

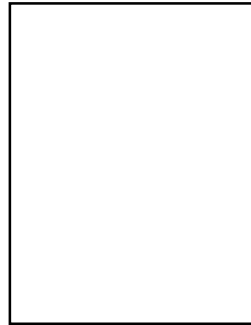
Rural Telecommunications— From Market Failure to Market Opportunity

William Gillis, Ph.D. and Steve McLellan



Dr. William Gillis is one of three members appointed by the Governor to the Washington Utilities and Transportation Commission. His professional career includes positions as associate professor of agricultural economics at the Pennsylvania University, director of the Center for Rural Pennsylvania, and president of the Gillis Group, a private economic development and consulting firm. He holds a Ph.D. in agricultural economics from the University of Wisconsin, and a B.S. and M.S. in the

same field from Washington State University.



Mr. Steve McLellan is executive secretary of the Washington Utilities and Transportation Commission. Prior to that position, he served as the agency's public affairs director and as staff counsel for the Washington State Legislature's Joint Select Committee on Telecommunications. He holds a law degree and Master degree in public policy from the University of Washington.

It is a beautiful spring morning, and Sally Trebing has come into her family's hardware store a bit early. The store has been in her family for over 100 years and is a mainstay of their small, rural town. Over the years, the Trebings have weathered many challenges, from the rapidly declining farm base, to the loss of a major railroad line, to the closing of a nearby food-processing plant. Each time, it looked like the end for the town and for the store, but each time, they adapted and survived.

But now, they were doing something much better than surviving—they were thriving. After years of declining population, people were moving back to town, and a number of new businesses had opened. Moreover, many existing businesses had their best year ever, with growing markets and greater efficiency. Why the change?

Many locals tracked the beginning of the change to the high school class of 1997 and their participation in an information technology experiment. The year before, local townspeople had met with representatives of the state economic development agency, public service commission staff, and a "technology facilitator" provided by the local cooperative-extension office. They

met to chart their information future and to envision a way that the growing global communications network could be brought to their community.

Out of that meeting came a clear and realistic action plan. First, the local school district, county courthouse, and hospital district jointly negotiated with the telephone company to install high-speed data lines, with an additional feed to the public library. At the same time, the school district sought a grant to set up a community Internet server and train teachers and students to develop and maintain a Web site. As they learned, the students and teachers fanned out into the local community to teach business people about the opportunities that could be tapped on the Net. The cooperative extension office arranged a volume discount on computer equipment for local businesses and residents. The discount was with a manufacturer that offered toll-free technical support, adding to the base of information available to local residents.

Sally, a member of the class of 1997, brought back to her family's store ideas that she had learned in her senior technology class. She convinced her father to let her set up a site on the Net where he could answer questions about common repair problems, a sort of

“virtual corner store” where urban dwellers could get a taste of a real country store. Out of that Web page came a small, but healthy mail order line that sharply boosted the store’s profits.

Other uses were more prosaic, but just as important. A group of local doctors reduced their costs by directly ordering supplies and claiming a discount. Several higher-income “lone eagles” moved to town, drawn by the quality of life and their ability to maintain national consulting practices. One, a financial planner, offered free advice to a local investment club as her “community contribution” and sharply increased the value of their portfolio. She also flew her best clients in for a week of fishing, horseback riding, and consultations. The recreational activities were set at a nearby guest ranch, while the seminars were held at a “telecenter” established by the hospital district and rented out to local businesses.

Each year, a community planning group would meet to track the progress of the information plan, and set new targets for the coming year. They paid attention to the levels of education and training in the community, as well as the overall investment in infrastructure and computers. Their knowledge base and focus made them a formidable force in negotiating with suppliers and advocating with local telephone service providers and state officials for policies that made it easier and cheaper for new technologies to be deployed.

There are as many scenarios of the future as there are pundits.¹ The store of Sally Trebing is a scenario which reflects our preferred future:²

- Rural residents and businesses have access to the same services available in urban locations.
- The cost of obtaining those services is not a major barrier.
- All residents of the state living in both rural and urban communities have the skills necessary to use available information technologies to their full advantage.

Like many other states, Washington is aggressively pursuing reforms in regulation and public policy to enhance the development of competitive telecommunications markets. The shift in state and federal policy to rely on competitive markets to distribute benefits of advanced telecommunications technologies raises important concerns for low-density rural markets that

would initially appear to provide fewer market opportunities. The traditional mechanisms of providing telephone universal service through explicit and implicit cross-subsidies is becoming unworkable as defined local monopoly service territories begin to disappear. New approaches to universal service are needed which maximize flexible competitive industry response to market demand in rural communities and minimize taxpayer and ratepayer subsidies.

In this article, we propose principles to achieve universal service goals and ensure rural communities benefit from emerging information technologies. We recognize that the availability of quality telecom infrastructure necessary to provide advanced telecom services is a cornerstone of universal service. However, in an era where the cost of serving customers is expected to decline while market opportunities in rural communities grow, it is no longer appropriate to assume private markets will fail to provide the necessary infrastructure and affordable services.

We describe an active public role in jump-starting a competitive industry response to the real market opportunities that exist in rural communities. We advocate a refocusing of public policy to:

- Facilitate the aggregation of demand for services in local communities.
- Ensure all citizens have the skills necessary to effectively utilize information technologies.
- Encourage, to the extent possible, the private market to respond to service needs within rural communities.

While federal and state governments should play active roles by providing technical assistance and, when necessary, financial help, success is most likely when local communities are given the flexibility to respond to local service needs in a manner appropriate to their unique circumstances. A focus on encouraging a private sector response to emerging rural market opportunities will not by itself ensure success in meeting universal service goals in all communities. However, it can substantially reduce the need for public subsidies and provide a mechanism to better target scarce public funds to communities and individuals where those dollars are most needed.

Universal Service: An American Success Story

Universal service is a concept nearly as old as the telephone itself. As early as 1907, Theodore Vail, then president of AT&T, argued persuasively for the public interest in establishing a nationwide network of interconnecting telephone companies.³

According to Vail, the public's interest in universally available telephone service could only be achieved by establishing a single monopoly network manager and eliminating competition among local service providers. Open market competition, he noted, would impede rather than encourage the development of the emerging telephone industry. This vision for the nation's telephone industry ultimately received broad public support and became the basis for federal and state telecom policy over the next 80 years.

A nationwide system of interconnected local monopoly telephone franchises was quickly established. A system of state and federal regulation was put in place to ensure that monopoly telephone companies were unable to exploit their market power to the detriment of the customer. This system of interconnecting local telephone companies, each with defined service areas, also provided a basis for within-company cross-subsidies between profitable and less profitable customer segments. Later, the subsidy system expanded to include explicit inter-company transfers of revenues from low-cost to high-cost service areas. This system of implicit and explicit cross-subsidies has been a dramatic success, supporting the creation of an efficient telecommunications network serving nearly every home and business in the nation.

Many states, including Washington, have gone one step further by requiring that every customer has available one-party service, flat-rated calling within the local area, free touch-tone service, and access to emergency 911 services. In cooperation with the industry, the Washington Utilities and Transportation Commission (WUTC) has expanded local calling areas to ensure that most farmers and residents living in the country are able to phone schools, doctors, and others in the community without paying an additional toll for local long distance.

These services are made possible by a high-quality telecom infrastructure. For example, the long predicted triumph of digital technology is nearly complete.⁴ Recent statistics compiled by the National Exchange Carriers Association (NECA) demonstrate

that nearly 90% of central offices owned by independent rural telephone companies are digital, and many of the remaining analog offices can be paired with a digital remote to provide digital services until they are changed out.⁵ In Washington, all small independent telephone companies have digital switching and the largest company, U S WEST, is on track to replace all remaining analog switches in the next five years. Soon, analog switches will be viewed like multi-party lines or rotary dial phones—a remnant of an older technology regime that will handicap providers and customers seeking quality services.

Significantly, nearly one-third of the central offices owned by independent rural companies across the nation and approximately two-thirds of the central offices in rural Washington have Signaling System 7 (SS7) capability. All U S WEST offices and most independent telephone company offices are projected to have SS7 capability by 1998. SS7 technology provides the technical capability to offer customers access to a variety of advanced telecom services including 800 database service, fast and more accurate calling card transactions, Caller ID, and name identification.

While there are certainly areas where technologies must improve, these facts indicate that, for many rural areas, the technological base exists to provide the high-quality, high-speed services needed to access advanced services. An effective universal service policy will need to look beyond technology to identify the organizational and educational factors that will allow rural areas to effectively tap the technology that exists and to draw investment for the next wave of upgrades.

The Powerful Forces of Change

By no small measure, the public policy decision made at the turn of the century to grant exclusive service territories to telephone companies was a major factor enabling universal deployment of telecommunications infrastructure and service in nearly all locations. In Washington, as well as many other states, legislatures, governors, and courts of law have eliminated long-standing exclusive franchise rights for local telephone service. National legislation pending before Congress promises to further reduce legal and statutory barriers to competitive entry by new local telecom providers.

The dramatic public policy shift toward competitive telecom markets is not a rejection of successful

public telecommunications policies of the past. Rather, the public interest in development of competitive telecommunications markets is a reflection of the future. Emerging information technologies are revolutionizing the way telecom services will be delivered in the future, while simultaneously creating new market opportunities for entrepreneurial providers of those services. It will become increasingly important and practical to free the nimble hand of the competitive market to respond to new opportunities as they develop.

Computer technology is perhaps the greatest driver of changes within the telecom industry. Gordon Moore, cofounder of Intel, estimates that microprocessors which drive the demand for telecom services, as well as the cost efficiency of communications switching, will continue to double in computing power every 12 to 18 months.⁶ At the same time, the cost of each unit of computing power will continue to fall. The technology that provides telecom services at both the consumer and provider ends will continue to get smaller, faster, cheaper, and better.

Advances in computer technologies leading to cost declines in switching and consumer information technologies are complemented by improvements in loop technologies. One example is the rapid advance of wireless loops as an alternative to land lines. Mobile telephones will increasingly compete head-on with fixed systems. But the most important innovation is likely to be a digital wireless link to a small fixed radio antenna in the home that can make extraordinarily efficient use of the radio spectrum. Unlike a mobile phone, the antenna is always tuned precisely to the correct base station.⁷

Emerging wireless technologies also appear to offer the potential to dramatically reduce the cost of constructing the local loop plant in low-density markets. The average cost of providing a local copper loop is approximately \$1,300. The average cost of providing a similar service via a wireless local loop is now around \$600 to \$700.⁸

Evidence is mounting that the declining cost of computing power, combined with an expanded ease of using information technologies, is providing a catalyst for increased information technology use in both rural and urban communities. A random survey of rural telephone subscribers in six Midwestern states revealed broad use of information technologies either at home or at work (see Table 1). A recent study of new migrants moving into the state of Washington provides insight into the level of technology use by nonmetropolitan homeowners (see Table 2).⁹

Table 1
Use of Information Technologies by Rural Telephone Subscribers

Technology	% of Households
Telephone Answering Machines	56
Fax Machines	48
Computers	46
Cellular Phones	27
Computer Modems	25

Source: Gillis & McLellan

Table 2
Level of Technology Use by Nonmetropolitan Homeowners

Technology	% of Households
Touchtone Phones	95
VCRs	87
Telephone Answering Machines	69
Cable TV	62
Personal Computers	43
Computer Modems	21
Fax Machines	12
TV Satellite Dish	7

Source: Dillman, Salant, & Carley

For most consumers, basic voice-grade service will continue to satisfy their near- and immediate-term needs. However, the demand for higher bandwidth applications is likely to expand with the growing development of video and multimedia information technology applications. This bandwidth could be provided through a number of technologies. Digital compression methods will continue to improve, making it more likely that acceptable digital broadband service could be provided over copper. Also, the "fiber/coax" hybrid that many companies are considering for broadband networks may well be suited to rural communities where cable television penetration is high. Wireless technology will continue to advance and become a cost-competitive alternative to land-based technologies, eventually providing high-capacity systems for expanded service in rural areas.

The forces of technological and market change within the telecom industry are very powerful.

Throughout this century, public policy has addressed the reality that competitive markets would most likely fail to provide rural residents with affordable essential telecommunications services. Today, we face a new reality where the cost of serving rural customers is expected to decline, while market opportunities in those areas grow. Rather than focusing on mechanisms to protect rural areas from market failure, we must now look to creative public policy approaches which facilitate new market opportunities in rural communications and jump-start the competitive industry response to those opportunities.

We recognize, however, that progress will be incremental, and the need for traditional regulatory consumer protection will not quickly disappear. By definition, the process of reinvention involves risk. Most analysts agree that the benefits of robust competition among telecom service providers will come first to major urban centers and the surrounding suburbs.¹⁰ Unless they are able to aggregate sufficient demand to attract new investment and services, customers living in remote rural communities appear to be at the greatest risk as competition develops. Because competition is expected to develop unevenly, it will be critical for state regulators to be vigilant in ensuring service providers do not shift network costs or reduce service quality in communities where they maintain monopoly power in order to respond with cheaper prices and better service to communities where they face competition.

The “invisible hand” of the telecom marketplace has been purposely shackled for nearly a century. As such, its muscles are weak, and its movements clumsy. Moreover, telecommunications corporations are making very large investments, and the results are uncertain. There is still much more money to be lost as companies try to develop services that have real and sustained consumer demand. As a result, they will naturally concentrate their resources in urban areas where the costs of deployment are typically lower and the potential rewards greater. In a world where economic opportunity, political participation, and educational advancement are increasingly intertwined with access and ability to use information technologies, we can ill afford to be passive bystanders as the invisible hand struggles to grasp the rural market opportunities. Over the years, rural areas have suffered abandonment of bus lines, rail lines, and airlines. They cannot afford to be without high-quality telecommunications lines if they are to participate meaningfully in the economic and social future.

New Directions for Universal Service in a Competitive World

As competition becomes more prevalent within the telecom industry, traditional approaches to ensuring universal telephone service will become less practical. However, there is little evidence that the public commitment to the goal of ensuring all residents and businesses have affordable access to critical telecommunications services has lessened. Consequently, public officials at all levels of government are searching for a new approach to universal service that will be effective, affordable, and realistic in an industry environment with telecommunications provided primarily as a competitive service.

In this final section, we propose the application of community and economic development principles to the challenge of ensuring all residents have equal opportunity to utilize and benefit from emerging information technologies. We define success as the ability of customers to receive the services they want—when and where they want them—at a price that is affordable. Clearly, the success of residents or businesses in receiving desired services is intertwined with the availability of infrastructure and services within their local community. The role of public policy is to facilitate collective decision making on infrastructure and services required by the community and, to the extent possible, encourage the private market to respond to service needs identified by the community.

While federal and state governments should play active roles by providing technical expertise and, when necessary, financial assistance, success is most likely when local communities are given the flexibility to respond to service needs in a manner appropriate to their unique economic and cultural circumstances. These are examples of time-tested principles that have traditionally been applied by local communities in providing key public services such as transportation, education, and public water systems. We believe the same principles can be applied at both the state and local levels to promote success in the broad dissemination and use of information technologies. The following is offered as a broad outline of how these principles could be applied within the State of Washington as well as in other states.

(1) Success begins with shared vision at the state level.

Future universal service success will ultimately depend upon building broad state-level consensus on a vision that includes the dissemination of benefits of

information technologies to all corners of the state, as well as a commitment to cooperative action by state regulators, legislators, and industry representatives. Effective policy is likely to involve many factors:

- Deployment of network technology.
- Penetration of personal technologies.
- Education and training.
- Public/private financing programs.

No single entity will control all of the elements of the policy. Without a shared vision and commitment at the state level, it will be difficult for local communities to play a significant role in encouraging a competitive market response to the telecom service demands of area residents and businesses. In Washington, we have begun this effort through the work of the Governor's Telecommunications Policy Coordination Task Force, which has spent the last year reviewing the markets for and public policies surrounding advanced communications technologies in the state, including the special circumstances of rural markets. Also, the WUTC has begun a "universal service docket," in which we plan extensive outreach throughout the state in an effort to better learn the needs of rural customers.

(2) Consumer needs should be the driver of policy.

We believe that, to be successful, public policy must be rooted in a firm understanding of the needs of the customer, not in hoped-for benefits from a particular technology. Public officials at all levels of government should resist the temptation to pick technology winners and losers.

It is often tempting to seek solutions in the latest technologies. Doing so often ignores technical developments in other fields, as well as consumer preferences, that may sharply change the predicted outcome. Right now, the media rage is the World Wide Web, with pundits predicting the development of cheap network-only computers. Next year, it may be something else. Perhaps the mass of the public would rather spend \$500 on a cable satellite dish than on an Internet terminal. Technological determinism, ignoring demographics, economics, and consumer preferences, is a risky way to make public policy and spend public capital.

We are not suggesting that policy makers ignore broad technology trends that are driving markets. For example, the development of global computer networks is driving a clear demand for increased band-

width, transmission speeds, and interconnection. Recognizing and supporting these trends in public policy is necessary. Government mandates for a specific technology to accomplish them, however, risks saddling the public with less choice, less innovation, and higher costs.

(3) Recognize that competitive telecommunications markets require a changing paradigm for universal service and greater flexibility by companies and regulators.

Using a narrow conception of universal service is likely to yield disappointing results, particularly when contrasted with the glowing promises made for the information age. Also, it will be important to carefully focus scarce taxpayer dollars on the activities of highest leverage.

In the past, the focus of universal service policy has centered around penetration rates. It was a reasonable expectation that anyone who had a telephone could use the telephone. Because of that, our universal service programs focused almost exclusively on telecom providers, ensuring that their networks were ubiquitous and their services affordable.

A focus on network quality and ubiquity will remain important, particularly in rural areas where there initially may not be sufficient densities to support expensive upgrades, much less facilities-based competition. In dealing with this problem, we need to look beyond the geographic franchise model of the past. Joint ventures and innovative business arrangements which provide greater service to rural customers should be encouraged. Allowing or inducing greater sharing of facilities, joint ventures, and resale could spread advanced services and consumer choice more quickly to rural areas. Regulators should work with consumers and providers to identify efficient ways to supply services and remove barriers that may be an artifact of a prior era.

Cooperative ventures between two or more service providers may be one of the more effective near-term means to provide advanced services to rural customers. For example, it is possible to provide many advanced services from a central switch to remote locations. This could allow services such as ISDN to be deployed in areas where the consumer demand would not justify expensive software upgrades for many years. *Rural Telecommunications* magazine recently described a joint venture between two small telephone companies to provide Internet services to their customers. "Willamette Valley Internet is an

excellent example of pursuing a strategic alliance to offer new technology to subscribers. The joint venture approach allows telcos to share costs and staff, and thus provide a service they might not be able to provide alone.”¹¹

Regulators may need to become more flexible, removing or loosening regulations that make it difficult for companies to try new service arrangements. At the same time, companies must remain sensitive to the need to keep basic services affordable and available.

(4) Community-based education and training in the use of information technologies should be encouraged.

When telecommunications was primarily voice telephone service, the need for customer education and training in the use of available technologies was minimal. However, with the expanding array of information service choices and the complexity of utilizing many of these technologies, customer education and training is taking on much greater importance. Rural telephone customers surveyed by the University of Nebraska cited “education and training programs in telecommunications” as the most important public policy initiative for bringing the benefits of information technologies to rural communities.¹²

There are many potential sources of technology education and training available in nearly every community. Unfortunately, these resources are relatively untapped. First, private providers of technologies and services may provide some level of support and education in their use. However, their presence in most rural communities is limited. Public school districts and libraries are becoming increasingly active as sources of technology education and training. Other potential sources of educational and training support include university outreach programs, public utility commissions, economic development organizations, and public utility districts. Perhaps the most effective source of expertise is the local residents themselves. John Huselton, mayor of a small eastern Washington community, has suggested that what is needed in his town is “a Toastmaster’s for computer users.”

It would be both inappropriate and unwise for state policy to dictate the most appropriate approach to provide community-based technology education and training. Each community is unique both in culture and resources available. However, statewide resources such as universities, economic development organizations, and regulatory commissions, should be

encouraged to provide support to local communities in organizing and implementing programs appropriate for their own circumstances.

(5) Rural communities need to aggregate their demand and become effective negotiators for new services.

Before turning to subsidies and deployment of publicly-owned telecom infrastructure, policy makers should help local communities aggregate demand for advanced services so that they become attractive to providers. Community-based technology education and training programs are one element of local demand aggregation. However, individual demand for services in dispersed geographic regions often do not send a strong enough signal to encourage the provision of new services. This is particularly true when providing a new service requires substantial investment in facilities or software.

A partial solution lies in local efforts which identify dispersed individual demands and, through cooperative effort, bundle those demands as an offering to the marketplace. For example, the local school, hospital, library, and several “lone eagle” entrepreneurs within a community may each have need for services of high-speed transport to a given “point of presence.” The volume of service demand by any one of these entities alone may be inadequate for the market to justify supplying high-speed transport service in that locale. However, the bundled aggregation of demand for all users may in fact make provision very feasible. The same concept applies to advanced services such as Internet or ISDN. Some level of local aggregation of demand may be necessary to get the attention of the marketplace.

Public entities such as school districts, economic development organizations, county government, hospital districts, public utilities, and private Internet service providers are examples of organizations within many rural communities that can provide a catalyst for demand aggregation. Organizations such as these are relatively large customers of telecom services and are most likely to be early users of the more advanced network technologies that may require new investment. These large public and private users of information services within rural communities can become “anchor tenants,” with combined demand adequate to make a rural community an attractive market opportunity for private providers of service. Once facilities are in place and services available within a community to serve these anchor tenants, it becomes more feasible to also provide advanced services to smaller users.

In general, the goal of sustainable, cost-effective market development is best achieved through the bundling of large user demands and the negotiation for services from private providers. However, in cases where the private sector is unwilling or unable to fulfill a critical market demand, public institutions such as schools or publicly-owned utilities may appropriately become providers of services to the community. For example, a local school district or publicly-owned utility could become the Internet service provider for local businesses seeking to establish a presence on the World Wide Web. To the extent excess capacity on publicly-owned infrastructure is resold for other uses in the community, appropriate safeguards must be in place to ensure that the deployment of public infrastructure serves as a catalyst for the development of new market opportunities. For example, cross-subsidies of telecom services from taxpayer dollars intended for education services or electric service is inconsistent with the concept of economic efficiency in infrastructure deployment and would ultimately stifle long-run market development for telecom services.

Once again, it is inappropriate for state policy to prescribe a particular approach to demand aggregation. Universities, economic development groups, state regulatory agencies, libraries, school districts, and other public and private organizations can and should provide expertise and perhaps seed capital to help community-based initiatives aggregate local demand.¹³ However, it is critical that public policy provide substantial flexibility allowing communities to most effectively utilize local resources in a manner most appropriate for their specific cultural and economic circumstances.

(6) State regulation should expand emphasis on promoting fair market competition, mediation of disputes, and gathering marketplace information.

We believe that, in the long run, the combination of declining costs of providing service and rapidly-expanding consumer demand sets the stage for competitive markets to provide customers in all locations with affordable, dependable, and quality telecommunications services. While we recognize the need for traditional regulatory oversight of monopoly telephone service providers will continue for some time, the overall direction of regulation will likely shift toward functions to help the market operate smoothly.

Washington and many other states are actively engaged in both regulatory and public policy reforms

to promote fair market competition among alternative providers of service. Examples include:

- Establishing terms, conditions, and technical standards for interconnection between facilities of competing providers of local service.
- Establishing guidelines allowing customers to retain their telephone number when they change service providers.
- Creating fair market standards for unbundling and resale of network services.

While state regulators can set the stage for fair market competition, the ultimate success of competitive markets will only be achieved when market participants themselves engage in good faith negotiations and successfully arrive at agreements on transactions of mutual interest. It is simply impossible for regulatory bodies to be either nimble or informed enough to dictate terms and conditions appropriate for each market transaction. We believe that the role of the regulator will increasingly become one of a neutral dispute mediator between parties unable to reach agreements through good faith negotiations.

Another major role for state regulatory bodies in a competitive world will be that of gathering and disseminating market information. The free flow of information is essential to any effectively operating market. State regulatory bodies should and can contribute to market development through systematically tracking and disseminating information on unfilled market demands as well as facility and service gaps. Such efforts will have the dual benefit of helping the market to function more effectively for the benefit of customers and carefully monitoring progress in achieving the public's interest in universal service to all residents and businesses in the state. To the extent that market forces are leaving some areas unserved, this type of information will also be helpful in targeting limited public resources.

Conclusion

The need for significant state and federal universal service programs—particularly focused on the needs of low-income consumers—both urban and rural will not disappear in the near term. In some areas, there may also be the need for direct assistance to help deploy needed technologies. Such programs are a necessary and appropriate response to market failures. However, we believe that the future direction of public

universal service policies should not focus on the response to market failures but rather on how to create and illuminate market opportunities. nto

¹ The views expressed in this article are those of the authors and do not necessarily represent opinions of the Washington Utilities and Transportation Commission.

² For more information on how to use scenarios as a tool to improve planning processes, see P. Schwartz, *The Art of the Long View: Planning for the Future in Uncertain Times* (Currency, 1995).

³ See, for example, A. Stone, *Public Service Liberalism: Telecommunications and Transitions in Public Policy* (Princeton, NJ: University Press, 1991), p. 151.

⁴ The authors recognize the contribution of Tom Spinks, David Griffith, Teresa Pitts, and Wally Budsberg of the WUTC staff in conducting background research on changing industry trends.

⁵ National Exchange Carriers Association, *Telecommunications: America's Vital Link*, Special Report (November 1995).

⁶ J. Ubois, "Auguring the Matrix," *Internet World* (November 1995):88.

⁷ See M. Dziatkiewicz, "Wireless Local Loops," *America's Network* (November 1, 1995):46.

⁸ D. Moffat, "Preparing for Competition: How to Manage Your Virtual Rural Market," *Rural Telecommunications* (May/June 1995):31.

⁹ D. Dillman, P. Salant, and L. Carley, "The Influence of Information Technologies on Long Distance Migration: Differences Between Metro and Nonmetro In-Migrants," Washington State Department of Rural Sociology Working Paper (December 1995).

¹⁰ Moffat, "Preparing for Competition," pp. 26-34.

¹¹ S. Curran, "Why Your Telco Can't Ignore the Internet," *Rural Telecommunications* (September/October 1995):30.

¹² J. Allen, B. Johnson, et al., p. 31.

¹³ In Washington, the ability for the state to provide seed capital may be limited by constitutional restrictions on lending state credit to private enterprises. See Wash. Const. art. VIII, secs. 5, 7. These provisions have been specifically amended to allow government assistance for energy conservation. A similar amendment may be possible for the type of market enhancement we propose, or the program can be designed to ensure that funds flow to public entities.