



# Lieutenant Governor's Telecommunications Report

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## Lieutenant Governor's Telecommunication Report

Telecommunications Infrastructure Task Force  
Report to the People of Colorado

by *(former)* Lieutenant Governor Sam Cassidy

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### Introduction

Telecommunications capability, the means of sending and receiving voice, image and data transmissions, and the cost of using it, will largely determine the future of Colorado. How that capability is deployed, the nature and placement of the infrastructure that carries it, will impact the state more dramatically than any other single issue we face at the close of this century. The importance of telecommunications in preparing for the new millennium cannot be overstated.

Telecommunications in the 21st century will affect economic development, health care, education and the delivery of government services. It will shape the growth of the state and the quality of life enjoyed by its citizens. It will accentuate or mitigate the chasm between society's haves and have-nots. It will determine whether Colorado creates its own destiny or concedes its fate to the vagaries of change.

The responsibility for guiding the growth and deployment of telecommunications capability in Colorado falls upon many: elected officials at the federal, state, county and local levels of government, the private sector providers and the consumers. Each of them will have an effect on the course of the future.

Market forces in the private sector already are driving deployment within the state. While it is arguable that those forces are wholly sufficient determinants of the eventual outcome, even private sector providers are quick to conclude that market forces operating without regulatory restraint will leave most of the state without access. Because telecommunications is becoming a fundamental component of public well-being, it is our opinion that government must play a significant role in ensuring reasonably equitable access for all Coloradans.

The role of government in guiding telecommunications development must be coherent, judicious and entrepreneurial. Piecemeal solutions, sophomoric schemes and clumsy, top-down approaches are doomed to failure. Only a plan that works creatively in partnership with the private sector and carefully assesses the needs of the citizenry can effectively serve the best interests of the state. Colorado deserves nothing less.

### Background

Denver is among the communications capitals of the world. Due to certain factors, including its unique

geographical and atmospheric conditions, and a young, highly educated population that has a growing familiarity with high technology, Colorado has grown and attracted numerous telecommunications companies, particularly those that utilize satellite transmission of their services.

Lying on the 105th meridian in the mountain time zone at a mile and more in elevation, the state offers unique capabilities that facilitate state-of-the-art transmission of signals, including "one bounce" transmission to Europe and the Pacific Rim. Colorado is home to Tele-Communications, Inc., the dominant cable television provider; Jones Intercable, the leading cable provider of distance learning; and DirectTV, innovator of the highest quality digital satellite transmissions currently available.

US West, the 14-state regional Bell operating company (RBOC), is headquartered in Denver. Numerous providers of long distance services, cellular or wireless companies, and others operate throughout the state, particularly along the Front Range and the I-70 corridor. In rural Colorado, more than two dozen telephone companies provide service, although US West is by far the largest, serving until recently some 98% of the users of basic service.

Since the federal-court ordered break-up of AT&T in 1984, the RBOCs have been given a monopoly over the provision of local service and are providers of last resort, meaning that they are responsible for providing basic service throughout their areas, even where such service is unprofitable.

Competition for high value customers is a principal reason US West is selling large numbers of rural exchanges throughout the state to independents. The recent sale of 40 rural exchanges to PTI Communications more than doubled the number of users served by independents, raising the percentage from 2% to 5%.

Independents manage to make a profit in areas where the RBOCs can't, due to their ability to access the Universal Service Fund, which subsidizes service, and because of streamlined operations. US West and TCI both have reported that they are unable to make a profit in areas of less than 50,000 population, which doesn't bode well for the rural communities of Colorado under current regulations.

Each telecommunications provider has unique capabilities of meeting the needs of the state's communities, once those needs are identified and quantified. Hughes Network Systems, the satellite-based provider, was the solution for a stock broker in Durango who had become frustrated by the lack of redundancy in the US West lines to Denver.

When the lines went down, voice communications usually were reestablished in a matter of minutes. But getting his computers up and running often took six hours or more. Reliable access to markets was crucial to his well-being. His buying power was strong enough to attract competition. He switched all his business to Hughes and reports complete satisfaction with the service he is receiving. He adds that although he has solved his problem, he hasn't solved that of the community.

To a greater or lesser degree, regulation of "basic service" has adequately served consumers throughout this century, but no one anticipated the demands that advances in technology would place on law makers and regulators.

Telecommunications is a far step beyond telephony, a step that requires new interpretations of basic service, of who and what should be regulated, and of how the needs of the consumer and the industry can best be met.

Due to the dramatic changes in the telecommunications industry brought on by rapid development of

technology, and the growing inadequacy of the regulatory structure to address those changes, it is abundantly apparent that a comprehensive plan is needed if the people of the state are to derive the maximum possible benefits from the emerging technologies.

When I was appointed Lt. Governor in May of 1994, I was directed by Governor Roy Romer, at my request, to devote the full resources of the office to designing a comprehensive, state-wide telecommunications infrastructure plan for Colorado.

### **Issues**

Plain old telephone service, the basis of current regulatory policy, no longer is the measure of adequate telecommunications capability for the people of Colorado. The goal of providing a single-party telephone line for every customer, which should be met in 1995, is merely the first step in addressing current needs for service.

Since the advent of facsimile telecopying, computer modem capability, and other advances in telecommunications, the demands on telephone companies to provide additional lines has grown in quantum leaps. Combined with the unprecedented growth of Colorado's population, US West has been slow in meeting the demand.

Additionally, blurring distinctions between the function of the telephone, television and computer have created a convergence of interests and capabilities among the various providers of those products and services. Each of them is looking covetously at the traditional businesses of the others.

Telecommunications service, as distinct from the plain old telephone service we once knew, can provide, at the minimum, the ability to access a wider range of services that includes fax and electronic mail capability, 911 emergency response, computer access to internet and local bulletin boards such as the state library system's Access Colorado Library Information Network (ACLIN).

Furthermore, interactive video and data transmissions can move in and out of our homes and businesses over improved phone lines, coaxial television cable and satellite dishes no larger than a large pizza with everything on it.

Certain sites across the country are demonstrating new applications made possible by telecommunications technology. In Georgia, a vivid example of the economic and social benefits has developed from the vision of Dr. Jay Sanders of the Medical Center of Georgia, who by sheer determination has fostered a state-of-the-art system for delivering medical and educational services.

Dr. Sanders seized an opportunity when at least \$50 million was slated for rebates to telephone ratepayers, and he helped convince Governor Zell Miller and the state legislature to earmark those funds for telecommunications improvements. That money is being used to tie existing telecommunications facilities together so they can enhance the ability of each connected system to serve its subscribers. Another principal project is the purchase of equipment necessary to establish distance learning sites throughout the state.

The final \$8 million was deposited into a revolving seed fund that initially has allowed Jones Intercable, a large cable provider in Georgia, to connect patients' homes with their hospitals, as well as connecting small health care facilities with Georgia's large hospitals. Once the communications equipment, under development by a partnership of Georgia Tech and a number of cutting-edge high technology firms, is in place, doctors will be able to see, talk with, and receive vital signs from patients who are sitting comfortably in their homes.

After two years, seed money recipients must begin repaying their interest-free loans, which will then be redistributed to other institutions wishing to purchase communications equipment. Perhaps an even better option would be to require recipients to lease equipment so they would not get locked in to technology which often becomes obsolete as it is removed from the box.

Hospitals often are among the largest employers in small communities. When they are unable to treat patients whose conditions require transfer to secondary or tertiary centers, the hospital loses money and the financial stability of the facility is threatened.

The ability to treat complicated cases at primary care facilities eliminates the trauma of moving the patient, lowers the cost of treatment and improves cash flow to the local hospital. Additionally, the exchange of information in diagnosing and treating patients adds to the local practitioner's training, enabling isolated doctors and staff to better keep abreast of advances in the medical profession.

What is most remarkable about the Georgia example is how quickly it grew into a broad-based cooperative effort among natural competitors. When the Jones Intercable offer came to its attention, the local telephone company, BellSouth, expanded the offer to include the provision of digital high-speed (ISDN) capability to an expanded group of facilities, including nursing homes and additional private dwellings.

Virtually every state is engaged in some stage of telecommunications planning and development. Their approaches differ, and we are fortunate to be able to learn from them. A description of some of the state initiatives is included in the Appendices.

The widening gap between those citizens who can access state-of-the-art service and those who still are limited to four-party lines portrays a future encumbered by a society of technological haves and have-nots. It's not a pretty picture.

The implications touch on every aspect of our lives: the way we do business, educate ourselves, receive health care, and deliver services from government agencies. In short, telecommunications is an issue that fundamentally impacts the quality of life we enjoy and the ability we have to grow and prosper, as individuals, as a state and as a nation.

Judicious management of these emerging resources in a manner that maximizes the potential well-being of our citizenry is the only worthy goal. In order to achieve that goal, we must take a long, hard look at this opportunity and observe it in the context of a people who stand at the doorway to a new millennium.

Technology, after all, is nothing more than another tool to use for better or worse. When individuals are so empowered that the sum of all the knowledge humanity has generated is suddenly at their fingertips, the question is: what shall we do with it?

### **Process**

Telecommunications is a vastly complex and challenging subject. During the first 90 days of my tenure as Lt. Governor, my staff and I met with literally hundreds of people for whom the subject is recognizably paramount to their interests.

These included representatives of large and small telecommunications companies, public interest groups, government agencies, and trade associations, as well as educators, health care providers, business development specialists, public safety officials, consultants, consumer advocates, lobbyists, reporters and a host of individuals whose expertise ranged from the ridiculous to the sublime. It was an

education. A partial list of those individuals and organizations is included in the Appendices.

The sheer numbers of people with a significant interest in the subject dictated the manner in which we chose to proceed. To design the right system, we had to involve the consumers of the technology, the educators, health care providers, private enterprise and government. They will use it and they will pay for it.

And we had to involve the private sector telecommunications companies who will invest capital in deploying the needed infrastructure. In order to get "buy-in" from all of the people and organizations who are significant stakeholders, it was necessary to design a process that gave them a voice and, at the same time, created a mechanism for moving toward the creation of a coherent infrastructure plan.

The Telecommunications Infrastructure Task Force is comprised of knowledgeable individuals representing the broadest possible spectrum of interested organizations. The process for creating an infrastructure plan was divided into four phases. To date, the first phase has been completed.

Phase One dealt with the users of telecommunications. Committees were appointed to address its five subsets. Each of the committees was asked to answer the question, "How do you want to use the new technologies?" They were charged with delineating near, mid and far term goals. A list of the Task Force members and their reports are included in the Appendices.

Of special note is the process for the Community Meetings subset. In order to ensure that a statewide response from users was gathered, we held a series of workshops that brought the issue into communities in every quadrant of the state.

Cosponsored by the Office of the Lt. Governor and the Colorado Rural Development Council, supported by numerous community organizations, and underwritten by Jones Intercable and US West, workshops were conducted at various local community colleges, schools, libraries and senior citizen centers in Durango, Florence, Lamar, Trinidad, Alamosa, Breckenridge, Glenwood Springs, Craig, Montrose, Delta, Limon, Ft. Morgan, Cortez, Ft. Collins, Denver's Five Points Media Center, and Pueblo.

The workshops were designed to serve several purposes: raise awareness that telecommunications is a critically important issue, present the current state of both technological and human resources available within the respective communities, teach citizens how to use them, assess developing markets for telecommunications, and form task forces to represent the communities' interests in the issue.

Attendance, which averaged about 100 per workshop, and response in every instance far exceeded our modest expectations. In every community the workshop goals were met. Reports identifying the needs and potential markets within the communities were received from every one of the task forces.

So many people contributed to the success of these workshops that naming them would double the length of this report. It is our hope that they will find sufficient thanks in the tremendous contribution they have made to the Infrastructure Task Force, the continued well-being of their respective communities and the health of their state. In addition, the Acknowledgements page lists certain individuals who were extraordinarily generous with their time and resources.

In addition to those reports, community response has been received from the 12 sites that have been funded by grants from the Colorado Advanced Technology Institute to develop community-based telecommunications systems. They include Steamboat Springs, Telluride, Durango, Clear Creek, Washington & Yuma Counties, and the Rural Health Care Telecommunications Coalition, in addition to

other communities and organizations we visited. The CATI report is included in the Appendices.

Also, we have given presentations on the Telecommunications Infrastructure Task Force in dozens of other locations, from Las Animas and Sterling to Salida, Aspen and Crested Butte, to Montrose and Grand Junction, for countless groups and organizations. Their responses have been gratefully received and duly considered.

### **Observations**

It is glaringly apparent that vast numbers of Colorado citizens recognize the growing importance of telecommunications in their lives and the future of their communities. They are vitally concerned with the role state government will assume in directing the course of telecommunications development. There is a growing perception that our government has not played a leadership role and that Colorado, consequently, is falling significantly behind the rest of the country.

Rural citizens and urbanites whose socioeconomic status leaves them outside the focus of market-driven response from telecommunications providers are particularly fearful that they may be left in the dust of stampeding technological innovation.

Why is it so important? Certainly, most people in the Denver metropolitan area will have access to modern telecommunications at some point in the future. The question is when, and it is a question that urban dwellers want this government to help answer.

Nor should this be viewed as an urban versus rural issue. City and country folk alike are largely disappointed in the lack of progress for all but a select few Coloradans.

The economic drivers that are present in the city ultimately will cause the infrastructure to be deployed, but not efficiently, not ubiquitously, and not without many needlessly duplicated infrastructure investments. Addressing that issue, however, will require strategies that differ from those necessary to meet the needs of the state's rural residents. Different solutions must be found for those areas that attract competition and those that lack sufficient economies to drive development.

What does it matter if the people of Holly or Rangely have capabilities similar to the best that the metro-Denver area will have? Perhaps some of the examples we used during the workshop presentations may help put the issue in perspective.

In Lamar, a young man of 17 or 18 years talked about the way his family trades cattle over a telecommunications network. The past week, he said, more than 160,000 head of cattle were traded on the network his family uses. While his neighbors still are taking whatever price the local feedlot offers, he is getting top dollar on the network.

Lamar also gave us an early example of the value telecommunications can bring to rural Colorado. Eight years ago, the local hospital was threatened with losing certification because its nursing staff didn't have the continuing education credentials they needed.

The director couldn't close down the hospital while his nursing staff went off to school in Boulder or Ft. Collins to get the credits they needed. Instead, he was able to get the necessary courses via distance learning from the University of New Mexico. Using telecommunications, credit classes were brought to Lamar. The nurses received the education they needed, the hospital was saved, and it was done without anyone leaving town.

On the other side of the state, in Olathe, modern technology has reinvigorated the value of agricultural land. It used to be that the most profitable day a farmer ever had in Olathe was the day a developer made him an offer to buy out his farm and turn it in to a housing development. John Harold changed all that.

John built a dry ice plant to pack fresh produce for shipment to distant markets and began growing produce on his property. He plugged a trailer full of computers into commodities markets worldwide and started marketing Olathe sweet corn and other produce at the time and place where he got the most money. Last month, he completed a deal to sell fresh Colorado squash to Japan. Now developers can't buy farm land in the area because John and his neighbors are making too much money on their crops.

In the Four Corners area, Bill Lupien is trading stocks and bonds by computer from Durango. He invented the software that enabled computer stock trading while plying his trade in Los Angeles. It wasn't long before he realized that he could conduct his business from anywhere he chose. Colorado was his choice.

He brought with him a business that employs many highly paid brokers and a large portfolio of investments from customers throughout the world. That kind of business development has a profound impact on the economy in a town of 15,000 people. Now he teaches business classes at Ft. Lewis College in his spare time, and, when he needs new people to staff his growing business, he hires their graduates.

Connections to a global market will revolutionize rural economies. In an age where distance becomes transparent in accessing that market, more and more people will choose the quality lifestyle that is uniquely available in rural Colorado. In the process, they will offer attractive alternatives to those communities: economic stability, non-polluting, high paying jobs, and a culturally rich and well educated populace that is fully vested in the pristine environment that first attracted them.

Telecommunications is changing the way people do business and it is opening up their choices of where to locate. But, it's important to realize that this new technology cuts both ways. Because these people are getting top dollar from their innovative use of telecommunications, it means that somebody else is getting less money for doing business the old way. We can't hope to hold our ground by ignoring the changes that are happening around us.

Telecommunications can create career building economic development in the state's rural communities. It can make farming and ranching profitable, which serves to preserve open space and maintain the character of Colorado that so many have found attractive. And it can provide life-long learning, first class health care and improved government services to every citizen of the state, regardless of where they live. Telecommunications defines the parameters of the new paradigm and it will change the nature of our communities in profound ways.

What, we would ask the workshop audiences, is the most precious resource we in rural Colorado lose year after year? They knew the answer. As parents, we work hard to raise our children to be good citizens. Often, we spend our life savings to get them a good education. And, if we do a really good job and raise the kind of citizens we want in our community, what happens? They move away to Denver or Chicago or New York where they can get a good job.

The new technology changes all that. For the first time, rural Colorado can have an advantage over the big cities. If people can make a decent living and utilize their talents from any location, they'll be far less likely to move away from the place where they were raised. The erosion of rural communities can be reversed for the first time in the 20th century.

The new technology makes distance transparent. It is possible now for any community to have the same quality of education, health care, government services and economic opportunities that people in the large cities enjoy.

But, in addition to all the opportunities it provides, the new technology confronts us with fundamental questions about equity in our state, questions that in certain instances may even touch on whether we are meeting constitutional mandates.

In September, I gave a speech at the dedication of one of 11 new schools that were opened this year in Jefferson County. A tour of the facility provided me with a graphic example of the growing disparity between schools that utilize the new technologies and those that don't. Even in the kindergarten class, there was a brand new computer on every desk.

Children are learning to use computers before they learn to read and write. In the metro-Denver area, they are accessing the vast resources of the Internet toll-free, which gives them a tremendous advantage over students whose schools are unable to provide such resources. In areas of the state where toll charges are assessed, the cost of gaining Internet access may run to \$18 per hour and more. Few schools can afford such fees, and those that can't are left to use their computers as little more than glorified typewriters.

The Colorado constitution clearly mandates that we provide "a thorough and uniform" education to every child in the state. What we are seeing in our schools is a growing disparity between haves and have-nots, where the education may no longer be thorough and certainly isn't uniform. The new technologies are changing the way we learn and what resources we offer our students. Lawmakers must review their responsibilities in light of those changes.

Why should the people of Denver care what happens in the rest of the state? Because telecommunications gives us the chance to preserve the quality of life that makes both the city and Colorado a desirable place to live, the nature of the place that attracted so many of us in the first place.

Last summer, The Denver Post reported that traffic in the metropolitan area is expected to double in the next ten years. Roads that already are choked with traffic and air that is thick with pollutants will experience twice the pressure by the year 2004.

The Christmas day edition of The Rocky Mountain News examined the state's rapid growth and cited the concerns of its citizens, both long timers and newcomers, that growth was stressing infrastructure and threatening to destroy the quality of life they came to Colorado to enjoy. Letting more water taps, expanding roads, hiring more police and building more prisons to deal with runaway urban expansion has done nothing to preserve our quality of life in the past. There is no reason to suppose it will fare any better in the future.

The industrial age is over and gone with it is the need for people to cluster around the local factories in order to make a living. If growth is inevitable, and the allure of our beautiful state suggests that it is, then the way we manage that growth is critical.

Dispersing population away from Denver and more evenly throughout the state is in the best interest of Colorado. If we are willing to recognize the need and the opportunity to act creatively, we may yet develop strategies for preserving our precious quality of life. New thinking based on new capabilities is where we will find solutions.

Telecommuting challenges the old way of doing things. As some of our policy makers continue to plod into familiar solutions, searching for millions of dollars to build more lanes on the state highways for more cars that poison our air, others are recognizing that the new technologies allow for unprecedented answers to our problems.

Local companies are innovating in ways that should provide clues to our policies for dealing with growth and the demands it places on infrastructure. All over the metro area, employees now are "phoning it in." Rather than travel to the office every day, employees are using computers, modems and other technologies to work from home.

The savings in commute time, stress and office space makes sense to business people. One can only hope that the example isn't lost on lawmakers.

The level of public interest in "doing something" about telecommunications is evidenced by the countless number of initiatives that are currently underway in Colorado. Substantial sums of time, energy and money are being invested in schemes, many of which are needlessly duplicative or in direct conflict with each other, that ultimately may not serve the best interests of users.

In developing its vision for Colorado, the TAC-14 identified nearly 300 separate projects. These include: Project Colorado, the One-Stop efforts of Fran LeDuke at the Office of Regulatory Reform, the CATI projects, the millions of dollars that Bob Tolman at the Department of Telecommunications is pouring into upgrading the antiquated state system, Colorado SuperNet, the ACLIN system, the health care system proposed by the University Health Sciences Center, the recently announced distance learning project jointly undertaken by Jones Intercable and the CCCOES, distance learning projects on the eastern plains that utilize dark fiber optics lines to tie widely scattered high schools to Morgan Community College, Mike Dermody's independent effort to wire the western slope, Dave Hughes promoting wireless systems from a bar in Old Colorado City, and literally hundreds of others.

Many of these are eminently worthy projects and others eventually will be seen as detrimental. While it is heartening to see in these efforts the determination to develop our telecommunications capabilities, chaotic planning and duplicative systems only increase the eventual cost to the end users. We can do better.

What will serve the best interests of Colorado is a coherent statewide plan, one that pursues a goal of reliable, affordable and ubiquitously accessible telecommunications capability. When a plan is in place, all proposals can be overlaid on it as a measure of whether or not they will move us toward our goal. Those that do should receive our incentive and support. Those that don't should be left to fend for themselves.

In order to achieve such a goal, it will be necessary to forge a partnership between government, the private sector and users of telecommunications throughout the state. A champion of the cause at the highest level of state government is absolutely needed.

An enlightened legislature can make a critical difference. Government can use its considerable buying power, regulatory control and taxing authority to provide incentive to the private sector for developing areas of the state that can't marshal a sufficiently attractive market.

Telecommunications providers will resist investing in all but the most lucrative markets unless significant incentives are offered.

Rapid depreciation schedules, enterprise zone designations, and other such changes in policy should be considered.

But nothing is more of an incentive than a profitable market. Whatever improves the market case that can be made by individual communities should be the foremost consideration.

Users of these services must aggregate their buying power to draw infrastructure to them. They must make a solid case to themselves and the providers that theirs is a market that is worth developing. First, they must recognize the importance of the new technologies to their community; then, they must take inventory of the people, the businesses, organizations and agencies in their community and determine how they want to use the new technology.

Every community to one degree or another has the beginnings of that market, but too often it is ineffectively spread among different systems of different providers, or it is underdeveloped because people still employ outmoded, inefficient systems of communication. Taken together, and combined with favorable policy at the state and federal level that adds incentives for meeting those needs, a business case often can be made that may surprise the community as well as the providers.

One need only look to the Georgia model to see the possibilities that are created by marshalling the demand of the communities and packaging it with government incentives to the private sector.

Where that market falls short, government must add its buying power to the case that the community can make. Rather than competing with the private sector, as is now the case, government will better serve its citizens by awarding its communications business as an incentive to providers that will serve currently unprofitable markets.

Barriers to that goal are many, but most of them reside within the purview of state and local government. What the federal government will do is unknown, but there is deep concern within state and local governments nationwide that congressional legislation will centralize telecommunications regulation in Washington and prevent states from implementing creative solutions. Nevertheless, it is conceivable and desirable that a well executed plan at the state level will produce a favorable reaction which may exempt the state from federal preemption of its regulatory powers.

An analysis of proposed federal legislation is included in the Appendices. It is worth noting that the incoming Congress is saddled with a full plate. The loudly trumpeted Contract With America is likely to receive priority over other issues, including any telecommunications regulatory reform.

Furthermore, the information superhighway concept is a trill sounded by the Clinton Administration's horn, an instrument that has been considerably muted by the recent election results. There is no evidence that Congress is any more apt to act on any telecommunications proposals this year than last. We may have one less barrier to our plan if federal preemption fails to take hold in this session of Congress.

Regardless of what policy changes occur in Washington, the market-demand approach we have begun with our community task

forces will produce private sector deployment of essential infrastructure if we continue to develop it.

Technology itself is not a barrier, although its cost may be. Lowering that cost is a primary policy consideration. The single greatest barrier is institutional culture, the entrenched, habitual manner of doing business as usual, and it is at its worst and most pervasive in government. Only persistent pressure from the highest authorities of government can change our state and local institutions.

Unlike government, change is a way of life among the providers and users. Inspiration alone is often enough to drive changes in the way we do business and live our lives. The case made by a growing market that demands service is a powerful motivator.

In the near term, and at little cost, there are several positive steps that can be taken to enhance the state's telecommunications capabilities. Responses from the community task forces across Colorado indicate that their foremost preference and most immediate need is free dialing access to the Internet.

Establishing such access from any point in the state offers a number of important and interesting advantages. It would enable users everywhere to explore the most unique and useful component of the developing information superhighway.

Simultaneously, it would provide a metric for assessing market growth potential as its users became familiar with high-technology capabilities. And, it would create an illuminating model for the changing nature of communications traffic, wherein vast worldwide stores of information are available from anywhere to anywhere, distance is irrelevant and cost of service is based on time of use or an annual access charge.

It is appealing as well because the Internet primarily is a learning tool and so much of what the envisioned information superhighway has to offer is education. In an age when knowledge truly is power, the Internet is probably our most ubiquitously and instantaneously accessible source of information.

In combination with the ACLIN system that is available through many of the state's libraries, citizens of Colorado would have greatly enhanced statewide access to vast stores of information. There is a clear opportunity to leverage federal dollars in this instance.

The nearly \$3 million in federal grant monies received by ACLIN to extend its deployment could be leveraged with a private sector partner. Together, they could provide universal access for all Coloradans to the Internet and super trainers in every community to show people how to use it for their own benefit. And, it would be a renewed attempt to meet constitutional mandates for education. The ease with which this project could be accomplished underscores the need to seize this opportunity.

Anyone who doubts that market demand can quickly attract infrastructure should note the response of US West. The offer the company made this month to the Public Utilities Commission for infrastructure improvement marshals the resources needed to take this giant step forward in satisfying the near-term objectives developed by most of the community task forces in our project.

No other accomplishment would be as important as establishing a delivery system for lifelong learning in Colorado. Therefore, a system that commences with the electronic linking of the state's colleges, universities, libraries, vo-tech centers, extension centers and other training facilities makes sense.

Making that linkage of a type that allows for sharing of the network by area businesses, health care providers, public safety offices, county courthouses and other government agencies would establish the foundation of the information superhighway in Colorado.

Partnering with the private sector to begin construction of a statewide communications infrastructure will require a clear recognition of that sector's perspective. As a profit-driven industry, it understandably would prefer to invest its capital only in areas of reasonably certain and immediate return on investment.

We have learned, as an example, that US West in Colorado derives 80% of its gross revenues from 30% of its customers and 30% of those same revenues from a mere 0.3% of its customers. One can intuit that business communications traffic between Denver's 17th Street and the suburban Tech Center represents the cream of the crop.

Not surprisingly, that is precisely where competitors are relentlessly eating away at US West's core of profitability. The Tech Center, for instance, has no less than six separate, independently operated fiber optic loops from which its tenants can choose to conduct their business.

While US West is fighting those battles, it is simultaneously charged with wiring Swink to Las Animas and Bayfield to Mancos, endeavors that generate little if any profit. We note that no competitors are clamoring to provide service in those areas. When the prospect of completely deregulating the industry is considered, so that market forces alone drive deployment of infrastructure to carry telecommunications, the likely impact on statewide service can be reasonably deduced.

Whereas the telephone companies have nearly 100% market penetration in Colorado, into both homes and businesses, the cable companies have less than 60%, primarily into residences. Since 80% of the state's population resides within 100 miles of the state Capitol, it is likely that most of the cable wiring lies within that radius. Neither should we overlook the gas and electric companies, who also have near 100% market penetration and are known to be looking at telecommunications possibilities, including operating their own systems.

The problem is that each of these systems is designed, built, and operated independently of all the others. Whereas in the digital age one sophisticated network could provide all telecommunications services, it still requires separate telephone, cable, and cellular networks to offer those services.

It should be noted that the cable companies' coaxial wiring is far superior for modern telecommunications usage than is the typical twisted copper pair wiring of the telcos. And most observers have concluded that, in a fully deregulated environment, cable companies

will greatly out-compete telephone companies. If that is true, a weakened profit margin would further erode the ability of the provider of last resort to service areas of the state that attract no competition.

Simply put, the telcos have more wiring, the cable companies have better wiring, and the cellular, satellite and other wireless providers believe quality service can be achieved soon without wires. It is likely that each of them will continue to play a growing role in providing services to the public, although in some areas, only telcos will be a factor unless regulatory reform is enacted and incentives for ubiquitous development are put in place.

## Conclusions

In preparing for telecommunications development, there are some critical lessons to acknowledge. Specific technology is complicated, evolves rapidly, and is a fickle suitor on which to fix our attentions. For every expert who tells us that fiber optic cable is the be-all and end-all technology for carrying signals, there are equal numbers of reputable authorities who insist that wireless is the ultimate technology of the future. We don't know, and neither do they, what the appropriate and necessary technologies are. What we need to know is what we want to do with them.

To do it right, we must focus on capability rather than specific technologies. How do we want to use the new technologies? What do we want to accomplish with them? Allow the providers of telecommunications services to determine which technologies will offer the greatest ratio of benefits to cost in meeting those needs. Stimulate competition to get it done.

The private sector, and not state government, is the ideal carrier of telecommunications services for the people of Colorado. By its nature, government is unable to respond to the rapidly accelerating pace of technological innovation that defines communications capability.

State agencies that currently provide telecom services claim that they offer great savings to the taxpayer and can carry the signals for far less than private sector providers. If they can, it is primarily because they avoid tariffs that the private sector is required to charge. Increasingly, they are offering services to other agencies and even private consumers, who are attracted by the cheaper rates. Duplication of infrastructure is inconsistent with the ultimate objective of an efficient statewide system. What communities need is affordable and reliable access to the new technologies.

The problem with duplication is exemplified in Durango, where five separately owned and operated microwave relay systems inadequately serve the community. In addition to US West, the State of Colorado, Intermountain Rural Electrification Association, AT&T and the federal government independently carry communications in and out of Durango, and the needs of the community are not met.

Not one of these systems provides sufficient bandwidth or redundancy, which are essential qualities of modern telecommunications networks. Yet, the people of Durango pay for all of them, either as ratepayers or taxpayers. In short, we have managed to

maximize cost and minimize quality.

If anyone would argue that duplicative systems adequately serve the community, Bill Lupien's example is an important reminder of how one powerful customer can be drawn away from the dominant provider's rate base by a competitor willing to offer a creative solution. If the investment that created those five duplicative microwave systems had been pooled to develop one state-of-the-art system, each individual provider and every customer would be better served.

Durango is not unique. Duplicative and inadequate infrastructure exists throughout the state, and more is being built every day.

But the taxpayers should know that, either way, they end up paying the freight. And when duplicative systems are built, they pay even more freight. When government takes business from the private sector, it is using public funds and exemption from regulation to compete with private enterprise. It is building and operating duplicative systems. Government does nothing that couldn't be done better and cheaper by the private sector in fair competition. And the telecommunications business is robbed of economic drivers that can help to deploy the infrastructure state-wide.

The perceived savings to the ultimate customer of government and the private sector, the citizen, is nothing more than smoke and mirrors. The only logical context in which the state can be a provider of telecommunications is for the state to be the basic provider, meaning that it would become the provider of last resort.

With the possible exception of its need for isolated communications requirements, the state should no more operate telecommunications systems than it should operate a telephone company. Most nations have figured that out by now and so should our state government.

Colorado government agencies should be prevented from competing with the private sector. Instead, that consumption should be added to the aggregate weight of the state's and its citizens' buying power. That way, the taxpayer, who is also the ratepayer, will pay only once and get better service to boot. Meanwhile, phasing out of state competition should be used as a negotiating tool to win infrastructure improvements from private sector providers.

Telecommunications offers our communities a unique opportunity to manage the rate, size and quality of their growth. It is smart growth. Each of them should determine how it wants to shape its own future. The appropriate role of state government should be to assist in implementing the will of the community.

We can utilize the state's taxing authority in concert with its regulatory powers to strive for a "point of presence" in every community, one that begins the electronic linking together of its essential institutions, including main street businesses, and provides them a gateway to the rest of the world.

Concepts such as "virtual enterprise zones," accelerated depreciation schedules for rural and other currently unprofitable infrastructure investments, no-cost provision of rights-of-way along state highways, and other such incentives should be considered.

We should rid ourselves of the "free lunch" approach that government is so fond of when it does business with the private sector. Cable companies, in particular, have been forced to provide service free of charge to municipalities in exchange for licenses to operate. The cost of providing free service is passed directly to the ratepayers, who are quietly subjected to a perverse sort of double taxation.

Another example can be discovered in a Request For Information issued recently by the Colorado Department of Transportation. It queried telecommunications companies as to whether provision of rights-of-way along state highways in exchange for free services to CDOT would be of interest. We believe our commissioners will take a broader view of the needs of Colorado citizens when they formulate policy on this issue.

We believe that our commissioners will see that, just as their traditional mission has been to move commerce forward by efficiently moving cars and trucks, the commerce of today and tomorrow is the movement of electronic information. An understanding of intermodal transportation will include telecommunications.

The state highway system can also be telecommunications infrastructure right-of-way. It already has been paid for by the taxpayers, who also are the ratepayers for telecom services. Should they pay twice? Or should we make rights-of-way available to telecommunications providers as an incentive to build the infrastructure we need in those areas where incentives are required to attract investment?

To commence the deployment of statewide telecommunications infrastructure, several schematics can be considered. What we are looking for is a widely dispersed presence throughout the state and considerable content to deliver. Government agencies and educational facilities immediately come to mind.

Government offers the greatest opportunity for demonstrating the cost savings and the improved services that telecommunications can provide. Simply by redefining the way it does business and reallocating existing monies in its budget, government could begin immediately to drive the deployment of enhanced telecommunications capabilities throughout the state.

One example is the change instituted by Joe Donlon at the Department of Labor and Employment. By installing a 1-800 number for people to file unemployment claims, he was able to reduce paperwork, speed up the claims process, deliver better service and save the taxpayers some \$2.5 million. And he uses a private sector provider to do it.

One can only imagine the savings that would accrue to a statewide, agency-by-agency adoption of that kind of thinking. Most of what we do at the office of the Secretary of State, for instance, could be transacted electronically. So too the business we conduct at our county courthouses, motor vehicle departments, and social service agencies.

If we can arraign prisoners in their cells, rather than paying to transport them to court, and if we can conduct sophisticated

medical examinations from hospitals on patients in their homes, then certainly there is a wide range of other services that can be provided electronically with all the attendant savings in time, travel expense, environmental impact, and facilities.

A plan to link federal, state, county and municipal government facilities would be an ideal starting point for directly involving those agencies with the citizens they serve. Unfortunately, the reality in our experience is that government often can represent the greatest barrier to creative deployment of such a system.

Institutional culture is the most ethereal and firmly entrenched resistance to change. The challenge of redirecting government is twofold.

First, we must convince agencies that are deeply settled in their ways to change old habits in preparation for utilizing the new technologies. The case must be clearly made that telecommunications can deliver better service for less money. By making that change, government positions itself to deliver massive amounts of valuable content, which is the point at which it can become an effective anchor tenant.

Second, some government agencies are actively engaged in telecommunications empire building. Convincing them to abandon the course they have set and redesign their mission is a tough sell. The competition they engage in with the private sector runs directly counter to the concept of using the government's buying power as an incentive for the deployment of infrastructure. Perhaps the Division of Telecommunications would better serve the people of Colorado by leading the charge to redesign the way state government agencies deliver their services by using the new technologies, privately provided.

At its best, a top-down system of change implemented under the leadership of state government would be the fastest and most direct route to the goal of building a statewide telecommunications infrastructure. However, it is also the most unlikely.

Rather, the likeliest course is one that partners the private sector with an aggressive grassroots movement to identify and develop potential new markets within communities across the state.

The question of cost arises when we consider these opportunities. What can we afford? Doing our homework, realistically assessing the market and then stimulating its growth, can provide us systems that save rather than cost money.

The efficiencies will be realized by building infrastructure that meets our current needs and can be upgraded for future requirements. Overbuilding a system will be costly. It is analogous to the decision a farmer faced when tractors replaced plow horses. Depending on the size of their farms, farmers chose vehicles of appropriate capability and cost. Their goal was to increase their yield, not to save money by continuing to rely on horses.

Anchor tenancy by state and other government agencies is a powerful incentive for private sector deployment of telecommunications infrastructure. It is the carrot. A reformed regulatory policy is the stick.

Regulatory reform should be focused on producing the optimum climate for private sector development of Colorado's statewide telecommunications capabilities. It must be undertaken by the General Assembly of the Colorado Legislature as soon as that body can be well enough informed to do it correctly.

The legislature first must recognize that the siren song of "total deregulation" as it is generally understood will poorly serve the future of the state. And, it must recognize that a policy which continues to permit unregulated providers to compete with regulated providers suppresses the quality of service for all but a select few. Instead, the playing field should be leveled in lucrative markets and stimulated elsewhere.

Colorado and the West are differentiated from the rest of the country in this matter because of lack of population density, the clustering of sparse populations in widely scattered urban centers, and the geographic barriers of the Rocky Mountains, which make infrastructure deployment difficult and correspondingly more expensive.

In a totally deregulated telecommunications environment, market forces will drive deployment only in select areas of the Front Range. Rather than creating a healthy climate for high technology development throughout the state, it will create greater competition for lucrative markets and abandon non-lucrative markets to a single provider of last resort, which will likely provide only the minimum permissible service.

Such a climate will create technological ghettos, fostering further social stratification rather than alleviating it. It will increase concentration of population in the Denver metropolitan area, with all its attendant burdens of increased crime, traffic, air and water pollution. It will condemn rural areas of the state to increasingly rapid decline. It will utilize the new technologies to diminish our quality of life rather than enhance it, both in rural and urban Colorado. It will snatch defeat from the jaws of victory.

The opportunity to learn from our past for the betterment of our future is in hand. Creative regulation of telecommunications is the tool. Ubiquitous statewide access to affordable and reliable telecommunications can redirect patterns of growth by providing career-building economic development, excellent education, quality health care and better government services in every community in Colorado. It can define the quality of life in our state. That is the prospect and the challenge the legislature faces in 1995.

To act judiciously on behalf of the citizens they represent, the General Assembly must reform the regulations that govern telecommunications in Colorado. In the face of pending federal legislation that could strip regulatory authority from the states, it is all the more important that Colorado implement regulatory reform that addresses its unique requirements in time to make a case for exemption from federal preemption.

It must comprehensively address the issue and avoid piecemeal solutions. The goal must be the creation of a ubiquitous statewide capability that provides affordable and reliable access for all citizens from strategically located points of presence within the state

at the earliest practical opportunity.

## Recommendations

What should be done? Our recommendations are divided into two parts:

### General recommendations

Identify a champion at the highest level of state government. One person must coordinate the executive branch with the legislature, lead the cultural change required in state agencies, and forge partnerships with private sector providers. States that have been most successful have had the personal leadership of the governor.

Complete the four-step process we have begun. If artfully directed, this process will forge the partnerships to build the right telecommunications system for Colorado affordably.

Let the private sector build the infrastructure, and use enhanced buying power of state government, as well as its regulatory control and other resources, to create the best climate for private companies to build a sophisticated, high-capacity network.

Expand state government's usage of telecommunications technologies. In addition to creating savings for government and greater incentives for private industry to build the infrastructure, this action will improve the service government provides to citizens.

Educate Congress about the unique attributes of the western United States.

### Specific policy recommendations

Redefine basic service to include universal access to new telecommunications services.

Encourage creative public and private partnerships that allow joint construction and use of infrastructure, fostering competition from the pipe to the door.

Ensure that systems are interoperable, minimize duplication, and offer reliable service.

Work cooperatively with industry to reform the state's high cost fund. Ideally, the fund's structure should maximize deployment of infrastructure while minimizing payments into it.

Consider whether distance is still an appropriate pricing mechanism in the tariff process.

Advocate federal preemption of local access transport area (LATA) boundaries where their existence inhibits rural market development.

In facing this exciting and critically important challenge, we must remember that our objective is service to the end user, which Glenn Jones so eloquently describes as that three-and-a-half pound electrochemical mass that is the brain. If the result of our efforts is to fully enable the people of Colorado to reach their potential and

fulfill their aspirations, then this government will have served them well. It has been an honor to be part of that effort.

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## Appendices

### What other States Are Doing

Almost every state is reforming its telecommunications policies. Some have already built networks, others are changing regulations in the hopes that advanced networks will be built, and still others, like Colorado, are trying to determine how government can best ensure that advanced services reach all segments of their populations.

The Task Force has collected information about other state initiatives and has compared notes with leaders from across the country. Rather than detailing what each state has done, it might be more helpful to examine the types of actions different states have taken and offer some examples of each, so Coloradans can draw from these models as best befits this state.

### Build it, own it, and operate it

Iowa spent \$100-170 million to build a network linking all state agencies and 125 sites across the state, each with the capability to transmit full-motion video (T-3). State government owns and operates the network and uses it almost exclusively for public purposes. Private organizations can access the network for videoconferences, but they cannot use the facilities to provide ongoing data links or other business services. Demand for the videoconference sites is so high that the state plans to link an additional 500 sites.

Many states, including Colorado, own and operate their own telecommunications networks. The problem is that most of these networks do not have sufficient capacity to accommodate the amount of traffic or the kinds of applications required today, and they are certainly not sophisticated enough to handle the technology of tomorrow.

### Subsidize its construction

North Carolina is spending nearly \$60 million to encourage private telecommunications companies to build a widespread, very high

capacity network. The resulting network, much of which is already operational, will be privately owned and operated by the existing service providers. The state is transferring all of its voice, data, and video traffic to this network.

Incentivize the private sector to build it

Nebraska audited public telecommunications usage and predicted its three year demands. The state then went to the phone companies and offered them a choice: build the infrastructure necessary to meet state needs, or the state would build the infrastructure itself. Industry has responded enthusiastically, and the government dismantled its state-owned telecommunications network and transferred all business to the private sector. As a result, tremendous network capacity has developed around the state, leading to expanded access to private and public entities.

Similarly, Kentucky recently issued an RFP for a network to meet state government's needs projected for 10 years. Responders must agree to a rate structure for that time period and are then free to market unused network capacity to any customer.

Change regulations and hope it gets built

Connecticut passed legislation in June 1994 which established three types of telecommunications zones: competitive, emerging competitive, and noncompetitive. The goal is to maximize the deployment of infrastructure by taking advantage of the best market conditions in each type of zone. Beyond the regulatory changes, though, there is not an activist effort by the state to seek expanded infrastructure deployment. That is, the state has not incorporated into its plan an effort to bundle state purchasing of telecommunications services.

#### Federal Legislation

Each level of government, federal, state, and local, has a role in regulating telecommunications providers. The principal federal responsibility is to oversee services which are interstate in nature, rely on use of the radio spectrum for delivery, or receive federal subsidies. Interstate long distance rates are regulated by the Federal Communications Commission (FCC). The FCC also decides how to allocate channels to television stations and cellular providers. And the Commission must approve any actions at the local, state, or federal level which affect subsidies from the Universal Service Fund, about \$600 million a year that helps provide basic service to particularly high-cost areas.

At the direction of Congress, the FCC has broad authority over national telecommunications policy. The agency recently wrote nationwide rules for the regulation of cable television operators, and it also judges whether telecommunications companies are in compliance with federal court orders like that which broke up AT&T in 1984.

This documents provides an overview of federal legislation and its prospects for success.

Congressional Action

Many consumers, providers, and federal lawmakers want to streamline the regulatory process to bring greater efficiency to the telecommunications industry. In the 103rd Congress (1993-1994), major telecommunications reform legislation passed the House of Representatives, but the Senate bill died before reaching the floor.

Both bills addressed the technology convergence which is making telephones, computers, and televisions perform increasingly similar functions and blurring the lines between once-distinct telecommunications industries. Congress wants to establish the conditions under which each can enter the others' lines of business and create more uniform rules for their operations.

Some of the issues that motivated Congress include:

The information superhighway must be built. Industry has been slow to deploy advanced technologies widely, which threatens U.S. competitiveness and stratifies Americans into technology "haves" and "have nots."

Competition is good. Telecommunications reform is predicated on the belief that competition will result in lower prices, faster introduction of new products, better customer service, and improved efficiency of infrastructure.

Competition is dangerous. The risks posed by deregulating telecommunications include (a) jeopardizing universal basic telephone service, which is now guaranteed since monopolies are required to provide it; and (b) further vertically integrating the most powerful members of the industry, a result which would likely eliminate the presumed benefits outlined above. For instance, Regional Bell Operating Companies (RBOCs), who own most local phone companies, have big market advantages in the provision of other services.

The courts are acting. Federal courts are gradually relieving telecommunications companies from federal restrictions. Congress wants to be sure the terms of opening up these businesses are consistent with its public policy objectives.

Congressional legislation would have, under prescribed conditions (a) opened local telephone service to competition, (b) allowed telcos to provide cable service, (c) allowed RBOCs to provide long distance service, (d) allowed RBOCs to manufacture equipment, (e) given broadcasters authority to use their spectrum for additional business services, and (f) let registered electric and gas utilities provide telecommunications services.

The main fight was over the conditions under which businesses could get into everyone else's markets. There are entry conditions and operating conditions. Entry conditions must exist before companies may enter other businesses (i.e., they already face competition in the markets they dominate). Operating conditions govern whether the telcos must, for instance, provide new services through separately owned subsidiaries. A main reason the House bill got over 400 votes was that the real fight over the entry standards was being waged in the Senate. Consequently, the Senate bill eventually died when those issues could not be resolved.

Outlook for 1995

These factors will influence congressional legislation in 1995:

The GOP-led communications committees are more interested in deregulation than were their Democratic predecessors.

Republicans are unlikely to proceed without an industry agreement. Look for a possible coalition of RBOCs and cable to cut a deal and steamroll a bill through.

Telecommunications has not been high on the Republican or Democratic agendas, yet it will take top-level commitment to reach consensus. The Contract With America items could keep telecom on a lower priority rung.

Clinton's people want a bill but don't seem wedded to a specific policy. That leaves the opportunity for Republicans, particularly candidate Dole, to act early on an issue where bipartisanship can be demonstrated.

Given the political importance of the telecommunications industry, legislation probably will not pass once the 1996 campaign heats up. That means Congress has 6-8 months to finalize legislation for Clinton's signature.

Congress and the Administration are making an early push to find common ground for a bill. The PR campaign says consensus will be reached. If enough people are convinced, the measure will get on a fast track and get leadership support. Any major stumbling block, however, could easily derail the bill for good.

Meanwhile, if state regulatory authority is federalized, decisions made at the federal level could neglect the unique challenges facing rural Americans who want access to advanced technologies. The effects will be severe for Western states.

Individuals and institutions interested in protecting state regulatory authority should consider two lines of action: (a) lobby Congress about the importance of having state control, stressing that individual states have different needs and must have the flexibility to address them; and (b) advertise the fact that Colorado is already addressing these issues and needs the authority to reach agreement on a policy which will achieve the same goals set by federal legislation.

#### Federal-State-Local Summit

On January 9, 1995, federal, state, and local officials will meet in Washington to discuss the role of each in regulating telecommunications. This will be an important opportunity for states to demonstrate that they have differing opinions on core issues. For instance, one state may stress deregulation and find that rural residents end up paying many times what they pay now for basic telephone service. That idea contravenes the basic goal of telecom reform in Colorado, yet it might be appropriate for a more densely populated state.

#### Federal, State, and Local Regulation of Telecommunications

The American Telephone and Telegraph Company (AT&T), was broken up in 1984 for antitrust reasons. Prior to the breakup, AT&T developed and manufactured its own equipment, provided long distance service, and was the monopoly telephone company for most Americans.

The breakup left (a) seven Regional Bell Operating Companies (RBOCs), which provide monopoly local telephone service; and (b) AT&T, which competitively offers long distance service and manufactures telecommunications equipment. The RBOCs, through what are called the "line of business restrictions," were prohibited from manufacturing equipment, offering long distance service, and providing information services (selling the content which was transmitted over their own lines). The federal judiciary subsequently lifted the information services restriction.

As the telecommunications industry has diversified and new technologies have emerged, a unique regulatory scheme has developed around each type of service. It is important to understand the disparate regulatory environments in which the different categories of telecommunications providers operate at the federal, state, and local levels.

#### Local telephone companies

FEDERAL: The Federal Communications Commission (FCC) regulates local exchange carriers (LECs) to ensure that their actions don't jeopardize universal service or violate the provisions of the AT&T breakup. The FCC, for instance, is determining whether RBOCs can provide "video dialtone," which would enable the telephone network to carry television programming. Also, the FCC caps the rates LECs charge interstate long distance companies for carrying long distance calls.

The FCC established the National Exchange Carrier Association (NECA) to administer three funds aimed at ensuring universal access to basic telephone service:

Universal Service Fund (USF), \$608.0 million in 1992. A LEC is eligible if its statewide average cost for delivering service exceeds 115% of the national average. US West serves over 95% of Colorado customers, including the low-cost Front Range. While the cost of serving a specific community may be high, that amount hardly affects the company's statewide average. Because its average cost is less than 115% of the national average, US West is ineligible for USF funds. As a result, Colorado subsidizes service to other states. Also, US West is induced to sell exchanges to companies whose statewide averages, because the companies do not serve inexpensive urbanized areas, exceed the threshold for USF eligibility. Enter PTI Communications, which is awaiting FCC approval to purchase 45 US West exchanges.

Link-Up America and Lifeline, \$15.2 million and \$93.9 million, respectively, in 1992. Link-Up helps customers pay their initial connection charges, and Lifeline subsidizes individuals' monthly bills.

STATE: Colorado allows only one LEC to serve each exchange area. The Public Utilities Commission (PUC) lets each LEC recover all its costs and earn a specified profit margin. In this monopoly environment, LECs get (a) a guaranteed rate of return on their investments, (b) the requirement that they serve every customer who wants telephone service, and (c) a mountain of regulatory burden. LECs have tight

restrictions on their accounting methods and pricing mechanisms. These mechanisms intentionally overprice some services in order to keep basic service affordable to all Coloradans.

LOCAL: LECs are required to reimburse municipalities for the costs of laying and maintaining their networks (ripping up and repaving streets, etc.).

#### Long distance providers

FEDERAL: To encourage the development of competition in the long distance market, the FCC regulates AT&T more stringently than other interexchange carriers (IXCs, the long distance companies). These extra regulations, which are gradually being eliminated, include overall price caps on interstate rates and generally longer notice requirements for changes in rates. All IXCs must file tariffs with the FCC for interstate long distance rates. Rates must be consistent nationally based on distance (called "averaging"). The IXCs are also assessed \$3.50 per subscriber to fund the three universal service funds administered by NECA.

STATE: Under flexible regulation, each carrier must give the PUC notice of changes in their intrastate long distance rates. Without objection, changes take effect in 14 days. Rates must exceed a floor set by the PUC, and they must also be consistent statewide based on distance. The averaging requirement is important, because it means that price wars in an urban area affect rates across the state.

As the principal long distance provider to rural Colorado, AT&T has a price cap and price floor.

LOCAL: IXCs are required to reimburse municipalities for the costs of laying and maintaining their networks.

#### Cable system operators

FEDERAL: Before Congress passed the Cable Act of 1992, cable operators were virtually free from federal regulation. Under the new law, the FCC has written rules governing subscriber rates, carriage of local broadcast signals, and customer service standards. Practically speaking, though, the FCC's role in regulating the cable industry is in setting the rules and adjudicating disputes over local enforcement of those rules.

STATE: Cable is not regulated by the PUC.

LOCAL: Cable is not a utility akin to electricity and telephones, so it needs local permission to access certain rights-of-way. In most cases, municipalities offer exclusive franchises to cable companies in exchange for fees, public-use facilities, and other items the entities negotiate. Where access to private property is required, cable operators are forced to negotiate with property owners on a parcel-by-parcel basis.

Local authorities wishing to regulate cable must now also certify that they will uphold FCC standards set under the Cable Act. Most are eager to do so.

The Greater Metro Cable Consortium (GMCC) has 23 member cities and sets policies for regulating cable within those communities. The GMCC has no legal authority over city council decisions, but the consensus nature of its planning process generally prevails.

#### Cellular/Wireless telephone systems

FEDERAL: The FCC licenses radio spectrum and thus governed the allocation of spectrum to mobile phone service providers in the 1980s. To spawn competition in cellular, the FCC awarded two licenses in every U.S. market, one to the LEC, and one to another applicant. Many people who received these licenses for free never intended to offer cellular service, but merely sold them to serious operators at tremendous profits.

Spectrum for the latest wireless technology, known as personal communications service (PCS) is being auctioned to the highest bidders. The current round is expected to raise as much as \$10 billion. Such high prices mean that successful bidders will face tremendous financial pressures, and relatively inexpensive technologies are likely to have hefty subscription rates. Other than awarding the licenses, the FCC does not regulate wireless services.

STATE: Cellular service is not regulated by the PUC.

LOCAL: Mobile service providers are most active at the municipal level, where they must get permission to build the many cell sites that carry their customers' signals. PCS requires many more transmission sites than cellular, so the municipal involvement will be even greater when these systems are being constructed.

#### Electric/Gas Utilities

FEDERAL: Registered utilities holding companies (with about 16 million customers nationwide) are prohibited from offering telecommunications services. Many of them already have fiber optic networks in place to handle the internal communications traffic necessary to their business (one use is real-time monitoring of anything from grid demand to individual household consumption). Utilizing the extra capacity on those networks for public telecommunications services would be a cost effective move for these utilities.

STATE: The PUC sets the rates electric and gas companies can charge their customers and determines the extent to which those companies can enter other lines of business which are consistent with federal law.

LOCAL: Utility companies are required to reimburse municipalities for the costs of laying and maintaining their networks.

#### Meetings

The Telecommunications Infrastructure Task Force relied on a wealth of human resources in designing the task force and framing its deliberations. While not all-inclusive, the following list of groups and individuals who met with Lieutenant Governor Cassidy during

this process reflects the diversity of knowledge and interests involved in the task force.

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Ken Felman, City of Arvada  
Vincent Fulginiti, CU Health Sciences Center  
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Morey Wolfson, Public Utilities Commission  
Hon. Bob Zanella, Mayor of Glenwood Springs  
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## Glossary

Access charge - fee paid to the LEC by the IXC for using the local network to originate a call placed in one exchange and terminate that call in another exchange. Access charges comprise about half the price of a long distance call.

Bandwidth - the speed and amount of information a technology can transport.

Basic service - defined on a state-by-state basis as the minimum level of service the telephone company must provide to all subscribers. In Colorado, this is voice grade, touch tone, and 2400 baud capability.

Baud - the rate at which a modem sends or receives data. Expressed in bits per second.

BPS (bits per second) - the speed and amount of information a technology can transport. Usually expressed as Kbps (kilobits per second [thousands]), Mbps (megabits per second [millions]), or Gbps (gigabits per second [billions]).

Broadband - bandwidth greater than 45Mbps, which is the minimum necessary for full-motion video transmission.

Cellular - wireless communications that connects a series of two-way radio transmissions with each other or with a wired network. A cellular conversation is a transmission from a cell-site to the phone, then from the cell-site to another cell-site, the wired network, or another phone.

Coaxial cable ("coax") - a relatively high-capacity single copper wire, such as that used to connect a television with cable service.

Compressed video - Video signals which carry only a portion of the information in order to allow them to be transmitted over low-bandwidth media. Motion in compressed video usually is blurred, and there is a slight delay when compressed video is transmitted live.

Copper pair (also known as "twisted pair") - the basic medium of telephone service. Every home telephone is connected to two small strands of copper wire; one sends and one receives the electrical impulses of the conversation.

Dedicated line - a telephone line which is rented by the month, rather than the amount of usage, to provide point-to-point, exclusive use to one customer.

Digital - the process of converting voice or video signals into binary form, represented by a series of 0s and 1s.

Fiber optics - tiny glass strands which transmit information as pulses of light instead of electrical impulses. No finite limit on transmission capacity has been identified.

Interactive - able to send and receive information (traditional television is not interactive; traditional telephone service is interactive).

Internet - a worldwide network of networks that allows any user to access any information made available anywhere on the system. Commonly referred to as the forerunner to the information superhighway.

Interoperability - seamless transition from one type of telecommunications system to another. In the competitive environment, all networks must be interoperable in order for someone using one type of service to call people who subscribe to a different system.

ISDN (integrated services digital network) - technology which allows a standard pair of copper wires to transmit and receive at 144 Kbps, or to split itself into two standard telephone lines and one data line. Available to many home telephone customers, but requires installation of special equipment.

IXC (interexchange carrier) - generally long distance companies, that is, companies which connect calls beyond the local exchange.

LATA (local access transport area) - boundaries defined at the breakup of AT&T within which RBOCs are allowed to offer interexchange service.

LEC (local exchange carrier, pronounced "leck") - the local telephone company which provides basic service to all customers in an exchange, usually under monopoly conditions.

Microwave - high-frequency radio waves used for communications. Requires a direct line of sight between sending and receiving stations.

Modem - electronic device attached to a computer that sends and receives data by MODulating digital signals into analog signals at the transmitting end and DEModulating them at the receiving end.

Narrowband - communications channel that cannot transmit high-speed data or video.

Number portability - allows a telephone customer to switch service providers without being forced to change phone numbers.

PANS - pretty amazing new stuff. This term describes the next generation of technology beyond basic telephone service, items which are available today in many places.

PCS (personal Communications Services) - the newest generation of wireless technology, the spectrum for which is currently being auctioned by the FCC. The initial application of PCS is expected to be creating wireless offices, in which computer networks, telephones, and fax machines will all function on PCS antennae instead of wires and cables.

POTS - plain old telephone service. The traditional pair of copper wires to the home, which can transmit information at 64 Kbps.

RBOC (Regional Bell Operating Company) - the seven holding companies which were created upon the breakup of AT&T to provide monopoly local telephone services.

Real Time - immediate communications, such as telephone conversations or live video transmissions. Communications which don't require real time, such as facsimile transmissions, can utilize slower speeds.

Switch - equipment that routes communication paths between separate users. When someone picks up the telephone to call a neighbor, a switch at the telephone company's central office connects the caller's telephone line with the line of the person being called.

T-1 - a dedicated line requiring two pairs of copper wires, and transmitting at 1.544 Mbps. The equivalent capacity of 24 standard telephone lines.

T-3 - a dedicated line offering the equivalent of 492 standard telephone lines, or 45 Mbps. Bandwidth is sufficient to transmit full-motion video



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