UNIVERSAL SERVICE TO UNIVERSAL ACCESS

THE PARADIGM SHIFT IN CITIZENS' USE OF TELECOMMUNICATIONS

State of Arizona

Contract No. A6-0028-001

by

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International Research Center
Tempe, Arizona

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Every few hundred years, throughout Western history, a sharp transformation has occurred. In a matter of decades, society rearranges itself. Its world view, its basic values, its social and political structures, its arts and institutions. Fifty years later, a new world exists. Our age is such a period of transition.

Peter Drucker in the Harvard Business Review

STATE OF ARIZONA

GOVERNOR'S OFFICE
OF TELECOMMUNICATIONS POLICY

FIFE SYMINGTON
GOVERNOR

JOHN B. KELLY
EXECUTIVE DIRECTOR

PREFACE

When the Governor's Office of Telecommunications Policy was created, its organic mission included the development of strategies to ensure that the benefits associated with information technology would be broadly available to all of Arizona's citizens. The issues of Universal Service and Universal Access present extraordinary challenges to state policy makers. But the rewards of meeting those challenges will be rich indeed.

This study, performed with speed and professionalism by International Research Center of Tempe, Arizona, establishes an unprecedented foundation of data and thought on the topic of Universal Access. It assesses our past, our current day efforts, and then begins to explore the possibilities in our future.

The implications of policy decisions in this area are enormous. They will affect the future directions of education, health care, social services, and economic development. Our best hope lies in strategies that work within the constraints of a competitive marketplace with a minimum of distortions.

The opportunity for creative policy solutions is at hand. This superbly researched and prepared document will give Arizona's policy makers the tools they need to make informed and visionary decisions.

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Executive Summary:

> Our most successful experiments with universal access have been with telephony and broadcasting. And now more homes have TV sets than have indoor plumbing. And an extremely high percentage of homes have telephone services, even in poor and rural areas. To the extent that that service approaches universality, the value to every customer is enhanced. To the extent that digital services available over broader bandwidth connections become as crucial to the America of the next century as telephone service has been during this last half-century, the definition of Universal Service should expand. Just as with telephony, the higher the percentage of homes and businesses that can access and afford a connection to the so-called information superhighway, the more valuable that resource is to every home and every business.
>
> Al Gore, Vice President of the United States, in Forbes ASAP, December 4, 1995

Arizona is in the midst of vast change driven by advances in telecommunications technology. In the last decade, telecommunications and technology companies have provided new means of information delivery and human interaction, new types of investment and infrastructure, new reliance and expectations on the part of consumers and businesses alike. The next decade promises more of the same. The bandwidth of fiber optic cable, the flexibility of wireless signal delivery, the ubiquity of the personal computer as information appliance, the great global net of interconnectivity will drive the evolution of new applications, markets, governmental responsibilities and even social structures beyond what most may imagine.

As basic phone service became more common and access to it became increasingly important to modern life, the desire to make that access available to all lead to the development of Universal Service in telecommunications. For most of this century it has aided rural communities as well as low income and disabled individuals to enjoy the benefits of basic telephone connectivity with its ability to reach out to the world beyond. The definition of Universal Service has remained relatively stable until recently. The rapid pace and scope of developments in telecommunications are forcing a reevaluation as the marketplace moves towards deregulation, the number of competitors increase, and more advanced services are developed and deployed. Access to Information Age services and resources is becoming as important today as access to basic telephony was in earlier times. Thus, the concept of Universal Service must evolve in order to continue aiding those segments of the population with special needs.

Today, we struggle to operate under the legal framework of laws, regulation and court decisions that oversaw the telecommunications industry in a simpler and more stable era. Now increasingly outmoded for the more complex environment in which we find ourselves, some of the necessary changes become evident. With a multiplicity of market entrants and methods of telecommunications service delivery, the dismantling of some long standing government oversight and control is necessary to reduce the regulatory burden and let markets develop and flourish. However, there remain areas in which government must still protect the public interests, where the government must review and renew its delivery of services and finally, where the government must reengineer itself, utilizing modern models and tools, to meet these needs in a cost effective manner.

The purpose of this study, as mandated by the Arizona Legislature in 1995, is to inform and guide the Legislature and other public policy participants in developing Arizona's telecommunications policy by:

- Reviewing the historical context in which Universal Service developed
- Describing the current status of Federal and state government programs designed to implement and manage Universal Service
- Analyzing the potential significance and impact of pending Federal legislative and FCC initiatives
- Examining the issues states are debating now and key initiatives that have surfaced to redefine and expand the scope of traditional Universal Service

To determine the current state of Universal Service and the best thinking on its future, International Research Center interviewed Commissioners or senior staff members from the Public Utility Commissions of each state and the District of Columbia. These interviews provided a wealth of data on the current programs, pending changes and future thoughts of each states' regulatory scene. Individual state reports may be found in Appendix E, but the comparison and analysis of these interviews combined with state demographic data appears in the section Universal Service Around the Nation.

To augment this regulatory focused perspective, we reviewed a vast array of published literature, consisting of books, articles, position papers and industry analyses to glean current thinking and trends on Universal Service and related issues. In addition, many government agencies, industry trade associations, telecommunications providers, academic and public policy institutes were contacted to provide background, references, publications and their current thinking. We incorporated that material throughout this document and provide appendixes containing the bibliography and a telecommunications policy resource guide to aid further investigation in this rapidly evolving environment. In addition, we invited position statements from over a hundred organizations and enterprises, resulting in thirty submittals representing a wide variety of views and interests, available for your review in Appendix D.

An analysis is presented of the importance of telecommunications infrastructure and applications to regional economic development, the prosperity derived from developing and retaining high technology industry, and the rise of the virtual corporation. Then, to better enable the public policy reader to look beyond the horizon, we survey Data Points, Trends and Portents, showing the range of services and applications now available, their market penetration, likely competitive entrants, and what one might expect to see in the future. Hopefully, this will prove an aid in understanding the increasingly vital role advanced telecommunication services is coming to play in the life and livelihood of the average citizen.

The expected adoption of rules next year by the Arizona Corporation Commission should establish a formal and well structured Arizona Universal Service Fund that is designed to accommodate the entry of competitive providers into the local exchange market. Arizona will join some 16 other states with well established programs. Notably, some states have expanded the scope of Universal Service by utilizing excess revenues or fines imposed on carriers for service quality issues, to fund access to advanced services. Arizona should pursue its ability to act in a similar manner. Pending Federal legislative and Federal Communications Commission initiatives may soon play a significant role in tuning and redefining the traditional Universal Service concept, though it remains unlikely that they will sufficiently broaden its reach to incorporate a full range of advanced telecommunication and information applications.

The individual states can take the initiative in the transition of Universal Service to Universal Access by promoting the availability of public information, always essential to the fostering of democracy and development, as well as insuring access to such information and advanced telecommunications services to their rural communities and to their public institutions, and through those institutions to the citizenry at large. States can not provide or fund all the necessary advances and should look to public-private partnerships to help advance the deployment of services and the ubiquity of access desired. States can also foster market-sensitive approaches by policies that reduce regulatory barriers and by designing incentives to encourage service providers and market forces to bring new services to the broadest possible consumer base, retaining to as great an extent as possible equity in available services and costs across rural as well as urban areas.

Development and Institutionalizing of Universal Service:

Historical Context:

The term "Universal Service" was introduced in 1907 by Theodore Vail, then President of AT&T. However, in the early twentieth century it had quite a different meaning in practice. Due to basic incompatibility or a lack of interconnection, competing local phone companies could often not connect their respective customers to each other. "Dual service" or subscribing to both services with the attendant duplicate wiring and equipment was common, especially for businesses. Thus, Universal Service at first meant compatibility and interconnectivity of competing phone services that we today take for granted.
It was only later that the term "Universal Service" became associated with a social compact to connect those disadvantaged by geography, income or other factors.

The Mann-Elkins Act of 1910 gave regulatory jurisdiction for interstate telecommunications to the Interstate Commerce Commission (ICC), defining telephone companies as "common carriers" who were "to provide service on request at just and reasonable rates, without unjust discrimination or undue preference." The Communications Act of 1934, though not naming "Universal Service" specifically, lays out its basic tenets "so as to make available, so far as possible, to all people of the United States a rapid, efficient, nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges." Establishing the separate Federal Communications Commission, the act gave the commission new powers to regulate tariffs and services but expressly limited federal authority to interstate service. In 1994, the sixtieth anniversary of the Communications Act of 1934, President Bill Clinton said:

> When President Franklin D. Roosevelt signed this historic legislation so many years ago, few realized the dramatic changes in communications that the future would hold. Yet that stroke of the pen ushered in the beginnings of the Information Age, an era in which vast amounts of knowledge flow freely across continents and circle the globe in a matter of seconds.
>
> Today, as we celebrate the vision of the authors of the Communications Act, we are still defining the role that telecommunications technology will play in our society. With a universe of electronic information at our fingertips, we can better educate our people, promote democracy, save lives, and create jobs across America. As we work to enhance the partnership between the public and private sectors, we continue to draw inspiration from the original Communications Act, which has long served to benefit all of our citizens and to propel our nation into the future.
>
> (Federal Communications Law Journal, Vol. 47, No. 2, December, 1994)

There subsequently developed a series of programs, structures and protocols to encourage and enforce the expectation that basic local and long distance telephone service be available to all. The major components

insuring ubiquitous availability of plain old telephone service (POTS) and other consumer services such as "free" broadcasting have been as follows:

Universal Service Fund (USF):

The Federal Communications Commission (FCC), anticipating the breakup of the Bell System, established the National Exchange Carrier Association (NECA) in 1983 as a membership association of local telephone companies. NECA is a non-profit company directly regulated by the FCC to establish and administer interstate access revenues, access charge pooling and administer the Universal Service Fund (USF) to provide assistance to telephone companies in high-cost areas (primarily rural, but defined as those with costs in excess of 115 percent of the national average). The funds are collected from major long distance carriers and administered and dispensed by NECA. The funds are used to extend telephone service to previously unserved areas, help pay for system extensions and to keep basic rates low.

Due to concerns about the Universal Service Fund's overall growth rate and annual growth fluctuations, the FCC adopted interim rules in December 1993 imposing an indexed cap on Fund payments for 1994 and 1995 pending completion of a broader proceeding on reforming the high cost area telephone assistance program. The USF expense adjustment for 1994 was projected as $741.5 million, however it was limited by a cap of $725.4 million. The USF expense adjustment for 1995 was projected as $777 million and capped at $749.2 million. The Arizona USF assistance for 1995 (capped) is $14.5 million.

NECA has had a policy of encouraging the investments of small telephone companies in new technologies. In their most recent study of telecommunications infrastructure (1993) covering 1194 small telephone companies, NECA tracked the deployment of fiber optics, digital switching and digital services. The study revealed that, despite their limited customer base and fairly broad service areas, NECA member companies continue a high rate of investment in modern central office switching, outside plant and signaling systems. Over 65 percent of these small telephone company customers had equal access to competitive long distance carriers up from 35 percent in 1991 (the FCC reports in February 1995 a 90% conversion for independent phone companies) and over 91 percent had access to digital switching.

> An evolving definition of Universal Service should be the foundation of a future national telecommunications policy. With technological advances making new services more affordable, subscribers are no longer content with "plain old telephone service." No community should be denied the opportunity to participate in and benefit from this exciting new network of the future.
>
> NECA 1993 Study - Building the Telecommunications Infrastructure of Rural America

Lifeline Assistance Programs - SLC Waivers and Link-Up America:

The Lifeline Assistance Programs are designed to aid low income residential subscribers. Again, funds are collected from long distance carriers and administered by NECA. Each state decides whether to participate and its public utility commission sets policies and guidelines governing the specific program implementation in that state.

As of April, 1989, the Subscriber Line Charge (SLC) for all residential subscribers to the public switched network rose from $1.00 to $3.50. To prevent subscribers from being forced off the network, the FCC established an SLC waiver program in 1985 where those customers meeting a state determined means test would have the full SLC charge waived if the state provided an equal reduction in either local service charges, connection charges or deposit requirements. NECA reports that in 1994, the SLC waiver fund was $123.4 million providing an average $2.34 per month in assistance to 4.4 million subscribers in the

35 participating states, the District of Columbia and the Virgin Islands. In Arizona, 9,146 subscribers benefited from $308,402 in SLC waiver subsidies last year.

The second program, Link-Up America, attempts to reduce the entry barrier for new low income subscribers by paying half the cost of telephone installation and connection charges up to $30. Though the participants must again qualify under a state determined means test, the state is not required to further contribute to reducing the hookup costs. A second part of the program covers the interest charges for any deferred payment plan on installation and startup costs that the telephone company provides (within specified limits). NECA reports that in 1994, the Link-Up America program fund of $18.6 million covered 839,470 subscribers in the 48 participating states, the District of Columbia, Puerto Rico, and the Virgin Islands. In Arizona, 367 subscribers benefited from $8,533 in Link-Up America subsidies last year.

Various studies have shown that these Lifeline Assistance programs have indeed had positive effects in getting subscribers onto the networks and in keeping them connected. States not participating in either program have shown lower level of total subscribership, especially for those households on public assistance.

U.S. Department of Agriculture Rural Telecommunications Financing:

Since 1949, the Rural Electrification Administration (REA) of the United States Department of Agriculture (USDA) has provided loans to small telephone companies serving rural areas to assure the availability of affordable, high quality service. Approximately 950 loans have been provided at interest rates below market, even below the cost of money to the government. This has led to over 96 percent of U.S. farms having telephone service and allowed the formation and survival of many small rural telephone companies as cooperatives. These coops would otherwise be unlikely to raise sufficient capital to initially build or modernize without access to such subsidized loans. If original qualified borrowers are acquired by larger telephone companies, these firms can continue to receive subsidized capital to modernize their rural areas.

Still, for the estimated 65 million Americans living in rural communities, problems remain with access to advanced telecommunications services. Most rural Americans still find online and Internet access prohibitively expensive since they must pay for a long-distance call to the nearest “point of presence.” Further, while almost 80% of libraries in cities over 250,000 inhabitants have some Internet connectivity, only 17% of rural libraries do. The availability of high speed connections (i.e. - ISDN, frame relay, T-1, T-3) for rural institutions and businesses usually lags urban availability within a region, though some small LECs are upgrading faster than the BOCs.

The USDA’s Rural Utilities Service (RUS) in FY 1994, used $12.2 million in funds to generate more than $500 million in Federal loans and loan guarantees, which in turn leveraged $2 billion in private investment in rural telecommunications infrastructure. In a typical year, RUS borrowers provide initial telecommunications services to over 62,000 families, install 6,000 miles of fiber optic cable, and purchase over 200 new digital switches. RUS also has a Distance Learning and Medical Link Grant Program which in FY 1994 made $10 million in grants to rural schools and health care providers to connect them to the National Information Infrastructure leveraged with an additional $15 million of private investments.
They have proposed a new $100 million loan program for FY 1996 to further finance their goals of rural connectivity. The U.S. Department of Health and Human Services (HHS) also has a Rural Telemedicine Grant Program managed by their Office of Rural Health Policy. (Source: USDA RUS publications)

In addition, the USDA is developing a new Rural Business Telecommunications Partnership Loan Program to leverage government loans with rural investment capital to fund locally shared, end-user telecommunications facilities. The purpose of this program is to provide access to advanced

telecommunications services and computer networks to improve rural job opportunities, stimulate local economies, and give rural businesses the opportunity to compete nationally and globally. An industry trade association, the National Rural Telecom Association (NRTA) has as its primary role the preservation of REA's role as the major provider of funds for rural telephone services.

Rate Averaging and Internal Cross-Subsidization:

State Public Utility Commissions require Local Exchange Carriers to charge the same rate for residences located throughout the often large geographic areas that each serves. This reallocates the actual costs to equalize or average rates across the LEC's service area independent of customer density and distance from switching offices, in effect subsidizing high-cost rural customers.

The Local Exchange Carriers are also closely regulated by the states as to approved tariffs, price caps and rate of return on their investments. LECs are allowed to charge fees above their cost for providing access to long distance carriers and the toll services charged to residential subscribers, with these revenues used to hold down the cost of basic residential service.

Assistive Technology for the Disabled:

Many Americans have physical disabilities which require special consideration in telecommunications as well as in other areas. With the growing percentage of older Americans, it's likely that the need for enhanced services and assistive technology will grow. In 1990, Congress passed the Americans with Disabilities Act (ADA) mandating the availability of interstate and intrastate telecommunications relay services to aid individuals with hearing and speech disabilities. In 1994, the Technology-Related Assistance Act was reauthorized. The United States has established the principles of a disability policy that stress inclusion, not exclusion; independence, not dependence; and empowerment, not paternalism.

The FCC adopted standards for Telecommunications Relay Service (TRS) providers, set forth a state certification program and appointed the National Exchange Carrier Association (NECA) to administer a fund. All common carriers contribute to the TRS fund on the basis of their interstate revenues. TRS providers then draw from the fund and include local telephone companies, long distance companies, state relay agencies and non-profit agencies operating state TRS programs. In operation, the individual with hearing or speech disability uses a text telephone (TTY) to call a toll-free TRS provider. A Communications Assistant (CA) then acts as speaking intermediary in placing the call to the intended destination and mediating the communication between the parties. States often oversee the availability and distribution of TTY terminals. Also, in most states, there are reduced telephone rates for handicapped subscribers and directory assistance charges are waived.

The FCC has long required that pay phones and emergency phones be compatible with hearing aids. Under a current proposal, most business telephones would be required to be hearing aid compatible by January 1, 2000 and existing business phone systems upgraded by 2005. Because this compatibility refers to the placement of an electromagnetic coil in telephone handsets, it is only effective with the estimated 1.8 million users of hearing aids containing a complementary electromagnetic coil (T-Coil). It does nothing for the balance of the 6 million hearing aid users (out of a total of 28 million Americans with hearing loss), but volume amplification controls and other technological solutions can offer some assistance.

The mandating of closed-captioning capability for most new television sets also aids the hearing impaired with the textual display of a programs audio content for an increasing proportion of the television programming

delivered. A side benefit of such text displays can be the teaching or augmentation of reading skills to those not proficient in the English language.

Broadcast Radio and Television:

Broadcast radio followed by television has primarily been sent out to the public at no cost, being supported by advertisers (or in the case of public radio and television by government, public institutions, sponsors and listeners). Once one bought the receiving radio or television, the only residual cost was a modest amount of electrical power. Some of the same rural availability issues remain, but by and large, consumers have had free access to an enormous wealth (some would say dearth) of programming material. The advent of cable television altered the model, charging a basic fee for connection and programming as well as premium fees for extended services, however local broadcast options have remained free and available. Satellite broadcasting to consumers with dishes now down to 18 inches in size and sold for less than $600, helps solve rural access by equalizing access costs (though the entry barrier still remains too high for the economically disadvantaged). Though not part of the formal definition of Universal Service, and largely unidirectional in information and entertainment delivery, these broadcast mediums have set the stage for consumer expectations, broad media and visual literacy, and more advanced, interactive services to come.

Libraries as Public Repositories and Access Points:

> As we approach the 21st century, a momentous telecommunications revolution is taking place. Electronic technology can help you find a job in another state or read the Congressional Record online. It can connect a student to the local library or the Library of Congress.
>
> But what if that child's parents or school can't afford a computer? What if you don't have one in your home or don't know how to use one? The information superhighway promises vast riches of information, but it also threatens to widen the gulf between "information rich" and "information poor." Our forefathers and mothers knew it made good sense to invest in libraries as a shared community resource for books. It makes even more sense to support libraries in acquiring the powerful and expensive technology needed to obtain electronic information.
>
> Nothing is more important to the future of democracy than ensuring public access to information. That is why we need our nation's public, school, college and university libraries online. The technological revolution is happening **now**. And now is the time to support your library and all libraries in their efforts to ensure equity on the information superhighway.
>
> Betty J. Turock, President, 1995-96, American Library Association (ALA)

Public libraries have long supported the continuing education of the common man and the essential values of lifelong access to informational resources for education, business pursuits and literary entertainment. In recent years, libraries have increasingly automated access to their "card catalogs" allowing more accurate and versatile entry to their wealth of resources. In many cases, they have or will soon have public dial-in (and/or Internet) access to their card catalogs and other online resources, so one may explore a libraries holdings remotely before one visits. Trends in recent years have been to enhance publicly available collections with both audio and video material for loan, but also to have CD-ROM or other computer accessible information resources available to the visiting public at terminals and computer workstations or even by remote dial-in access. Hard copy serial collections are frequently reduced to pay for electronic versions of journals and magazines, but often a broader range of materials become available as the access becomes more precise and efficient. In the future, government entities will make increasing volumes of public information available but may or may not provide the means of

access (i.e.- public kiosks), thus libraries seem the most logical venue to invest in and develop so as to support and expand public access
to advanced information resources.

Pending Federal Legislative and FCC Initiatives:

> Tantalizingly close to toppling the cable/telco cross-ownership ban once and for all, Local Exchange Carriers wait for the courts, Congress and/or the FCC to cut them loose from legal limbo. The inevitable march at the federal level toward opening the video marketplace has competitors scrambling to ensure anti-competitive safeguards are in place. State and local governments also are sounding warnings that they have jurisdiction over intraLATA services
> and they don't intend to see their authority preempted.
>
> Deborah Ely, Washington Editor in America's Network, February 15, 1995

Is the 1995-96 legislative session the year that the Communications Act of 1934 is finally updated? Attempts last session faltered and no action was taken. The same may happen again. On June 15, 1995 the Senate approved telecommunications reform legislation, S. 652 by a vote of 81 - 18. On August 4, 1995 the House approved its version H.R. 1555 by a vote of 305 - 117 including the Manager's Amendment which substantially alters some of the original intent. A conference committee has been selected consisting of 11 senators and 9 representatives, though an additional 25 House members will participate in portions of the negotiations for a total of 45 conferees.

The outcome remains uncertain and this session is proving a busy one with the budget crisis, welfare reform, Bosnian peacekeeping efforts and other issues at the fore. Even if the conference committee produces a bill that both houses can and do pass, the president has threatened a veto over cable rate deregulation, media concentration, and the terms under which the RBOCs can enter the long distance market. The total federal legislative telecommunications reform effort is enormously complex with
wide-ranging implications beyond the scope of this study. We will concentrate here on elements that concern the role and evolution of Universal Service.

Both the Senate and House versions direct a Federal-State Joint Board, comprised of three federal and four state representatives, to recommend a definition of and funding mechanisms for Universal Service to the FCC. The House version includes an additional state appointed utility consumer advocate representative. After enactment of legislation, the Board has 270 days to submit its recommendations and the FCC one year to complete any related proceedings. The House bill gives the Board a five year life shifting oversight to the FCC, whereas the Senate envisions an ongoing role.

Both measures seek to promote "reasonably comparable services for the general public in urban and rural areas, while maintaining just and reasonable rates." The Senate version goes farther in asserting that "access to advanced telecommunications and information services should be provided in all regions of the Nation" and that "citizens in rural and high cost areas should have access to the benefits of advanced telecommunication and information services for health care, education, economic development, and other public purposes." In advancing those goals, the Senate version provides for special telecommunication access rates for rural health care facilities, most schools and libraries. While the House bill directs the Joint Board to recommend "specific and predictable mechanisms to provide adequate and sustainable support for Universal Service" and requires that all carriers make "equitable and nondiscriminatory contribution," the Senate version is more specific regarding contributions to and payments from a Universal Service fund. Senator John McCain of Arizona had offered a failed amendment that would have replaced the current system with a need-based voucher system, though the conference committee may revisit this proposal.

While both bills seek to address the difficult definition of future Universal Service capabilities, the Senate version is more forward looking and adaptive in requiring that the determination of included service elements be driven by "advances in telecommunications and information services" which "are essential for Americans to participate effectively in the economic, academic, medical, and democratic processes of the Nation." The Senate bill also allows the states to provide for additional conditions to advance Universal Service as long as these additions are paid for by the state and don't conflict with Federal rules. The Manager's Amendment to H.R. 1555 requires that the interest on escrow deposits received by the FCC for its spectrum auctions be used to establish a Telecommunications Development Fund. The fund would provide access to capital (as the REA does for rural telcos) for small businesses in order to enhance competition in the telecommunications industry. The Manager's Amendment further allows states to waive the rural telco exemption from interconnection/unbundling requirements and changes the standard of access by the disabled from "undue burden" to "readily achievable."

> I voted for this important legislation because it seeks to promote competition in practically all telecommunications markets. It also reduces the federal regulatory burden on communications firms. As a result of more competition and less regulation, American consumers will benefit from a greater choice of telecommunications services with lower prices and higher quality than is presently available. The legislation will allow local telephone companies to compete with cable companies to supply video services to homes across America. Once local telephone loops are open to competition, Bell operating companies would be allowed to compete in long distance and manufacturing markets. The bill also provides for the timely entry of Bell operating companies into electronic publishing and alarm services. Despite passage of both Senate and House measures by overwhelming margins, controversy over selected provisions contained in the telecommunications reform measures insure that further modification of the legislation will be sought during the House/Senate conference.
>
> John Shadegg, Congressional Representative, 4th District, Arizona

Pending FCC Initiatives:

The Federal Communications Commission (FCC) has also entered a process to review and revise Universal Service in response to some shortcoming in hoped for telephone subscribership rates and in anticipation of competitive local markets. On July 13, 1995 the FCC adopted two Notices of Proposed Rule Making (NPRM) and a Notice of Inquiry (NOI) regarding Universal Service. The comment and reply period for all three have now concluded, but subsequent action has not yet been taken. The FCC will eventually refer its proposals to the federal-state joint board on jurisdictional separations for a recommended decision.

Increase Telephone Subscribership:

Notice of Proposed Rule Making (NPRM) FCC 95-281 seeks to address the fact that while the average telephone subscribership rate is 94%, it is substantially lower for certain population groups, namely African-American, Hispanic and Native American households as well as those who are unemployed, receive public assistance or are "mobile" in their lifestyle. Many households without phone service were once connected but subsequently disconnected for failure to pay long distance charges. LECs could be prohibited from disconnecting local service for non-payment of interstate long distance charges (already prohibited in Arizona by Administrative Code section R14-2-509 subsection 1c) or required to offer interstate long distance blocking options or preset monthly limits on time or expenditures.

The NPRM also seeks to explore the feasibility of revising or expanding Link-Up America to better serve low income subscribers in connecting (or reconnecting) phone service and similarly adapting Lifeline Assistance with

the aim of improving their retention as consistent subscribers. Significantly, the FCC also will review expanding Lifeline Assistance to cover multi-line public institutions, such as schools and libraries, taking into account their community role within the National Information Infrastructure.

Reconsidering the USF for High Cost Areas:

Notice of Proposed Rule Making (NPRM) FCC 95-282 and its attached Notice of Inquiry (NOI) exhibit the FCC's interest that the distribution of the Universal Service Fund (USF) be more equitable and efficient and its concern that the current implementation of the fund in providing assistance to Local Exchange Carriers in high cost areas may act as "de facto barriers to competitive entry." The FCC states four principles to consider in evaluating its proposals:

- Assistance should be properly targeted so that support is given only to those service providers or users who need assistance to maintain local service.
- To promote efficient investment and operation, assistance should be delivered on a basis that is technology-neutral in order to avoid encouraging investment in specific types of facilities or technologies when other means could deliver local service at lower cost.
- To avoid suppressing usage of interstate toll services, the provision of high-cost assistance should not impose excessive subsidy costs upon interstate carriers and ratepayers.
- Our high-cost assistance rules should not impose barriers to competitive entry into local telecommunications, nor otherwise disrupt normal market forces.

Currently, USF subsidies are provided to LECs based on their reported costs to provide phone service in high-cost, primarily rural, areas. The FCC is considering a "high-cost credit," essentially a voucher, for each individual subscriber line in high-cost areas, allowing customers to choose a LEC who would then receive that credit. The high-cost credits may be limited to areas where local competition is established but issues as to determining the presence of competition and defining minimum service commitments remain.

The FCC is interested in more precisely targeting high-cost areas and may move from variable and usually large geographic areas to "Census Block Groups" of from 250 to 550 housing units as a basic geographic unit for which to calculate costs of service and subsidy levels. The current calculation are based on the LEC's reported costs of service but are being reconsidered. In the future, they may employ stricter guidelines in determining the LEC's costs or move to the use of proxy factors (such as subscriber density per square mile, average distance from nearest wire center, terrain, and climate) to calculate an objective high-cost basis independent of actual LEC costs. Yet a third option would be to apply such proxy factors to determine total support levels to be provided to each state, distribute the equivalent of block grants, and allow state Public Utility Commissions to design their own plans, in accordance with FCC guidelines, for distributing assistance to the LECs servicing high-cost areas.

The Dial Equipment Minute (DEM) weighting rules, allowing LECs with study areas of no more than 50,000 access lines to allocate a higher percentage of local switching costs to the interstate jurisdiction, may be revised or eliminated. And once competition for local telephone services is established, a system of competitive bidding by LECs to act as a "carrier of last resort" in specific Census Block Groups may be implemented. In an effort to control USF expenditures, assistance to any area that would total less than $1 per line per month may be eliminated. Also under consideration is an indexed cap for the total USF with adjustments in eligibility thresholds to keep within that level. And finally a proposal is included to means-test Universal Service assistance for the intended individual telephone subscribers.

All in all, an enormous range of Federal legislative and regulatory reconsideration of telecommunications issues is underway, which will affect the definition and manner in which Universal Service is provided for decades to

come. Unfortunately, until the results of the Congressional conference committee are known and the proposed legislation is acted upon, matters are not likely to become much clearer. Even then, it will take a year for the new Federal-State Joint Board to make its recommendations and the FCC to complete related hearings. If telecommunications reform legislation passes this session, matters will become increasingly well defined and understood through calendar 1996.

> The ostensible goal of Universal Service is to make sure Americans of meager means can procure essential telecom services in high-cost areas at "just and reasonable rates." Fine and dandy. But does this require perverting the economic foundations of a $100 billion industry? Has anyone asked whether there is a more direct way to help the poor, such as means-tested vouchers that can be used to procure services on the open market? Food is more important than phone calls, but we sure don't ship food stamps directly to Stop-and-Shop and Grand Union based on some weird geo-political formula of hard-to-feed locations. Yet that's exactly what we do in the telecom business.
>
> Why is it that the regional Bells haven't adapted readily available technology to solve the problem of delivering basic services to high-cost areas? Could it have anything to do with the fact that all their costs get buried in the rate base, giving them a powerful economic incentive to remain inefficient? And just how is it a newcomer is supposed to compete if they can't outperform the incumbent in exactly those markets that are being uneconomically served? If telecom prices were allowed to reflect costs directly, undistorted by hidden taxes and subsidies, both the issues of cream skimming and red lining would go away.
>
> Bill Frezza, President of Wireless Computing Associates in Communications Week,11/27/95

Universal Service in the State of Arizona:

Over the last decade residential telephone subscribership in Arizona has caught up with national penetration averages. Between 1984 and 1993, the percentage of Arizona households with telephones rose from 86.9% to 93.4% (up 6.4%) while the national average rose from 91.4% to 94.2% (up 2.3%). In 1993, thirty four states exceeded Arizona's subscribership rate ranging up to a high of 97.3% (Pennsylvania). (Source : FCC Trend Report, February, 1995)

The Arizona Corporation Commission (ACC) is authorized by the state's constitution (Article XV) to "prescribe just and reasonable rates and charges to be made and collected, by public services corporations." Under its constitutional charter it is effectively another entire branch of state government with three popularly elected commissioners serving staggered, six-year, non-consecutive terms. Up until now, Arizona has not had as structured and rule-based a Universal Service fund as some states. A fund contributed to by LECs and toll service providers (but not by all connected to the public switched network) developed out of a Contel rate case in the late 1980's. They were acquired by GTE and subsequently, the service of the "study area" passed to Citizens Utility, who currently receives a rate subsidy of almost $750,000 a year. They are the only firm supported from the current state Universal Service fund.

The Arizona Corporation Commission (ACC) worked with industry and consumer groups to develop a more comprehensive Universal Service policy and this past summer moved to establish a new Arizona Universal Service Fund (AUSF). Its purpose is "primarily to assure the availability and affordability of basic local exchange telephone service in areas that are predominantly rural" and to broaden the base of telecommunications providers contributing in a competitively neutral manner. The proposed rules will be before the commission in the first quarter of 1996 with attendant public hearings. Section R14-2-1201 of the rules defines the required features of "basic local exchange telephone service":

- Access to one-party residential service with a voice grade line
- Access to touch-tone capabilities
- Access to an interexchange carrier
- Access to emergency services (including but not limited to emergency 911)
- Access to directory assistance service
- Access to operator service
- Access to a white page directory listing
- Access to telephone relay systems for the hearing impaired

The rules require that all telecommunications service providers that interconnect to the public switched network provide contributions to the AUSF. Providers of basic local exchange service (or equivalent service) will provide one-half of the AUSF funding based upon total access lines (including business, residence, wireless, public access and others) assessed as an access line surcharge. This incorporates all wireless providers (including cellular, paging and Commercial Mobile Radio Service) that interconnect to the public switched network as well as any non-traditional providers (such as cable television companies) that choose to offer basic local exchange telephone service. A second category consisting of providers of intrastate toll service will provide the other half of the AUSF funding assessed as a percentage of their total Arizona intrastate toll revenue. All other types of telecommunications service providers that interconnect to the public switched network after the rules take effect can select which category of service provider they will join, irrevocable for at least 3 years.

Any Local Exchange Carrier (LEC) may seek AUSF support in conjunction with a rate request. The amount of support will be based upon the difference between the benchmark rates for basic local exchange telephone service provided by the carrier and the appropriate cost to provide service as determined by the ACC, minus any Universal Service support from federal sources. For small LECs (20,000 of fewer AZ access lines), the AUSF support area includes all exchanges they serve. For intermediate LECs (more than 20,000 but less than 200,000 AZ access lines), the AUSF support area will be either all exchanges they serve in Arizona or a differently defined support area as approved by the ACC. Any requests by intermediate LECs for AUSF support more than three years after the new rules become effective or by large LECs (more than 200,000 AZ access lines) any time after the rules become effective, will be based on U.S. Census Blocks (small geographic areas) and the Total Service Long Run Incremental Cost, based on incremental costs given that the requester is already providing other services and is further based on the least cost, most efficient technology capable of being implemented at the time.

Once the ACC approves AUSF support to a provider for a defined area, that support will also be available to competitive providers calculated on a per customer basis, at the same level at which the incumbent provider receives support. US West will serve as interim Administrator of the AUSF for a transition period pending appointment of a private, neutral third party no later than July 1, 1996. The ACC will review the implementation of the AUSF within three years to recommend any necessary changes.

The Federal Universal Service Fund (USF) assistance (or jurisdictional shift) from the National Exchange Carrier Association (NECA) for Arizona in 1995 (capped) is $14.5 million. Direct subsidies are provided to Local Exchange Carriers servicing high-cost areas, whose costs exceed 115% of the national average. NECA's 1995 disbursements are based on 1993 year end costs. The estimated 1996 figures are based on 1994 year end costs and still subject to modification by pending cap adjustments and USF rule alterations.

	1995 $	Est. 1996 $
Arizona Telephone Company	198,720.	224,712.
Citizens Utilities Company (DBA Citizens - Arizona)	0.	3,809,881.
Citizens Utilities Rural Company Inc.	3,035,350.	5,117,916.
Contel of California - Arizona	540,002.	1,133,970.
Contel of West Inc. (dba GTE of West AZ Inc.)	4,647,822.	0.
Fort Mohave Telecommunications Inc.	172,682.	347,506.
Gila River Telecommunications Inc.	751,386.	623,490.
Midvale Telephone Exchange Inc.	68,003.	118,368.
Navajo Communications Company Inc.	3,626,250.	2,804,696.
Southwestern Telephone Company	0.	18,776.
Tohono O'Odham Utility Authority	354,382.	322,946.
Universal Telephone Company of Southwest Arizona	100,978.	98,840.
US West Communications (formerly Mountain Bell - Arizona)	0.	0.
Valley Telephone Cooperative Inc.	970,338.	1,004,738.
Arizona Total NECA USF Subsidies	**14,465,913.**	**15,625,839.**

The FCC first certified Arizona for participation in Lifeline Assistance in 1986 followed by Link-Up America in 1988. In 1994, NECA provided $308,402 in SLC waiver subsidies matched by the state to 9,146 Arizona subscribers and $8,533 in Link-Up America subsidies to 367 Arizona subscribers. A Telecommunications Relay Service (TRS) has been in statewide operation since 1987 including toll-free access and funded by a surcharge on 911 revenue. Handicapped telephone subscribers are eligible for a 35% discount on direct dialed intraLATA toll calls and for the waiving of directory assistance charges. Since 1991, the Arizona Department of Economic Security (DES) has run the Telephone Assistance Program (TAP), subsidizing residential telephone subscriber costs for almost 7,000 households with
low incomes and certifiable medical problems. It is funded by US West and serves only their customers.

Five Arizona telephone companies (Arizona Telephone Co., Citizens Utilities Rural Co., Gila River Telecommunications Inc., Tohono O'Odham Utility Authority, Valley Telephone Coop Inc.) currently participate in the USDA Rural Utilities Service (RUS) program for rural telecommunications loan support.

Universal Service Around the Nation:

In order to help policy makers better understand the current and future status of Universal Service in the United States, International Research Center conducted structured telephone interviews with a key informant in each of the 50 states and the District of Columbia, either senior level staff or Commissioners involved in telecommunication policy formulation in their state. Interview questions focused on:

- Status of Universal Service in the state and any pending actions
- Description of the states Universal Service program, if the state had one, including target groups
- Description of the Universal Service Funding mechanism, if the state had one
- State's participation in Federal programs that support Universal Service
  (Lifeline, Link-up America, High Cost)
- Definition of "basic service"
- Rates and types of technology used to provide "basic service"
- Public/private partnerships used to promote Universal Service/Universal Access
- State programs promoting access to advanced information services
- State programs to provide electronic access to public/government records and documents.

Information gathered from these interviews was supplemented with other secondary information for each state. This secondary information included demographic information about the state's population, geographic size, and median income; census data on poverty levels (percent on public assistance and percent below poverty); FCC data on the state's telephone system (number of LECs, penetration rate, technology), and data from a study on rural LECs conducted by the Organization for the Protection and Advancement of Small Telephone Companies (OPASTCO). In addition, key informants in states which had or were actively involved in developing a Universal Service program forwarded copies of relevant legislation, commission orders, and staff proposals.

Information gathered through the interviews was combined with the secondary data to generate a profile for each state. These profiles are included in Appendix E. To ensure the accuracy of the state profiles, a draft profile was faxed to the key informant in the state for review and modification. Changes were made to 26 state profiles based on key informant comments. In a number of cases, the changes updated the secondary data with more current information. Information from the state profiles was then aggregated into a number of matrixes which are presented and discussed below.

What is "basic service"?

Consistent with the Federal definition, states have defined Universal Service as the availability of telephone service at reasonable rates to all citizens in the state. Basic service, on the other hand, has been defined by a limited number of states, and those definitions vary from state to state. Table 1 shows the states that have defined basic service and the elements included in their definitions. Asterisks (*) indicate states with definitions that are pending. Twenty-five states have a pending or approved definition of basic service at this time. Based on these definitions basic service in the United States typically consist of a single party (16) voice grade (18) touch tone (20) line with access to emergency services (23) , directory assistance (16), operator services (14), long distance services (17), and a white page listing (18). A number of states also include Telecommunication Relay Services (TRS) for the hearing impaired (8). These are the identical elements as in the Arizona Corporation Commission's proposed definition for basic service in Arizona.

Less common elements included in the definition of basic service are a modem capable line (6), privacy protection (6), and access to repair services (5). The most unique services included are a required usage element (Connecticut and Ohio), non-published service (New York), access to optional digital services (Alaska), ANI capability (Connecticut), access to custom calling features (Missouri and Oklahoma), toll

Table 1: State Definitions of Basic Telephone Service

State	Single party	Multi-party	Touch tone	Rotary	Voice grade line	Fax grade line	(911)	(411)	Operator services	White page listing	Long-distance access	Modem capable	Repair services	Privacy protect	Other
Alaska*	Yes		Yes		Yes		Yes	Yes			Yes		Yes		Access to optional digital services
Arizona*	Yes		Yes		Yes		Yes	Yes	Yes	Yes	Yes				Telecomm relay services
California			Yes		Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Colorado	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	2400	Yes	Yes	
Connecticut	Yes		Yes		Yes		Yes	Yes	Yes	Yes	Yes			Yes	ANI Capability; Usage element
Delaware				Yes			Yes	Yes	Yes	Yes					Switch/relay access
Florida			Yes		Yes		Yes	Yes	Yes		Yes				Flat rate residential
Georgia	Yes		Yes				Yes					9600			1+ dialing
Hawaii*	Yes		Yes		Yes		Yes	Yes	Yes	Yes					Access to relay services
Louisiana	Yes		Yes				Yes	Yes	Yes	Yes	Yes				Affordable line connection; Telephone relay service; Customer support
Massachusetts															Unlimited calling in local exchange calling area
Michigan										Yes					Dial tone
Missouri	Yes		Yes		Yes		Yes				Yes				Access to custom calling features
Nevada			Yes		Yes		Yes			Yes	Yes				Dial tone
New Jersey	Yes	Yes		Yes	Yes		Yes			Yes	Yes		Yes	Yes	
New York*			Yes		Yes		Yes	Yes	Yes	Yes	Yes			Yes	Exchange access; Statewide relay service; Non-published service; Direct inward dialing
North Carolina*	Yes		Yes		Yes										Flat rate local calling
Ohio*	Yes		Yes		Yes		Yes	Yes	Yes	Yes	Yes	14400	Yes	Yes	Usage packet (400 minutes); Telecomm relay services
Oklahoma	Yes		Yes				Yes			Yes		Yes			Custom calling features available
Oregon	Yes		Yes		Yes		Yes	Yes	Yes	Yes	Yes				Toll blocking; Relay services
Pennsylvania	Yes		Yes		Yes		Yes	Yes	Yes	Yes	Yes				Disability services; Access to incoming and outgoing calls
Tennessee			Yes		Yes		Yes			Yes					Access line; Telecomm relay services; Educational discounts
Vermont			Yes		Yes		Yes	Yes				Yes			Enhanced 911 services; Telecomm relay services

West Virginia *							Yes	Yes	Yes	Yes	Yes				Telephone number; Local call switching; Telecomm relay services
Wisconsin*	Yes		Yes			Yes	Yes	Yes	Yes	Yes	Yes	9600			Telecomm relay services; Toll blocking; Annual directory; Reasonably adequate calling area
Wyoming	Yes				Yes		Yes				Yes				Residential or business; Flat or measured rate
Total	**16**	**1**	**20**	**2**	**18**	**2**	**23**	**16**	**14**	**18**	**17**	**6**	**5**	**6**	**(* - Definition Pending) (Page 15)**

blocking capability (Oregon and Wisconsin), educational discounts (Tennessee), and an annual directory (Wisconsin). While 25 states and DC did not have a definition of basic service at this time, a number of states are developing them in conjunction with open dockets on local competition or Universal Service.

What does "basic service" cost?

Table 2 shows the residential telephone rates (R1- flat rate) for the BOC in each state, and the range of rates for the LECs in each state. Since this information was not available from a secondary source, we relied on the key informant in each state to provide this information. Specifically, the key informant was asked what the rate would be for "basic service". Given the complexity of rate structures in some states, the variations in telephone service across the states, and the fact that half of the states don't have a definition for basic service, the rate information should be viewed with caution. Perhaps as more states develop definitions of "basic service", it will be possible to develop a better overall picture of the price of basic service in the United States and what customers should expect to pay for basic service. In Table 2, states with definitions of basic service are identified by asterisks.

In spite of these qualifications, there are a number of interesting patterns within the data. First, in some states the BOC has a single statewide residential rate, while in others there are a range of rates depending generally on the subscribers geographic location and calling area. The lowest reported rate for a BOC was in DC. DC, however, does not have a definition of basic service, has only one LEC, and this is a special rate for low income households. Of the states with a definition of basic service, Wisconsin has the lowest BOC rate ($5.40 for measured service) and New York has the highest rate ($22.27). The average rate for "basic service" for states with a definition is $11.95. In four small states, there is only one LEC, typically the BOC (Delaware, DC, Hawaii, Rhode Island). The number of LECs in the remaining states range from 2 (Maryland) to 160 in Iowa. The range in residential rates for LECs in almost all states was greater than the range of rates for the BOC. Thus, there are some LECs in each state with lower rates for residential service than the BOC and some with higher rates. LECs with the lowest rates typically have very limited calling areas, while LECs with the higher rates are in high cost/rural areas. Again, looking at those states with a definition of basic service, the lowest LEC rate was in North Carolina ($2.56) and the highest was in West Virginia ($36.00). The average of the lowest LEC rate for states with a definition was $7.30 and the average of the highest rates was $18.00.

Table 2 also presents results from the OPASTCO study (last three columns) which provides insights into the costs of providing basic service in rural/high cost areas. In 1994, OPASTCO examined the consequences of changes in FCC regulations that would eliminate federal support mechanisms for small rural LECs (i.e., DEM weighting, 25% gross allocator, USF, and federal Lifeline and Link-up America programs). The first column in this section of Table 2 shows the local service revenues per subscriber per month for small rural LECs included in the OPASTCO study group. The average for the 424 LECs induced in the study group was $15.31. The second column shows OPASTCO's estimate of the average local service revenues per subscriber per month that would be required if federal supports were eliminated. The average for the study group was $28.75. This means that, on average, local service revenues would have to go up by 72.3%, if federal supports were eliminated. Required revenue increases vary widely from state to state with greatest estimated increases being in New Mexico (228.8%), Texas (176.1%), North Dakota (170.4%), Idaho (157.6%), and Nebraska (154.4%). OPASTCO also surveyed a random sample of the study group's subscribers to determine the impact the estimated rate increase might have on continued telephone service. Twenty percent of the subscribers said they would discontinue service if the rates were increased to the estimated level.

Arizona's average local service revenues per subscriber per month in the OPASTCO study group ($21.05) was above the overall average ($15.91), but the percent increase in revenues needed, 47.8%, was less than the national average. This still reflects an average estimated increase in local service revenues of $9.64 per subscriber per month for customers served by Arizona's 13 rural LECs. Thirteen percent of those survey by OPASTCO in Arizona said they would disconnect service if rates went up by that amount. This would equate to 9,700 access lines in rural Arizona. The OPASTCO study findings are important since they highlight one of the biggest issues related to Universal Service; that is, how to provide affordable telecommunication services to rural areas which have significantly higher costs than urban areas. The study provides an indication of what the actual costs are to provide telephone service in high costs areas, and the possible consequences of federal and state governments not taking necessary steps to maintain Universal Service in the new competitive telecommunication market.

Table 2: State Residential Telephone Rates

	Bell Operating Co.		Local Exchange Carriers			OPASTCO Study		
State	BOC	Rates	Number of LECs	Lowest Rate	Highest Rate	Rev/ Customer	Rev w/o Subsidy	% Increase
Alabama	Bell South	$16.00-15.00	34			$18.94	$30.42	60.6%
Alaska*	na	na	23	$5.00	$30.00	$20.94	$34.73	65.9%
Arizona*	US West	$13.18	14	$4.50	$21.00	$21.05	$30.69	47.8%
Arkansas	SW Bell	$14.00	27	$5.00	$32.00	$16.71	$28.66	71.5%
California*	Pacific	$11.25	23	$11.25	$17.80	$20.64	$48.77	136.9%
Colorado*	US West	$17.82	36	$4.15	$30.00	$21.31	$36.10	69.4%
Connecticut*	NYNEX	$12.50	3	$8.00	$15.00	na	na	na
Delaware*	Bell Atlantic	$9.40	1	$9.40	$9.40	na	na	na
Dist. of Col.	Bell Atlantic	$3.00-14.60	1	$3.00	$14.60	na	na	na
Florida*	Bell South	$10.65	13	$6.00	$11.63	$16.77	$30.32	80.8%
Georgia*	Bell South	$14.33	36	$4.00	$18.00	$18.12	$32.09	77.1%
Hawaii*	na	na	1	$14.40	$14.40	na	na	na
Idaho	US West	$11.61	16	$9.40	$17.20	$14.51	$37.37	157.6%
Illinois	Ameritech	$11.20	56	$5.40	$28.00	na	na	na
Indiana	Ameritech	$13.50	43	$3.00	$25.00	$16.19	$24.75	52.9%
Iowa	US West	$11.05-13.05	160	$2.00	$24.78	$13.92	$24.40	75.3%
Kansas	SW Bell	$11.00	45	$3.50	$13.00	$13.55	$28.07	107.2%
Kentucky	Bell South	$18.00	20	$5.00	$18.00	na	na	na
Louisiana*	Bell South	$10.97-15.05	21	$9.00	$18.50	$21.95	$44.24	101.5%
Maine	NYNEX	$10.50-12.50	24	$4.75	$14.50	$11.09	$25.63	131.1%
Maryland	Bell Atlantic	$9.52-11.17	2			na	na	na
Massachusetts*	NYNEX	$16.85	5			na	na	na
Michigan*	Ameritech	$10.38	38	$3.76	$12.30	$11.31	$19.87	75.7%
Minnesota	US West	$14.10	103	$5.00	$30.00	$15.25	$23.02	51.0%
Mississippi	Bell South	$14.85- 19.00	20	$11.50	$18.00	$21.40	$39.36	83.9%
Missouri*	SW Bell	$7.55-12.50	42	$4.00	$16.00	$13.91	$26.02	87.1%
Montana	US West	$13.84	8	$7.10	$16.38	$13.39	$31.70	136.7%
Nebraska	US West	$14.90	42	$4.00	$15.00	$12.90	$32.83	154.5%
Nevada*	Nevada Bell	$10.00	13	$5.75	$16.00	$15.56	$30.86	98.3%
New Hampshire	NYNEX	$18.00	14	$6.00	$9.00	$11.20	$22.04	96.8%
New Jersey*	Bell Atlantic	$7.00-8.00	3	$5.30	$8.30	na	na	na
New Mexico	US West	$10.96-15.86	14	$10.96	$15.86	$16.26	$63.22	288.8%
New York*	NYNEX	$12.45-22.27	40	$3.84	$17.92	$16.33	$26.15	60.1%
North Carolina*	Bell South	$9.94 -13.94	20	$2.56	$18.26	$19.07	$23.94	25.5%
North Dakota	US West	$12.00	29			$14.22	$38.45	170.4%
Ohio*	Ameritech	$15.25	42	$2.70	$22.90	$18.31	$21.88	19.5%
Oklahoma*	SW Bell	$9.50-13.00	47	$5.00	$20.00	$13.94	$33.84	142.8%
Oregon*	US West	$12.80	33	$8.00	$16.00	$15.99	$29.31	83.3%
Pennsylvania*	Bell Atlantic	$8.20-12.95	38	$3.25	$17.73	$12.09	$24.96	106.5%
Rhode Island	NYNEX	$7.50-22.00	1	$7.50	$22.00	na	na	na
South Carolina	Bell South	$14.20-16.90	28	$3.00	$16.90	$18.37	$24.80	35.0%
South Dakota	US West	$12.00-15.20	31	$5.25	$15.75	$11.85	$28.20	138.0%
Tennessee*	Bell South	$7.50-12.15	18	$6.00	$13.00	$16.67	$22.83	37.0%
Texas	SW Bell	$8.15-11.05	58	$5.05	$19.00	$15.55	$42.94	176.1%
Utah	US West	$3.50 -7.98	14	$10.00	$12.00	$12.60	$29.13	131.2%
Vermont*	NYNEX	$12.75	9	$6.00	$16.00	$15.15	$28.68	89.3%
Virginia	Bell Atlantic	$8.51-14.82	21	$6.00	$16.35	$13.05	$25.94	98.8%
Washington	US West	$8.75-12.75	26	$7.00	$26.00	$13.10	$25.94	98.0%
West Virginia*	Bell Atlantic	$15.80	9	$22.00	$36.00	$25.56	$49.37	93.2%
Wisconsin*	Ameritech	$5.40	86	$2.90	$25.00	$13.49	$17.45	29.4%
Wyoming*	US West	$12.64-14.64	14	$5.75	$16.80	$16.05	$35.26	119.7%

(Note: ***** indicates states with a definition of basic service)

How is “basic service” delivered?

Table 3 shows the types of technology used to provide telephone service in each state. Again, asterisks indicate states with a definition of basic service. Each year the FCC aggregates data on the types of equipment LECs have deployed, as reported by the LECs. The FCC has considerable information about telephone equipment in each state, but much of it is beyond the scope of this project. One general indicator of the level of the technology used to provide basic service is the extent to which the local loop circuit is digital or analog. Using FCC data on the “total equipped local loop circuit”, the percent digital was calculated for each state (see column 1). Overall, 39% of the local loop is digital, but there are wide variations between states. In five states the local loop circuit is all digital, and in 18 other states including Arizona the local loop is more than 95% digital. States with relatively low levels of digital circuits included California (9.61%), Louisiana (10.58%), Massachusetts (6.95%), Nevada (10.36%), New York (8.41%), and Rhode Island (9.57%).

The key informants were also questioned about the type of technology used to provide basic service both in the “last mile” and in the infrastructure. All informants indicated that they used both copper and fiber optic to deliver basic service. Twisted pair into the residence, with copper and fiber in the infrastructure was the primary reported technology. Three states also were installing Hybrid Fiber Optic cable and 17 were using some microwave. Key informants were also asked if there were any unique technologies used to provide service, especially to rural areas. Nine states reported using Basic Exchange Telephone Radio Service (BETRS) and three reported using fixed cellular to provide basic service to isolated areas of their state, and one mentioned satellites (Alaska).

In summary, basic telephone service, for those states that have defined it, typically is a single party voice grade touch tone line with access to emergency services, directory assistance, operator services, long distance services, and a white page listing. The rates for basic service for BOCs is around $12.00 per month, but can cost be as much as $22.27 per month or as little as $5.40, and LECs may have rates exceeding $30.00 per month. Basic service is typically provided using twisted pair copper wire into
the house with a mixture of fiber and copper in the infrastructure, although some remote areas require wireless technologies.

What is the status of Universal Service programs in each state?

In order to make telephone service available and affordable to all citizens, federal programs have been put in place to support Universal Service in every state and a some states have developed their own Universal Service programs. The oldest state program was established in California in 1983. Given recent trends toward deregulation of telecommunications and the introduction of local competition, almost very state is now involved to some degree in examining or reexamining Universal Service. For states which have had a
Universal Service program, like Arizona, this has lead to a comprehensive change in the program. States which have not had a Universal Service program have responded quite differently. Some are just beginning to examine the issue, wondering if they need a fund. Others are finishing up the rule making process, and will be soon establishing their state’s first Universal Service program. This section of the report examines

Table 3: State Telecommunication Technologies for Providing Basic Service

State	Percent Local Loop Digital	Copper	Fiber Optic	Hybrid Fiber	Microwave	Other
Alabama	18. 59%	Yes	Yes			
Alaska*	na	Yes	Yes		Yes	Satellite, BETRS
Arizona*	98.47%	Yes	Yes		Yes	BETRS
Arkansas	99.41%	Yes	Yes			ISDN
California*	9.61%	Yes	Yes			
Colorado*	94.04%	Yes	Yes	Yes	Yes	ISDN on 70% of lines
Connecticut*	90.87%	Yes	Yes	Yes		
Delaware*	100.00%	Yes	Yes			ISDN
District of Columbia	100.00%	Yes	Yes			
Florida*	35.43%	Yes	Yes			95% Digital Switches
Georgia*	27.79%	Yes	Yes		Yes	
Hawaii*	73.23%	Yes	Yes		Yes	
Idaho	98.91%	Yes	Yes		Yes	95% Digital Switches
Illinois	95.26%	Yes	Yes			
Indiana	99.46%	Yes	Yes			
Iowa	92.32%	Yes	Yes			
Kansas	100.00%	Yes	Yes			
Kentucky	17.70%	Yes	Yes			
Louisiana*	10.58%	Yes	Yes			
Maine	14.21%	Yes	Yes		Yes	BETRS
Maryland	100.00%	Yes	Yes		Yes	
Massachusetts*	6.95%	Yes	Yes			
Michigan*	99.96%	Yes	Yes			
Minnesota	99.78%	Yes	Yes			
Mississippi	16.44%	Yes	Yes			
Missouri*	94.93%	Yes	Yes		Yes	Fixed cellular
Montana	76.27%	Yes	Yes		Yes	BETRS
Nebraska	72.15%	Yes	Yes		Yes	
Nevada*	10.36%	Yes	Yes	Yes		Fixed cellular, BETRS
New Hampshire	12.92%	Yes	Yes		Yes	
New Jersey*	99.98%	Yes	Yes			
New Mexico	99.02%	Yes	Yes		Yes	BETRS
New York*	8.41%	Yes	Yes			
North Carolina*	23.00%	Yes	Yes			
North Dakota	84.82%	Yes	Yes			
Ohio*	96.88%	Yes	Yes			ISDN
Oklahoma*	99.70%	Yes	Yes			
Oregon*	98.63%	Yes	Yes		Yes	BETRS
Pennsylvania*	99.20%	Yes	Yes			
Rhode Island	9.57%	Yes	Yes			
South Carolina	25.01%	Yes	Yes			
South Dakota	66.30%	Yes	Yes		Yes	
Tennessee*	19.96%	Yes	Yes			ISDN
Texas	99.00%	Yes	Yes			
Utah	98.03%	Yes	Yes			
Vermont*	14.27%	Yes	Yes			
Virginia	99.74%	Yes	Yes			
Washington	97.73%	Yes	Yes			ISDN, BETRS
West Virginia*	100.00%	Yes	Yes			
Wisconsin	96.22%	Yes	Yes		Yes	
Wyoming*	67.96%	Yes	Yes		Yes	Fixed cellular, BETRS
AVG./TOTAL	**39.02%**	**51**	**51**	**3**	**17**	

(Note: ***** indicates states with a definition of basic service)

state participation in federal programs, status of state Universal Service programs, and characteristics of established state Universal Service programs. Key informants in each state were also asked to identify activities related to the provision of advanced information services such as video/cable, Internet, etc. Since the key informants are not directly involved in the regulation of these advanced services, they generally provided very limited, second hand information. However, one important exception involved rate cases where the Commission used its regulatory authority over local telecommunication companies as a means for enhancing the development of advanced information services. In a number of states, the Commission had used rates case findings and excess earnings as a vehicle to require a carrier, usually the BOC, to provide resources to increase the capabilities and access to advanced information services. Listed below are the states and, in brief, the programs they developed:

- In Arkansas, overearnings are to be used to upgrade infrastructure for hospitals and schools.
- California PUC is seeking Federal authority to use US Funds to for advanced information applications.
- Colorado set up a telecommunication trust fund for distance learning which is funded by the BOC.
- The District of Columbia had the BOC install ISDN lines in all schools.
- Georgia is requiring Bell South to spend $500,000,000 over five years for infrastructure improvements including distance learning and telemedicine applications.
- Indiana has mandated that the BOC spend $130,000,000 on infrastructure development and a grant program for distance learning - $5,000,000 per year is for schools, libraries, and government agencies.
- Kansas is having Southwestern Bell provide interactive video to all schools in the state.
- Maine has mandated that NYNEX spend $14,000,000 per year on infrastructure upgrades and $4,000,000 per year is to go to education.
- Michigan is requiring Ameritech to use its excess earnings to link schools to the Internet.
- In Missouri, SW Bell will fund special projects including “Telecommunity Centers.”
- Oklahoma is having SW Bell upgrade the infrastructure in schools and provide access to the Internet.
- Pennsylvania is having the BOC hook-up schools and hospitals to the Internet.
- South Dakota is requiring US West provide local call access to the Internet.
- Texas assessed providers $150,000,000 per year for advanced infrastructure and applications.
- Wisconsin required providers to install fiber optic connections to all secondary schools in the state.

Participation in Federal Universal Service Programs

The federal government has three programs states can voluntarily participate in to promote Universal Service in their state -- Lifeline, Link-up America, and High Cost (USF) programs. Lifeline and Link-up America are targeted towards low income groups, while the High Cost fund is targeted to LECs in rural areas. Since these programs are voluntary, all states do not participate in all programs. Table 4 shows states’ participation in the federal programs and related demographic data. The key informants provided the information on participation, while the demographic information was from the U.S. Census. Thirty-nine states and DC participate in the Lifeline program, while 45 states and DC participate in Link-up America. Arizona participates in both programs. Three were reasons given by those not participating.

- The state does not have the authority to mandate participation in a voluntary federal program.
- The state can not provide matching funds required by the program and cannot require the LECs to provide matching funds (i.e., Lifeline).
- The state is prohibited from validating income information required by the program.

Thus, in the case of these programs, lack of participation has little to do with the need for subsidized rates or reduced hook-up charges for low income households, and more to do with general statutory barriers. Some states that do not participate in these programs now are considering changing the law to allow participation, especially in those states contemplating the creation of a state Universal Service Fund. They may require LECs to participate in federal programs as a prerequisite to participation in a state program.

Table 4: State Participation in Federal Programs

State	Percent on Public Assistance	Percent Below Poverty Level	Federal Lifeline Program	Federal Link-Up Program	Proportion Rural	Subscribers Per Sq Mile	Federal High Cost Program
Alabama	7.10%	17.10%	Yes	Yes	39.6%	13.6	Yes
Alaska	6.70%	10.00%	Yes	Yes	32.5%	0.3	Yes
Arizona	6.40%	15.10%	Yes	Yes	12.5%	2.6	Yes
Arkansas	6.80%	17.40%	Yes	Yes	46.5%	9.6	Yes
California	10.70%	15.80%			74.0%	5.8	Yes
Colorado	5.00%	10.60%	Yes	Yes	17.6%	1.4	Yes
Connecticut	6.00%	9.40%	Yes	Yes	20.9%	na	
Delaware	5.20%	7.60%			27.0%	na	
Dist. of Col.	13.30%	20.30%	Yes	Yes	0.0%	na	
Florida	6.80%	15.30%	Yes	Yes	52.0%	13	Yes
Georgia	8.50%	17.80%	Yes	Yes	36.8%	13.9	Yes
Hawaii	5.90%	11.00%	Yes	Yes	11.0%	na	
Idaho	3.20%	15.00%	Yes	Yes	12.6%	0.7	Yes
Illinois	7.90%	15.30%		Yes	15.4%	9.9	Yes
Indiana	5.00%	11.70%		Yes	35.1%	12.9	Yes
Iowa	5.00%	11.30%		Yes	39.4%	8.5	Yes
Kansas	4.60%	11.00%		Yes	30.9%	4.6	Yes
Kentucky	9.80%	19.70%		Yes	48.2%	15.7	
Louisiana	10.20%	24.20%	Yes		31.9%	10.7	Yes
Maine	7.60%	13.40%	Yes	Yes	55.4%	11	Yes
Maryland	6.00%	11.60%	Yes	Yes	18.7%	77.1	
Massachusetts	7.50%	10.00%	Yes	Yes	15.7%	91.6	Yes
Michigan	9.00%	13.50%	Yes	Yes	29.5%	11.7	Yes
Minnesota	5.70%	12.80%	Yes	Yes	30.1%	6.8	Yes
Mississippi	11.80%	24.50%	Yes	Yes	52.9%	8.2	Yes
Missouri	6.80%	15.60%	Yes	Yes	31.3%	9.0	Yes
Montana	5.40%	13.70%	Yes	Yes	47.5%	0.5	Yes
Nebraska	4.20%	10.30%		Yes	33.9%	2.3	Yes
Nevada	3.60%	14.40%	Yes	Yes	11.7%	0.5	Yes
New Hampshire	3.40%	8.60%		Yes	49.0%	30.9	Yes
New Jersey	6.10%	10.00%		Yes	10.6%	387.2	
New Mexico	8.00%	21.00%	Yes	Yes	27.0%	0.5	
New York	9.00%	15.30%	Yes	Yes	15.7%	21.8	Yes
North Carolina	7.20%	15.70%	Yes	Yes	49.6%	30.0	Yes
North Dakota	4.30%	11.90%	Yes	Yes	46.7%	1.4	Yes
Ohio	8.70%	12.40%	Yes	Yes	25.9%	17.8	Yes
Oklahoma	6.40%	18.40%	Yes	Yes	32.3%	4.6	Yes
Oregon	5.20%	11.30%	Yes	Yes	29.5%	2.9	Yes
Pennsylvania	6.90%	11.70%	Yes	Yes	31.1%	36.9	Yes
Rhode Island	8.00%	12.00%	Yes		14.0%	na	
South Carolina	6.70%	18.90%	Yes	Yes	45.4%	25.8	Yes
South Dakota	4.60%	14.80%	Yes	Yes	50.0%	1.4	Yes
Tennessee	8.60%	17.00%	Yes	Yes	39.1%	16.0	Yes
Texas	6.30%	17.80%			19.7%	2.4	Yes
Utah	3.80%	9.30%	Yes	Yes	13.0%	0.6	Yes
Vermont	7.20%	10.40%	Yes	Yes	67.8%	23.1	Yes
Virginia	4.80%	9.40%	Yes	Yes	70.6%	15.0	Yes
Washington	6.90%	11.00%	Yes	Yes	23.6%	11.6	Yes
West Virginia	9.70%	22.30%	Yes	Yes	63.9%	8.9	Yes
Wisconsin	6.90%	10.80%	Yes	Yes	34.3%	13.6	Yes
Wyoming	5.20%	10.30%	Yes	Yes	35.0%	0.2	Yes
U.S. TOTAL	**7.60%**	**14.5%**	**40**	**46**	**24.8%**	**4.4**	**42**

According to the key informants, 42 states, including Arizona, participate in the federal High Cost program (USF). The predominate reason for LECs not participating is the state is not a high cost state. This typically means the state is small with a predominately urban population and/or they have no LEC (often they only have one LEC) with costs above 115% of the national average. Thus, barriers to participation in this program have less to do with statutory constraints and more to do with the LECs need for support.

Status of State Universal Service Programs. Key informants were asked a series of questions about the current status of any state Universal Service programs, and any pending actions related to Universal Service. Based on this information, five categories were developed to characterize the status of different state efforts with regard to Universal Service. The categories, referred to as "Status" in Table 5, are:

1. **No statutes, regulations, or commission orders mandating Universal Service**. States in this category did not have a mandate for Universal Service at this time. However, this did not mean the state was not considering a state Universal Service program, or that it did not have a general statement to promote Universal Service. In fact, almost all states falling in this category were actively investigating Universal Service, and determining whether it should be mandated. In many cases these states were studying Universal Service as a part of, or as an off-shoot of, a docket on local competition. Nineteen states fell into this category.
2. **Mandated Universal Service in initial stages of rule making process**. States in this category had a statute or commission order mandating Universal Service, and they were in the early stages of the investigative process. Five states fell into this category.
3. **Mandated Universal Service actively involved in rule making process**. States in this category had a mandate for Universal Service and were actively involved in developing rules related to Universal Service, again often as a part of, or extension of, a docket on local competition. Many of these states had legislative mandates to develop proposed rules for Universal Service, and were given specific time frames for completion. This category included nine states.
4. **Mandated Universal Service rules with approved rules, fund not in place**. States in this category had essentially finished the rule making process, and were waiting for final legislative approval to set up a state Universal Service fund. Two states, Wisconsin and Wyoming, were in this category.
5. **Mandated Universal Service rules with approved rules, fund in place.** States in this category had a mandate, rules and an approved state Universal Service Fund in place. However, these are not newly established funds, but are typically existing funds established in the late 80's. So, while the 16 states in this category have a fund in place, all except one, are in some stage of revision or modification. Nevada is the only state in this category finished this rule making process, and they have yet to collect or distribute Universal Service Funds. These states would fall into categories 2, 3, or 4, if they had not previously established a state Universal Service Fund. And like states in those categories, the redesign of the existing programs has been triggered by deregulation and local competition.

Besides showing the status or each state's Universal Service program, the relevant statutes, regulations or commission orders are cited in Table 5. In addition, the status of local competition and the date is was permitted is presented. This information was gathered from the FCC's report on Common Carrier Competition and updated by seven key informants on their draft state profiles. A brief summary of pending actions related to Universal service is also presented. More detailed descriptions of pending actions are included in each state profile (Appendix E).

Description of State Universal Service programs.

Eighteen states have approved Universal Service programs in place. These states and descriptions of their programs are shown in Tables 6 and 7. With the exception of state penetration rates, the information was gathered through key informant interviews and examination of commission orders and regulations. Penetration rate data is from the FCC's 1993/4 Statistics of Communication Common Carriers. Like the federal programs, state Universal Service programs generally target two different groups -- LECs in high

Table 5: Status of State Universal Service Programs

State	Status	State Statute	Commission Order	LEC competition permitted	Pending Activities Related to Universal Service
Alabama	1			8/95	APSC has docket and workshop on US.
Alaska	2	4205.145	R-94-5	policy barrier	APUC has a rule making docket to adopt US. Statute allows for creation of USF for long distance service.
Arizona	5		Contel Rate case	7/95	ACC has draft rules to establish a new USF that is more structured and rule based
Arkansas	5	23-17-304		prohibited	Statute gives commission authority to continue or change the USF. The APSC hasn't held hearings.
California	5	Moore Univ. Act 1983	84-04-053 PU Code 871	7/95	The CPUC has a major rule making investigation and is looking at a complete revision of the US program.
Colorado	5	House Bill 1335		5/95	Colorado has a high cost fund in place, but is currently developing revised rules for new act.
Connecticut	5	Section 16247		7/94	The dominant LEC is proposing a creation of a high cost fund. The CPUC is reviewing the proposal.
Delaware	1			no regulatory barrier	Delaware has a general statement to promote universally available and affordable service but not a US program.
District of Columbia	3		Rate case #850	statutory barrier	The PSC is looking at US as part of a new rate case.
Florida	2	CHAP 364.025		6/95	The FPSC just completed evidentiary policy making proceedings on an interim US mechanism.
Georgia	3	Sen Bill 137		7/95	The GPSC is in process of developing rules for a USF.
Hawaii	3	Act 225 1995		6/95	The HPUC has opened a docket and issued draft rules on competition and Universal Service.
Idaho	5	62-610 1988		prohibited	The IPUC has nothing pending regarding US, but a task force is looking at Idaho's telecommunications law.
Illinois	5	13-801		1988	Staff is filing proposed rules for US. They expect to be done by April, 1996.
Indiana	5	8-1-2.6		no regulatory barrier	The IURC is in the middle of a workshop on local competition, and is reviewing the US program.
Iowa	1			5/95 (never prohibited)	They are looking at US as part of a docket on local competition.
Kansas	1			no statutory barrier	The KCC has an active docket examining US in Kansas.
Kentucky	1			policy barrier	The KPSC has a docket on local competition that includes US and a USF. They expect to finish in 1997.
Louisiana	3		V-20883-Sub Docket A	prohibited	The Commission has proposed regulations for local competition which includes a mandate for US.
Maine	2	Title 35A, PT7, CH71		no regulatory barrier	The MPCU is considering polices to establish local competition which may lead to consideration of US.
Maryland	1			1994	US may be a commission case in future due to local competition.
Massachusetts	1			1991	US is one part of a pending docket on local competition. The MPUC should have a decision in March, 1996.
Michigan	1			1991	The MPSC has nothing pending regarding US.

Minnesota	3	Chap 156, S.F. No 752		8/95	Legislature required Commission to develop rules for US. The statutory dealine is August, 1997.
Mississippi	5		77-3-35	policy barrier	The MPSC opened a docket for local competition which will include US. They will hold hearings in 1996.

(Table 5 Continues on Following Page)

Table 5: Status of State Universal Service Programs (Continued)

State	Status	State Statute	Commissio n Order	LEC competition permitted	Pending Activities Related to Universal Service
Missouri	1			prohibited	The MPSC has a docket on local competition which may bring up the issue of US.
Montana	1			not prohibited	A task force is looking at the issue of US. They may addresss this issue as part of local competition.
Nebraska	1			not prohibited	The NPSC has a docket on US, and are in the comment stage. They also have a docket on local competition.
Nevada	5		RO63-95	5/95	They just adopted new omnibus telecommunications regulations that includes a Universal Service Fund.
New Hampshire	2	SB-106		8/95	The NHPUC has a docket on local competition and they are currently doing background research.
New Jersey	1			under consideration	The NJBPU has nothing pending regarding US.
New Mexico	5	63-9A-6.1		1985	The NMCC will be opening up a docket on local competition which may involve US.
New York	3		94-C-0095	1992	DPS has a docket on local competition and one part of it involves US.
North Carolina	1			1995	The NCUC has a docket on local competition and US. Interim rules are due 12/31/96, final rules by 7/1/98.
North Dakota	1			no regulatory barrier	The NDPSC has minimal jurisdiction over telecommunications. Nothing is pending regarding US.
Ohio	3	ORC 497-202 1988		8/95	The PUCO has a docket on local competition with US being a key part. Staff is now developing comments.
Oklahoma	1			possible statutory barrier	The Commission has a docket on local competition and draft rules, and US is a part of that docket.
Oregon	5	759-1103	95-1103	1993	Oregon has completed Phase I of a docket on US. Phase II will create the funding mechanism.
Pennsylvania	3	House File 518	Docket No 1-940035	yes	The PPUC has a Universal Service docket, and they expect to have their policy in place by Summer 1996.
Rhode Island	1			yes	RIPUC has nothing pending regarding US. They do have a docket on local competition.
South Carolina	1			possible statutory barrier	The SCPSC is just forming a task force to look at local competition. The task force will address US issues.
South Dakota	2	49-31-4.1 1988		yes	SDPUC has nothing pending regarding US.
Tennessee	3	Sec 65-5-207		1995	The TPSC has established a proceeding on local competition and is developing rules for US.
Texas	5	1987		1995	TPUC is currently revising rules for its high cost fund.
Utah	5	54-86-11&12		1995	Utah is revising its US program and expects to be done by September 1996. They have an interim USF.
Vermont	5	Chap. 87		no regulatory barrier	VPSB has a US program in place and is developing a formula for distributing high costs funds.
Virginia	1			1995	VCC does not have a docket on US now, but will after they issue rules on local competition.
Washington	5		U-85-23	1994	WUTC is developing a position paper on US and a USF in response to a LEC's request.
West Virginia	1			no regulatory barrier	WV is considering US as part of a docket on local competition, and they have formed a task force to look at US.
Wisconsin	4	S196.218 1994	1-AC-155	yes	The PSC has submitted rules to the legislature for their US program. The program is to start January, 1996.
Wyoming	4	37-14-501		1995	The PSC has nearly finished its rule making process for US, and the Governor will sign the rules within 60 days of final adoption.

cost areas and low income/economically disadvantaged households. Sixteen of the eighteen states with programs, are targeted at LECs in high cost areas, and eight are targeted to low income/economically disadvantaged. Seven states have programs targeted at just high cost LECs and only one state (Connecticut) is targeted at just low income/economically disadvantaged. Colorado, Texas, and Wisconsin have programs for users with disabilities, while Vermont has targeted emergency services and Wisconsin has targeted homeless and advanced services to schools and health care organizations.

Programs that are targeted at high cost areas are not portable, while programs targeted at low income/ economically disadvantaged, or users with disabilities are portable. That is, for these later groups the subsidy goes with the individual; if the person moves to another carrier's exchange, the subsidy moves to the new carrier. Portability should not confused with whether the individual gets a voucher or credit on their bill or not, or whether the funds go to the LEC. It is possible to have a voucher or credit go to a customer in a high cost area, even though it isn't portable. One informant suggested the idea of including a credit or voucher in high cost areas, so the customers would realize the subsidy they were receiving, even though it wasn't portable. Another interviewee suggested their state's high cost program should be modified so that only those who needed a high cost subsidy would get it -- that wealthy individuals would

Table 6: Description of State Universal Service Programs

State	Status	Penetration Rate	Targeted Groups	Administration	Is subsidy portable?
Arizona	5	94.1%	Rural/high cost	BOC	No
Arkansas	5	90.0%	Rural/high cost	BOC	No
California	5	95.2%	Rural/high cost Low income/economically disadvantanged	Independent 3rd party	Yes, for low income
Colorado	5	95.7%	Rural/high cost	Commission	No
Connecticut	5	96.4%	Low income/economically disadvantanged	LECs (changing to 3rd party)	Yes
Idaho	5	94.8%	High cost (not stated but implicit)	Independent 3rd party	No
Illinois	5	93.5%	Low income/economically disadvantaged Rural/high cost	Non-profit organization; LEC Assoc.	Yes, for low income
Indiana	5	92.9%	Rural/high cost	BOC	No
Mississippi	5	88.7%	None	BOC	No
Nevada	5	92.8%	Rural/high cost	Independent 3rd party	No
New Mexico	5	88.6%	Low income/economically disadvantaged Rural/high cost	Commission established board	No
Oregon	5	96.2%	Rural/high cost Low income/economically disadvantaged	LEC Assoc. (OECA)	No
Texas	5	91.5%	Rural/high cost Low income/economically disadvantaged Users with disability	LEC Assoc. (TECA)	Yes, for low income and disabled
Utah	5	96.6%	Rural/high cost	Commission	No
Vermont	5	94.7%	Rural/high cost Low income/economically disadvantaged Emergency services (911)	LEC Assoc. (NECA)	Yes, for low income
Washington	5	95.7%	Rural/high cost	LEC Assoc. (WECA)	No
Wisconsin	4	97.0%	Rural/high cost Low income/economically disadvantaged Users with disability, Homeless Advanced services to schools & health care	Independent 3rd party	Yes, for low income and disabled
Wyoming	4	92.6%	Rural/high rate	Commission	No

not receive a subsidy just because they lived in a high cost area. Doing this, would in affect make the states high cost subsidy portable. State Universal Service Funds are typically administered by an independent third party (4) or a LEC Association (5). In four states the commission is currently responsible for administering the fund, and in four the BOC administers the fund. Table 7 shows the funding mechanisms for current state Universal Service Funds. In all states except Illinois and Mississippi, LECs, the BOC and the IXCs contribute to the fund. Only six states currently require providers of wireless telecommunication services to contribute to the fund, and in all cases these are providers of cellular service. The trend in pending programs, however, is to define contributors as broadly as possible. Many states are developing mechanisms that will require wireless companies and resellers to contribute. One of the barriers these states face is they do not currently regulate wireless communication, and resellers are often located out of state. Arizona is one of the states that have defined contributors very broadly in their proposed rules to include providers of cellular, paging and commercial mobile radio services. Cable companies will also become contributors in many states once they are providers of local service. As one interviewee stated, "Any company that benefits from the network should contribute to the Fund."

States with a Universal Service Fund tend to use some variation or combination of "total revenues", "total access lines", or "total minutes of use" as the basis for determining each carriers contribution to the fund. The carries contribution is typically based on their proportion of the total for the state (i.e., what proportion the carrier's total revenues are in comparison to the total revenues for all carriers in the state). There are no distinctions made between business or residential "revenues", "access lines" or "minutes of use". Perhaps the most unique program currently in place is Illinois' program were customers can make a voluntary contribution to a fund that is used to waive installation charges to low income subscribers.

Most state Universal Service Funds provide a rate subsidy to the carrier or the customer, and even when the subsidy is for the customer, it typically goes directly to the carrier to off-set a credit on the customers bill. The trend in pending programs is to continue providing subsidies to carriers. Few states currently provide direct infrastructure reimbursement to the carriers, and when they do it is on a case by case basis.
The criteria used to distribute funds is closely tied to the selected target group. Generally, programs that target rural/high cost groups distribute funds to carriers based on the carriers costs or rates being above the statewide average by some percentage. Many current programs modeled their program after the federal high cost program, providing subsidies to LECs whose unsupported NTS loop costs were greater than 115% of the statewide average. Others states based distributions on the LEC's rates being a certain percentage above the statewide (i.e., Idaho, Wyoming) or above a certain fixed amount established by the Commission (Oregon, Utah). Programs that target low income/economically disadvantaged or disabled, subsidized carriers based on the number of eligible subscribers who receive credits. Wisconsin's program is unique in that distributes "high rate assistance" based on the median income in the service area (i.e., if the rate for basic service is greater than 2% of the median income for the service area subscribers receive a subsidy). Many pending programs have yet to determine the manner in which they will distribute funds. Fund distribution is perhaps the most complex, unresolved and difficult issue in pending programs. Even those with proposed rules have yet to specify exactly how funds will be distributed.

In summary, states' Universal Service programs are generally targeted to high cost areas, and this trend continues in pending programs that are developing in response to local competition. Only a few small, urban states are focusing primarily on low income households. The selected target group, in turn, typically determines the type of subsidy and its portability, with most high cost programs providing rate subsidies to carriers. While some states use direct infrastructure reimbursement, they do not rely on this for promoting Universal Service to rural areas. There is clearly trends to broaden the base of contributors to state funds to include all telecommunication carriers that benefit from the network and to better target areas by using Census tracts for

identifying high-cost areas. The greatest variation in programs, and perhaps the toughest issue is how to distribute funds. Many states are still trying to resolve this issue.

Table 7: Description of State Universal Service Funding Mechanisms

State	Contributors	Basis for Contribution	Types of Subsidies	Who Draws From Fund
Arizona	LECs, BOC, IXCs	Surcharges per access line and per minute of use on intrastate toll	Rate subsidy	LECs who demonstrate high cost (one LEC now)
Arkansas	LECs, BOC, wireless, IXCs	% of retail billed minutes of use	Rate subsidy	LECs with intrastate NTS costs per loop > 115% of statewide weighted average
California	LECs, BOC, wireless, IXCs	% of billable revenues	Carrier rate subsidy; Subsidy to customer	LECs with high cost and eligible subscribers
Colorado	LECs, BOC, IXCs	Minutes of use and access charge per line	Rate subsidy	Costs above average investment for the traffic
Connecticut	LECs, BOC, IXCs	Total gross revenues as a percent of total state revenues	Rate subsidy with subsidy going to customer	LECs with eligible subscribers Subscriber receives credits for intra and interstate service
Idaho	LECs, BOC, IXCs	Surcharge on all local access lines and each intrastate toll minute	Bulk check to carrier	LECs with rate for 1-party single line in excess of 125% of weighted statewide avg.; or avg. charge per minute for NTS/ WTS in excess of statewide avg.
Illinois	Customer contributions, and IXCs	Customer voluntary, and LEC intrastate minutes of use for high cost program	Waiver of installation charge to customer; Sliding scale subsidy to carrier for costs above statewide average	LECs based on the number of eligible PA customers; Small LECs based on average costs per access line versus statewide average
Indiana	LECs, BOC, wireless, IXCs	Intrastate carrier common originating and terminating access minutes	Rate subsidy; Direct infrastructure reimbursement; waiver of hook-up charge.	LECs with intrastate NTS costs above the statewide average
Mississippi	BOC, LECs	Minutes of use	Rate subsidy; Direct infra-structure reimbursement	13 LECs with high-cost
Nevada	All telecommuni-cation providers	% of intrastate retail revenues	Rate subsidy; Direct infra-structure reimbursement	Small LECs with rate of return below commission set level
New Mexico	No one currently	Total revenues	Rate subsidy	No one is drawing from fund
Oregon	LECs, BOC, IXCs	% of gross revenues	Rate subsidy; Direct infra-structure reimbursement	LECs who show cost shift would cause residential rates to exceed $15.00
Texas	LECs, BOC, IXCs	Access minutes of use	Rate subsidy to carrier; Equipment reimbursement; Customer rate reduction	LECs with high cost who show cause or those with eligible customers
Utah	LECs, BOC, wireless, IXCs	1/2 cent/minute NTS traffic	Direct infrastructure reimbursement, Cost of service subsidy	LECs (not BOC) whose rates equal or exceed a target rate set by the UPSC
Vermont	LECs, BOC, wireless, resellers	2% surcharge on all bills including interstate, cellular, directory assistance, 2-way cable, PCN service	Rate subsidy; Direct infrastructure reimbursement	Reimbursement to providers of TRS service; Rate subsidy to eligible customers; Direct infrastructure reimbursement to carrier for 911 upgrades
Washington	LECs, BOC, IXCs	Carriers proportion of total access minutes	Rate subsidy to eligible carriers	LECs whose unsupported loop costs is 115% of statewide avg.
Wisconsin	All providers of telecomm services with rev > $200K	% of gross revenues	Rate subsidy, Direct infrastructure reimbursement; Equip-ment reimbursement	LECs for eligible subscribers (low income and disabled); High rate assistance based on median income in service area
Wyoming	LECs, BOC, IXCs, wireless	% of gross retail revenues	Rate subsidy to carrier with credit on bill	LECs with rates above 135% of statewide average

Economic Development and the Rise of the Virtual Corporation:

> Information technology is obliterating the distinction between small business and big business. Big businesses are becoming collections of small businesses, and small companies are partnering with one another, creating virtual corporations for a given period. Many industries that have been dominated by large corporations, like the automobile industry, are becoming networks of small suppliers linked through Information Technology (IT). In the past, one of the major barriers to entry for small business into fields dominated by large players was access to information. But large companies no longer have a monopoly on information regarding emerging technologies, consumers, capital markets, or even personnel. Today, small companies can rapidly form niche markets using all this specialized information.
>
> Robert Reich, U.S. Secretary of Labor

The advances in telecommunications technology, first facsimile (fax) transmission of business notes and documents with unprecedented immediacy, the prevalence of e-mail and file transfer, and more recently the evolution of mobile computing, videoconferencing and groupware applications have proved to be substantial enablers to the efficient operation, delivery of customer service and strategic outreach and interaction of today's businesses. Large enterprises utilize these telecommunications tools to drive efficient internal operations and manage the information flows in their global organization and customer base. Smaller firms can form collaborative partnerships and offer more competitive service delivery by also employing these tools, creating a business presence and quality of service well targeted to an era of outsourcing and the rise of entrepreneurial service enterprises .

ASPED (Arizona Strategic Planning for Economic Development), the forerunner of today's Governor's Strategic Partnership for Economic Development (GSPED), in their January, 1992 report "Creating a 21st Century Economy: Arizona's Strategic Plan for Economic Development," clearly stated the issue:

> Telecommunications and access to information have taken on increasing importance as the global economy becomes more tightly connected. Invariably, the most economically successful regions of the world also possess the most advanced information and communications infrastructure. During the 1980s, a virtual revolution in telecommunications occurred as a result of the fusing of computer and communications technology. The revolution was further fueled by the breakup of AT&T and the new competitive marketplace it created. For Arizona, information and communications infrastructure may be the key to opening up whole new economic development opportunities.

This vision of Arizona's economic development, nourished by its active participation in the revolution in telecommunications, is further advanced by the January, 1995 report of the Governor's Commission for the Study of the Telecommunications and Information Industry in Arizona. The report, prepared by Network Resources, Inc. is titled "Arizona Telecommunications: Leadership through Partnership for Competitive and Innovative Information Industry." Section 2 on Telecommunications and Economic Development in Arizona analyzes in detail the historical trends and research data confirming that the need for and use of advanced telecommunication and information services is inexorably linked to economic development and that the telecommunications industry itself is a major employer and generator of economic activity. It also confirms the linkage of the availability of advanced telecommunication and information services to the presence and demands of high technology companies and that such availability remains a substantial factor in their growth, the new formation of such companies within an area and the potential for high technology business relocation to an area. The importance of such high technology businesses to the state's economy is very significant and well documented in the Governor's Commission report and elsewhere.

Rural areas can reap enormous development benefits from the availability of advanced telecommunication services that are competitive with the region's urban services and costs. Rural economic development, at a disadvantage for many traditional factors, can greatly benefit from the integration of technology and automation in its existing businesses and be aided in the development and attraction of new businesses, often diversifying the business base of a community in the process. Returning again to the January, 1995 Governor's Commission Study, we find extensive and thoughtful analysis in Section 8.3 on Telecommunications and Rural Development in Arizona authored by Edwin B. Parker including this quote:

> Telecommunications offers the promise and potential to help rural businesses overcome problems of distance and lack of economies of scale. Many rural businesses, especially information-intensive businesses, can bridge wide distances to serve an enlarged customer base, including urban customers, through advanced telecommunications technology and services. This is why many catalog sales and other "telemarketing" businesses have grown in rural areas in the past decade and why many software developers and "lone eagle" entrepreneurs have moved to rural communities. As the U.S. and Arizona economies continue the global trend to more high technology and telecommunications-dependent businesses, rural locations with good telecommunications can be economically viable.

A recent study, "Impact of High Technology Industry on the Arizona Economy," begins by describing that "Among states and cities that actively recruit businesses to relocate, high technology firms are coveted. There is good reason for this. First and foremost, the high technology industry offers high quality jobs. In addition, high technology firms tend to be export oriented and make important contributions to the balance of trade." The report, published October, 1995, was authored by Dr. Alberta Charney and Dr. Julie Leones, both of the University of Arizona in Tucson. Upon its release, Governor Fife Symington of Arizona said, "This report tells us that this is the industry that is going to carry us into the 21st century." Some highlights of the data are presented below:

Direct contribution of high technology industry to Arizona's economy (1994)

- 95,099 jobs representing 4.8% of total state employment in the following industries:
  - electronic components and computers 49%
  - aircraft and missiles 20%
  - scientific instruments (including optics) 18%
  - computer software and services 8%
  - research services 3%
  - chemicals (including biotechnology products) 2%
- $4.360 billion in employee compensation
  - $45,800 compensation (including all benefits) per employee
  - Average pay is 75% higher than average Arizona pay per employee
- $5.369 billion in foreign exports, an estimated 63% of total Arizona exports
  - 7% of high technology sales in AZ, 59% to rest of U.S.,34% are foreign exports
- $6.626 billion in total expenditures on goods and services ($2.862 billion spent in AZ)
- $5.931 billion value added to Arizona's economy (6.8% of Gross State Product)
- $250 million paid in state taxes

Total contribution of high technology industry to Arizona's economy (1994)

- 180,261 jobs representing 9% of total state employment
- $6.498 billion in employee compensation
- 9.546 billion in total value added impacts (11% of Gross State Product)

- $609 million paid in state taxes

In April, 1994, the AZTEL 2000 study "Strategic Plan for Arizona's Information Infrastructure" was published as a collaborative effort of government, University and private enterprise participants led by the Arizona Department of Administration. The report "concludes that current and future telecommunications environments are central to the economic, social, and educational growth of the businesses and people of the State, and that the infrastructure needed to support Arizona's emerging future must be flexible, dynamic, and inclusive." In regards to business and economic development, it notes "As in other modern economies, the competitive survival of Arizona's business and work force depends on both the flow of information and the infrastructure that controls that information within the State. Critical services such as government, education, manufacturing, agriculture, financial services, transportation, wholesale and retail commerce, and utilities are all becoming increasingly dependent on telecommunications for cost effective administration."

While going on to propose a vision of a coordinated Arizona's telecommunications infrastructure which has yet to be realized, the driving factors the Aztel 2000 Task Force identified remain thoroughly relevant:

- Enhanced global competitive advantage for our business clusters.
- Rapid development of quality jobs.
- Environmental, family, and business benefits from telecommuting.
- Support of our telecommunications enterprises in the global marketplace.
- Readily available government services.
- Enhanced access to health care.
- Improved public safety and emergency care.
- Improved life-long education.
- Improved economic well-being.
- North American Free Trade Agreement (NAFTA) data link for expanded commerce.
- Improved government cost, efficiency, and effectiveness.
- A balance between information access and individual privacy.
- Timely, efficient, and cost-effective introduction to and use of appropriate emerging technologies.
- Affordable telecommunications services.

The Morrison Institute for Public Policy at Arizona State University in conjunction with the Arizona Telecommunications and Information Council (ATIC - formerly the Advanced Information and Communications Infrastructure Foundation) surveyed Arizona businesses in June, 1994 on the effects of telecommunications and information issues on their individual companies and Arizona business in general. The nearly 60 businesses surveyed were from all around the state and included some of Arizona's most prominent employers as well as small, medium, and large businesses in each of the 10 industry clusters of the Governor's Strategic Partnership for Economic Development (GSPED). More than 80% of these companies, divergent in their size, location and industry, ranked telecommunications and information services as "very important" to the future success of their businesses. The majority of the companies currently use local and wide area networks, electronic mail, and electronic commerce. They also found they faced a variety of barriers to using telecommunication and information services in technical areas (incompatibility of systems, concerns for data security, complexity of technology), business rationale (difficulty in identifying return on investment), and market forces (lack of provider choice, access in their locale, regulatory barriers). The results of the survey indicated six directions for public and private entities. They are listed below, followed by selected data from the survey on Arizona business' current and planned utilization of various telecommunications technologies.

- Expand the amount and types of information and services available online from local and state government agencies.
- Promote electronic commerce in general, and “electronic data interchange” in particular, through legislation and technical assistance.
- Expand existing network information centers (such as those at the state’s three universities) to increase technical assistance, information on connections, and training available to business.
- Produce a telecommunication and information “report card” regularly that rates Arizona’s environment for services from the users’ point of view. Use the process to monitor regulatory initiatives and developments among providers, in addition to the issues faced by current and potential provides in changing or expanding services.
- Advocate for the expansion of telecommunications infrastructure in Arizona that will allow businesses, regardless of location, to take full advantage of telecommunications and information services.
- Promote actions that will lead to reduced costs in telecommunications and information services throughout Arizona.

Table 8: Arizona Businesses - Utilization of Network Technology

	Currently Using %	To Be Used In 3 Years %	No Response %
Local Area Network	93	5	2
Internal E-mail	86	10	3
Electronic Commerce	76	21	3
Wide Area Network (WAN)	66	12	22
Commercial Services E-mail	48	24	28
Metropolitan Area Network (MAN)	24	30	47
Frame Relay	17	33	50
Switched Multimegabit Data Services (SMDS)	12	31	57
Asynchronous Transfer Mode (ATM)	10	43	47
Synchronous Optical Network (SONET)	2	36	62

(Source: Morrison Institute for Public Policy at ASU Study, September, 1994)
(From a Business Perspective: Outlooks on Telecommunications and Information Services)

Table 9: Arizona Businesses - Utilization of Telecommunications Transmission Systems

	Currently Using %	To Be Used In 3 Years %	No Response %
Modem	95	0	5
Dedicated Phone Lines	88	2	10
Wireless or Personal Communication Devices	69	21	10
Cable Systems	67	9	24
Fiber Optic Lines/Networks	66	12	22
Satellite	40	3	57
Microwave Radio Relay Systems	34	14	52
ISDN	33	26	41

(Source: Morrison Institute for Public Policy at ASU Study, September, 1994)
(From a Business Perspective: Outlooks on Telecommunications and Information Services)

Data Points, Trends and Portents:

This multi-part section is structured to illustrate the range of services and applications currently available, what role they play in today's telecommunications market, what competition may soon enter these application arenas, and what technology advances may drive their evolution. It is hoped that these brief overviews will aid the reader in grasping the complexity of telecommunications services and applications.

> People rarely distinguish among data, information, knowledge and wisdom. But they are as different from each other and as interlocking as starch molecules, flour, bread, and the flavorful memory of a superb morning croissant.
>
> Lewis Branscomb, Harvard professor and former IBM Scientist

Deregulation of the Local Telephone Market:

> Opening local phone and cable industries to vigorous competition will have a great long-term positive impact on high tech. This is especially true for America's PC industry, a world leader whose ever-more powerful machines operate over the narrowband copper phone wires and unswitched TV cables of regulated monopolies. Competition in local loops will drive investment in broadband switching networks. Additionally, state public utility commissions should complement federal reform by setting ISDN rates at POTS prices so that ISDN can serve as a bridge between narrow and broadband lines. Exploding Internet use is driving demand for ISDN lines and getting them should become inexpensive, fast and easy.
>
> Michael C. Mailbach in Upside, December 1995

Independent of federal action, many states have moved to allow competition in the local loop and more will follow in an inexorable march towards ending monopolistic control of local telephone service (see Table 10). Some consumer groups have voiced strong opposition to pending Federal Legislation that would prevent state and federal regulators from using rate of return regulation to set prices for local telephone service. The International Communications Association warns that this and even the proposed price caps, could cost consumers as much as $14 billion a year by awarding most of the benefits of technological change to telephone companies until a transition to a competitive market is complete.

Table 10: State Regulatory Commission Treatment of Competition in Switched Local Service (as of September 1, 1995)

	Competition is Allowed, Rules are in Place	Competition is Allowed, Rules are Not Yet in Place	Allowing Competition Under Consideration	Allowing Competition Not Being Considered
Firms are actively competing	IL, MI, NY, WA			
Firms have been approved for operation	CT, MD, MA, NC	AZ, OH, TN, UT		
Firms have applied for certification	CA, GA, TX	AL, FL, IA, OR, WI	KS, NJ, PA	
No statutory or generic regulatory barrier		CO, HI, ID, MN, NH, NM, NV, RI, SD, VA, WY	IN, ME, NE, OK, SC, VT, WV	DE, MT, ND
Generic policy or order is barrier				AK, MS
Statutory barrier			DC, KY (1)	AR, LA, MO

(Source : FCC Common Carrier Competition report, Fall 1995)

(Note: (1) Kentucky Public Service Commission indicates they belong one category higher up on this table, having currently a regulatory barrier, not a statutory barrier to competition.)

The glut of advertising from telcos seeking long distance customers will accelerate as they and other market entrants move to active competition for local service customers. Public and private telephone company advertising is already showing strong gains up 17.5% for the first half of 1995 to $762 million while cellular radio and phone system advertising surged 50.3% for the first half of 1995 to $141.5 million. (Source : Competitive Media Reporting)

As Local Exchange Carriers (LECs) downsize staffing to prepare for local telephone loop competition, service problems have seemingly increased in areas such as delayed installations, missing repair commitments and billing problems. Of 27 states reporting LEC staff reductions, 24 indicated an increase in service quality complaints (see Table 11). An upcoming NARUC study plans to recommend benchmark service levels, though it will be up to the individual state Public Utility Commissions whether to adopt them and how to monitor and enforce them. The importance of service quality versus lowest cost to consumers has yet to be determined in the local telephone market, but the immediate connection for customers of cellular and other wireless loop solutions may yet prove an advantage over waiting for conventionally wired service.

Table 11: Local Exchange Carriers Under Investigation for Service Quality Problems

LECs Under Investigation for Questionable Service Quality	State Public Utility Commissions Involved
Ameritech	IL, OH
GTE	AK, HA, MO, NC
NYNEX	NH (Informal Investigation), NY, RI
US West	AZ, CO, ID, IO, MN, NE, OR, SD, UT, WA

(Source: Preliminary Survey Results - National Association of Regulatory Utility Commissioners,11/95)

The FCC assists consumers in resolving a wide variety of problems. The three most common types of complaints accounted for more than half of the estimated 21,000 received in 1994. These top three categories were: “800” calls where the initial “free call” turned into a billable call, operator service company practices and rates, and unauthorized switching of long distance service (“slamming”). The

FCC is starting to compile a periodic Carrier Performance Scorecard to enhance consumer awareness of common telecommunications problems and the carriers most prone to them.

Computers and Telecommunications - More, Better, Faster, Cheaper:

Residential Telephone Subscribership Trends:

The FCC reports that in July, 1994 93.7% of U.S. households had telephones representing 92.4 million of the 98.6 million households. This was down slightly from a year earlier (94.2%) but up as a long term trend from November, 1983 rates of 91.4% penetration. The FCC also reports that in October 1993, the average for flat rate residential service was $18.82 monthly, including taxes and subscriber line charges. In most cities, consumers can subscribe to a service with a lower monthly charge than the cost of unlimited one party service. The average minimum monthly bill for such services was $11.27, including taxes and subscriber line charges. At the same time, the average business rate was a total of $42.57 monthly.

An interesting report published earlier this year by the Rutgers University Project on Information Policy was titled “Universal Service from the Bottom Up: A Profile of Telecommunications Access in Camden, NJ.” The authors, Dr. Milton Mueller and Dr. Jorge Reina Schement, studied Camden with a telephone penetration level of 80.6%, well below the national average, but with racial and ethnic composition and income levels similar to other low-penetration U.S. inner cities. They explore and discredit six common myths of telephone penetration, at least for their particular study area and methodology:

- Myth #1 - That affordability of telephone service hinges on the price of local access, thus the price of basic monthly service rates should be the focus of Universal Service policy. Most marginal users are driven off the network by usage-related costs.
- Myth #2 - That Universal Service subsidies should be focused on the elderly. For age 65 and older, national penetration rate is 97%. Lowest rates are in younger age groups, especially minorities.
- Myth #3 - That maintaining Universal Service is primarily a problem for rural areas. Nationwide, penetration in rural areas is several percentage points higher than in central cities.
- Myth #4 - That low income and minority areas are threatened with "electronic redlining," in which they are systematically denied access to advanced features and services.
- Myth #5 - That telephone service is intrinsically more valuable than cable television service, because the interconnectivity function of telephone is more important than the entertainment function of cable TV.
- Myth #6 - That adoption and use of the telephone and other electronic media are insensitive to differences in race or gender.

Cable Television Enters the Competitive Arena:

Cable television originated in the late 1940s as a means to carry broadcast signals into mountainous areas where over-the-air reception was poor with a community antenna and coax cable redistribution of television signals. With increased channel capacity, over time, cable systems developed local programming and licensed additional content sources, expanding their markets through all urban and most rural areas. The National Cable Television Association (NCTA) reports that there are over 109 national and 37 regional cable networks as of April, 1995. These cable systems pass by 97% of television households capturing 63.4% (60.5 million) as basic cable households, carrying an average 40 channels of entertainment, information and community access programs.

Cable systems pay "franchise fees" to their local communities, typically 5% of revenue reaching $1.01 billion in 1993 (up from $51.2 million in 1980). The industry's Cable in the Classroom program provides over 65% of U.S. K-12 schools with free cable service and access to commercial free programming. Cable companies employ over 109,000 workers and have revenues of over $23 billion a year. Over the next five years, an estimated $24.9 billion will be spent upgrading the network with fiber optics (an estimated 69,000 miles installed to date), digital compression technology, bi-directional signal capabilities and a new generation of set-top boxes. This will allow eventual expansion of video services to interactive modes, movies on demand, voice communications and high-speed access to online services.

Indeed, existing cable systems, with their broadband capable last-mile coax passing 97% of American homes, are well staged with some strategic upgrades, to challenge the Local Exchange Carriers for basic telephone subscribership while continuing to deliver mainstay entertainment content. Cable companies will also expand into Personal Communications Services (PCS), like cellular phone service, utilizing their existing infrastructure to transmit signals from cell to cell. And they will utilize their high bandwidth capacity to enter the "private line" business market as alternative or Competitive Access Providers (CAPs). Cable modems will allow personal and business users high speed access to the Internet and online providers at multi-megabit per second speeds, hundreds of times faster than telephone modems.

But while cable expands its markets, its traditional delivery of television programming is under attack. Direct Broadcast Satellite (DBS) has emerged as a strong competitor to cable with small (18") dishes, up to 150 higher quality channels, coverage across the U.S., and ready availability at retail outlets. It is estimated that DBS will capture over 2 million subscribers by the end of this year and from 5 to 10 million by 2000. Meanwhile, local telephone companies, with new regulatory authorization, will move forward in their efforts to deliver "video dialtone" (VDT) over their infrastructure. This competition should act to constrain market prices as new strategic alliances engage the battle for the consumers video dollars.

Cellular and Other Terrestrial Wireless Expand Their Range and Services:

With a 45 percent annual growth rate, the number of U.S. cellular customers exceeded 28 million by the end of June, 1995, growing by more than 4 million users in the first half of 1995. About two out of every three new phone numbers are being assigned to cellular telephones. Average local monthly bills dropped to $52.45 per month from $58.65 a year earlier, and down 46% from 1987 when the average monthly bill was almost $100. The industry's revenue for the year through June, 1995 was $16.5 billion. In the first half of 1995, nearly 2000 new cell sites were added and a record $2.8 billion was invested for a cumulative total since 1983 of more than $21.7 billion. (Source : Cellular Telecommunications Industry Association)

At least 420 MHz of radio spectrum is being reallocated and auctioned by the FCC for Personal Communication Services (PCS) and related technologies. Compared to the 50 MHz of spectrum used by current cellular carriers (two per market), this represents the equivalent of 16 additional cellular services in each geographic market. Plus the transition from analog technology, still prevalent in most existing cellular networks, to digital with its associated compression and interference immunity, will multiply the carrying capacity of those networks. The Personal Communications Industry Association (PCIA) estimates that by 2000 there will be 14.8 million subscribers to broadband PCS services competing with traditional cellular, which is expected to have almost 50 million subscribers by then. In addition, PCS will serve an estimated 8.1 million subscribers with narrowband two-way services (i.e. - two-way and digital voice paging).

The Local Exchange Carriers will find increasing competition from these "wireless local loop" providers. A recent study by Economic and Management Consultants International projects 7 million customers will abandon traditional wired telephone service by 2002, for specially designed and priced PCS services where the mobile instrument uses a home-based cell for at-home use with automatic transfer to mobile facilities and rates when away from home. Additionally, such mobile instruments may transfer to satellite services when out of terrestrial cell site range and incorporate advanced features such as paging, voice messaging and even video conferencing.

Today 170 wireless cable operators serve 700,000 homes with Multipoint Distribution Systems (MDS) but modern wireless cable television technologies may more significantly encroach on traditional cable providers. New local multipoint distribution services (LMDS) can provide interactive video, data and voice services. Perhaps 16,000 subscribers will be served from one node serving a 6 mile radius cell.
The downlink could contain 224 digital video channels and telephony with more limited uplink bandwidth available to subscribers.

Wireless is being increasingly deployed within enterprises and organizations to link Local Area Network nodes without network wiring installation and mobile business users rely more and more on wireless messaging and voice services as they roam their territory and the wider world. A very interesting proposal from Apple Computer, supported by the National Telecommunications and Information Administration (NTIA) is before the FCC. The petition requests that approximately 200 MHz of bandwidth be set aside for non-licensed low-power digital applications allowing for perhaps 20 million bit per second digital information rates at distances up to 6 miles. Digital spread spectrum technology would allow many simultaneous users to share this "citizens band" at no cost and without license, undoubtedly leading to enormous growth in wireless LANs, telemetry and other enterprise and personal applications.

Satellite Based Wireless Covers the Globe:

Satellite communications have long been the global linchpin for transport of high-capacity audio, multi-channel video, and volumes of digital data to remote locations. Home satellite reception developed to

tap off the video programming flow for personal viewing until eventually portions were scrambled and licenses to receive and decrypt sold to consumers along with the necessary equipment. More recently, geosynchronous earth orbit (GEO) satellite systems have come online specifically targeted to consumers. These Direct Broadcast Satellite (DBS) systems (or Digital Satellite Systems - DSS) employ small dishes (18"), low-cost ($600-800) receiving packages, and cable competitive rates to deliver up to 150 channels of basic and premium video programming with high quality images and audio. Federal law currently prohibits these providers from delivering programming available locally including network television, PBS and local stations unless the consumer is in an area not reached by over-the air or cable services. Thus, for now, most DBS customers retain a basic cable subscription or antenna for local broadcast reception.

Global radio communications devices for consumer use will soon be practical with the upcoming launch of the Motorola-lead consortium's Iridium and other similar systems. Iridium will soon place 66 (and competitor Globalstar 56) low earth orbit (LEO) satellites in polar orbits insuring world-wide coverage. The new mobile telephones, as discussed above, will defer to the least expensive available connection, progressing from home-based cell to terrestrial cell to satellite as necessary. At long last, there will be a system deployable in rural areas at equivalent costs of infrastructure, equipment and (to a varying degree) usage. To the extent that these satellite systems succeed in the market and costs of ownership and use are driven down, long standing rural high-cost infrastructure and service delivery issues will at last fade. More ambitious visions, such as Teledesic (backed by Bill Gates and Craig McCaw), plan for 840 satellites linked to a fixed grid of 20,000 supercells across the earth's surface enabling higher bandwidth applications from fixed and mobile customers on a global scale.

Interesting hybrid options will occur, such as Hughes' DirecPC, which via a small satellite reception dish will allow subscribers to receive a personalized stream of digital data, such as Internet downlink at 400 Kbps while simultaneously uplinking low-bandwidth navigation commands through telephone lines and their Internet access provider. Additionally, the continuing evolution of Global Positioning System (GPS) applications combined with terrestrial transmitted weather and traffic data will drive vehicular navigation and other mobile applications.

Fiber Deployment - Telecommunications at the Speed of Light:

The first commercial fiber-optic cable was introduced by Corning Glass in 1970. By 1980, 3,700 miles were deployed and exponential growth has occurred ever since. Fiber's ability to carry very high bandwidth combined with its low bulk compared to copper trunk cable has made it the transport medium of choice for telephone, cable, and utility companies alike. Fiber deployment moves ever closer to the home as telecommunications providers design their networks to deliver higher bandwidth applications to consumers, but usually stops short of actually reaching those homes, merging with existing twisted pair or coaxial infrastructure at some distance away. Large business users often receive their long distance telephone connection from their Competitive Access Providers via fiber from metropolitan loops directly into their facilities. Within business enterprises, fiber optics are being more frequently employed as Local Area Network back often to the department level and even to the desktop, especially where high-end computer workstations are used.

Public utilities often install fiber cable along their right-of-ways, driven to abandon traditional microwave connections to remote facilities by FCC reallocation of radio spectrum. Where not prohibited by their regulatory oversight agencies, they may become resellers of fiber capacity or "dark fiber." Cities and states may also benefit from leasing right-of-way access either by fees or in exchange for municipal or government use of the commercial fiber infrastructure. For example, New York State recently granted a 20 year agreement for a fiber optic network to be distributed along the Thruway to be remarketed to other

communications carriers. It is expected to stimulate economic development along its path and yield 20% of the network's gross revenues in payment to the state.

From POTS to ISDN to ATM:

Plain Old Telephone Service (POTS) has been the mainstay of personal and business voice communications for well over a century. It has evolved to support many new features and functions: touch-tone dialing, 911 emergency service, facsimile (fax) document transmission, computer data transmission via modem (from an original 55 baud to 28.8 K baud today), caller identification, call waiting/forwarding, voice mail, automatic credit card authorizations and remote applications from keypad entry. The mostly analog telephone instruments and signals have connected to an increasingly digital and complex infrastructure.

Integrated Services Digital Network (ISDN) moves the essential digital conversion of voice, allowing the integration of additional data forms, back to the subscriber's instrument. In doing so, it completes the digitization of the telephone network enabling existing copper wire infrastructure to support higher information rates, transport that information in its most efficient, digital form and makes possible a host of new services and applications as well. The RBOCs have been upgrading their Central Office equipment aggressively and ISDN is now available in from 70 to 100% of their territories. An estimated 650,000 lines will be in use by the end of 1995, and many millions more in the next few years. Pacific Bell estimates that they will deploy over a million ISDN lines in California alone by the year 2000.

Still problems abound. Special new customer premises equipment is necessary at substantial cost, though those costs are dropping. Specifications for installation and configuration are complex and often troublesome to get working properly. The providers themselves are often not yet familiar enough with the technology to provide adequate support. None the less, the transition from POTS to ISDN will persist. With ISDN, Internet access can be accelerated by a factor of four as effective baud rates reach 128K. Collaborative computing and telecommuting are further enabled as voice and data can be mixed so that documents and videoconferencing transmit simultaneously with conversation. It should serve well the Small Office or Home Office (SOHO) and Work-at-Home environments, becoming ever more prevalent.

Table 12: ISDN Rates for Business

Regional Telephone Network	Installation Cost	Monthly Rates	Per Minute Rate
Ameritech	$144	$38	$.04 first, .04 +
Bell Atlantic	$98	$19.26	$.09
Bell South	$264	$111.50	surcharge
GTE	$110	$50	surcharge
Nevada Bell	$227	$80	flat rate
NYNEX	$117	$46	$.06 ($.01-$.55)
Pacific Bell	$40	$26.5	variable
SNET	$245	$33	$.03
Southwestern Bell	$485	$31	flat rate
US West	$110	$69	$.10

(Source: Dataquest, Inc., Note: Residential Rates may be lower and all rates may vary by area)

For all its improvements in digitizing basic phone service at its source and all its promise, ISDN is still the first step for the telcos on the path to deliver broadband to the home. Network transport protocols such

as Asynchronous Transfer Mode (ATM) must be overlaid on digital signal communications to allow bandwidth on demand and varying priorities to be assigned to different digital message packet streams. Twisted pair capacity will not be bound by current ISDN rates, but as research and development efforts bear fruit, move into the multi-megabit ranges to allow competition with other providers for the advanced services market as it continues to develop.

Personal Computer Ownership and Modem Use:

> The rise of computer sales for home use should not come as any surprise. Most parents would like their personal computer to remain personal, which means that (for those who can afford it) a second home computer has become a necessity. Frequently, the kids' computer is better than the one the parents control, loaded with "educational" features. I hear a constant stream of stories from proud parents whose son or daughter has mastered the mechanics of their machine.
>
> Glorianna Davenport, MIT Media Lab in IEEE Multimedia Fall, 1995

Table 13: Trends in PC and Modem Ownership and Use

	1994 %	1995 %
Household has a PC	31	36
Ever use home PC	26	32
Use home PC daily	6	7
Use home PC for Personal Use	21	29
Use home PC for Work	17	18
Use home PC for School	12	12
Use a PC at Work	NA	41
Use a PC at Home	NA	10
Home PC has a Modem	12	20
Someone in House goes Online from Home	8	11
Percent of Americans who go Online from Home	6.6	8
Subscribe to Commercial Online Service	3	6
Use Internet Directly	NA	1
Connect to Office or School from Home	3.6	3

(Source: Times Mirror Center for the People & The Press, Technology in the American Household 10/16/95)

Table 14: Percentage of Households with a Personal Computer by Income and Education

Family Income	High School or Less	Some College	College Graduate
Under $30,000	14	32	43
$30,000 to $49,000	29	47	55
Over $50,000	50	62	73

(Source: Times Mirror Center for the People & The Press, Technology in the American Household 10/16/95)
(Note: Average 1995 Percentage of U.S. Households with PCs = 36%)

Table 15: Percentage of Households Who Go Online by Income and Education

(% of Population in Category / % of Computer Owners in Category)

Family Income	High School or Less	Some College	College Graduate
Under $30,000	4 / 29	15 / 47	24 / 56
$30,000 to $49,000	8 / 28	17 / 36	26 / 47
Over $50,000	17 / 34	26 / 42	35 / 48

(Source: Times Mirror Center for the People & The Press, Technology in the American Household 10/16/95)
(Note: Average 1995 Percentage of U.S. Households Who Go Online = 11%)

In the Times Mirror Center study, of the 36% of American households with PCs, 21% have had them for more than two years, 11% for less than two years, and 4% though they own a PC, don't use it. An additional 9% had a PC at one time but gave it up. The Arizona Republic and Phoenix Gazette recently commissioned a study that showed Phoenix area computer ownership of 51%, well above the 33-36% of most national polls. It also showed that 22% of the total local population goes online versus much lower national numbers. They consider the margin of error to be 4% and no specific explanation of the higher Phoenix computer and online usage is readily available without detailed analysis of the study's methodology and sample group. Other interesting data on consumer attitudes regarding local telephone and high tech services competition is also presented.

Table 16: The Arizona Poll on Telecommunications

	Yes	No	Don't Know
Do you have a computer at home?	51	49	-
Do you use the Internet or other online services such as America Online or Prodigy at home? (Note: % of 73% of computer owners with modems)	59	41	-
Do you think competition between local telephone service providers will help hold down costs to the consumer?	64	18	18
Do you think competition between local telephone service providers will speed up introduction of new high-tech advances, such as videophone service and movies on demand?	68	15	17
Would you consider using your cable-TV provider to provide telephone service?	32	42	26
Would you consider using your cable-TV provider to provide a package of services like telephone, cable TV and computer data transmission?	37	40	23

(Survey conducted for The Arizona Republic and The Phoenix Gazette, 9/22-23/95, 600 Adults)

Gordon Moore, founder of Intel, proposed more than twenty years ago that semiconductor fabrication density of transistors in integrated circuits would improve rapidly and continuously leading to a doubling of memory chip capacity about every 18 months and a doubling of effective microprocessor speed every two years. Moore's Law, as it has come to be known, suggests that the microprocessors of today at some 4 million transistors will utilize 13 million by 2001 and 90 million by 2010 in ever denser, more efficient chips. Speed, processing capability and memory size driven by ever more demanding applications tends to obsolete our business and personal computers every other year or so. The trends in increasing computer power and capacity

available at reasonable cost, access to higher bandwidth through public and private networks, and implementation of better signal compression technology will converge to drive incredible advances in multimedia enabled applications incorporating virtual reality elements.

Though the demand for portable computers has soared, Personal Digital Assistants (PDAs), handheld computers, have languished. PDAs will be reenergized by PCS and other emergent wireless connectivity and may well combine with mobile telephony into a single portable computer-phone instrument. On the low end, there is much talk of new, inexpensive ($500 price point) "Information Appliances." These limited functionality computers could be used in connection with the networked information infrastructure (client-server model) to serve most individual's needs (or so the story goes). How they will fare in the market and how a new generation of cable set-top boxes will position against personal computers for control of the media hearth in the home is yet to play out. Stay tuned!

Advanced Telecommunication Applications:

> If knowledge is power, then control of the kingdom of information could be at your fingertips within a decade. Flick a switch, and a video window covering a wall in your home will open up your ramp onto an ultra highspeed data highway shipping electronic bits of information at light speed. Booting up your computer, you'll cruise along hair-thin fiber optic grids. At a command, specially designed knowledge robots, your information slaves, will rocket through the supernetworks, sifting databases larger than the Library of Congress to ferret out whatever you request. The network's capability to transmit lifelike video images can electronically transport you on virtual voyages to the far reaches of the data galaxy or bring the world to your living room.
>
> Corporations, research labs, universities and medical centers will interface through a national data highway transmitting visual and audio images thousands of times faster than today's fastest networks. These synergistic links between myriad scientists, scholars, government officials and business people should catalyze an information explosion profoundly transforming the way we live. Such a supernet could allow anyone on the data highway to harness up the power of supercomputers and provide users with calculations for complex applications such as climate modeling, stock market analysis, cosmological research and medical diagnoses and treatment.
>
> Omni Magazine, December 1992

Table 17: Estimates of New Media Technology Markets in $Million

	1994	1995	1996	1997	1998
Commercial Online Services (1)	795	1,100	1,600	1,800	1,700
Internet (2)	366	771	1,500	2,400	3,700
CD-ROMs (3)	2,500	2,800	3,100	3,300	3,500
Kiosks (4)	292	496	823	1,400	2,200
Interactive TV (5)	37	261	831	2,000	4,200
Infomercials/Home Shopping (6)	2,800	3,300	3,900	4,600	5,400
Videogames(Hardware/Software) (7)	3,800	3,900	4,000	4,200	4,300
Virtual Reality (6)	116	190	262	374	570
Total New Media Markets	**10,706**	**12,818**	**16,016**	**20,074**	**25,570**

(Sources: (1)Forrester Research, (2) Goldman, Sachs & Co., (3) Dataquest, (4) Inteco Corp., (5) Jupiter Communications, (6)Paul Kagan & Assoc., (7) BT Securities)

Customers no longer will take merely what we give them. Customers will become powerful buyers, not just users, driving the direction of the market, not necessarily regulators or product developers. Consumer receptiveness to choice is what drives technology. Technology does not drive consumer receptiveness or choice.

There is no threat to market diversity when thousands of content providers, network access providers, manufacturers, telcos, cable companies and all the other companies are already out in the field lining up for the transition. Do not be obsessed with dividing the pie. It's making it bigger that is better for everyone. We will spend more than $20 billion in the next ten years updating our networks for tele-TV, Internet access, video phones and similar products. Although ISDN is available everywhere in our territory, you have to be pretty rich in some places to afford it. We are hoping to have 100 percent practical ubiquity for ISDN and expect major progress on the deployment.

Ivan Seidenberg, Chairman, President and CEO of NYNEX

Table 18: Consumer Online Services

	CompuServe	America Online	Prodigy	World Wide Web
Total Subscribers	3.2 Million	3.0 Million	1.2 Million	30 Million (Est.)
Average Age	42	(1)	36	35
Household Income	$93,000	$75,000	$60,500	$60,000
College Education/ Degree	94%	88%	75%	NA
Male	90%	79%	60%	82%
Female	10%	21%	40%	18%

(Source: Marketing Tools, November/December 1995)

(Notes: (1) Age 18-34=37%, 35-44=34%; Microsoft Network is estimated to have 525,000 subscribers)

Electronic Mail:

E-mail has swept the communications and information world during the past decade, providing instantaneous global information and data exchange. People who send e-mail via the Internet - the amorphous network that links computers worldwide via telephone lines - can correspond with individuals 10,000 miles away as easily, quickly, and inexpensively as they can with neighbors next door. They can communicate with one or many people at the same time. And they can distribute information to any other user as soon as they create it.

However, even though this revolution has broadened and changed the ranks of people with access to information, it has not altered one fundamental feature: An information elite still exists, made up of those with access to and knowledge about computers and e-mail. And as e-mail becomes more pervasive, as more commercial and government transactions in the United States take place online, those information haves may leave the have-nots further behind, unless we make concerted efforts today to provide all citizens with access to the technology.

RAND report, "Universal Access to E-Mail: Feasibility and Societal Implications," 1995

E-mail has joined facsimile document transmission as an essential business tool and increasingly as a vital personal asset and need. It compresses time and distance in the sending of messages and is transmitted at

virtually no incremental cost once the equipment and access are in place. The Electronic Messaging Association estimates that the largest 2,000 American companies employ 5 million individuals, transmitting and receiving 6.1 billion messages annually. By the year 2000, the total number of e-mail users worldwide is expected to exceed 100 million.

If any elements of the array of global information applications are to be added to an expanded range of Universal Service capabilities, it must certainly be that individuals have a electronic in-box to receive e-mail and the means to access it. Where available, Free-Nets and civic networks such as AzTeC readily provide e-mail accounts at no charge and are increasingly placing public access terminals around their regions. In some locales, state and municipal governments along with libraries have taken the lead in providing terminals and kiosks to access public records and selected information resources. In the future, they may also provide more general Internet access, allowing users to "pick up" their e-mail. Next generation consumer devices, such as TV set-top boxes and even telephones, may be e-mail enabled. Additionally, a market for "pay" terminals for e-mail and general Internet access may develop, merged with pay phones or similarly distributed. Already some coffee houses and restaurants in urban centers offer patrons computer workstations or phone jacks for portable computer attachment for these purposes. Additionally, commercial network providers may offer "free" e-mail to those willing to accept advertising messages.

Videoconferencing:

Since the widely-seen demonstrations of AT&T's Picturephone at the 1964 World's Fair, the broad availability of personal videoconferencing has been eagerly awaited. Teleconferencing between conference rooms of business people have long since proved its value in connecting remote sites in collaborative meetings, saving travel costs and time while resolving issues and advancing business objectives. The improvements in PC workstation processing capability, access to more bandwidth over corporate LANs, ISDN and other high-speed public network means, improvement in signal compression technology, and worldwide standardization of videoconferencing protocols should finally drive the market resulting in wide deployment of desktop-to-desktop or personal videoconferencing. More than just voice and visuals, documents and drawing will be viewed and annotated by multiple parties (whiteboarding) while files are transferred as background activity. Projects like ECNet (see Arizona Projects and Activities of Note below) are good examples of the value and benefits that can be obtained with the prevalence of full-featured videoconferencing. Telemedicine applications also require such capabilities along with assured security and reliability.

Consumers have been plugging their camcorders or dedicated video cameras into their own PCs and beginning to videoconference on the Internet and by direct dial interconnection. Market penetration by dedicated desktop instruments should follow. At the most recent Comdex show, Panasonic introduced a mobile handheld PCS videophone in the familiar cellular phone form factor. Signs of finally reaching critical mass for video telephony applications in the next few years look positive, but the Year of the Videophone has seemed "real close" for over 30 years now. By the way, not everyone is so anxious to participate in videoconferencing as this quote illustrates:

> In less time than Al Gore can say "national information infrastructure," they tell us, we'll all be hooking video cameras to our computers. If they're right (horrors!), we'll actually have to look at the people we communicate with online. Work-at-homers who pad around all day in flannel PJs and bunny slippers will be on display to clients; hooky-playing employees will have to look the part when they e-mail in sick; and 250-pound, balding guys from Teaneck, NJ, who've been carrying on steamy online affairs under the pseudonym Rip will be exposed for the pudgy-faced impostors they are.
>
> Zach Wolff in Netguide, April 1995

Telecommuting:

> In a country that has been moaning about low productivity and searching for new ways to increase it, the single most anti-productive thing we do is to ship millions of workers back and forth across the landscape every morning and evening.
>
> Alvin Toffler, Futurist and Author

In addition to home-based businesses, many traditionally employed workers spend part of their workweek telecommuting or are simply based by their employer at their own residence. This has a growing impact on traffic, reducing demand on transportation infrastructures and improving air quality. Employers may be able to reduce space needs and overhead, access new labor pools and comply with transportation reduction regulations with increased productivity, recruitment and retention. Employees often consider telecommuting as improving their quality of life with reduction in commute time and associated costs, increased flexibility and family interaction, and improved morale. Telecommuting may offer new employment opportunities for the mobility limited and can aid rural development as distance from one's employer becomes less important to workers. This non-traditional model has proved difficult for some enterprises to adopt and adjust to, but has been largely successful for appropriate job functions.

Advances in telecommunications services and technologies further enable the development and success of telecommuting. The well-equipped home work area may have a second phone line, personal computer and the ability to fax and copy documents. A recent computer modem protocol, DSVD, allows simultaneous voice and data transmission over a single POTS line, perfect for telemarketing, catalog sales and other applications where one needs to converse while accessing data. Technologies such as ISDN further enable these applications with their faster data rates and ability to more rapidly transfer calls from site to site.

Nationwide 9.1 million people telecommute one or more days a week, a 20% increase over 1993's total of 7.6 million. There are 4.2 million additional telecommuters who are self-employed business owners with their primary place of business located outside the home for a total of approximately 13.4 million telecommuters working an average of 7 days per month at home. (Source: Find/SVP, 1994 American Information User Survey). In Maricopa County, almost 93,000 employees (8%) telecommute at least one day per week saving an estimated 600,000 miles of travel and 12 tons of pollution each weekday. (Source: WestGroup Market Research, 1994 Report on Maricopa County Telecommuting)

Lost in Cyberspace - Navigation Tools:

Vannevar Bush, science advisor to President Franklin Roosevelt, published an article in 1945 envisioning hypertext and multimedia. Only recently have those concepts been sufficiently actualized in broadly used products and environments. The Internet and its military/research precedents plodded along for decades involving a growing, yet still minuscule community in its text-based world of e-mail, file transfer and data retrieval. Only with the onset of the World Wide Web several years ago, with its graphic views and point-and-click navigation did Internet use explode to include an estimated 30 million U.S. users, adding to the many millions subscribing to consumer online services.

Even with its vastly improved graphical access, the Internet can remain a foreboding place. As a network of networks, the information content is maintained and delivered from tens of thousands of sites across the planet. Only now are comprehensive hierarchical directories and well-designed search engines reaching common and practical usage, but they often still require inordinate amounts of time and effort to sort through potentially relevant material to find what is needed and reliable. In the government and public policy arenas, what information there is available is often of high quality and utility. But in many other areas of interest, the signal-to-noise ratio (useful and reliable content as compared to useless or misleading) remains much too low.

Traditional and new entrepreneurial publishers are establishing a solid presence and electronic journals often deliver timely, valuable information, but there's just too much "stuff" out there.

Software applications and agents will supersede browsers for much of our personal information gathering needs. Customized newspapers, the "Daily Me," will be delivered to your in box or "electronic doorstep." Intelligent agents or Knowbots will have a profile of our needs, preferences, budgets and resources and take "assignments" to visit a vast array of information resources, collecting and sifting data to prepare and present targeted results to us. Such capabilities (i.e., Telescript from General Magic) are being integrated to operating systems and applications for near-term viability.

> The Librarian daemon looks like a pleasant, fiftyish, silver haired, bearded man with bright blue eyes, wearing a V-neck sweater over a coarsely woven, tweedy-looking wool tie. The tie is loosened, the sleeves pushed up. Even though he's just a piece of software, he has reason to be cheerful; he can move through nearly infinite stacks of information in the Library with the agility of a spider dancing across a vast web of cross-references.
>
> "Yes, sir," the Librarian says. He is eager without being obnoxiously chipper; he clasps his hands behind his back, rocks forward slightly on the balls of his feet, raises his eyebrows expectantly over his half-glasses …
>
> Neil Stephenson in Snow Crash, 1992

Education in the Information Age:

> It is my very strong belief that free connections to the National Information Infrastructure (NII) may not be enough. If we want young people to actively use the technology of the future so it becomes second nature to them, then we must go a step further and provide free usage of the telecommunications lines that will connect school children and young people to new sources of knowledge. The principle of "free" public education for all children is the bedrock of our democracy. Not cheap, inexpensive, or available for a fee but in its very essence "free." We believe in this basic American principle because we know its long-term value for society as a whole.
>
> A child or young person who gets an education of high standards and excellence becomes the worker you can depend on, a better citizen, and a stronger consumer. An early investment in education should have broad application in creating a rate structure for the future use of the NII. Educational institutions, large and small schools, libraries, literacy centers, early childhood centers, community colleges, and universities should have access and usage of these services. If we can't connect the NII with all educational institutions at once, then schools, libraries, and literacy centers should be at the top of the list. I believe that this early investment in education will provide a handsome and long-term economic return to business and to the nation as a whole.
>
> Richard Riley, U.S. Secretary of Education

Technology itself can't provide educational excellence, but it certainly can be utilized as a tool to aid and deliver it. The necessary technological literacy and skills for modern living and productive employment are best learned at an early age. Since the late 1970's and early 1980's, personal computers have been extensively deployed in K-12 and higher education environments. Eventually stand-alone systems were networked to form learning laboratories and share peripherals and resources. More recently, these learning tools have been connected to a wider realm of on-site resources (i.e., school library or administration) and through the Internet to the world at large. A recent study found that in 1995, 37 states provided a connection for their K-12 institutions to the Internet via a statewide education network, up from 29 states in 1993. Seventeen states support their

educational networks as a separate budget line item. Federal, state and private funding for such statewide networks was more than $207 million in 1995 ($199 million from state allocations). The same study reports that 6% of Arizona school districts have direct Internet connections and 31% have local dial-in access. (Source: Quality Education Data "Networks Now 1995:
A Survey of How Schools Use Telecommunications Networks in Education) Recently, some state Public Utility Commissions have been requiring BOCs to use excess earnings to link schools to the Internet.

The Arizona Department of Education provides local access to the Internet in Phoenix, Yuma, Tucson and Flagstaff through its AzEdLink program. Currently 3,000 users are supported and the department's World Wide Web site offers access to background on their visions and goals as well as access to many educational resources (see Arizona Projects and Activities of Note for more details). Beyond government provided funding, many private initiatives are surfacing to support educational goals through advanced telecommunications services. For example, AT&T has recently announced their Learning Network, a $150 million commitment to put all the nation's 110,000 K-12 schools on the information superhighway by the year 2000. AT&T Capital Corporation offers innovative financing programs for high-tech equipment, software, and even building wiring, with tax exempt lease/purchase as an alternative to bond issues. In California, America Online has offered to connect over 2,000 schools next year providing unlimited free access to its services. President Clinton recently announced that Tech Corps will become a primary means of bringing technology into the classroom by recruiting, placing and supporting volunteers from business to lend technical support to schools in their communities. Many other such opportunities for public-private partnerships will be forthcoming and Arizona needs coordinated efforts in identifying and responding to such potential programs.

In Arizona's higher education environment, Arizona State University through their world-class Computer Commons and statewide outreach through ASPIN, has exhibited vision and persistence in bringing access to advanced information resources to the educational community and beyond. Northern Arizona University's NAUNet has pioneered distance learning, again statewide, with an extensive microwave network and a commitment to content development (again see the section on Arizona Projects and Activities of Note for more details). The Western Governor's Association has articulated a vision of a degree-granting "Virtual University" through their SmartStates program, foreseeing regional cooperation in distance learning for cost-effective, high quality delivery of higher and adult education. From the land-grant universities of the 19th century, America has committed its resources to the development and support of its higher educational institutions. In the past, this often meant the funding of physical infrastructure, institutions that students came to. In the Information Age, this support will hopefully translate to deployment of high technology infrastructure and applications, enabling the institution's offerings to be participated in "virtually" or remotely.

Electronic Democracy and Access to Government Information:

With one simple click of the mouse, one is granted rights of citizenship into a virtual community of individuals that spans the globe. As the Internet, including the World Wide Web and the various online services available today, has grown, so, too, has the ability of the individual to participate in discussions on issues of regional, national, and even global importance without the usual constraints which have traditionally limited meaningful discourse among groups of individuals (cost, distance, ease of communication, geographical barriers, etc.). We cannot fully appreciate at this moment the impact this revolutionary way of communicating ideas will continue to have on reasserting the true creative and expressive potential of the individual in our democracy. The freedom of individuals, without regard for class, nationality, or ideology, to express their viewpoints, is an essential part of the Internet and the online community. Such freedom stands in sharp contrast to the "group-think" of recent decades that was perpetuated by those who still believe in a top-down "Washington knows best" attitude. The

> ability to engage in an electronic forum on flat taxes, welfare reform, term limits, or virtually any other issue of importance to an individual or group of individuals is helping to overcome the once wide gap between Washington and the American people.
>
> Newt Gingrich, Speaker, U.S. House of Representatives in Boardwatch, December, 1995

The foundations of effective democracy are built on an informed citizenry, empowered to express their views and offered the opportunity to interact with and perhaps influence the policies of their government. The Federal and state governments act as enormous repositories of information that they collect and generate. Tradition and law mandate the availability of this wealth of data and electronic access is coming to offer the most versatile, logical and cost-effective means of delivery. The Federal government has undertaken with visionary zeal the development of a National Information Infrastructure and initiated efforts at all levels of government to reengineer itself and provide citizen services via advanced information access programs. A wide range of coordinated efforts and already successful programs are underway as detailed in Appendix B - Telecommunications Policy Resources.

> The web transformed the Internet from an often difficult and confusing search for information to an entertaining and rewarding journey through a wealth of material in what amounts to a global electronic library. And it brought the government - both federal, state and local - into its embrace. It's hard to find a federal office, state capital, or even a city that isn't represented on the Internet. Government may fall short in many areas, but in cyberspace it has delivered with a comprehensiveness and enthusiasm that wins applause across the country. That information would cost a lot of money if you tried to get it from other sources, so there's a lot of value out there.
>
> James Evans in Government Technology, November, 1995

Many states have undertaken similar initiatives to develop an Internet presence and deliver a broad range of information and services through this new medium. Almost all the states have home pages as an entry point for citizen access. An estimated 36 states have Legislative home pages and about 20 offer legislative tracking, if not the full text of laws and bills. (Source: Government Technology, December, 1995)

Arizona state government has provided an official home page for some time. A number of state departments have their basic mission and contact information available and depth of content continue to slowly develop. The Arizona Departments of Commerce and Education have the most advanced scope of services on the World Wide Web at this point, but the Arizona Corporation Commission's STARPAS dial-in service is most indicative of the depth of public record access that should soon develop.

> If you think of what government does, it is often the collection of information, the recording of official information, and the compilation of statistics. Yet much of what is collected and maintained by government just sort of sits there in primitive records that are sometimes accessible electronically. Yet the government is often protective of information because, certainly within the departments, there's an awful lot of turf protection in the data they collect. If government took its role as one of making information available and providing accessibility, we would see a lot more confidence by the public in government.
>
> What was clear was that for a new generation of leadership, public accessibility is part of regaining trust. In my experience as a legislator, when I went online, I immediately got a lot of e-mail from people saying it's about time, this is overdue, we've used this at work for 10 years, I'm so glad that I can contact you as a constituent. Many of them are people who probably would have never written a letter, gotten a stamp or gone through that whole process. Yet, they wanted to feel like they could be in touch and I had a wonderful experience with that.

Earl Baker, former U.S. Senator from Pennsylvania, VP of Unisys Corporation
in Government Technology, December, 1995

Notably, former Arizona Representative Sam Coppersmith, with the aid of ASU and ASPIN, was the first member of the U.S. Congress to go beyond e-mail to provide positions, surveys and constituent services on the Internet. The Arizona Legislature is planning an extensive World Wide Web presence for the 1996 Legislative Session. They should utilize the Governor's Office of Telecommunications Policy and the Department of Administrations Chief Information Officer to determine the range of information resources provided by other states and how they are funded, managed and delivered. And with this information, determine how best to provide encouragement or mandate that the divisions of Arizona state government move forward in the electronic provision and citizen access to public information and records.

A popular government, without popular information or the means of acquiring it, is but a Prologue to a Farce or a Tragedy or perhaps both. Knowledge will forever govern ignorance, and a people who mean to be their own Governors, must arm themselves with the power knowledge gives.
James Madison, 4th President of the United States, 1822

Virtual Communities in Cyberspace:

The original intent behind the development of the Internet's predecessor, ARPANET, was the linking and sharing of supercomputer resources around the nation. As researchers and scientists at Universities and centers began to communicate by e-mail, the value of such collaboration became unexpectedly and quickly of significant importance to the progress of their work. Virtual communities of interest arose and over the ensuing years many others got connected and joined in leading to tens of thousands of sites, news groups and mailing lists dedicated to their own often narrow nexus of interests, applications and goals.

"Smart connections" mark a fundamental change in the way we are able to communicate in the new digital world. In this new world, more and more people are using their personal computers to create digital content. Smart connections, which are the combination of the intelligent personal computer and the communications infrastructure, advance everything from medical practices to business transactions. They enhance the way we work, play and learn.

Technology can bring to life a virtual community of people while they are visiting a site on the World Wide Web. This is a smart connection that is right around the corner. People thousands of miles apart can seem to gather in a single room. By the end of the decade, personal computers will become the most ubiquitous consumer device in the world, surpassing the television in worldwide unit sales. PCs will stand alone as the most versatile and most cost effective way to bring people and information together.
Andrew Grove, President and CEO of Intel, in America's Network, November 1, 1995

Information Services Haves and Have-Nots:

It is sometimes thought that there is a magic solution to building the Global Information Infrastructure (GII) - for example, that the answer is the Internet, or that it is broadband ISDN,
or that it is interactive cable television, or that it is future generation wireless technologies. Personally, I do not believe that there is a magic solution of this kind that some "revolutionary technology" or "killer application" will conquer the world. It is more likely that the GII will
be a "network of networks" and evolve out of existing technologies and services, just as communications has always done. Let me suggest that we also have a compass - a moral
compass - that should point us toward paths that maximize values such as universal access,

> the right to communicate and diversity of expression. These values are fundamental not only to communications, but to the democratic evolution of mankind.
>
> Pekka Tarjanne, Secretary General of the International Telecommunications Union (ITU)

As we move from the traditional measurement of Universal Service by telephone penetration rates to attempts to quantify Universal Access, the variety of possible services and content and the wide range of delivery mechanisms hinder any easy definition. Early analysis of technology availability (computers and modems) against demographics, such as the recent National Telecommunications and Information Administration's "Falling Through the Net: A Survey of "Have Nots" in Rural and Urban America," indicate many of the same populations are underserved. Information "have nots" are disproportionately found in rural areas and the inner cities. Not surprisingly, they also closely track the distributions of telephone penetration for race, age, region, income, and level of education.

It is not likely that as formal and encompassing a program as supported Universal Service will arise to meet the needs of the "have nots" in the Information Age. But it is necessary that the same traditional populations are targeted by a majority of the many efforts and programs that are put in place. In the absence of a national definition and plan, though not without vision and support, states and localities must take the initiative to identify and participate in broader regional and national initiatives, and where those are lacking or not appropriate or adequate for their populations, define their own.

> If systems like the Internet become critical parts of national and global infrastructure, then universal access to them will be vital. Public policies that encourage universal availability of access would be a logical and desirable outcome. I hope and believe that it will be possible to provide universal access through competitive cost reduction and where appropriate, business incentives. Alternatives that apply regulatory methods to achieve this goal are often found to be inimical to good business practice and therefore, artificial and risky at best.
>
> Vint Cerf, VP of Data Architecture at MCI Communications Corp. and Internet pioneer

Enabling Access for Persons with Disabilities:

Technology has always proved a great enabler, a way to multiply strength or speed tasks or perform the otherwise impractical. It has similarly reenabled those with disabilities, often returning to them the mobility and capability to achieve greater independence in their personal, social, recreational, educational, and vocational activities. The amazing advances in assistive technology continue to arrive at a rapid pace, returning a semblance of lost senses or skills to the disabled. Technology transfer from advanced space, military and communications programs feed an industry supported by dedicated research institutions.

The other side of the issue is that the common telecommunications functions widely deployed in society should remain accessible. This has driven the Telephone Relay Services inclusion in Universal Service, the requirements for hearing aid compatibility of telephones, the wide availability of closed-captioning for television, the accessibility of Braille and audio books, among others. With the graphical nature of the modern computer and information access systems, care must be taken in the development of standards and the specific design of products and services to include as much as possible those with disabilities. By enabling optional input and output devices and formats, delivery of information services can continue to reach the broadest possible population. Speech output can be substituted for the graphic display while voice recognition or alternative input devices other than keyboards and mice can allow navigation and data entry. Standards and requirements for such capability will be driven at the national and international level, but it falls largely to the states and localities to provide programs and social support structures to propagate the equipment and support services necessary.

Electronic Commerce and Security:

Electronic Data Interchange (EDI) is the means by which businesses can conduct paperless, instantaneous, secure transactions. It greatly reduces transactional costs and is increasingly required by government entities and large businesses for those vendors wishing to deal with them. As harmonized international EDI business documents mature, ever more of our trade and monetary flows will pass this way. Though much EDI moves through clearing houses and third parties, it will increasingly shift to the level of direct transactions between parties on secure public networks.

Indeed, security is quickly reaching practical levels and will soon be embedded in operating systems and applications as a ubiquitous function to authenticate those in a transaction, authorize purchases and payments, secure the privacy of the matter and enter into legally binding arrangements. Much consumer electronic commerce is already taking place on the Internet via unsecured credit card purchase or to a small extent, with one of the early forms of digital cash. Some consideration for state and localities, are the issue of sales tax obligations in cyberspace, the tracking of interstate and international cash flows and the enabling and encouragement of such electronic commerce (i.e., California and Utah have enacted digital signature legislation).

> Sending a credit card number to an electronic merchant over the Internet is probably the safest way to make such a transaction. In the last week, for example, I handed my credit card to a waiter who disappeared with it for five minutes. I faxed my credit card information to a business in New Jersey, and the fax probably lay exposed to everyone in that office for hours and perhaps to the cleaning crew that night. I called a hotel and gave my credit card data to a reservation clerk and continued my recklessness by ordering some merchandise from a clothing catalog, again by reading my credit card information to some unseen operator. Compared with the risk of handing my credit card to a stranger, which I do nearly every day, sending it over the Internet is pretty secure.
>
> Peter H. Lewis, journalist in the New York Times (November 13, 1995)

Privacy, Censorship, Copyright and Civil Liberties:

> Everybody's watching me. You know all those articles about "Will They Spend?" Well, I'm one of **them**. Just as people are sick of polls in the weeks before elections, and predictions about who will be in the Super Bowl before the play-offs begin, I am sick of the blow-by-blow reports on retail sales figures during the so-called Holiday Season. Suddenly you feel as if you are letting your country down if you are not spending. One Jingle Bear too few and you're the consumer equivalent of a Pledge of Allegiance refusenik.
>
> Alice Kahn in Luncheon at the Café Ridiculous, 1990

In this time of enormous transitions, the whole basis of our rights and civil liberties must be reevaluated in light of emerging information and telecommunications technologies and the societal shifts they drive. The issues are plentiful, complex and often interrelated.

On the issue of citizens' privacy, one must consider the ability to accumulate and coalesce a digital picture of an individual's spending and habits and apply that to marketing or investigation. In Europe and many other countries, the secondary use of much marketing information openly brokered here, is controlled or prohibited. The availability of strong cryptography has been particularly contentious of late as the Federal government has proposed requirements enabling authorized surveillance and retaining strict export controls, which has been met by unprecedented industry and public resistance and activism. The privacy

of e-mail at work or in public transit, the possibilities of anonymous messaging, the personal and intense nature of “flaming” in electronic discourse, all are elements of a broad and difficult debate.

The many new forms of publishing, both new media itself and the forms of transmittal are forcing reexamination of our intellectual property laws, especially in the area of copyright. The ability to readily copy the works of others grew with the advent of the photostat machine and with the digitization of word, image, and content in general, the potentials for digital copying and transmittal enormously complicate the rights of ownership, reproduction, royalties and fair use. Significant efforts to redefine copyright laws and adapt them to new media are underway as authors, publishers, libraries, and users meet in concert with policy makers, but expect some bumps in the road.

> As a desktop publishing medium, the World Wide Web harkens to the old model of pamphleteering, where anyone has the right to advertise opinion without censorship or editorial interference. How far can we go down this aesthetically and sociologically independent path before regulators and other forces converge to tame it, imposing a layer of moderation or editorial control between author and audience.
>
> Glorianna Davenport, MIT Media Lab in IEEE Multimedia Fall, 1995

Where do we set the limits of free speech in this new world of communication possibilities? Are the telecommunications providers a common carrier with no responsibility for the messages they transmit, are they publishers with the liability for content that ensues, or are they somewhere in between? Do images or content transmitted between individuals over state or national borders have to meet the “community standards” of both the sending and receiving sites to not be assailed as pornography? Fortunately, their are now voluntary industry efforts underway for “content labeling” and tools for filtering or blocking access to specific sites or types of materials. Parents and schools must assume some substantial responsibility for the protection of minors and methods to limit and monitor access will become increasingly prevalent.

Some of the most interesting and contentious issues on the new frontier concern these issues. It is well beyond the scope of this report to survey this broad landscape and even suggest solutions. However, in the Resource Guides (Appendixes B and C) are details and contact information on many public policy players active in this debate for your further investigation and consideration.

Arizona Projects and Activities of Note:

(Note: Contact information can be found in Appendix B - Telecommunication Policy Resources)

Arizona State and Municipal Government:

Arizona Corporation Commission (ACC)

State of AZ Public Access System (STARPAS) provides dial-in access via computer modem to information on corporations, limited liability companies, trademarks, tradenames, and limited partnerships having a business presence in Arizona. It is a fee based system requiring a modest $36. startup fee and a deposit account with the ACC to cover the $.50 per minute usage fee. It is a good model of providing state public records to the business and legal communities, but the deposit account model precludes casual or occasional public usage.

Arizona Department of Education (ADE)

AzEdLink is the department's current Internet access service for the K-12 educational community. For an annual fee of $35, public school instructional, administrative and support staff members as well as affiliated community members and students (currently a total of 3,000 users) dial-in via computer modem for full Internet access. The 800 service used in the pilot program has been discontinued due to traffic and cost, but in addition to Phoenix local lines, Yuma, Tucson and Flagstaff have local access. ADE (along with the Department of Commerce) has the most thoughtfully designed and useful World Wide Web site in Arizona government with their visions and goals readily accessible as well as pointers to K-12 schools hosting their own Web presence and links to many educationally related resources.

Governor's Office of Telecommunications Policy

The Governor's Commission for the Study of the Telecommunications and Information Industry in Arizona in their January, 1995 report had as their first recommendation that the state "develop visible and effective leadership for telecommunications" by establishing the Governor's Office of Telecommunications Policy to "proactively advocate, coordinate, mediate and educate Arizona residents and policy makers on telecommunications issues." Last session, the legislature enacted Senate Bill 1258 creating the office which has been in operation since July.

Arizona State Legislature

The State Legislature has promised a World Wide Web presence for the 1996 Legislative Session. The Arizona Legislative Information System (ALIS Online) will carry a full range of legislative information:

- Members' biographies, committee assignment, and sponsored legislation
- Committee background, membership, agendas, and assigned bills
- Status and full text of bills as well as the floor calendars
- Full text of Arizona Revised Statutes (ARS)

City of Phoenix

PhoenixNet is an initiative to provide broad electronic service and information to citizens, specifically targeting elderly, disabled, and economically disadvantaged citizens. Senior centers, community centers, libraries and non-profit special needs centers dispersed throughout the city are being equipped with workstations for public access to city information and services, some including assistive technology for the disabled. Aided by grants from the Telecommunications & Information Infrastructure Assistance Program (TIIAP) of the National Telecommunications and Information Administration (NTIA), Phoenix has a well thought out and organized plan to develop online information resources and going beyond general public access, to insure including targeted under-served populations.

City of Tucson

The Community And City of Tucson Information NETwork (CACTI-NET, formerly METCOM) has served the Pima County community for several years by providing electronically accessible government, local business and community information about the southern Arizona region. Their offerings include a significant body of trade, business and economic resources. In addition to their local dial-in access and gopher presence on the Internet, they serve as Tucson's gateway to the AzTeC Free-Net (see below) and are developing their World Wide Web presence for introduction in 1996.

Arizona Higher Education and Public Institutions:

Arizona State University (ASU)

Arizona State Public Information Network (ASPIN), based at ASU, assists Arizona's public organizations and communities in connecting to the Internet. Phase I connected the three primary urban areas of Flagstaff, Phoenix, and Tucson with a state-wide backbone and within these urban areas they have provided connections to many organizations (over 50 in Phoenix). Phase II , aided by NSF funding, extended the backbone out to the state's eight rural community colleges and from their into their communities. Phase III is a proposed plan to connect Arizona's K-12 schools to the backbone developing a robust educational network. ASPIN also staffs and supports three state-wide Network Information Centers (NICs) providing a one-stop ready reference point and help desk for Internet users. ASPIN will assist Navaho Community College, who just received a NTIA TIIAP grant, in establishing the Navajo Learning Network (NLN) connecting seven community college campuses and eventually all K-12 schools throughout the Navajo Nation as a single virtual campus linking educational and community resources.

Northern Arizona University (NAU)

Northern Arizona University Network (NAUNet) is an instructional interactive television (distance learning) system that NAU is building throughout Arizona encompassing over 20 independent sites with an extensive microwave network. NAUnet's classrooms are on the campuses of NAU, ten community colleges, and five rural school districts. The NAU Learning Alliance (nauLA) is a network of more than 100 satellite downlink sites across Arizona that participate in NAU satellite programs. Also joining with Missouri, Oklahoma and Washington leaders in satellite education, NAU has formed IdeaNet to connect 2,000 schools in 33 states to an interactive television and computer network, as well as provide a wide range of programming.

University of Arizona (U of A)

Arizona Health and Information Network (AZ-HIN) is a non-profit consortium of Arizona teaching hospitals and health science educational institutions based at the Arizona Health Sciences Center. AZ-HIN uses the Internet to connect hospitals, libraries, teaching and health care institutions, and to provide access to health literature databases, other information and education products. The Biomedical Communications department of the Arizona Health Sciences Center produces medical and health related teleconferences, participated in from around the state and offers classes to the three state universities via NAUNet.

Economic Development Information Centers (EDICs)

Located throughout Arizona, 28 public and community college libraries have established Economic Development Information Centers to support their local business communities and provide the information local businesses and economic development practitioners need. A core collection of business reference materials and a staff person familiar with business resources, the local economy and community are available. The EDIC staff also provide referrals to other business information specialists and support organizations, as well as performing database searching and utilizing Internet access to meet the business patron's needs. Seed money came from the federal Library Services and Construction Act while ongoing funding comes from local support and federal grants.

Arizona Associations and Industry:

Arizona Procurement Technical Assistance Network (APTAN)

APTAN is a non-profit economic development corporation that assists participating businesses in identifying and competing for federal, state, county, and local government contracts. Their computer system matches company capabilities, products and services to procurements from federal, state, county and municipal agencies, state universities and other public institutions, automatically notifying businesses of opportunities matching their stored profile. Further assistance is provided in preparation of bid packages and access to technical support information. Their Arizona Automated Vendor Inquiry System (AAVIS) allows nationwide targeted access to business profiles on over 6,300 Arizona companies.

Arizona Technology Access Program (AzTAP)

The Institute for Human Development at Northern Arizona University is the lead agency for the AzTAP program. Their mission is to increase access to assistive technology (AT) devices and services for individuals and their families. AT devices are increasingly high tech enabling access to computers and networks or through devices embedding high technology, returning function and capability to the disabled. AzTAP provides an 800 hotline for information and referral, recycling of used or abandoned assistive technology equipment, access to AbleData (an extensive database of assistive technology products), and also offers training, research and advocacy

Arizona Technology Development Authority (ATDA)

ATDA was created by the Legislature in 1993 to help Arizona firms secure federal high technology development grants. However, the last two legislative sessions have not provided the requisite funding. Last year, House Bill 2131 would have provided up to $6 million over two years as potential matching funds. Without such funds from state government, regional industry consortiums or other public-private sources, federal grants are not likely to be awarded. Twenty nine other states do have a similar authority that can provide a competitive advantage in attracting and retaining high technology firms.

Arizona Telecommunications and Information Council (ATIC)

ATIC is an economic development foundation under the Governor's Strategic Partnership for Economic Development (GSPED). Their mission is to drive implementation of an information applications and telecommunications infrastructure that will support economic growth in Arizona. ATIC provides a forum for telecommunications issues, education and advocacy involving a diverse range of public and private partners including large and small business users of telecommunication services, economic development organizations, libraries, consumer organizations, local and state government agencies, educational institutions, health care, the Arizona Corporation Commission, the Arizona Legislature, and information technology and telecommunication companies.

Arizona Telecommunication Community Computing (AzTeC)

AzTeC is an Free-Net developed to provide noncommercial access to the Internet. AzTeC serves up a variety of local information (including municipal background, news and events) and provides e-mail accounts and limited Internet access for approximately 12,000 Phoenix area residents (currently only local dial-in phone lines are provided). They are linked to many other nationwide and worldwide community-based Free-Nets and are working to site public access terminals in convenient locations throughout the community (10 in place so far).

Arizona Telecommuting Advisory Council (AzTAC)

AzTAC is a statewide telecommuting advocacy and information resource center, dedicated to making telecommuting a recognized alternative to travel for a broad range of needs. They provide telecommuting resource information and assistance to organizations, as well as holding educational seminars, workshops and

conferences. In Maricopa county alone, 93,000 employees now telecommute an average of one day a week saving 600,000 miles of travel and 12 tons of pollution each weekday.

Datalink Project

Datalink has been funded by the Arizona Legislature for study and pilot trials the last two years. Its focus is the facilitation of trade within the Pacific NorthWest Economic Region (PNWER) and throughout the NAFTA (CANAMEX) trade corridor via the discovery, cataloging and routing of trade related information such as trade leads and access to databases about companies, government agencies, and industry focused associations. Consultants have developed a pilot World Wide Web site and proposed a range of models and implementation strategies. Decisions on funding, ownership and execution are pending.

Electronic Commerce Net (ECNet)

ECNet has been one of the first broadband metropolitan area networks (MAN) to be implemented and tested within the cable industry. A joint pilot project of Cox Communications, Digital Equipment Corporation and Arizona State University, EC Net has connected approximately 12 Phoenix manufacturing companies to support collaborative engineering, improve productivity, enhance product quality and reduce time to market for new products. Utilizing the existing hybrid fiber/coax cable network to achieve 10 Mbps Ethernet connectivity, this demonstration project can evolve to serve videoconferencing, concurrent CAD, multimedia warehousing, telecommuting and high-speed Internet access needs in the years to come.

Recommendations for Arizona Action - Updating the Social Contract:

The Arizona Corporation Commission (ACC) has new rules pending that will establish a formal and well structured Arizona Universal Service Fund (AUSF). Upon approval next year, Arizona will join some 16 other states with similarly well defined and established programs. The ACC's rules define "basic local exchange telephone service" in a manner consistent with other states and retain the intent to equalize for rural areas the cost and quality of basic service, the most fundamental tenet of Universal Service. Notably, these rules anticipate the competitive entry of providers in the local loop market, spreading the contributions to the fund across all providers of basic local exchange service (as an access line surcharge) and providers of intrastate toll service (as a percentage of intrastate toll revenues). The movement from "study areas" to the more precisely defined and smaller U.S. Census Blocks, combined with the availability of approved subsidies to competitive providers on a per customer basis will encourage (but not insure) competitive entry into the high-cost areas of the state.

The impact of Federal legislative and Federal Communications Commission initiatives may well drive new scope, criteria, and responsibilities down to the state Public Utility Commission (PUC) level. The pending Federal-State Joint Board will be empowered to redefine Universal Service in terms of what minimum services it should guarantee and how they are to be funded and administered. Whether advanced information services are included in a new basic service definition or whether specific rural or public institution infrastructure funding or incentives for such services will develop, remains to be seen. The state Public Utility Commissions will certainly retain significant oversight and management, but a range of possible new directions including a "voucher" system to high-cost subscribers, block grants to the states, new calculation methodologies for geographic areas and cost basis (perhaps with proxy factors), will drive near continuous adaptation for the foreseeable future. The Arizona Corporation Commission should look to organizations such as the National Association of Regulatory Utility Commissioners (NARUC) and the National Regulatory Research Institute (NRRI) for ongoing insight to the changes occurring, model regulations and programs, as well as how state PUCs around the nation are handling the federally driven evolution of Universal Service.

Over a dozen states are "thinking out of the box" of traditional Universal Service, in that through state PUC administered rate cases or fines placed on carriers, excess earnings and penalties are being collected and applied to advanced information services development, infrastructure and deployment. These substantial pools of funds (ranging up to $500 million in Georgia) are being used to fund Internet connections for schools and libraries, distance learning applications, telemedicine and citizen access programs, as well as rural telecommunications infrastructure development. In light of the inevitable shrinking of Federal dollars to fund such initiatives, it is recommended that the Arizona Corporation Commission survey their legal structure, rules and situation to determine whether such funds could be similarly accumulated or negotiated for in Arizona and invested in these kinds of advanced information services and access. If prohibited by existing factors, the ACC and the Legislature should consider steps to enable and encourage pursuit of such telecommunications reinvestment.

Rural telephone rates and infrastructure development have been at the core of Universal Service as rural areas with their lower population densities and greater interconnection distances have always encompassed the majority of high-cost subscribers. Just as programs in rural electrification aided the development of infrastructure for electricity and telephony, rural datafication is needed today. The new realities of economic development are not based as much on land or natural resources as in the past, but rather on human resources, the skills and education of a region's workforce. As physical transportation of goods is displaced increasingly by the delivery of services, aided by the conveyance of data and information, the availability of adequate telecommunications infrastructure is becoming as important as the highways and railways of yesteryear. Promising technological advances will aid equality of service cost and capabilities, but as always, rural deployment will lag urban areas and attract fewer competitive entrants. The subsidized connection of schools, libraries and health facilities will offer a safety net for those who can't afford their own personal connections to the National Information Infrastructure. They may then get direct access at public locations or at least the benefits of their educators and health care providers having such access. Distance learning, telemedicine and videoconferencing can allow the utilization of specialists and experts on an as-needed basis from remote locations, expanding the base of knowledge and expertise available.

Even as available Federal funds shrink, many current programs will yet continue and some new ones will be initiated. For example, the USDA's Rural Business Telecommunications Partnership Loans and Rural Telemedicine Grant Program are developing and expanding while the NTIA continues its ambitious grant programs. Industry is also stepping in, particularly the high technology sector, shifting their public service contributions to educational and infrastructure projects. These amounts can be significant as with AT&T's recent announcement of $150 million for K-12 Internet connectivity and services. Regional initiatives such as the Western Governor's Association SmartStates offer collaboration and leverage by partnering with other states in the development and deployment of applications and services. It is recommended that the Governor's Office of Telecommunications Policy take the lead in identifying such public and private programs, qualifying the likelihood of Arizona participation, disseminating the pertinent information, fostering coalitions of participants and facilitating the necessary response and follow-up. Only through such coordinated and concerted effort can we expect Arizona to fully participate in these programs and funding sources.

The strength of democratic institutions and governments is founded on the rights of its constituents to be aware of its doings and remain well informed, so as to form opinions, express their viewpoints, and incorporate those perceptions and information into the fabric of their life and livelihood. Government initiatives and dissemination of a wide range of information also serves the needs of its business community and fosters economic development. Every state in the union has begun to offer its records and resources in electronic form to aid in its own operation, to better serve its citizens and to protect and foster the public interests. We recommend that the Governor's Office of Telecommunications Policy and the state's Chief Information Officer undertake to

determine the range of information resources provided by states and localities and their manner of funding, management and delivery. Further, it is hoped they will benchmark the "best practices" among states, consider where public-private partnerships may prove effective and beneficial, and recommend coordinated and progressive Arizona development in this area. The Legislature can then consider enabling and promoting future progress by mandates, incentives and coordination of funding.

In moving to make a wide-range of state government information and resources available electronically and recognizing the growing importance to modern life of accessing these and the wealth of other information assets and the ability of electronic communication to foster communities of interest, the state must also consider the means of citizen access. It is here that the long-held social compact providing Universal Service to insure access to basic telephony must evolve to a concept of Universal Access to best preclude information have-nots in the Information Age. For the citizens who live in high-cost areas or who cannot invest in the equipment and services to provide such access, the state should encourage, enable and/or provide the means of access at a community level. This may to some extent be served by the competitive telecommunications marketplace in an increasingly deregulated environment, but should also be aided by incentives or programs for the connection of schools, libraries, health institutions and the fostering of community networks.

The ideals of inclusion basic to Universal Service have always gone beyond rural access to also embody aid to the low-income and disabled segments of our population. Appropriate assistive technology must be incorporated into any and all information access initiatives to insure that every citizen may participate and benefit. Consideration should be given to e-mail as a new "basic service" enabling participation in the sending and receiving of electronic messages. Though civic networks and both public and private institutions may provide electronic mailboxes at low or no cost, the means of remote access from community level resources should be provided to best serve low-income and mobile populations.

As the National Information Infrastructure extends its reach, capabilities and importance, Arizona, with its current initiatives, high technology industry base and electronically literate citizenry, is well positioned to take advantage of the transformation from the Industrial Age to the Information Age. The premises of traditional Universal Service remain valid today, but the scope and expectation must evolve to a broader concept of Universal Access as we undergo a paradigm shift in citizen's use of telecommunications.

Electric circuitry has overthrown the regime of "time" and "space" and pours upon us instantly and continuously the concerns of all other men.
We now live in a global village.

Marshall McLuhan, 1967