emerging local networks. This telecommunications capacity is so critical to Vermont that it is important to highlight at least the range of its diverse applications.
  - (1) Distinctive courses for small schools -- advanced placement and other course offerings, feasible to be taught at one school and extended to students at other schools.

- (2) Information and support for students of all ages -- the global Internet provides the means for e-mail, study, and discussion exchanges among learners.
- (3) Advanced and specialized training seminars -- national and regional experts can reach a critical mass of business, health, government, or other Vermont leaders.
- (4) Training and skills-building, particularly for small business -- locations dispersed throughout the state make it practical and cost-effective to reach employees near the work site.
- (5) Continuing education for professions and occupations -- professional organizations, state agencies, and higher education institutions can reach a critical mass of practitioners and learners on a regional or statewide basis while saving time and travel costs.
- (6) Collaboration and information exchange -- legislative committees, school boards, state agencies, town managers, and many others utilize interactive television to communicate among and learn from peers and constituencies.
- (7) Support services for place-bound learners -- many adults are enrolled in individualized programs of study, remote from campus services. Counseling, tutoring, financial aid, and other services can be provided to reduce the disadvantages of individualized study.

All of these educational applications are happening now, at various stages of availability, in Vermont. Beyond these applications, others are "on the brink," including home-based interactive telecommunications via computer and cable.

These are important issues for Vermont. As we work to realize our goal of providing equitable and universal access to these educational applications for all Vermonters, we must avoid a future with telecommunications "haves" and "have nots." We must encourage public/private sector partnerships to create the necessary infrastructure. We must ensure that colleges and schools throughout Vermont have the opportunity to not only embrace these changes, but also to play an important part in assuming leadership for these changes.

## **Government**

Virtually every one of Vermont's 576,000 citizens interacts with government. Vermonters pay taxes and fees. They provide and receive information, and they apply for and receive benefits, permits, and licenses. Some Vermonters' interaction with government is even more intense. Among these are clients, patients, wards, or prisoners. And still others provide goods or services to the government or to others on behalf of the government.

These interactions produce an enormous number of transactions. Once the transactions are processed, individual and aggregated data is produced, manipulated, analyzed, and transmitted within the originating agency, to other agencies, to other levels of government, and to the public. It's an enormous and complex task, one for which bureaucracy was invented. But it is clear that resource constraints will force government to shrink and that bureaucracy will have to be reduced and made more efficient. Government services to -- and interactions with -- its citizens increasingly will have to occur in homes, at libraries, town offices, schools, even shopping mall kiosks. And the processes by which information is maintained, aggregated, manipulated, analyzed and distributed within government and between levels of government must be improved.

The following briefly describes some of the applications which will permit Vermont to take advantage of the telecommunications and associated new computer technologies.

### ***Citizen Information***

People have to ask the government a lot of questions: Am I eligible for certain benefits? What are the requirements for licensure in my chosen occupation? Do my children need inoculations? What approvals do I need to build a new store? What goods or services does state or local government want to buy? The variety of information that must be maintained and made available is endless.

Citizen access to information is the first level of telecommunications application. The Department of Libraries currently makes a wide variety of information, including state bidding information, legislative information, and court decisions, as well as library holdings, available through the Vermont Automated Libraries System (VALS). Also, the Agency of Human Services is developing a system by which potential clients can self-screen themselves for eligibility for programs or benefits.

The development of rule-based expert systems and computer kiosks, which can be placed in schools, malls, or wherever people gather, can make government information accessible to citizens wherever they are. A computer in the home, office, town office or library, or a kiosk in a mall or convenience store, can become the equivalent of a state office. The system can provide the same services as a deeply knowledgeable civil servant, guiding the citizen to authoritative and responsive information quickly.

It is hard to think of a department of state government that could not benefit from such a system. The obvious candidates include the departments of the Agency of Human Services, the regulatory departments of the Agency of Natural Resources, the Department of Motor

Vehicles, the Department of Employment and Training, and the Department of Labor and Industry.

And clearly, the larger municipal governments could profit by participating in such systems with information relating to zoning, planning, bidding, and meeting schedules.

### ***Citizen Interaction***

The second level of application is that of actual interaction. Citizens, once they know what they want to do, must actually complete a transaction with the government. Transactions with the government generally consist, at a minimum, of submitting an application or form which is more or less detailed, and receiving the decision of the government in the form of a permit, license, or evidence of enrollment in a program. Many transactions involve payment of a fee. Much of the business of government consists of processing and acting upon such applications and forms. Many of these transactions require coordination, concurrence, or liaison between or among a number of agencies.

One of the fastest developing areas of telecommunications is that of on-line transactions. Most World Wide Web servers and clients, for instance, have a "forms capability" by which information or queries can be submitted to a system. More importantly, the capacity to conduct secure financial transactions is in the final stages of development and deployment. Within a year or so it will become possible, even routine, to order and pay for goods and services, even transfer funds, on-line with a high degree of confidence in the security and integrity of the transaction.

This will make it possible to apply for benefits, enroll in programs, submit license and permit applications, submit bids and qualifying information, pay taxes and fees, and pay traffic fines from personal computers or computer kiosks. Citizens will be able to conduct their business with government from virtually anywhere. Government initially will have the transaction data in electronic form, which will significantly improve efficiency and effectiveness.

### ***Communication and Coordination***

The third level of application involves the flow of information between and among government agencies and levels of government. Government will continue to be organized functionally; that is, there will always be a Department of Health, a Department of Public Safety, and Agency of Natural Resources (ANR) with its functional departments, and so on. Each department must coordinate or cooperate with other departments as it does its work, as well as with the federal government and local governments. And local governments must communicate and coordinate with each other, with state agencies, and to some degree, with the federal government.

In the Agency of Human Services, for instance, a social welfare client will typically also interact with one or more other AHS departments; these might include SRS, Health, Mental Health or one of its local agencies, or Corrections. That client may also be involved with the Departments of Education or Employment and Training.

Permit applications to the ANR show a similar pattern, in that they must be considered and reviewed by a number of organizations and programs within the agency.

It is entirely feasible to build a common interface for each of those agencies. In AHS, the appropriate department would become the primary service provider to the client, with the system linking the resources of the secondary departments to the individual or case worker and feeding data to the supporting departments. Work flow, imaging, and expert software could vastly improve the speed and effectiveness of permit approval in the ANR.

Local governments vary widely as to the functions they perform or the sophistication and complexity of their operations. But there is a common core of functions that all towns perform, including those of the treasurer, clerk, road maintenance, and assessor. And most towns operate planning commissions and zoning boards.

Town treasurers receive and disburse funds. They are potential users of secure on-line transaction software for both the receipt and disbursement functions. Clerks process a wide variety of information, either to record it and maintain it for public access or to issue permits and licenses. They are candidates to use the same type of software and systems described above for state agencies. Towns typically solicit bids for goods and services involved in road maintenance, and should be able to do so electronically. The assessor function is carried out by listers who apply complex assessing rules developed by the state. Rule-based expert systems were developed for precisely that sort of application.

There is a constant flow of information between towns and the state. The planning function at each level is critically dependent upon information developed and maintained by the other. And although there is not a well developed lateral flow of information between towns, it is well understood that events and development in one town can have a profound impact on its neighbors. Computerization and telecommunications can make that lateral flow not only easy, but natural.

Telecommunications offers government the opportunity to re-engineer its internal processes and restructure its interactions with its citizens.

### ***Constraints and Barriers***

The first and most obvious constraint in taking advantage of the opportunities that telecommunications offers government and its citizens is the problem of infrastructure and access to it by the public. The state will require the use of a high bandwidth backbone linking agency or departmental networks to perform its functions. The public will require low cost and anonymous access, in the near future and through the phone system, to government systems.

Second is the availability of hardware at affordable cost to individuals, municipalities, and all businesses, as well as widely distributed, easily used software for public use. The cost of hardware, however, is plunging and sophisticated communications software is increasingly distributed at low or no cost. The only real question is when the two together will reach a critical mass for the applications outlined here.



Even as the hardware and systems are put in place, there will remain the problem of training and "culture." Many approach computers with fear and trepidation at worst, and unease at best. The problem will be most pronounced among many whom the government serves most intensely. The experience with automatic teller machines, however, suggests that what starts at a fairly low usage rate rises rapidly to become, in time, virtually universal.

More daunting problems revolve around issues of confidentiality, security, and access. It is not enough that the integrity of data in government systems be maintained and that additions and changes be made only by authorized personnel. Some of the data must be managed to ensure that it remains entirely confidential. But a significant amount of data must be made totally accessible by the public. These issues are complex from both the policy and operational perspectives.

## **Non-Profit and Public Service Sector**

The non-profit and public service sector is perhaps the most critical application. It is crucial in a free society that all citizens, regardless of location, education, economic status, or special need have access to the means of production and distribution of information. Because "informed decision-making" is a founding principle of democracy, access to telecommunications must be broad-based and affordable as information distribution moves from print to digital formats.

### ***Public Access***

Meaningful telecommunications policy must accommodate the needs of two constituencies:

- Individuals who will not be able to access telecommunications-based information services.
- The social, environmental, educational, cultural and community non-profit and public service agencies.

It might follow the model of local libraries which serve as community work stations for those wishing to avail themselves of telecommunications-based information. The Vermont Automated Libraries System contains valuable information about Vermont including card catalog information from various libraries, state bids, state legislation, and Internet access. While VALS is readily available to anyone with a computer, telephone line, and modem, it is also available free at community libraries in Vermont that provide a computer and modem for community members. VALS is well-positioned to be Vermont's electronic gateway to government information and is currently being merged with GovNet.

Establishing affordable access points and service for all citizens can take a number of forms and begin with access to basic telecommunications services. Coin operated telephones can be more widely located in low-income neighborhoods and rural communities. Voice mail services can provide the opportunity to participate in economic activities for those who cannot afford a telephone.

Expanded public telecommunications facilities are emerging across the country and include community computer centers in low-income neighborhoods providing computers, copiers, telephones, video production, and training for educational and job opportunities. These centers could be expanded and funded based on the model of public access cable television.

Access to information is also critical for citizens to participate in community life. Civic networks may include a number of institutions, data, and services. Vermont's most prominent example is the VALS automated libraries system. Non-profit and municipal information is being developed into community and county wide networks that will also provide e-mail services and, in some cases, Internet access. Civic networks tie together community bulletin boards, local and non-profit databases, electronic mail and even "web pages." While data is the main currency of these networks, voice and video services are quickly becoming an important part of the information exchange.

Local versions of civic networks are found in the non-profit and private sectors and can be tied into larger community initiatives.

### ***Non-Profit***

Non-profit organizations can benefit from an advanced telecommunications network in two major ways. First, they can manage their own administration more efficiently and interact with each other more easily. Second, they can provide better services to their clients and other members of the community.

- Databases of volunteer centers could be linked via telecommunications. Non-profits could gain information from those databases using dial-up access or the Internet. Non-profits could match needed skills with volunteer profiles retained in the linked databases (e.g., United Way, The University of Vermont, Saint Michael's College).

- InfoVermont, a database created by the Agency of Human Services, contains pertinent information which can be useful to non-profit agencies and their clients about all of Vermont's human services agencies such as telephone numbers, addresses, and summaries of services provided.

- With PCs using a Local Area Network (LAN), agencies could share files and information resulting in cost and time savings. Several agencies could choose to connect their LANs together through a Wide Area Network (WAN). Following this same concept, agencies' LANs could interconnect with government funding agencies both for information sharing and time and cost savings for any transactions taking place between them (e.g., electronic fund transfers, electronic document transfers, etc.).

- Agencies could use voice mail systems creatively to enhance their communication internally, with other agencies, and with clients. Voice mail systems are useful for leaving information for an individual and for broadcasting the same message to several people. Community voice mail boxes allow several hundred people access to one message (e.g., PTA, Rescue Squad, Board of Selectmen, etc.).

- Electronic mail offers the same benefits to non-profits as voice mail, allowing information to be left for an individual or sent to a large group of other agencies, government entities, or clients. Electronic mail suggests that those with whom you are communicating have a PC and a modem and read their electronic mail regularly. Electronic mail via the Internet enables information sharing worldwide at minimal cost.

- Electronic bulletin boards can also be a tremendous resource base by allowing non-profits to provide information to anyone who takes the time to browse them. Electronic bulletin boards also provide an excellent opportunity to gather information from the general public.

■ Non-profits who travel to their constituents (child care, elder care) can use wireless technology such as cellular phones, modem equipment, laptop computers, and pagers for their own safety and that of their clients. For example, a visiting nurse who arrives at a home where a medical crisis exists can use a cellular phone to call for help when no phone is available at the site.

■ Non-profits working with economically or physically disadvantaged individuals find their clients can use telecommunications to help bridge the gap between the "haves" and "have-nots" both through education and employment opportunities.

■ Distance learning can help improve educational quality by eliminating geographic and economic constraints which have traditionally prevented high-quality teachers in specific fields from reaching disabled, poor, rural, or inner-city students. The Department of Employment and Training already uses Vermont Interactive Television (VIT) to assist Vermont's unemployed in receiving training that might not otherwise be available in their local area.

■ Work-at-home options offered by an advanced communications infrastructure allow businesses to employ disadvantaged employees who could not otherwise travel to a work site due to distance, child care issues, and other barriers. Telecommunications services help enhance employment opportunities in other ways. People temporarily staying at homeless shelters in Vermont have voice mail boxes. A prospective employer can call and leave a message at a personal telephone number that does not identify the recipient as "homeless," a label that often proves to be a barrier to employment.

■ Non-profit agency resources can become more available to the elderly, disabled, and economically disadvantaged (indeed, all citizens) through the use of telecommunications. The provision of teleradiology, telemedicine, and counseling via teleconferencing helps those who have difficulty traveling to medical care facilities or agencies. These video-based diagnosis and consultation services enable medical specialists and agency counselors to evaluate clients in a timely, cost-effective manner; non-profit clients can have access to expert consultations without incurring expensive travel costs.

■ Public safety is a particular concern for the elderly and disabled citizens who have difficulty communicating, live alone, are immobile, or in fragile health. Advanced telecommunications allows Enhanced 911 systems which identify the name and address of the caller (life-saving information for a stroke victim who is unable to speak) to respond more quickly.

The potential for telecommunications to enhance the delivery of services by the non-profit sector is enormous. This is only the early stage of an information revolution that will provide the opportunity for all citizens to access social services, arts and cultural programs, health care, and employment opportunities.

## Conclusion

### *A Time for Action*

The Vermont Business Roundtable believes that the state of Vermont is at a critical point in determining the future role of telecommunications in the lives of Vermonters. As communications technology advances at an extraordinarily rapid pace, products and services considered "cutting edge" only a few years ago are now obsolete. The imperative for inspired vision, effective action, and meaningful understanding of the applications opportunities is both immediate and universal.

The Roundtable encourages individual citizens as well as policy makers in both the executive and legislative branches of government to give serious attention to this paper, including objectively assessing the vision for telecommunications, carefully examining the action steps proposed, and thoughtfully considering the broad implications of the various applications. Efforts must be focused on policy, architecture, and strategy, rather than on details and operational minutiae.

Policy makers, both public and private, are only beginning the ascent up a steep learning curve. There needs to be an understanding of the consequences of the ferocious rate of change in all aspects of telecommunications and software. Planning as it has traditionally been done in government becomes impossible. Applications which were unthinkable three years ago become possible this year and indispensable next year. Planning must begin with a clear understanding of the goals in light of current and immediately foreseeable requirements and capabilities.

However, strategies and policies must be designed to accommodate change which is inevitable, even if it cannot be predicted in great detail. Above all, the planning process must be iterative, a cycle in which results (whether successes or failures), technological changes, and the new opportunities or requirements that technological change produces, are constantly being fed back into assumptions, requirements, and goals. At the same time, we hopefully will have created an environment that will assure the presence of quality providers which are ready and willing to meet the market demands created by Vermonters.

The consequences of our failing to establish policy, take action, and implement that action through a broad range of applications will be that Vermont will lose the opportunity to be one of the foremost places in the country to provide this important infrastructure resource for the benefit of its citizens. The results will be dire because it will become increasingly difficult for Vermont businesses, individuals, and institutions to remain connected to government, political, educational, cultural, and medical networks.

Cooperative and aggressive action is needed now by both the private and public sectors to assure Vermont's full participation in the rapidly changing universe of technology, that which is available today and that which will become available in the near future. Only by taking such action combined with forward looking, proactive policy leadership can we provide the economic security as well as the quality of life desired by all Vermonters.

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