Arizona Broadband Initiative Framework

Analysis and Report

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Executive Summary

Reliable, affordable access to high-capacity telecommunications infrastructure has become as essential as water, sewer, transportation and electricity service in creating healthy and successful communities in the 21st century. This is true for all communities, not just the urban or affluent.

Arizona's own statewide economic development planning seeks to improve prosperity and the quality of life for residents in all of Arizona's communities. This requires employment opportunities, quality education, access to healthcare and effective delivery of the broad range of public services. Robust telecommunications infrastructure underpins all of them. However, such critical infrastructure has been slow in coming to many of parts of the state. Throughout the country as well as in Arizona, the private sector has invested heavily but the industry cannot undertake an infrastructure modernization effort at the scale broadband requires by itself. Government can bridge the gap between firm industry return on investment business decisions and communities that cannot attract private investment because they are unable to demonstrate sufficient demand for a service they don't yet have.

This report examines several state and community programs from across the nation that are taking steps to improve the deployment of broadband telecommunications infrastructure to historically unserved or underserved areas. There are three general models for these programs. One scenario has seen states like Washington and Colorado act as aggregators of public sector demand for advanced telecommunications infrastructure and anchor tenants that purchase enough statewide service to create the demand required to get the private sector to invest the necessary resources to deliver capability to all parts of the state. A second scenario in states like Michigan, California, Vermont and Maine relies on strong executive leadership from the governor and seeks to expand broadband deployment through creation of a state Broadband Authority with the legal power to collect funding through state Universal Service Funds. The Authority then makes grants or loans to commercial infrastructure providers or communities. The Authority also has the power to reform the processes governing access to publicly-controlled right-of-way. The third approach that has produced significant success in Kentucky, North Carolina and Utah relies on a public-private partnership structured in the form of a state-chartered nonprofit corporation. These partnerships are then able to coordinate infrastructure expansion efforts and draw on both public and private resources.

Arizona's ability to meet its goals through a public service, anchor tenancy network may be limited. AZNet is the state of Arizona's telecommunications network infrastructure contract awarded in 2005 and extended until 2012. All state agencies and departments are required to participate in AZNet. However, other government organizations that are part of the state's purchasing cooperative have the option to participate, if they qualify. Contract terms and conditions and the opt-in provisions for other jurisdictions may limit Arizona's ability to follow the Colorado or Washington models and leverage state government's telecommunications needs as an anchor tenant able to influence broadband deployment in rural areas.[1]

Whichever model Arizona chooses, the experiences of other states have shown that the choice cannot be based solely on financial considerations. Research did not identify a

consistent methodology among states for hard dollar quantification of states' return on investment in this area. It does not appear that states are able to show a direct dollar-for-dollar correlation between money spent on broadband infrastructure development and money returned to the state general or other funds. It seems that where attempts are made to measure return, the attempts are done broadly and in more intangible or "soft dollar" terms. For example, successful return is assumed if additional infrastructure results in increased distance learning, telemedicine, target area economic development activity or achievement of some other public policy goal.

There are several legal, policy and program options commonly found in other states with active broadband expansion programs available to Arizona's policymakers. They include:

- Identifying, encouraging and promoting local initiative and preserving local government's authority to deploy broadband networks,

- Hiring a professional grant writer to create and coordinate broadband telecommunications grant applications,

- Inventorying broadband infrastructure and identifying priority deployment areas,

- Actively seeking public-private partnership proposals to maximize existing public infrastructure and public assets,

- Streamlining regulation and fee structures for access to public rights-of-way, either through executive order or legislation,

- Establishing a statewide broadband "champion"; and,

- Creating a broadband deployment coordinating authority or nonprofit corporation with the ability to fund and manage specific projects.

Taken individually, each of these options offers the opportunity to improve the likelihood that broadband infrastructure will become available in all of Arizona's communities. However, it is the adoption of a comprehensive program and the willingness to make telecommunications infrastructure a political and leadership priority that have been most successful in other states.

If Arizona is going to take a leadership position in this area the state must act quickly. The opportunity for states to use ubiquitous broadband deployment as a competitive differentiator is quickly passing. Soon the availability of such infrastructure will be expected, and states that have not found a way to establish it will be penalized as businesses and technology-dependent workers of tomorrow choose to locate elsewhere.

Introduction

One view of Arizona's economic strategy is expressed in the following way, "A community's capacity—infrastructure, business climate, quality of life, sense of place, and people—determines the possibilities for its economy. Building community capacity is a critical investment in economic growth."[2]

To advance community economic capacity for success across the state, Arizona has undertaken a study to look at the legal, policy and economic programs and incentives in place around the nation aimed at increasing broadband telecommunications capability and deployment, particularly in rural and underserved areas. This will be accomplished through the creation of an Arizona Broadband Initiative Framework (ABIF).

The report examines 14 state and six local or regional programs that may prove helpful to Arizona in crafting a program that meets the state's needs. Some programs have been in place for several years and have records of accomplishment. Others are essentially new initiatives put forward as high priority agenda items for newly-elected governors. They are certainly not an exhaustive or complete list of all activities in all states or communities nationwide. Those chosen for inclusion were selected because they contain at least some components that are representative of national trends.

The scope of this research was focused on public sector initiatives or public-private partnerships and did not include interviews with or assessment of any individual private sector firms or their business activity.

But experience has shown that effective expansion of broadband infrastructure to underserved areas will not take place without the engagement and involvement of the private sector. At a statewide level, publicly owned and operated broadband infrastructure has not proven feasible. In some instances that model has met individual community needs. However, the most successful model is a partnership between government and the private sector. The question is how Arizona can create a policy and investment environment that encourages and supports individual community initiatives and creates the necessary business incentives for private investment.

The Arizona Department of Commerce commissioned a report in 2003 that confirmed a fundamental business premise. Commercial service providers make investment decisions using complex models that assess return on investment and return on assets that calculate the economic merits of investment opportunities. Low demand and high costs characteristic of rural communities relegate these communities down the scale of competing investment needs, below the criteria needed for a positive investment decision.

The realization of broadband connectivity in parts of rural Arizona will not be accomplished by relying on normal market forces alone. Private sector service providers' investment decisions are based largely on a business case, and in many rural and smaller communities a business case is not apparent. In this situation, communities must look to innovative and alternative solutions. These solutions will come from both the business model embraced in the pursuit of broadband connectivity, and from the sources of funding that are tapped to achieve this goal.[3]

It is unlikely that Arizona will be able to simply adopt any other state's program in total. Arizona's goals and objectives will likely be best met by creating an Arizona-specific program that adopts selected program components and draws on the experiences and lessons learned over time in a variety of jurisdictions. Arizona policymakers will need to consider the efforts of other states, but choose aspects of those programs that are compatible with the realities of Arizona's politics, geography and differences in population density between the major urban centers in Maricopa and Pima counties and rural communities. Just how lawmakers choose do that will determine how far Arizona goes toward ubiquitous deployment of broadband technology and how quickly it gets there.

Assessment and Trends

The research in this report has confirmed that a wide variety of telecommunications infrastructure initiatives are underway at the state and local level across the nation. There is no single solution that works in every situation. Policy, technical, legal and economic factors contribute to the proliferation (or lack thereof) of broadband telecommunications capacity, especially in rural areas.

To lay the foundation for discussion of an Arizona Broadband Initiative Framework, a summary inventory was created of broadband deployment initiatives in selected states. Representative community-based initiatives were include because of their ability to illustrate success through creativity, resourcefulness and extensive partnerships.

For this review, several specific components of those programs were examined in order to identify those that potentially align with Arizona's goals and objectives.

Components include:

- **Purpose:** What are the policy goals that will drive and inform the infrastructure initiative?
- **Content:** What will a network carry that makes it used and useful and drive demand?
- **Funding sources or incentives:** What are the available and acceptable financing mechanisms?
- **Right-of-way usage:** How is public right-of-way made available and under what circumstances?
- **Internet service class**: What infrastructure elements need to be enhanced or created to bridge gaps and make advanced telecommunications infrastructure viable?
- **Location availability**: What geographic locations will the infrastructure serve?
- **Provider**: Which entities will build, maintain and operate the infrastructure?
- **Participant:** Who will be served by the infrastructure?
- **Payer:** Who will contribute to creation, maintenance and operation of the infrastructure?

States with active infrastructure expansion programs seem to be adopting one of three general approaches. The first seeks to encourage the private sector to deploy high-capacity infrastructure throughout a state through creation of a statewide public service

network connecting all levels of government, education and healthcare funded through government anchor tenancy. Washington and Colorado have been successfully working this model for more than 10 years.

The second model is built upon strong executive leadership and the creation of a broadband authority with powers and duties conferred either through executive order or legislation. Michigan was an early example of this model, with California, Maine and Vermont among others now adopting it.

The third approach is built upon the creation of a public-private partnership coordinating organization. North Carolina, Kentucky and Utah are using this model. Recently, the Tennessee Broadband Task Force concluded that Tennessee should follow the *ConnectKentucky* model (ConnectKentucky is a strategic alliance of technology-minded companies, universities and government entities working together to promote broadband availability), and West Virginia's Senate Transportation and Infrastructure Committee endorsed a bill modeled on ConnectKentucky's program.

At the local level, community-driven initiatives also seem to be built on one of these three general models.

All three approaches have been successful. Selecting the best approach for Arizona is a decision that must be made by elected and appointed public officials. This report examines the individual programs of selected states and communities in order to give Arizona policymakers the foundation they need to establish a program that works for the state.

Background

Reliable, affordable access to broadband communications infrastructure has become as essential as water and electricity service in creating healthy and successful communities in the 21st century.

However, as previous studies have concluded, private sector provision of such infrastructure has been slow in coming to the rural areas of Arizona where it has been difficult to ensure an adequate return on investment. Throughout the country as well as in Arizona, the private sector has invested heavily, but the industry cannot undertake an infrastructure modernization effort at the scale broadband requires by itself. In a predictable but unfortunate cycle, the telecommunications industry invests based on its calculation of consumer demand; consumer demand is driven by the availability of compelling content and services; and the content creators hedge their bets based on perceived consumer demand and availability of advanced network services. A catalyst is needed to break the cycle of waiting and, by default, that catalytic agent is government. Public institutions are uniquely positioned to need and anchor the network in all parts of the state, while having greater tolerance for amortizing network construction costs over a longer period of time.[4]

Applying a statewide catalyst may be especially important to encourage the development of “middle mile” infrastructure. “Middle mile” telecommunications services are those services that constitute the basic network infrastructure of the Internet service providers (ISP). An example of such services would be the high-speed lines that a national ISP leases from a telecommunications network provider to connect its local “points of presence” in every city with its central computing infrastructure.[5]

Rural communities remain isolated without middle mile infrastructure to connect to local community efforts and governments often deploy “last mile” telecommunications services to connect an Internet access customer or subscriber to an Internet access provider. “Last mile” customers may be households or businesses, and the providers may be specialized ISPs or telecommunications or cable TV companies.[6] The last mile telecommunications technologies in use include ordinary voice telephone lines (used with a conventional modem in dial-up service); high-speed DSL; coaxial TV cable (used with cable modems); dedicated, high-speed T1 lines leased by businesses; wireless linkages (such as those used by handheld devices, Internet-equipped cell phones and Wi-Fi-equipped laptop computers); and satellite linkages.[7]

The third necessary components of full telecommunications connectivity are the very high-speed, very high capacity fiber-optic trunk lines, known as the Internet “backbone” that crisscrosses the United States and the world, connecting the networks of major Internet service providers to each other.

States like Kentucky and North Carolina have been successful in expanding middle mile broadband connectivity by creating public-private partnerships that relieve the shorter-term return on investment pressure and instead create an environment where a longer-term view of return of investment is calculated. This return can be calculated in more than strict financial terms and can include the public policy goals of economic

development, distance learning, telemedicine and improvement of electronic government capabilities.

Arizona's previous research confirms the value of regional collaboration where there are similar cultures, resources and options. Without a regional orientation, many of Arizona's smaller communities lack the critical mass to continue to develop their economies or to adapt to current trends. By pooling scarce resources and working together, communities of all sizes can plan effectively and provide the infrastructure, housing, workforce and recreational amenities that will appeal to firms and individuals.[8]

Throughout the last few years, several nationally-focused reports have categorized and ranked a variety of broadband initiatives launched by individual states. The discussion below covers some of the highest-profile state initiatives. States that have enjoyed the most success seem to have developed workable strategies that address both the supply and demand side of broadband infrastructure build out.

The California Public Utilities Commission conducted a study in 2006. It found that, "Some of the states profiled here – Kentucky, North Carolina and Michigan – vary in their demographic and geographic profile, as well as a level of broadband access and adoption. The similarity among these states is their coordinated, analytic approach to statewide broadband initiatives. These states know the extent of broadband access and adoption at the household level, and track changes at least annually. Integral to this tracking is detailed mapping and inventories, most often supplied directly by the universe of broadband providers. These states also have publicly articulated goals about how much broadband access and usage they expect to achieve and when. They implement the strategies they define and demonstrate the effectiveness of large-scale, public-private efforts aimed at specifically increasing broadband deployment and access."[9]

Even so, there does not seem to be a uniformed measure of effectiveness between state programs. Some, like Kentucky record the number of households actually connected via broadband access. This metric is tracked closely and regularly updated. Others, like California, have a less-mature program that has yet to define specific interim goals beyond reducing fees charged by the state for use of right-of-way and an ultimate goal of providing high-capacity access to all state businesses and residents.

In addition, leading states have the organizational infrastructure and processes in place to successfully review and evaluate opportunities to leverage or consolidate grants, gifts, or other resources available to build a case for the deployment of broadband telecommunications infrastructure.

Initiatives already undertaken in California, Colorado, Kansas, Kentucky, Maryland, Maine, Michigan, Minnesota, Missouri, North Carolina, South Carolina, Utah, Vermont and Washington are included in the study. Additionally, a review of representative community activities across the country provides some insight into locally designed solutions that provide broadband access to targeted populations.

Project Approach and Methodology

A great deal of information has been compiled or developed regarding broadband and its value to Arizona businesses and communities. In particular, the Communications Infrastructure Advisory Committee (CIAC), a subcommittee of the Governor's Council on

Innovation and Technology (GCIT) has issued the “CIAC Year in Review 2006” to document the status of broadband in Arizona.

Given that, this report focuses on identifying and analyzing the legislative and/or policy models and incentives and alternatives for the deployment of broadband infrastructure capacity to rural and/or underserved areas in other states. Both public and private entities and the partnerships they have created are included, along with actionable recommendations.

To lay the foundation for discussion of an Arizona Broadband Initiative Framework (ABIF), a summary inventory was created of broadband deployment initiatives in selected states.

To the extent possible researchers drew on existing work to provide a brief review of selected best practices and successful deployment initiatives from across the nation. These success stories have been selected to demonstrate the potential of various approaches for solving the middle mile challenges in rural Arizona.

This research includes the study and analysis of other state broadband network initiatives identified through the Digital States, Digital Counties and Digital Cities surveys conducted by the Center for Digital Government; legislation; state-sponsored broadband assistance programs; traditional media; Internet; trade magazines; and state and local historical data.

Report recommendations stem from an extensive review of available literature on state best practices, an examination of current broadband initiatives in various states, and interviews with individuals knowledgeable about broadband issues including state and local officials and managers of broadband programs in other states.

For purposes of this report, “broadband infrastructure” is defined as any telecommunications platform that provides high-speed services, including voice, video and data. High-speed service is expected to transmit at speeds of more than .2 megabits per second, the Federal Communications Commission (FCC) reporting threshold. Infrastructure platforms may include wireless, wireline, satellite, fiber optics, or coaxial cable outside plants.[10]

To determine the success of a state’s program, we looked at how closely it came to reaching the defined goals specified in its enabling bill, executive order or law. If the program met objectives within the expected time frame, continued to receive the support of the sponsoring government body and produced a positive impact in a rural or underserved community, it was considered successful**.**

Arizona-Specific Background

The "CIAC Year in Review 2006" document notes:

> *Broadband availability has become as essential as access to power and water for citizens of our State. Over the last 15 years, multiple studies have described the public benefits associated with deployment of "broadband" telecommunications infrastructure. The increasing reliance on electronic communication and transactions for every thing from commerce and public safety to education and health care makes this infrastructure increasingly important to ensure that the benefits of the information age are widely available across the State's geography.*
>
> *While broadband has become increasingly available and affordable in many larger communities, smaller communities still remain largely left behind. It is estimated that as many as 50% of Arizona citizens living in rural settings (about 10% of the state's population) do not have access to broadband connections (connection to the Internet at speeds above 200Kbps). Some communities in Arizona are completely devoid of such connectivity. Likewise, Arizona's rural businesses, rural school districts, rural Government institutions, rural health facilities, all struggle with especially high costs for broadband access, or worse, its non-availability. The fact is, too many of Arizona's citizens are thus prevented from entering into, or receiving the benefits of the Information Age*.[11]

State of Arizona Telecommunications Issues

Growth is and has always been an issue for Arizona policymakers. According to United States Census Bureau statistics, the rate at which Arizona is growing continues to accelerate. In fact, in 2006 Arizona ended Nevada's 19-year reign as the nation's fastest-growing state. Fueled both by immigration and Americans moving from other states, Arizona led the nation with a population growth rate of 3.6 percent, up from 3.5 percent the previous year.[12]

When Arizona's first 10-year statewide economic plan was prepared in 1992, Arizona had just more than 3.8 million people and an economy worth approximately $74.1 billion, ranking 26th in the nation in size. Today, nearly 6 million people call Arizona home and economic output ranks 23rd in the nation at nearly $200 billion in current dollars. By 2030, demographers estimate the state will have 10.7 million in population.[13]

Rapid and continuous growth throughout the state creates significant challenges for transportation, utility and communication infrastructure. The state will need to invest in infrastructure expansion and improvements to accommodate more residents, growing demands from businesses, and continuing changes in technologies.

Specific Project Goals

The ultimate goal of this study is to identify a menu of options – both public and private – to facilitate the ubiquitous deployment of a broadband infrastructure to all parts of

Arizona, with emphasis on rural Arizona. Another major goal is to facilitate “middle-mile” deployment, i.e., that infrastructure, sometimes called trunk lines or fiber lines, that connect remote communities to each other and to urban “tier one” sites (major cities).[14]

As noted earlier, middle mile infrastructure is generally a private sector financing issue. However, in less populous and rural areas, private companies find it difficult to demonstrate an adequate and timely return on investment to justify the cost of developing the infrastructure. There are potentially some public solutions that can help address this failure in the market. For example, the Commerce and Economic Development Commission (CEDC) was given bonding authority in its enabling legislation, and was explicitly created to provide financial assistance to private sector companies for economic development purposes. In addition, the U.S. Department of Agriculture’s (USDA) Rural Utilities Service (RUS) provide grants to improve rural infrastructures providing broadband service. The USDA RUS Community Connect Program provides grants to deploy transmission infrastructures to provide broadband service in communities where no broadband services exist, and requires grantees to wire specific community facilities and provide free access to broadband services in those facilities for at least two years. Grants can be awarded to entities that want to serve a rural area of fewer than 20,000 residents. Approximately $9 million was appropriated in 2004, as well as in 2005, for this purpose.[15]

RUS’s Rural Broadband Access Loan and Loan Guarantee program provides loans to eligible applicants to deploy infrastructures that provide broadband service in rural communities that meet the program’s eligibility requirements. A wide variety of entities are eligible to obtain loans to serve small rural communities. To obtain a 4 percent loan, the applicant must plan on serving a community with no previously available broadband service.[16]

Increasingly, communities appear to be choosing publicly-driven alternatives to provide broadband capacity, particularly for the last mile. In Arizona, the town of Superior has been awarded a grant from the U. S. Department of Agriculture (USDA) Rural Development program to develop and implement high-speed Internet service in the greater Superior area. The grant will enable the town to pay for the necessary infrastructure to install and implement a Wi-Fi canopy covering the entire town. Once the necessary infrastructure is in place, an Internet service provider will be managing the system under contract.[17] The city of Tempe has partnered with a private telecommunications provider to create a community-wide wireless broadband infrastructure that makes use of city physical infrastructure assets and right-of-way in exchange for providing service to government at no fee.[18]

Another frequently mentioned public sector financing option may be to enable the Greater Arizona Development Authority (GADA) to provide debt financing to cities, towns, counties, tribal governments or special districts. There are numerous public models around the country, many of which are discussed in detail later in this report.

Finally, there are government, institutional and other programs that offer grants, gifts, or other resources to build a business case for the deployment of broadband telecommunications infrastructure, applicable to both the middle and last miles.

National Perspectives

Case Story Overview of Exemplary Programs

Following is an assessment of selected telecommunications infrastructure programs and rural broadband initiatives undertaken by states and communities across the nation. They were chosen for inclusion in this report based on the likelihood that they contain governance, organizational, legal, and technical or policy implementation components or insights that may at least in part be useful in creating an Arizona solution.

CALIFORNIA

On Oct. 27, 2006, the Governor of California issued Executive Order S-21-06 entitled "Twenty-First Century Government: Expanding Broadband Access and Usage in California."

Highlights of the executive order include:

- Establishing a broadband task force to recommend additional steps the governor can take to promote broadband access and usage.
- Designating one agency – Business, Transportation & Housing (BT&H) – as lead coordinator for implementing the state's broadband policy, to help ensure cohesion, speed and efficiency.
- Directing BT&H to create a database linking private broadband companies with state transportation agencies, permitting companies to better coordinate fiber-optic installation, leading to more consumer choice and efficient pricing.
- Establishing a pricing policy for private companies paying for rights-of- way access to state roads. Previously, charges to lay fiber varied widely – the order sets pricing based on actual costs incurred by the state.
- Calling for streamlined, expedited rights-of-way permitting procedures to accelerate broadband deployment.
- Directing BT&H to collect and analyze current broadband information so the state can accurately map existing resources.
- Directing the Department of General Services to make wireless Internet access available in state buildings and increase video streaming to deliver public meetings, training materials and other state resources online.
- Directing state agencies to enable Voice over Internet Protocol (VoIP) technologies for business and government use, and include broadband conduit in their infrastructure planning.[19]

The executive order was issued in part as response to a 2005 California Public Utilities Commission (CPUC) issued report on broadband deployment in California that, among other items:

(1) Specifies how the state can be a leader in promoting the availability and use of broadband services,
(2) Calls for the creation of the California Broadband Task Force,
(3) Endorses increased use of advanced communication services for government operations and public access, and

(4) Recommends limiting rights-of-way (ROW) fees assessed upon broadband providers.[20]

The Business, Transportation & Housing Agency will be the state coordinator on broadband policy. In response, the California Department of Transportation (Caltrans) will switch to a cost-only fee basis for fiber-optic installation to communities – meaning they will pass on only the actual costs incurred for permits and other construction.[21]

Additionally, California is home to the Corporation for Educational Networking in California (CENIC), a nonprofit corporation serving the California Institute of Technology, the California State University system, Stanford University, the University of California system, University of Southern California, California community colleges and the statewide K-12 school system. Member institutions combine their networking resources (funding, equipment, and expertise) under the CENIC organizational umbrella. CENIC's mission is to facilitate and coordinate the development, deployment and operation of a set of robust multi-tiered advanced network services for this research and education community, California Research and Education Network (CalREN).[22]

CalREN consists of a CENIC-operated high-capacity broadband telecommunications backbone to which schools and other institutions in all 58 of California's counties connect via telecommunications circuits or fiber-optic cables leased from private sector telecommunications carriers. In order to facilitate collaboration in education and research, CENIC also provides connectivity to non-California institutions and industry research organizations with which CENIC's associate researchers and educators are engaged.[23]

CENIC is governed by its member institutions. Representatives from these institutions donate expertise through their participation in various committees designed to ensure that CENIC is managed effectively and efficiently, and to support the continued evolution of the network as technology.[24]

In 2003, the state of California awarded a grant to CENIC to focus on speeding 1 GB broadband to all Californians; educational institutions, businesses and residences by 2010. Known as “One Gigabit or Bust,” the initiative is to address critical technical, policy, economic and implementation challenges that must be overcome to reach the goal.[25] Because it connects educational institutions in all 58 California counties, the state of California looks to CENIC to help develop the strategies necessary to expand high-capacity broadband capability beyond existing educational networks to residents and businesses throughout California.[26]

California Teleconnect Fund

The California Teleconnect Fund (CTF) Program helps expand broadband throughout the state. It was established by Public Utilities Commission in 1996. In this decision, the Commission reaffirmed its commitment to universal service, and in accordance with state and federal directives, created the CTF program to provide a 50 percent discount on selected telecommunications services to qualifying schools, libraries, government-owned and operated hospitals and health clinics, and community based organizations.[27]

The program is funded through a surcharge on all end-users of intrastate telecommunications services. The requested budget for FY 07-08 was approximately $25,000,000.[28]

COLORADO

Colorado authorized the Multi-Use Network (MNT) Program approximately 10 years ago. The Department of Personnel and Administration, Division of Information Technologies (DoIT) then launched the MNT Program in June 2000 by formally entering into a public-private partnership with Qwest Communications.

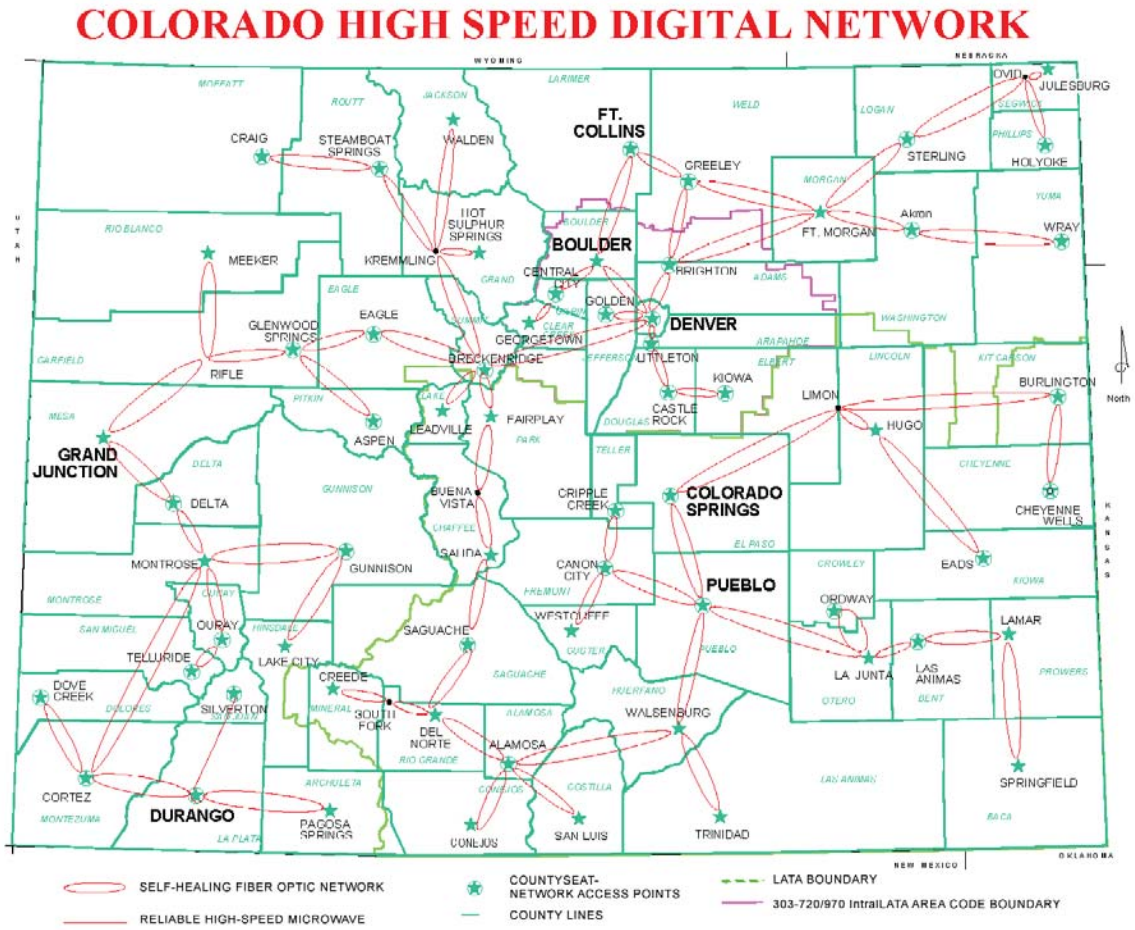
Colorado agreed to aggregate its data telecommunications circuits onto the MNT and purchase a large portion of bandwidth if Qwest would build a high-speed digital network comprised, where possible, of fiber-optic infrastructure. It took three years to complete the network and there are now 65 aggregated network access points throughout Colorado. With this basic backbone in place, it made it feasible for service providers to then offer service to more rural areas. Currently, 97 percent of all county seats have at least DSL service. Colorado officials report that the number of technology-dependent jobs in rural areas has increased 6 percent, compared to a 2 percent decline in urban areas.[29]

A sister program to the MNT, the Beanpole Project authorized by HB 99-1102, addressed the “last-mile” issue. The Beanpole Project was managed by the Department of Local Affairs. Funding is available through the project for community-level aggregation of network traffic, also known as community incentive funding. The Department of Local Affairs and the Colorado Rural Development Council manage the $4.6 million program with funding legislatively appropriated to encouragement of private sector telecommunications investment by providing incentives for the public sector to serve as anchor tenant. The Department of Local Affairs supports a Beanpole Project Advisory

Committee to review grant guidelines, establish evaluative criteria, and review grant applications from Colorado's regions and communities.[30]

With the successful completion of the MNT in 2003, fiber-optic connectivity is now available to every county seat in the state, except Silverton, which is served by reliable high-speed microwave.[31]

The MNT will continue in its role of anchor tenant to stimulate telecommunications investment in under served areas of the state. This role will be renewed with the 2010 competitive re-procurement of telecommunications services to meet the State's data communications needs.[32]



The figure above illustrates the conceptual layout of the Colorado High Speed Digital Network (CHSDN), owned and operated by Qwest and its partners, that provides the network infrastructure of the MNT. While the CHSDN is available to all customers, the MNT has reserved 20 Mbps of traffic capacity at each of the county seat nodes. Each link is shown as a loop illustrating that, typically, each point-to-point link is comprised of two runs of fiber separated by at least 50 feet, compliant with the Self-Healing Alternative Route Protection (SHARP) standard. The point-to-point loops in many cases form larger loops that can reroute traffic due to outages or congestion.[33]

KANSAS

KAN-ED was created by the Kansas Legislature and is administered through the Kansas Board of Regents. The purpose of the program is to expand the collaboration capabilities of KAN-ED's member institutions, specifically K-12 schools, higher education, libraries and hospitals.[34]

KAN-ED operates a private, statewide network over which constituents (or their Internet service providers) may route traffic, as well as provides grants to members who want to develop and/or implement innovative uses of the network. KAN-ED does not act as an Internet service provider (ISP) for access to the commercial Internet. Rather, the network supports access to the commercial Internet through local providers, i.e. ISPs or telecommunications providers.[35]

Fiscal Year 2006 funding in the amount of $10 million was provided through appropriation from the Kansas Universal Service Fund (KUSF). Actual expenditures for Fiscal Year 2006 total $13,581,577, which exceeds the $10 million appropriation as a result of carry over funds and the receipt of E-rate funds.[36]

KENTUCKY

Kentucky's broadband initiative, part of the governor's Prescription for Innovation, is a comprehensive broadband deployment and adoption plan that will leverage state, federal and private investment to blanket Kentucky with high-speed Internet access by the end of 2007.

It is a comprehensive plan to accelerate technology growth, particularly in the areas of broadband deployment and technology literacy and usage. The initiative maintains four key tenets for impacting statewide economic development:

- Full broadband deployment by the end of 2007;
- Dramatically improved use of computers and the Internet by all Kentuckians;
- A meaningful online presence for all Kentucky communities, to improve citizen services and promote economic development through e-government, virtual education, online healthcare; and
- eCommunity Leadership Teams in every county – local leaders assembled to develop and implement technology growth strategies for local government, business and industry, education, healthcare, agriculture, libraries, tourism and community-based organizations.[37]

Over the course of implementation of the *Prescription for Innovation*, statewide broadband availability and usage have increased by 45 percent and 46 percent respectively. An estimated 429,000 previously unserved households can now access broadband as private sector investment in telecommunications infrastructure has reached an unprecedented level in Kentucky. Currently, 87 percent of Kentucky homes can access broadband, on track to reach 100 percent availability by the end of 2007. Home computer ownership has grown by 17 percent, and more than 100 counties are actively engaged in the eCommunity Leadership process to establish a nine-sector

technology growth plan for accelerating technology locally. Moreover, the rate of Kentucky's high-tech job growth is outpacing the national average.[38]

ConnectKentucky is a public-private, nonprofit technology-based economic development partnership that is funded through state, federal and private dollars. It is the implementation organization for the governor's Prescription for Innovation initiative. ConnectKentucky advertises the following metrics since 2004:

- $500,000,000+ — Private capital invested in Kentucky telecommunications
- 429,000 — Approximate number of new households that have received broadband access since start of Kentucky's Prescription for Innovation
- 5,640 — Number of new high tech jobs created
- 1,000 — Number of home computers being delivered to underprivileged households during the pilot phase of No Child Left Offline
- 116 — Number of Kentucky counties actively engaged in the eCommunity Leadership Team process (assessing needs, building interest, planning)
- 46% — Growth rate of broadband usage in Kentucky over last two years
- 45% — Growth rate of broadband availability in Kentucky over last two years
- 17% — Growth rate of home computer ownership in Kentucky over last two years
- # 1 — Kentucky's national ranking for expanding broadband[39]

Rural Kentucky communities have been especially successful in receiving U.S. Department of Agriculture (USDA) Community Connect Grants. In 2006, ConnectKentucky developed the grant applications in partnership with four such communities and various telecommunications providers that resulted in $1M in federal broadband infrastructure development funding.[40]

In 2006, the Kentucky Infrastructure Authority (KIA) authorizing legislation was amended to include broadband deployment projects as an eligible activity for the Authority to participate in. Within the legislation, "broadband deployment project" is defined as the "construction, provision, development, operation, maintenance, leasing, or improvement of broadband infrastructure, broadband services, or technologies that constitute a part of, or are related to, broadband infrastructure or broadband services, to provide for broadband service in unserved areas of the Commonwealth." An "unserved area" is defined as "any place where broadband service is not available."[41]

The KIA is authorized to issue revenue bonds financed through the collection of a tax of no more than two percent of the gross amount of each water service or sewer service

purchase. The KIA then makes funds available through loans and or grants to governmental agencies within the state to be used for infrastructure development including broadband deployment.[42]

ConnectKentucky collaborates with the Kentucky Infrastructure Authority and the Commonwealth Office of Technology to produce a community-by-community comprehensive GIS-based inventory of existing broadband infrastructure and service availability. The map serves two purposes. The first is to ensure that state agencies, local government, and local economic development organizations are working together to make strategic decisions about regulation and technology investment. The second is to identify those areas of Kentucky with inadequate broadband access so they may be targeted for community planning activities and the investment necessary to establish broadband connectivity.[43]

MAINE

The Advanced Technology Infrastructure Act became effective on Aug. 23, 2006. The purpose of the act is to stimulate investment in Advanced Communications Technology Infrastructure so as to increase access to broadband and wireless services for all Maine communities, especially rural communities. The statute also authorizes the Connect Maine Authority (ConnectME) to assess every communications service provider an annual fee not to exceed 0.25 percent of revenue received or collected for all communications services provided in the state by the provider. Facilities-based providers of wireless voice or data retail service may voluntarily agree to be assessed by the authority as a communications service provider. Funds generated in this manner support the broadband development projects undertaken by ConnectME.[44]

With previously collected money from the Universal Access Fee, Maine will use up to $500,000 annually for at least two years to accelerate private investment in communication services including wireless, broadband, cellular, and satellite infrastructure especially in under-served areas. The ConnectME authority is authorized to receive up to $500,000 of previously collected but unallocated funds within the Maine Universal Service Fund as start up funds but requires ConnectME to reimburse the fund for this one-time advance. The ConnectME authority may make grants or loans to:

1. General-purpose local governments (municipalities and counties);
2. Local government authorities, and joint or multi-county development authorities;
3. Private for-profit companies that provide broadband; and
4. Any other responsible entity or group determined by the Authority to be capable of installing, using, and managing advanced communications technology infrastructure in the area.[45]

Maine laid the foundation for the Advanced Technology Infrastructure Act in 2005 when the governor issued an executive order that created the PK-20 Telecommunications and Technology Infrastructure Board, the Broadband Access Infrastructure Board, and the Telecommunications Infrastructure Steering Committee to prioritize, coordinate and implement the necessary enhancements and accessibility of wireless telecommunications and broadband technology.[46]

That order calls for the Broadband Access Infrastructure Board to "Focus on how to expand the availability of broadband services throughout the state to private homes, businesses, public and private educational institutions, research centers and other entities that would benefit from such services. The board's objective will be to provide for universal broadband access by 2010."[47]

In addition, there is a bill in the Maine Legislature (LD 218) authorizing a $2 million General Fund bond issuance. Proceeds will be used to provide matching funds to communities to build the infrastructure necessary to provide high-speed Internet access to underserved areas of the state.[48]

MARYLAND

In July 2006, the Maryland Legislature established the Rural Broadband Coordination Board and Rural Broadband Assistance Fund. The Board is charged with assisting in the deployment of middle mile broadband communication infrastructure in Maryland's rural and underserved areas; cooperating with public, private and nonprofit entities to obtain, coordinate and disseminate resources for the establishment of broadband communication services.[49]

A Rural Broadband Assistance Fund in the Department of Business and Economic Development was created. The fund consists of money appropriated in the state budget, federal money allocated or granted to the fund, and money from other sources accepted for the benefit of the fund. The fund may be used only for planning, construction and maintenance of broadband communication services and equipment and related activities in rural and underserved areas, ensuring that Maryland's underserved regions, particularly those in rural regions, have access to broadband. The authorizing legislation requires the governor to include a general fund appropriation in Fiscal Years 2008 and 2009 of $4 million per year to the fund.[50]

The legislation also requires the Department of Transportation to allow the use of any state right-of-way for the installation of broadband communication infrastructure provided by nonprofit telecommunications services providers in rural and underserved areas of the state without imposition of any charge for the use of the right-of-way.[51]

The state of Maryland also provides Network Maryland, a statewide high-speed network for public sector use. The network was created from an initiative to utilize resource-shared fiber-optic cable assets throughout the state to provide affordable, high-speed bandwidth to all areas of the state and to provide a cost savings to the citizens of the state of Maryland. Network Maryland provides network connectivity for all public entities in the state to improve the economy of scale by coordinating joint network build-outs, consolidation of services and by providing the necessary information for proper network growth.[52]

MICHIGAN

The Michigan Broadband Development Authority (MBDA), an independent state government agency, was created to help Michigan attract more private sector investment in high-speed Internet infrastructure, and to increase demand for and

utilization of broadband services. It does so by offering low-cost loans from funds generated through the sale of state tax-exempt bonds to telecommunications companies willing to make such investments, and by offering organizations low-cost financing for the acquisition of hardware or software applications that will improve or increase their use of broadband service.[53]

The MBDA was initially capitalized by the state's housing authority through a $50 million bond sale. The MBDA was authorized to issue investment grade, taxable and tax-exempt bonds, the proceeds of which can be used to provide financing assistance.

In 2005, the Governor of Michigan unveiled her Rural Broadband Initiative (RBI), created to ensure the expansion of high-speed Internet access to rural and underserved areas of the state by targeting the funding mechanisms of the MBDA to these areas. Under the RBI, qualifying broadband providers in eligible regions could qualify to receive 4 percent loans (a 50 percent reduction of the standard 8 percent MBDA interest rate) with interest-only draw periods of up to 24 months.

Under the governor's RBI, companies eligible for the funding could be telephone companies or they could be construction companies that lay fiber or cable in mainly rural areas. A university could get funding as well. Even though the MBDA did not own a network, some of the big telecommunications players in the state viewed the Authority as a competitor because money was loaned to small, independent telecommunication providers, thereby allowing them to compete with larger, better funded companies.[54]

One example of an MBDA supported project began in September 2006 when the Authority issued a $5.6 million loan from MBDA funds to deploy near line of sight (NLOS) access points and customer premise equipment throughout underserved rural areas. "NLOS describes a partially obstructed path between the location of the signal transmitter and the location of the receiver. Obstacles that can cause an obstruction in the line of sight include trees, buildings, mountains, hills and other natural or manmade structures or objects."[55]

Since inception, the Authority has reviewed more than $100 million in loan applications and approved approximately $30 million worth of loans. The Michigan Broadband Development Authority started as a seven-year program with a sunset clause option requiring legislative renewal.

It is currently in its last year and will not be renewed. State officials initially believed that the MBDA would eventually become self-sustaining; however, that did not happen. Recently, legislative criticism of the Authority's business plan and slow progress toward self-sufficiency, public concern over Authority staff salaries and criticism of loan programs from major telecommunications carriers concerned that government was unfairly assisting their smaller competitors led legislators to the decision not to reauthorize the MBDA.

The Authority is no longer accepting loan applications, though it is monitoring current loans and completing projects already underway. According to MBDA staff reports the efforts of the Authority have helped establish broadband coverage of some time in 99 percent of the state.[56]

MINNESOTA

Minnesota's Network for Enterprise Telecommunications (MNET) is a public-private partnership delivering an integrated statewide network for education, local governments and state agencies. The statewide network is operated by the Minnesota Office of Enterprise Technology. MNET offers data, voice and video services to government, education and related markets.[57]

The effort to expand rural broadband infrastructure in Minnesota is coordinated and supported through a public-private partnership between the state of Minnesota and the Blandin Foundation. The Blandin Foundation is focused on the economic viability of rural Minnesota communities as part of their mission to help strengthen rural Minnesota and the Grand Rapids area.[58]

The Blandin Broadband Initiative is designed to catalyze broadband investment and use, raise awareness about the value of broadband and encourage public and private investment in rural broadband capacity. The Blandin Broadband Initiative began its efforts in 2003 with a review of the level of broadband utilization and deployment in Minnesota's rural communities. The initiative's strategy board identified the need to increase broadband use as a top priority. In response, the foundation launched the *Get Broadband* community grant program, which supports locally-led education and outreach efforts aimed at bringing the benefits of broadband to rural households and businesses. By January 2006, 20 communities were participating in the program.

Participating *Get Broadband* communities are encouraged to come together to share information, experiences and resources. The Blandin Foundation provides each *Get Broadband* community with up to $15,000 in grant funds to support community education efforts and further local initiatives. To access the funds, the community must deliver matching funds. With the funds, communities are expected to build local leadership capacity through workshops with experts on technology, marketing and applications. Communities may apply for second year grant funding in an amount up to two-thirds of the original grant award (e.g. $10,000, in the case of those communities that received a $15,000 grant).[59]

Since its inception, the Blandin Broadband Initiative has:

- Formed a strategy board of 18 public and private leaders (including the CEOs of six Internet service providers) to guide the Initiative.

- Published the *Community Guide to Broadband Development* to help local leaders across Minnesota learn more about broadband and explore their options for increasing local availability and use.

- Designed and implemented *Get Broadband,* a community-based broadband utilization program that, as of January 2006, includes 20 communities from around the state.[60]

- Dedicated $250,000 to support the *Get Broadband* program in local communities and raised additional public and private sector support.

- Received $250,000 from the state of Minnesota General Fund to further the reach of the *Get Broadband* program.[61]

MISSOURI

The Missouri Telehealth Network (MTN) exists to enhance access to care to underserved areas of Missouri. It also provides educational opportunities for healthcare providers to further homeland security efforts related to disaster preparedness and to be available in the event of a disaster, and to provide research opportunities to clinicians wanting to study telehealth.[62]

MTN began in 1994 as one of the nation's first public-private partnerships in telehealth. A nine-site network was initially developed with federal support coming from the U.S Department of Health and Human Services, Health Resources and Service Administration's Office of Rural Health Policy and private support coming from telecommunication companies, as well as each telehealth site. Today, MTN has 82 sites in 40 Missouri counties, with an additional 14 sites in four new counties to be installed. The network is funded with federal, state and institutional dollars from all MTN sites.[63]

The Federal Communications Commission (FCC) recently announced the establishment of a pilot program to help public and nonprofit healthcare providers build state and region-wide broadband networks dedicated to the provision of health care services, and connect those networks to Internet2. The pilot program will fund up to 85 percent of the costs incurred to deploy state or regional broadband networks dedicated to healthcare and up to 85 percent of the costs of connecting the region and/or state to Internet2.[64] This program may hold promise for further extending Arizona's existing investment in telemedicine.

The Missouri Research and Education Network (MOREnet)

MOREnet provides high-speed, reliable Internet access to the state's public sector. A unit of the University of Missouri System, MOREnet serves a consortium that includes 513 public and four private K-12 schools, 130 public libraries, 26 public and 41 private higher education institutions and 10 other nonprofit entities. In addition to Internet connectivity, MOREnet provides training and technical support needed to make that connection a useful tool. MOREnet is funded through a state legislative appropriation, federal E-rate and grant funds and fees paid by participating members for services.[65]

MOREnet encouraged the state's telecommunications providers to construct a MOREnet-designed, advanced, high-speed, high-bandwidth network throughout Missouri. This was done by aggregating K-12 and higher education demand and contracting with private sector providers to establish high capacity broadband infrastructure the availability of infrastructure in rural areas has been increased. These connections, managed by MOREnet on behalf of the state's schools and libraries, also laid the groundwork for Internet availability to thousands of rural Missourians. MOREnet is not a private Internet service provider and does not provide services, including dial-up access, on an individual basis. All network use by MOREnet members, project participants and those connected via MOREnet members or project participants shall be for, or in support of, research; education; local, state or national government affairs; economic development or public service.[66]

NORTH CAROLINA

In August 2000, the North Carolina General Assembly created the Rural Internet Access Authority through Senate Bill 1343. It was replaced in 2003 by the "e-NC Authority" to continue the work of the Rural Internet Access Authority.[67]

Recently, North Carolina extended the work of e-NC for five more years from January 1, 2007 through December 31, 2011. The e-NC originally focused only on rural areas of the state, but now works on developing Internet connectivity in all economically distressed areas. By working with both public and private service providers, e-NC first achieved 100 percent access to local dial-up services by summer 2001. The e-NC originally had a goal of 100 percent broadband Internet access within three years. By the end of 2003, e-NC reported that broadband access was available to 80 percent of the state.[68]

The e-NC is a state authority but does not issue debt. It is housed in a nonprofit, the North Carolina Rural Economic Development Center. The e-NC Authority is a hybrid organization that benefits from funding and collaborating with a variety of the following groups:

- private entities
- nonprofits
- national, state and local governments
- telecommunications companies
- small Internet service providers
- software and equipment companies
- foundations
- universities
- think-tanks.

Since inception, e-NC has acted as a grant maker, grantee, researcher, policy advocate, and convener. In its early years, the Authority awarded $30 million in connectivity grants. These grants were primarily awarded to counties, but also to specific government institutions such as libraries, consortiums and private enterprise. All work with e-NC is a unified effort to improve North Carolina's connectivity. In 2005, e-NC operated on a budget of approximately $4 million. That funding was received from the North Carolina General Assembly, various foundations and corporations.[69]

SOUTH CAROLINA

South Carolina governor's budget for fiscal year 2007-08 includes a request for $2 million to bring high-speed Internet access to rural parts of the state. This allocation from the state's Capital Reserve Fund will be used to create a rural broadband fund to increase broadband penetration in under-served communities. The fund is also designed to boost economic development by providing Internet access to students, businesses, entrepreneurs, rural counties and local governments. The $2 million will be used for direct grants and to match private sector dollars aimed at creating broadband infrastructure in rural areas.[70]

A new, nine-member South Carolina Broadband Advisory Committee would be created at the Department of Commerce to manage, oversee and monitor use of the fund. The committee, chaired by the state's Secretary of Commerce, would prioritize funding to

areas of the state that have been under-served by existing telecommunications infrastructure.[71]

UTAH

Fourteen cities in northeastern Utah have formed a consortium to create the Utah Telecommunication Open Infrastructure Agency (UTOPIA), which delivers high-speed Internet access, telephony and television programming through a fiber-optic cable at data rates that reach 30 megabits per second (Mbps). Future plans call for offering subscribers access at speeds of 50 and even 100 Mbps.[72]

UTOPIA is a nonprofit government agency that is considered an extension of the municipalities that created it and is authorized under amendment of Utah's Municipal Cable Television and Public Telecommunications Services Act of 2001. UTOPIA is funded through municipal bonds issued by participating communities. State law allows municipalities to group together to form what it calls "interlocal cooperation entities" in Utah — nonprofit corporations that benefit each municipality equally.[73] Under certain circumstances, the creation of “intergovernmental agreements” that may provide the necessary legal foundation for such an approach are authorized.[74]

During 2003 and 2004, 11 city councils passed resolutions that guaranteed the bonds that would be issued by UTOPIA. Three others remained in UTOPIA, but declined to guarantee the bonds. In the summer of 2004, $85 million in bonds were sold to fund the first phase of construction: laying down fiber for the six southernmost cities.

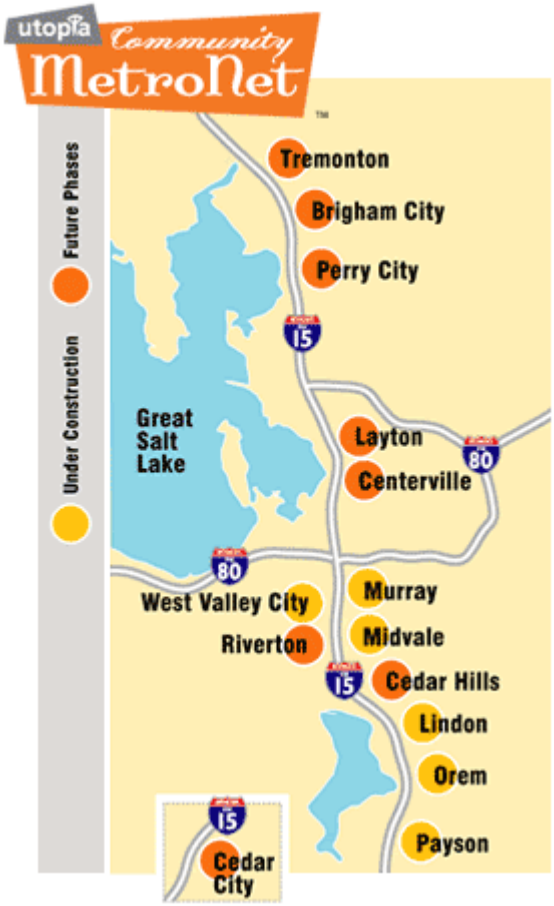
UTOPIA pays back its bonds by collecting a fee whenever a service provider signs a homeowner up for one of its services. The agency is intended to be self-sustaining, which they predict will be possible if 30 percent of eligible homes subscribe to at least one service. If fewer households sign up, the 11 cities are on the hook, and they will have to honor UTOPIA's bond commitments with money from sales taxes that the participating communities’ referendums authorize them to collect.[75] According to the UTOPIA Web site, “Current UTOPIA rates on construction loans are approximately 1.5 percent. As construction for a phase is completed, UTOPIA converts the loan into a 20 year municipal bond with expected interest rates of 6 percent.” According to Roger Black, Chief Operating Officer of UTOPIA, the take rate is ahead of projections, although it is not as good as he would like it to be. A bill proposing a $2M legislative appropriation is working its way through the Utah legislature.”[76]

COO Black is pleased that contractors have built the UTOPIA Community MetroNet network at or below the initially stated cost. In addition, Black noted that the agency has experienced a substantially lower level of maintenance expenses than anticipated, which is largely due to the nature of the infrastructure, which is reportedly quite reliable. UTOPIA offers a completely new overbuild “Fiber to the Home” network. As a wholesale network, the agency is reliant on service providers to market the services to communities. Black states that the agency is pleased with the commitment service providers have made, but he believes that they can do a better job of marketing once service providers and UTOPIA become more knowledgeable about what messages will inspire potential users to subscribe.

Currently, there are four service providers available on the network. At a minimum, UTOPIA will deliver 100 Mbps of bandwidth to every connected home and 1 Gbps (Gigabits per second) of bandwidth to every business. Black states that the network has been designed in such a way that future upgrades to higher speeds will be a very inexpensive process.

Part of the reason service providers have not been actively marketing is that Qwest has filed a Federal lawsuit accusing the agency of taking advantage of its status as a governmental agency — which is exempt from sales and property taxes — to allow its contractors, including AT&T, to provide telecommunications services at below-market prices, while Qwest has no such option.[77]

Nevertheless, an aggressive marketing push is scheduled for spring 2007 and businesses that are using the network are very happy with it. Many apartment and condominium complexes are installing hookups to the network from the start. Areas outside UTOPIA boundaries have expressed interest in linking up as well.



78

VERMONT

In his 2007 inaugural address, the Governor of Vermont announced a four-part plan to bolster research and high-tech economic development through his "Vermont Way Forward" strategy. The strategy includes a plan to make Vermont the country's first "e-state," one in which universal access to broadband and wireless technologies are available anywhere within the state's borders.

A new Vermont Telecommunication Authority will partner with private businesses to build a next-generation infrastructure for voice and Internet access. The strategy calls for $40 million in both general obligation and revenue bond backing by the state for the Telecommunication Authority. With these funds, it is thought that the state will be able to leverage an estimated additional $200 million in private investment.

The Governor has also suggested that "some private investment could be structured so that it flows through limited-obligation municipal indebtedness to gain the advantages of that investment." Money will be invested in infrastructure elements (such as fiber-optic cable or small towers) to bring broadband and cell phone service to un-served or under-served parts of the state. The bond would be repaid through revenues generated by leasing infrastructure to cellular and Internet service providers, and ultimately by the users of telecommunications services in Vermont.

A small portion of the Authority's appropriation ($200,000 over two years) will be dedicated to the continuation of a three-year-old grant and incentive program to encourage users (such as town offices, downtown and village businesses and residential users) to share broadband connections through WiFi. The program will focus on getting at least one highly visible WiFi hotspot in every city, village and town in the Vermont. This year, four projects received $50,000 grants each to extend broadband coverage.[79]

Right-of-way reform is also a key component of the "Vermont Way Forward" strategy. The Telecommunication Authority will work to reduce the amount of time and review required for lower-impact wireless facilities in wireless permitting processes at the state and local level. Specific actions include:

- Create a minor permit process for municipalities to use that will result in a streamlined local permitting review of small wireless communications facilities.

- Exempt homeowners from the need for wireless permits to attach small antennas to their homes for distributing wireless broadband services.

- Reduce the Act 250 (Vermont Land Use and Development Act) jurisdiction over structures used for wireless communications facilities if they are not taller than the height of a common utility pole.

- Create a single, state-level permit process at the Public Services Board (PSB) for coordinated proposals to build five or more towers located in more than one Act 250 district, in place of local zoning and Act 250.

- Direct the PSB to create a streamlined process for permitting wireless communications attachments to electric transmission and generation towers via the sec. 248 process.

The Authority will take additional steps to more effectively leverage government and public utility assets such as poles and rights-of-way. Specifically:

- Ensuring that all broadband and wireless providers have the rights to attach to utility poles on terms established by the PSB.

- Establish a published policy for access to state-owned road and rail rights-of-way (ROWs) by all categories of broadband and wireless service providers which recognize the value of developing these services.[80]

According to an article in the *Burlington Free Press,* "Despite the leadership efforts of the governor, legislators are expressing concerns about making sure the state is neither duplicating services already in the works nor building a network that will be technologically obsolete before it's done. They plan to hire a consultant of their own who can provide technical advice."[81]

WASHINGTON

The State of Washington has sometimes been described has having built a "Network of Networks" to support public sector telecommunications statewide.

Nearly all of the data transport in state government — including city, county and educational network traffic — is combined onto the state Department of Information Services' (DIS) managed Wide Area Network (WAN) infrastructure. Through this demand aggregation the department can competitively acquire large amounts of bandwidth from private sector providers, thereby driving down costs for telecommunications goods and services while boosting available speed and capacity.

This Inter-Governmental Network (IGN), with an established point-of-presence or access point to the rest of the Internet in all 39 Washington counties, is a high-speed, high-capacity, state-run telecommunications infrastructure. It uses portions of existing public and private networks, stressing wide participation in a shared infrastructure rather than a proprietary approach.

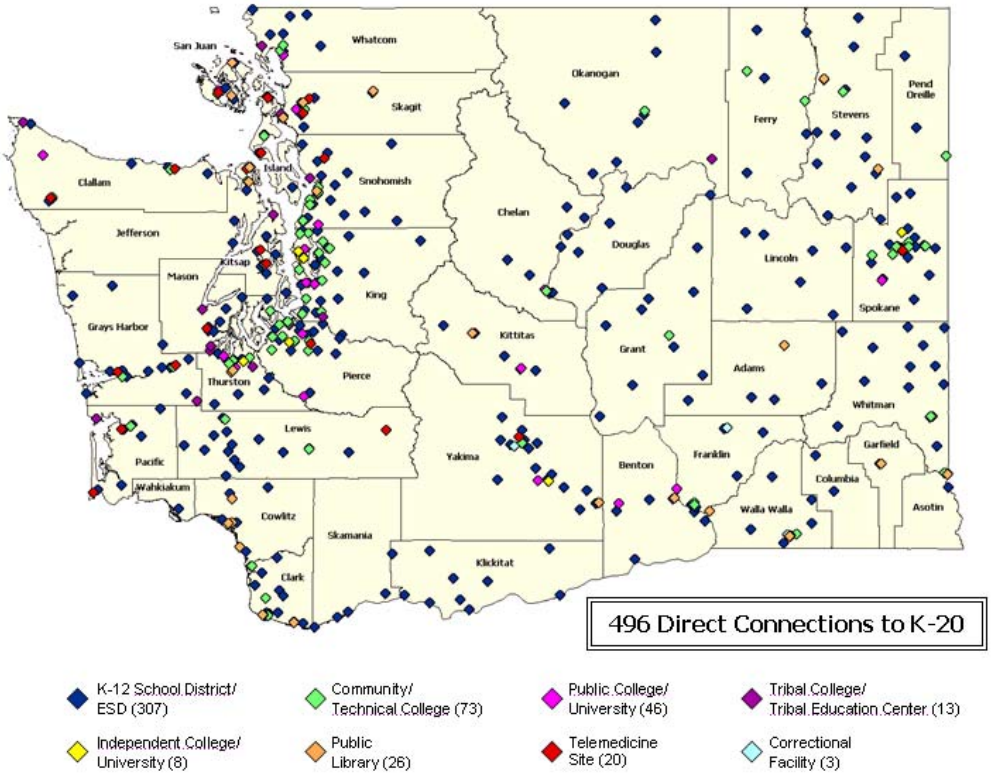
Another foundational component of Washington's network strategy is the K-20 Education Network. Founded in 1996 and coordinated by DIS, the K-20 Network provides educational sectors with dedicated, scalable telecommunications capacity.

Additionally, the statewide infrastructure represented by Washington's public service and education networks has increased location options for Washington businesses and expanded economic development prospects, particularly in rural areas. Because the network primarily uses leased infrastructure, it serves as a single "anchor tenant" that justifies increased private-sector investment in these smaller communities and, as a result, expanded telecommunications services offerings.

By aggregating public service and education demand for telecommunications capacity, the DIS is able to present that need to the private sector as a single package. Requirements are made known to telecommunications providers with specific capacity needs defined from one location to another throughout the state. Telecommunications providers can then submit cost quotations for specific segments of the network or for the

total network, depending on their available infrastructure. Every company able to provide the required capacity is eligible to offer their services. The selected providers for each of the segments are then assembled by DIS into a virtual, single, statewide network. Reacquisition of network segments is conducted at regular intervals to ensure Washington receives the best possible service and price, as well as fair and open competition among providers. The private sector has enthusiastically supported this model because they are able to negotiate very large contracts with a single entity.

In this fashion, the K-20 Network's deployment connecting all state educational facilities has led to significant commercial deployment of high capacity Synchronous Optical Network (SONET) infrastructure in rural eastern Washington, allowing companies requiring high-bandwidth network applications to locate in communities they would not have considered before. Network service costs across the all the networks are covered by a combination of state general fund appropriations and subscriber fees. The fee structure for the FY 2007-2009 biennium is roughly comprised of $20.2 million in appropriations and $6 million in user co-pays.[82]



Analysis of Selected State Programs within Context of Arizona Broadband Authority Task Force Goals and Matrix

The following matrix organizes information from 13 states' existing networks and broadband programs, many of which you have just read about. The table is most effective when using the questions on the left to orient a reader to what information they can find. The questions on the left represent the questions researched for each state network or program, and an "X" indicates the program has a particular feature. States are indicated at the top of the table.[83]

	CA	CO	KS	KY	ME	MD	MI	MN	MO	NC	UT	VT	WA
NETWORK NAME/ PROGRAM	CENIC/ CalREN	Multi-Use Network Service	KAN-ED	ConnectKentucky	Advanced Technology Infrastructure Act / ConnectME Authority	Network MD/ Maryland Rural Broadband Initiative	Michigan Broadband Development Authority	Blandin Foundation /MNET	MOREnet & Missouri Telehealth Networks	e-NC Authority	UTOPIA	Vermont Telecom Authority	IGN/JIN/K20
Broadband Deployment													
Public Infrastructure		X									X		X
Private Infrastructure			X										
Combination	X			X		X		X	X				
DOT Rights of Way Used?	X			X	X	X	X			X		X	X
State Definition of Broadband													
Use Federal Definition (200KBS)	X	X	X	X			X		X	X			
1 MB													
2MB													
Other?					**1.5MB**	**100 MB**			X		**100 MB**		X

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Attracting/Keeping Residents and Businesses		X		X	X		X	X		X	X		
Normal Business Function		X		X				X		X	X		
E-Business Functions/ Location Based Services		X		X						X			X
Government Functions		X		X		X		X	X	X			X
Health Functions		X	X	X		X		X	X	X			
K-12 Education Functions	X	X	X	X		X		X	X	X			X
Higher Education Functions	X	X	X	X		X		X	X	X			X
Courts/Criminal Justice		X				X		X					X
Public Safety/Emergency Response		X				X		X	X				X
Web Business Functions		X											X
Telecommunications Provider Functions					X		X						X
Content													
Information	X	X	X			X		X	X		X		X
Communications	X	X	X			X		X	X		X		X
Transactions/E-Commerce		X							X		X		X

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Entertainment											X		
Education	X	X	X					X	X				X
Health Care		X	X					X	X				
Government Services		X				X		X	X				X
Internet													
Broadband Home		X		X	X		X						
Broadband Business		X		X	X		X						
E-Commerce Business Services				X			X		X				
ISP Class Services	X					X			X				X
Local Network Access Point	X		X			X			X				X
Regional/National Network Access Point (NAP)						X			X				X
Network Service Provider			X			X			X				X
Aggregated Network Access Point (ANAP)		X				X							X
To Whom Available													
Public Facilities													
State or Local General Government		X		X	X	X		X	X				X
Courts/Criminal Justice		X		X		X		X					X

	CA	CO	KS	KY	ME	MD	MI	MN	MO	NC	UT	VT	WA
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Schools	X	X	X	X		X		X	X				X
Hospitals	X	X	X	X		X			X				
Libraries		X	X	X		X		X	X				X
Other Public	X								X				
Private Facilities													
Every Resident		X		X	X					X	X		
Selected Persons/Businesses		X		X	X								
All Low Income Persons/Businesses													
Middle Income Persons/Businesses													
High Income Persons/Businesses													
Other	X		X						X				
Funding Source or Incentive?													
General Fund	X		X	X		X		X	X	X		X	X
State Broadband Universal Service Fund	X		X	X	X				X				
E-Rate	X		X	X					X				X
Rural Utility Service				X					X	X			
Federal Grant	X			X						X			
Federal Loan				X									
State or local Loans							X						

	CA	CO	KS	KY	ME	MD	MI	MN	MO	NC	UT	VT	WA
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State or local Bonds							X				X	X	
Tax Incentives and or Credits for Investment		X											
Tax Incentive for Subscription													
Increased Provider Investment				X			X			X			
Government Funding via Anchor Tenancy		X				X							X
Aggregation Economies		X		X		X			X	X			X
Reduced Rates from Increased Competition				X			X		X				
Funding from Interested Third Parties	X			X				X		X			
Advertisers													
Who Pays?													
Customer	X	X		X	X		X	X	X				X
Ratepayer				X									
Taxpayer		X	X	X	X	X	X	X	X				X
Shareholder									X				
Other Interested Parties								X					
Advertisers													
Others									X				

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NETWORK NAME/ PROGRAM	CENIC/ CalREN	Multi-Use Network Service	KAN-ED	ConnectKentucky	Advanced Technology Infrastructure Act / ConnectME Authority	Network MD/ Maryland Rural Broadband Initiative	Michigan Broadband Development Authority	Blandin Foundation /MNET	MOREnet & Missouri Telehealth Networks	e-NC Authority	UTOPIA	Vermont Telecom Authority	IGN/JIN/K20
Where Available													
Rural	X	X	X	X		X	X	X	X	X	X	X	X
Towns		X	X	X		X	X	X	X	X	X	X	X
Cities		X	X	X		X	X		X	X	X	X	X
Government Places	X	X		X		X	X	X	X				X
Regions		X		X		X	X	X	X				X
State	X	X		X		X	X	X	X				X
Who Provides													
Government/Municipal Utilities										X	X		
Local Exchange Carriers	X		X	X		X	X	X	X				X
Competitive Local Exchange Carriers/ISPs	X	X	X	X		X	X	X	X				X
Long Distance Carriers	X			X		X	X	X	X				X
Cable TV	X		X										
Municipal Utilities	X												
Public Utilities	X												
Wireless/ Cellular Carriers				X	X	X			X				
Converged Carriers				X					X				

	CA	CO	KS	KY	ME	MD	MI	MN	MO	NC	UT	VT	WA
NETWORK NAME/ PROGRAM	CENIC/ CalREN	Multi-Use Network Service	KAN-ED	ConnectKentucky	Advanced Technology Infrastructure Act / ConnectME Authority	Network MD/ Maryland Rural Broadband Initiative	Michigan Broadband Development Authority	Blandin Foundation /MNET	MOREnet & Missouri Telehealth Networks	e-NC Authority	UTOPIA	Vermont Telecom Authority	IGN/JIN/K20
Network Connection													
Public to Public	X			X		X	X	X	X		X		X
Public to Private				X			X		X		X		
Private to Private			X	X			X		X		X		
Private to Public			X	X			X		X				
Public Policy Activity: (How Implementation is Accomplished)													
Statute	X	X	X	X	X	X	X	X	X	X	X	X	X
Rule													
Executive Order	X			X			X					X	
Docket									X				

Community Case Stories

Following are several case stories or brief summaries describing individual community approaches to telecommunications systems that took place independently of centralized state action. They reveal a variety of ownership structures and technological delivery mechanisms. The case stories come from communities of various sizes.

City of Tempe, Arizona

On April 21, 2005, the Tempe City Council approved a 5-year contract for citywide wireless broadband service with a network systems vendor but not a service provider. Instead, all Internet service providers will have access to the network.

Tandem networks running on different frequencies will be deployed using the same infrastructure — one for public use and one for municipal government use. The City of Tempe did not install the network, nor do they maintain it. In exchange for access to the city street light network and existing fiber backhaul (connections from access points to the Internet), the city will not be charged for municipal use of the wireless network.

The network covers 40 square miles. It will reach approximately 65,000 households, 1,100 businesses, and 50,000 students, and provide municipal services to Tempe police, fire, emergency, city and Arizona State University (ASU) personnel. Customers will be able to subscribe to services ranging from low-cost Internet services to high-speed services capable of handling VOIP and video.

The Tempe WiFi Community Alliance has been a motivating factor in both the downtown and new citywide networks. Free access will be continued in the downtown zone, and access to city and ASU sites are available free of charge to those without a subscription.[84]

Moorhead, Minnesota

GoMoorhead! is the name of Moorhead, Minnesota Public Service high-speed wireless Internet service. Moorhead Public Service (MPS) is a community-owned utility that has historically provided municipal electric and water services. In March 2005, the Moorhead Public Service Commission unanimously voted to establish the utility's Broadband Services Division. The City Council authorized the city to loan MPS the funds to pay for the new utility from revenues generated by the electric and water utilities. These funds (about $4 million in 2002) would normally go to the city's general, capital and economic development funds.[85]

The GoMoorhead! network consists, in part, of nearly 300 standards-based WiFi transceivers installed on existing utility and streetlight poles throughout the city. These transceivers create a blanket of coverage in Moorhead that allows residents and businesses to connect to the Internet virtually anywhere within the community.[86]

Chelan County, Washington

Chelan County Public Utility District (PUD) has a municipally owned fiber-to-the-home system that sells wholesale access to service providers. Currently, more than 2,000 end-users receive service through one of the 14 competing Internet service providers. Most of the ISPs are locally owned. There is only one conventional telephone provider, but all of the ISPs offer VOIP (Voice over Internet Protocol) either through their own system or a third party.

According to the Chelan County PUD Web site, the agency expects to reach 75 percent of the county (30,000 homes and businesses) by 2008, at a total system cost of about $70 million.

Revenues generated by the sale of surplus hydroelectric power finance the investment. The system is projected to have positive cash flow in 2013, assuming that about one-third of homes subscribe to each service. The county PUD expects a full return of investment in 2020.[87]

Nelson County, Virginia

The Central Virginia Electric Cooperative (CVEC) was the first cooperative utility to commercially deploy a Broadband over Power Line (BPL) network. The system is entirely power line-based, but in the future it could incorporate wireless to deliver signals to homes.

CVEC has an agreement with International Broadband Electric Communications (IBEC), which is building the BPL network using CVEC's infrastructure and provides Internet service. The first phase reaches 4,000 homes and was completed in November 2004. IBEC offers 256 kpbs bi-directional speeds at a cost of $29.95 per month. Business class broadband is offered at $69.95 monthly. The only other Internet service available is via satellite.[88]

Broadband over Power Line tests conducted initially in Cottonwood, Arizona by Arizona Public Service Company and Mountain Telecommunications, Inc. were suspended after complaints of interference from citizens band and HAM radio operators. Since then, the City of Surprise, Arizona has been testing BPL connectivity.

In the summer of 2006, the Federal Communications Commission (FCC) affirmed the right of broadband power line (BPL) operators to provide communications services over power transmission lines provided their services don't interfere with existing radio services. Statements released by the FCC and its commissioners show continued support for new broadband platforms (such as BPL), stating they hold great promise as a ubiquitous broadband technology that can compete with cable, DSL, fiber, and wireless broadband systems. The FCC emphasized the advantage of allowing customers to simply plug into an electrical outlet for broadband connectivity.[89]

City of Philadelphia, Pennsylvania

Philadelphia has created a nonprofit corporation called "Wireless Philadelphia" that will handle the design, construction and management of a citywide wireless network.

Start-up funds will come from taxable bonds, foundation grants, and low-interest bank loans. The city projects the $7 to $10 million start-up investment will be recouped in 5 years.

Access will be available at wholesale rates to private service providers. The nonprofit will not sell access directly to individuals or businesses. Free access (nodes that are not password protected) will be provided in public spaces.[90]

Tribal Digital Village: 18 Tribal Communities in Rural San Diego County, California

In 2001, Hewlett-Packard awarded the Southern California Tribal Chairman's Association a $5 million "Digital Village" grant to develop a wireless network throughout Southern California tribal lands. Today, the network connects 18 tribal communities located hundreds of miles apart and separated by mountainous terrain. Within these communities, approximately 50 tribal government and community buildings are connected to the network. Additional funding has come from the U.S. Department of Health and Human Services, E-Rate, the Ford Foundation and the U.S. Department of Education Parental Information and Resource Centers (PIRC). Individual tribes can also apply for grants.[91]

Arizona Context

At the end of 2005, the Arizona agency called GCIT, or the Governor's Council on Innovation and Technology identified 11 telecommunications related recommendations, developed with input from industry leaders, economic development groups and various Telecom stakeholders from all parts of Arizona. These recommendations are targeted to overcoming barriers to Broadband deployment, especially in the rural areas of the State:

- Establish a Telecommunications Infrastructure Advisory Group or Committee
- Consider Establishing a Broadband Authority
- Provide Support for the Development of a Statewide Telecommunications Strategic Plan
- Convene a Series of Telecommunications Roundtables
- Encourage the Arizona Corporation Commissions to Modify the Current Arizona Universal Service Fund; or Establish an Arizona Broadband Universal Service Fund Investment
- Provide State Support to Identify Potential Funding Sources and Grant Writing
- Implement a Strategy to Facilitate increased use of Federal E-Rate Subsidies
- Provide Ongoing Funding for Community Telecommunications Assessments
- Adopt an Arizona Definition of Broadband to be 1Mbps
- Encourage Access to Local, State, Federal, and Tribal Rights-of-way
- Monitor Legislative Actions to ensure that Explicit or De Facto Barriers to Municipal Participation in Broadband Deployment are eliminated.[92]

The preceding review of state and community broadband telecommunications programs and initiatives has confirmed that GCIT's recommendations are consistent with components of the most successful programs in other states. However, Arizona must conform to a specific state constitutional provision that will preclude some options implemented in other states.

> *The Arizona Constitution contains a "gift clause" (Article 9, Section 7)[93] restricting the ability of public entities from providing loans, grants, subsidies or other forms of assistance to private entities except as to such ownerships as may accrue to the state by operation or provision of law or as authorized by law solely for investment of the monies in the various funds of the state. The CEDC [Commerce and Economic Development Commission] has, by provision of law, been given express authority and was specifically created to provide financial assistance to private entities for economic development purposes and is authorized in statute to provide loans, grants and subsidies to these entities.[94]*

Funded primarily with the proceeds from two Arizona Lottery "Scratcher" games, the CEDC has been the conduit for several economic and community development programs of which private sector entities are the recipients, with job creation being the ultimate goal.[95] For example, the CEDC's "Direct Assistance to Business" program provides grants and loans to companies relocating, creating or retaining jobs in Arizona. The monies must generally be used for plant, equipment or physical infrastructure and loans are secured by appropriate collateral. The Arizona FAST grant program awards small grants to companies for professional assistance in applying for the federal Small Business Innovation Research program.

In addition, when the CEDC was enacted, bonding authority was included in “session” or temporary law. However, no expiration date was stated and the Attorney General’s office believes this authority to still be “good law.” In order to implement the CEDC’s bonding capacity for broadband (or any other) projects, the authority must be codified in regular law to increase the palatability of the program for the financial markets. Additionally, bond financing and repayment issues would need to be addressed.

Although legislation is required to activate the bonding capacity, it appears the CEDC can easily surmount the bigger hurdle of the “gift clause” issue. As a result, the CEDC may be an extremely viable option for implementing middle and last mile programs that involve loans, grant or other subsidies to the private sector, as long as the economic development benefit can be identified and measured. If the CEDC’s taxable bonding capacity is indicated, legislation can be introduced in the future to authorize this.[96]

Arizona’s Rural Economic Development Strategy

The effectiveness of broadband deployment to stimulate additional economic prosperity in rural Arizona will depend on the overall economic development strategies at work. For example, other states have seen success in attracting telework centers to rural communities able to provide appropriate “industrial strength” telecommunications infrastructure. However, another alternative may be to focus on providing individual broadband connection to the home, thereby giving individuals access to location independent high-wage, high-skill careers and professions. It is a way of focusing economic development on job creation, not just corporate location. Both scenarios require robust telecommunications capability but the scope and scale of the infrastructure and associated investment required are significantly different.[97]

Conclusions

Broadband networks are taking their place alongside electricity, water, sewer and roads in communities across the country. From Maine to California, states and localities are pursing new strategies for making broadband as common as the twisted pair telephone wire have been. The opportunity for states to differentiate themselves and receive economic development bonus points for ubiquitous broadband access is quickly passing. Soon the availability of such infrastructure will be expected, and states that have not found a way to establish it will be penalized as businesses and the technology-dependent workers of tomorrow choose to locate elsewhere.

Widespread broadband deployment has been a priority for some states for long enough that de facto best practices now exist. Arizona's success in creating a program that meets the state's unique requirements will depend in large measure on the priority assigned to that effort by leadership.

States with the most mature and successful programs (such as Kentucky, North Carolina and Michigan) have benefited from sustained cooperation and collaboration between the legislature, governors, communities and the private sector. The places that have invested both the political and financial capital necessary have seen broadband provide advantages to compete for businesses and people. The leaders of those state programs understand they hold the key for simplifying the integration of previously segregated and constrained services and opening new vistas in educational opportunity.

The goal of near-ubiquitous deployment of broadband telecommunications capability is one that is easily shared. The difficulty comes in selecting the appropriate menu of actions that will work to achieve that goal. Some states like Minnesota, Missouri and Kansas choose broad collaboration and look to succeed over the long haul through incremental improvement. Others, like Vermont and Maine, have put a firm stake in the ground and are looking to accelerate the pace of change through future executive leadership and sponsorship commitments of their governors and legislators. Even states with fairly far-reaching deployments have seen residents benefit from lower prices as a result of market competition created through development of additional broadband solutions.

In all cases, it is a two-part equation: states have found that they can stimulate broadband access and adoption by creating incentives for providers (supply-side) or by creating incentives for users (demand-side). Supply-side incentives have taken the form of grants, loans, preferential tax treatment, right-of-way reform and other incentives. Demand-side incentives come in the form of education, community organization, distance learning, telemedicine or broadband-dependent economic development opportunities.

In some instances, communities have not been waiting for private sector investment strategy or state government policy to help meet development needs. Strong local leadership has helped promote broadband deployment by organizing and educating community members, building demand for high capacity telecommunications and securing the necessary resource commitments. To put it another way, some

communities have developed broadband capability because community leaders have decided that being connected is a priority worth working for and investing in.

Arizona's policymakers must decide for themselves how high of a priority their broadband deployment is, and how aggressive they will be in accelerating it. The availability of financial resources is necessary for success, but not sufficient. In order to "go far and go fast" there must also be a willingness to make success in this area a significant and visible political priority. Once the State of Arizona has decided where this issue resides in the spectrum of political priorities, a variety of options are available.

Recommendations

The following recommendations are presented as a menu of options from which Arizona's policymakers may choose. They all represent components of programs that have been successful in other states. Some can be implemented easily, while others require significant executive commitment or legislative approval.

- **Identify, encourage and promote local initiatives and preserve local government's authority to deploy broadband networks.**

Numerous small and rural communities across the nation have been able to successfully establish municipal networks through independent initiatives that provide adequate and affordable broadband infrastructure where no private sector firm is willing or able to invest. These communities' authority to do so should be preserved. In some states, large telecommunications companies have been able to persuade the legislature that municipal self-help projects create unfair competition and are an improper activity for government.

- **Hire a professional grant writer to create and coordinate broadband telecommunications grant applications.**

Millions of dollars in federal grants, loans and other incentives are available every year for state broadband deployment and development projects that require and utilize broadband. Money is being left unallocated because there are not enough viable grant applications. Many of these funding programs are focused on facilitating broadband deployment in lower-use communities. The state should hire or dedicate a professional grant writer to develop expertise and write and coordinate grant submissions on behalf of state agencies, community-based organizations and local governments.

- **Inventory broadband infrastructure and identify priority deployment areas.**

The experience of other states shows that cataloging (or mapping) broadband infrastructure accurately can be accomplished effectively if it is undertaken by a lead organization in cooperation with service providers, and if sufficient resources are allocated to sustain the effort over time. Knowing the location and characteristics of major broadband gaps is essential to implementing a flexible broadband strategy. Kentucky is able to produce an inventory of existing broadband infrastructure and service availability at a statewide and census-block level. Some of the items mapped include water towers, wireless towers, proposed sewer lines, roads and population density. The maps also plot which areas are served by municipal, local exchange carrier, cable, and wireless broadband providers. In this way, Kentucky is able to identify and select high-priority deployment areas.

- **Actively seek public-private partnership proposals to maximize existing infrastructure and public assets.**

The State of Arizona should serve as an information broker between industry and communities, helping to identify and evaluate broadband expansion opportunities. Telecommunications providers should be invited to submit proposals describing ideas for

extending broadband capability to unserved or underserved areas if all state, county and local public assets (from facilities to land, towers, poles, buildings, etc) were made available. In addition, providers should indicate what type of structured agreement they will use: in exchange for access to those assets (they could lease, barter, or come up with another agreement). Such proposals may identify creative, competitively neutral solutions for extending broadband connectivity across multiple jurisdictions that are currently cost prohibitive due to a lack of political coordination or affordable access through traditional rights-of-way processes.

- **Streamline regulation and fee structures for access to public rights-of-way either through executive order or legislation.**

Consistent procedures for identifying and assessing the cost associated with using publicly held right-of-way is a common success factor among states leading in broadband deployment. Michigan and Vermont have comprehensive legislatively-mandated programs covering both middle and last-mile infrastructure that provide a high degree of uniformity and certainty in the permitting process, access fee structure and regulatory treatment of right-of-way users. The Governor of California has reformed middle-mile right-of-way access through an executive order.

- **Create a broadband deployment coordinating authority or nonprofit corporation with the ability to fund and manage specific projects.**

The states that have had the greatest success developing broadband telecommunications capability in rural and underserved areas have created a Broadband Development Authority or public-private nonprofit able to establish consistent policy, legally implement a funding structure and centrally administer appropriations, grants, loans and donations. Models for the authority structure are available from states like Maine, Maryland, Vermont and Michigan. Kentucky and North Carolina offer examples of a statewide public-private partnership approach. Either model can be vested with the legal authority to stimulate investment in advanced communications technology infrastructure in unserved or underserved areas of the state.

- **Establish a statewide broadband "Champion."**

If state leaders determine that the time is not right to create a formal authority or nonprofit coordinating entity, a "broadband champion" should be identified. The champion could be a local or state leader, or could be a group of people such as a task force. Several states taking a slower, more incremental approach have adopted a task force structure to look for and champion infrastructure expansion activities. In most cases, a senior ranking elected official or governor's appointee oversees efforts and serves as Chair.

Definitions

Minimum Broadband Capability

The Council on Innovation and Technology definition of minimum broadband for Arizona of 1Mbps is appropriate, falling between the Federal definition used by most states and the most aggressive 100 Mbit/s adopted by the most aggressive states.

The FCC definition of broadband is 200 Kbit/s (0.2 Mbit/s) in one direction, and advanced broadband is at least 200 Kbit/s in both directions. The Organization for Economic Cooperation and Development (OECD) has defined broadband as 256 Kbit/s in at least one direction. This bit rate is the most common baseline that is marketed as "broadband" around the world.[98]

However, the National Academy of Sciences defines broadband as an access service that enables the creation of applications and content. By this definition, broadband is not a fixed transmission speed. It is the capacity to use existing applications and create new ones. Thus, 1.5 Mbps (megabits per second or million bits per second) downstream and 256 kbps upstream may be considered broadband today, since it meets most people's demand for Internet services. In a few years, the downstream capacity demanded may be much higher to accommodate, for example, video-on-demand. The demand for upstream capacity will increase if more peer-to-peer networking applications are developed.[99]

Under-Served Communities

Michigan defined under-served areas as "geographical areas of this state identified by the MBDA as having the greatest need for broadband development. Economic conditions, including, but not limited to, family income, affordability of access, lack of options available, low percentage of residents subscribing," and any other criteria considered important by the authority.[100]

Maine is still engaged in the rulemaking process of creating definitions, but the enabling legislation for the Broadband Authority gives this guidance: "The authority shall establish criteria that ensure that an area is not determined to be an unserved or under-served area if the effect of that determination would inhibit or impede private investment in any area or diminish the value of prior investment in advanced communications technology infrastructure within any area." Criteria established by the authority must include but are not limited to whether investment is planned in an area within a reasonable time.[101]

Eligible Entities and Activities

Eligible entities and activities vary by state and by program. There is a split between how eligibility for government-provided networks is defined, as opposed to more general eligibility to broadband service provided by a broadband authority or organization like *ConnectKentucky*.[102]

Eligibility for access to networks in states such as Colorado, Washington and Maryland is limited to governmental and quasi-governmental organizations. Networks in Kansas, Missouri and California are restricted to education. Eligibility for access to networks created as part of *ConnectME*[103], ConnectKentucky or e-NC is open to all residents and business of the state.

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[86] http://www.gomoorhead.com/index.asp
[87] https://fiber.chelanpud.org/euedu/
[88] http://www.forcvec.com/bplcoop/index.html
[89] "FCC Endorses Broadband over Power Lines," *InfoWorld*, August 4, 2006. By John Blau. http://www.infoworld.com/article/06/08/04/HNfccendorsespowerline_1.html
[90] See the "Wireless Philadelphia Business Plan" for more information at http://www.wirelessphiladelphia.org/pdfs/Wireless_Phila_Business_Plan_.pdf

[91] See the "Vision Statement" for the Tribal Digital Village at http://tribaldigitalvillage.org/vision/VisionStatement.pdf, and for additional information, see the *California Broadband Report* at http://www.cpuc.ca.gov/static/telco/reports/california+broadband+report+for+sept+2006+cetf+meeting.pdf

[92] For general information on the council, see http://www.gcit.az.gov/. For more information on the recommendations, see the "Progress Report" from Dec. 2006 at http://www.gcit.az.gov/Documents/ProgressReport121806Rev.pdf.
[93] http://www.azleg.state.az.us/const/9/7.htm
[94] Arizona Revised Statutes §41-1505.05 et seq
[95] See the Executive Initiatives for more information at http://azgovernor.gov/dms/upload/NR_011207_FY08ExecutiveInitiatives.pdf.
[96] http://www.commerce.state.az.us/BusAsst/CEDC/
[97] From *Telework 360* by the Center for Digital Government. Available for download at www.centerdigitalgov.com/publications
[98] See "broadband Internet access" in wikipedia at http://en.wikipedia.org/wiki/Broadband_Internet_access.
[99] http://books.nap.edu/html/broadband/ch2.html
[100] http://www.cis.state.mi.us/mpsc/comm/broadband/mcl_act_49_of_2002.pdf
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[103] http://www.maine.gov/connectme/