



**Report of Findings:
Wyoming Broadband Interviews**

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Overview

The State of Wyoming's Office of the Chief Information Officer (CIO) selected the LinkAMERICA Alliance¹ to apply for and administer a statewide Broadband Mapping and Planning Grant from the National Telecommunications and Information Agency (NTIA).² The Wyoming grant was awarded in November 2009 – please see Appendix A for a summary.

This grant supports a comprehensive mapping and planning project and includes:

- An assessment of the current availability, adoption and use of broadband communications infrastructure throughout the state;
- The development of specific strategies to fill current gaps in broadband access; and
- The development of a “business plan” to expand the adoption of deployed broadband and expedite the achievement of priority goals.

As an initial step in this process, a team of LinkAMERICA Alliance³ researchers designed and implemented a series of 26 individual interviews to support the “planning” aspect of this project that focuses on the areas of education, health care, economic opportunity, energy management, environmental quality, governmental effectiveness, civic engagement and public safety, as well as improving the quality of life.

Purpose of Report

This report presents the findings from interviews with 26 key stakeholders from around Wyoming. These results lay the groundwork for a series of regional planning efforts designed to increase the availability and adoption of broadband throughout the state.⁴ The report will be used to frame two subsequent data collection efforts: 1) a consumer survey investigating broadband usage, and 2) an interactive movie/survey designed to raise awareness and to identify region-specific priorities for broadband. Together, these research findings will be combined with the outcomes of the mapping process and applied into strategic actions by regional planning teams.

Context of Report

It is important to emphasize that the findings presented here reflect the diverse perspectives of the interviewees. The findings are not intended to be statements of

¹ -----The fiscal sponsor for the LinkAMERICA Alliance is the Puget Sound Center for Teaching, Learning and Technology.

² -----<http://www.ntia.doc.gov/>

³ -----<http://www.linkamericaalliance.com/>

⁴ -----Appendix B provides an overview of the planning steps.

consensus. Rather, this report represents a broad perspective on what is considered by the 26 people interviewed as both possible and desirable for the future of broadband deployment and adoption in Wyoming as it unfolds over the next five years.

Development of Findings

The group of interviewees was chosen as representative stakeholders because they are engaged in various aspects of broadband development in Wyoming. Interviewees were selected from all regions of the state. The interview process was designed to investigate the different stakeholder perspectives for Wyoming's broadband development and use.

Additionally, they provided examples of resources that could be drawn upon to improve broadband development and suggested actions that need to occur to make this possible.

Below is list of these stakeholder perspectives:

- Education (5)
 - K-12
 - Higher Education
 - Libraries
 - Public Television
- Health Care (3)
 - Medical Center
 - Data Network
 - Research
- Economic Development (7)
 - Statewide Association
 - Government
 - Training & Asset Building
- Telecommunications Providers (2)
- State and Local Governments (7)
 - Technology Leadership
 - Transportation
 - Policy, Law and Regulation
 - Public Safety
- Community-Based Organizations & Non-profits (2)
 - Association
 - Foundation

Wyoming's Broadband Readiness

Interviewees provided detailed information about the barriers and opportunities for broadband development in Wyoming. Some factors that influence availability and build-out of broadband include the low population of Wyoming, the state's rural nature, fiscal conservativeness and a lack of awareness about the potential benefits of broadband to the state. Most of the population lives near the state borders, so people tend to leave the state for some services.

Detailed in this section are findings relevant to broadband infrastructure and adoption in Wyoming. Assets and barriers for each are discussed.

Broadband Infrastructure

Broadband infrastructure availability tends to mirror the population base in Wyoming. Given that Wyoming is a highly rural and low population state, some communities find themselves in a broadband gap. Below are some assets and barriers related to Wyoming's broadband infrastructure.

Assets

Wyoming has some existing high-capacity fiber and network infrastructure on which to build, including the Wyoming Education Network (WEN) and WyoLink. The WEN connects 130 high schools and community colleges with high-speed broadband and provides video conferencing capabilities to the schools. WyoLink is a 57-site trunk network that operates on VHF for public safety, school buses and public works communications. Wyoming has a large microwave tower network that is used for public safety communications. There is the opportunity for other entities (in addition to the fire, law and medical agencies) to leverage public safety spectrum as long as they are included in emergency response or support plans, and incidental use does not interfere with emergency and safety needs. In addition to government networks, Wyoming has many broadband Internet service providers.

The availability of broadband infrastructure is relatively high in many communities including Cheyenne, Casper, Sheridan, Gillette, Ten Sleep, the Big Horn Basin, and Powell. For example, Casper has a wi-max system, and Gillette has a fiber ring through the whole community and is putting in a municipal wi-max system using some of their mineral severance revenue. These cities have higher broadband resources due to a higher population, municipalities' use of mineral revenues to fund infrastructure investment, or other innovative funding models. Rural telecoms, such as Dubois Telephone Exchange (DTE), Silverstar, Range Telephone, RT Communications, AllWest and TCT have been instrumental in building out rural broadband and fiber transport infrastructure. In areas where broadband is available, the uptake rate is high. In TCT's area, they have universal

broadband at a high penetration rate with an uptake rate higher than the nationwide average. There is some hope that connectivity will improve in underserved Qwest areas due to CenturyTel's acquisition of Qwest. University grant funding through a Federal Communications Commission (FCC) pilot program will improve broadband connectivity for health care in rural areas over the next year and a half.

The University of Wyoming is a heavy user of video conferencing and distance learning resources. They have 50 video conferencing sites in 24 communities across the state. Wyoming has a 2-way digital microwave system that connects every community college to the University of Wyoming. Through the Wyoming PBS system, there are 40 digital translators that reach homes in the state.

Other strategic assets that Wyoming can leverage to support communication include the Wyoming Department of Transportation (WYDOT) public-safety digital microwave system that operates at 6GHz frequency, dark fiber parallel to I-80 in the southern part of the state, 109 videoconferencing units on the Wyoming Video Conferencing System/agency data network, and Wyoming public radio transmitters (26 locations). The National Center for Atmospheric Research (NCAR) supercomputer project also lit up dark fiber between Laramie and Cheyenne.

Barriers

Rate structures both incent and discourage investment in Wyoming. Rate of return carriers have more of an incentive to invest. It is hard to draw major telecom companies to provide service in Wyoming due to the low population base, distance between towns and the rural nature of the state. Telecom investment is limited due to perceived low rates of return on investment. Lack of broadband availability is a barrier to economic development and attracting businesses and residents to the state. Lack of fiber route diversity (often referred to as redundancy) is a critical issue for key users of broadband, such as technology-dependent businesses, hospitals and clinics, education and law enforcement.

In addition, Wyoming lacks an adequate mobile broadband network infrastructure (cellular phone/smart phone coverage), which is a detriment to the travel and tourism industry, a drawback for business and economic development, and a danger to public safety. For example, several public safety agencies have high-tech data terminals in their vehicles; however, mobile broadband coverage is limited and does not permit consistent use over their entire operating area. Reasons cited for underdevelopment of the cellular tower infrastructure include the expense of building towers, public and environmental resistance to them, and difficulty in obtaining leases to raise towers on public lands, such as forest service properties. Also, WyoLink public safety radio infrastructure only allows very low speed data communications, at less than 9.6Kbps, which is limiting for data terminal use compared to broadband.

Establishing connectivity on tribal lands is challenging because the Bureau of Indian Affairs (BIA) still has fiduciary trust over tribal lands and rights of way. Even if a tribe wants to start up a communications company, they still have to go through the same right-of-way process that any other company would.

Most telecoms and some legislators do not want the public sector investing in broadband infrastructure; simultaneously, many people cite politics, competition and pricing concerns as key barriers to broadband growth. Federal legislation and initiatives driven by the FCC's National Broadband Plan may influence availability of support for broadband investment. Smaller telecoms fear that changes to the Universal Service Fund (USF) may negatively impact them and discourage their investment in rural connectivity. Rural telecom companies rely to an extent on USF and low-interest loans from RUS, CoBank, RTFC and others to expand and build their networks. The proposed federal broadband speed definition may influence access to USF support in the future. One megabyte up and four megabytes down is the proposed new standard, and if an area has that capacity, USF funds cannot be used to upgrade them beyond that standard. The National Broadband Plan may lead to the elimination of the rate of return regulation and a change to incentive-based regulation price caps. Some believe this will limit companies' ability to make profit on their investments. Incentive-based regulation encourages companies to keep costs low and prices capped, which can lead to less new construction and poorer maintenance in rural areas.

Broadband Adoption

Wyoming's broader population in 2010 is just beginning to understand the application, implication and possibilities for using broadband. Following are some of the assets and barriers that promote and discourage adoption.

Assets

Wyoming has some strong examples of how broadband can be leveraged to support economic development in Wyoming. Eleutian, based in Ten Sleep, leverages broadband to teach English language skills to Koreans. They employ hundreds of teachers, contributing to Wyoming's economy. Availability of broadband promotes small business development and entrepreneurship; for example, a rural Wyoming company uses broadband to search the U.S. market for the best deals on medical technology supplies to sell to hospitals.

Organizations, such as the Wyoming Business Council, can assist businesses with accessing and adopting broadband. Many rural telecoms are very service oriented and support their consumers greatly in adopting and using technology.

Education entities, including K-12, community colleges and universities, are broadband access points. The community colleges and University of Wyoming have long-standing

distance education programs that offer online and video courses, and full degree and certificate programs. There are some K-12 online-learning programs available in Wyoming; for example Fort Washakie High School provides a virtual eLearning academy. Some schools offer students computers to use at home, which increases home computer access rates and opportunities to use technology for learning at home.

Other forces driving demand for broadband include consumer entertainment, the push to make more government and education information available online, and continued technological innovation. Generational issues around broadband interest will naturally transition as people grow older. Younger populations desire broadband availability for all aspects of daily life.

Health-related organizations such as Wyoming Health Information Organization (WyHIO) can help hospitals and clinics adopt medical technologies such as electronic medical records (EMRs).

Many local and statewide organizations and education institutions have identified broadband as an important tool for economic development, education and competitiveness. These organizations have strong relationships with their constituents and can assist in increasing awareness, advocating for access and encouraging adoption of broadband. Overall, the interest in broadband access and adoption in Wyoming seems to be increasing.

Barriers

Some barriers that deter adoption of broadband include:

- A lack of awareness of broadband technology benefits.
- Lack of computing or broadband access.
- Lack of technology skills and training.
- Cost of access and technology.
- Lack of bandwidth to support high-quality video or data transfer.
- Lack of redundant broadband.
- Social and cultural barriers.

Additional barriers to adopting broadband supported applications include:

- The licensing costs and restrictions of proprietary online learning systems.
- The presence of multiple non-compatible video conferencing platforms.
- Inadequate training and technical support.

In the health care field, the expense and training associated with adopting new technologies is a barrier. Older practitioners are reluctant to adopt EMRs, and too many competing EMR systems and skepticism about the viability and longevity of the technologies influence adoption.

Priorities for Broadband Use

In March 2010, the Federal Communications Commission (FCC) released the National Broadband Plan that emphasizes the importance of broadband access, adoption and use to achieve priorities in education, health care, economic opportunity, energy efficiency, environmental quality, government performance, civic participation and public safety. These categories are used below to organize the priorities for Wyoming, as described by the interviewees, for broadband adoption and use over the next five years. The thematic category of “quality of life” has been added to this report.

Several overall factors influence Wyoming’s priorities for broadband use, including:

- The need to diversify the industry base to become less vulnerable to the boom-and-bust cycles of the energy industry.
- The need to attract and retain workers and businesses to the state.
- An aging and diminishing population.
- A fiscally-conservative economic and political environment.

Education

Wyoming can leverage broadband technology to improve quality of and access to education. The University of Wyoming is already using broadband technology for distance education services and video conferencing, which could be used more widely across Wyoming. These services can help maintain and expand access to high quality educational opportunities available to learners in K-12, as well as post-secondary systems.

The funding model for education and technology needs to be restructured to support evolving opportunities, such as distance learning (currently built on a “bricks and mortar” model). Additional resources for technology training and technical support are required to improve technology adoption rates, particularly for teachers and adults. Additional education opportunities include:

- Leveraging University of Wyoming’s expertise to expand distance learning opportunities to K-12, community colleges and workforce development.
- Developing distance learning resources specifically for Wyoming’s health care workforce.
- Mobile broadband connectivity on school buses could enable students and athletes to do homework during travel time to school and sporting events.
- Leveraging library public computing capability to support online learning needs.

Health Care

Wyoming has a shortage of health care workers and an increasing need for services due to an aging population. Out-of-state health care providers displace local efforts and decrease income for the state. According to one interviewee, \$100 million a year is being lost out-of-state in outpatient fees. There is a perception that out-of-state health care is either better and/or that the care is not available in Wyoming. Low population density deters the establishment of hospitals and medical centers in Wyoming, and many places have no access to emergency services or the infrastructure to support them. Use of telemedicine could improve access to medical care, particularly specialty care and mental health care. Other interview data point to a need for the following broadband-related considerations:

- Health care is moving from being local or regional and toward having "centers of excellence" where medical specialties are concentrated.
- There is an increasing shortage in Wyoming of some specialties, especially in mental health--every county is a federally-designated mental health care shortage area.
- Access to health care is a major consideration for business and industry who are considering locating in Wyoming.
- Greater residential broadband access could promote and encourage home health monitoring.
- There are federal incentives to adopt electronic medical records.

Energy and Environment

Wyoming is dependent on the energy industry for most of its revenue and employment. Most interviewees stated that Wyoming needs to diversify its industry base to protect against fluctuations in the industry and invest in growing a diversified economy. Municipalities like Gillette have channeled mineral revenues into broadband infrastructure investments.

Wyoming's great natural resources and parks attract visitors to the state. A focus for Wyoming is balancing development of natural resources with recreation, farming and ranching. Wind energy production is increasing rapidly as is the pace for oil and gas development, but Wyoming's capacity to transmit power is limited in part due to community resistance to adding additional power lines. Smart grid technology could help better manage the electric utilities infrastructure investment and enable use of more intelligent energy-saving appliances. Another consideration is that large portions of Wyoming's national forests could be destroyed by the bark beetle over the next five years, which will negatively affect the tourism industry and impact quality of life. Additional issues and opportunities related to broadband for this area include:

- Leases are slowing through the Bureau of Land Management (BLM) for oil and gas exploration. The energy industry is laying off workforce because they are anticipating a lower rate of growth than in the past. This affects the workforce of industries that service the energy industry as well.
- Oil and gas has demand for high bandwidth. They may be in a position to invest in higher bandwidth to meet their needs, but the boom-and-bust cycles make people reluctant to make long-term investment.
- The electric utilities infrastructure is probably the most expensive infrastructure in Wyoming. It is a struggle to manage that investment, in part due to regulatory uncertainty.

Public Safety

Residents of Wyoming value public safety, but many places in Wyoming have delayed access to emergency services and limited broadband infrastructure to support those services. Wyoming's WyoLink network enables public safety communication, but additional investment is needed to leverage advancements in technology and support transmission of data. Below are several comments related to public safety communications:

- It is highly desirable to enable seamless, interoperable transmission of data across public safety networks and improve availability of mobile broadband on all major highway corridors.
- Secure, strong communication systems should be built to withstand technology changes and large-scale disasters.
- Wyoming doesn't have a lot of security threats to data storage due to their remoteness and a low threat from natural disasters and terrorism.
- Transportation communication could be transmitted directly to vehicles using Intellidrive (SM) to provide advance warnings of safety hazards.

Government Performance and Citizen Engagement

Investment in broadband could save the Wyoming travel costs, create efficiencies and improve access to government. There is optimism that the Governor's Task Force on Distance Education, Video Conferencing, and IP-Based Communications recommendations will lead to greater use and availability of video conferencing resources, which will reduce costs and improve efficiencies among government and education sectors.

The upcoming election of a new governor could negatively influence ongoing broadband projects. There is hope that whoever is elected will believe ongoing technology and

broadband initiatives are important to maintain. Some training and awareness-building will be needed to support broadband adoption by both government and citizens.

Following are some examples of priorities for broadband use for government and citizen engagement:

- Video conferencing technologies can be leveraged for statewide communication and reduce travel costs.
- Citizens could participate in legislative hearings remotely and increase their engagement with the political process.
- Government could use "desk-to-desk" video conferencing capacity throughout its offices, departments and conference centers to reduce travel costs and increase government performance.

Economic Opportunity

Almost all interviewees emphasized the need to diversify Wyoming's economy to reduce the impacts of boom-and-bust cycles. Historically, Wyoming's employment rates have been tied to the price of natural gas and oil. In some areas, leases are slowing for oil and gas exploration causing reductions in workforce both in the energy and service industries. Reductions in mineral revenues will cause a reduction in state, city and library budgets.

Telecommunications, broadband speed and availability, and access to health care are key factors for businesses considering locating in Wyoming. Increasingly, organizations need redundant broadband to maximize productivity and protect mission-critical operations in areas like finance, data processing, health care and public safety. Several people stated, "Broadband is becoming an essential utility similar to electricity."

Below are some ideas related to economic opportunity provided by interviewees:

- Wyoming's success in attracting the National Center for Atmospheric Research (NCAR) to the state sends a message to industry leaders outside the state that Wyoming should be seriously considered as a potential site for business development and/or relocation potential. It is anticipated that tertiary businesses will emerge as a result of NCAR's locating in Wyoming.
- The Wyoming Business Council and other economic development-focused organizations can play a key role in diversifying Wyoming's economic base through coordinated efforts and the resources they can provide, such as the Business Ready Communities (BRC) Grant & Loan Program.
- Wyoming has an initiative to attract data centers to the state. Improving broadband access and fiber route diversity could significantly improve this effort.

- If mobile broadband connectivity was improved, the travel and tourism industry could provide information about visitor opportunities graphically to the traveling public's smart phones.
- Broadband access could breathe life into struggling communities, providing them with economic opportunities and helping them retain both their youth and adult populations.

Quality of Life

The people of Wyoming want to preserve their quality of life, which is closely tied to the landscape, natural resources and recreation activities. They have an independent spirit, are motivated by a sense of tradition that maintains a western heritage, and value longstanding relationships and in-person interaction. There is a general distrust of government and outsiders, and some people in rural areas do not want to see their communities grow. The state does not levy personal or corporate income tax. There is an interest in protecting Wyoming's environmental resources for tourism, recreation and future generations.

Below are examples of how expanding broadband access and adoption can benefit quality of life:

- Broadband could increase access to education, health care, and business opportunities that can help retain populations in rural areas.
- Workforce training can increase access to better job skills and work opportunities.
- Distance education and online health networks can increase access to educational resources and health services.
- Video conferencing can reduce the time, risk and expense of travel.

Resources for Action

Wyoming has many strong assets available to support efforts to increase the deployment and adoption of broadband. These assets are found in the state's government, local public agencies, education institutions, health care organizations, businesses and community-based organizations.

Below are four general types of resources identified that Wyoming could draw upon to improve broadband access and adoption in Wyoming.

Economic Resources

Energy extraction and natural resources are a large revenue source for the state of Wyoming and its municipalities. Wyoming has a low cost for doing business. They have no corporate income tax, and Wyoming's low electricity costs make it attractive for high-energy consumption businesses. The success of attracting NCAR to the state brings credibility to Wyoming and will attract partnerships with other states⁵ and other technology-related businesses. Additional advantageous resources follow:

- The University of Wyoming's Technology Business Center incubates businesses and could attract additional businesses to the state.
- Wyoming's excellent transportation network of highways and railroads make the state well-suited for transportation and distribution of goods.
- There is an extensive and growing fiber optic transport network all over the state, with multistate access.
- The Wyoming Legislature implemented programs that lowered the cost of broadband access and power consumption during the initial startups of data centers. A similar model could be used for other projects.
- Sheridan is developing a high-technology business park, which will include a data center by 2011.

Effective Leadership

Leadership capacity for broadband development exists at many levels throughout the state. Interviewees expressed a need for statewide vision, coordination and support, and suggested that local leadership and advocacy is important to move forward decision-

⁵ --- South Dakota State Network has expressed interest in access to NCAR.

making. The Governor understands the importance of broadband for business development and could provide vision and leadership for this effort.

- The Wyoming Business Council and the Wyoming Association of Municipalities could provide broadband leadership and related training as part of their mission to build capacity in communities.
- Organizations, such as the Wyoming Economic Development Association, Wyoming Association of Municipalities, Wyoming Telecommunications Association and Wyoming Travel & Tourism, could provide leadership for broadband as part of their effort to promote economic diversification and enhanced communication in the state. Wyoming County Commissioners Association could assist as well.
- The Public Safety Communications Commission could recommend and support better broadband for public safety purposes.
- Some local communities are already engaged in efforts to expand broadband connectivity through public/private partnerships.

Education Resources

The Wyoming Education Network (WEN), which connects 130 high schools and community colleges with high-speed broadband, was frequently cited as an important asset for education in the state. Some people felt this network could be leveraged to benefit more people. The Wyoming public libraries and public television provide access to information for citizens across the state. The need to access the Internet drives people into libraries for those without home access. Additional education resources include the following:

- The Governor's Task Force on Distance Education, Video Conferencing, and IP-Based Communications examined the capacity for distance education and videoconferencing. The recommendation was made to fund the Wyoming Distance Learning Center (DLC), which will support distance learning at all levels and types: K-12, community college, university, professional development, training, lifelong learning. The Wyoming DLC will provide support for development and implementation of distance learning opportunities, but it will not offer courses. The Center will be a clearinghouse for information about good practices in distance learning and also a distance learning research center. The Center will be administratively located on the University of Wyoming campus, but designed to serve the entire state.
- The University of Wyoming is well-versed and advanced in terms of investing and utilizing broadband technology for distance education services and

videoconferencing. Among state leaders, there appears to be awareness of the benefits of videoconferencing. The recommendations of the video conferencing taskforce (released in December 2009) will be a resource moving forward.

- Hathaway Scholarship Programs exist that encourage student excellence and provide opportunities for Wyoming students, both for traditional, degree-seeking in-state students, as well as for those returning to the state for advanced degrees.
- Wyoming has high-quality public schools.
- Both public schools and libraries provide public computing access, although use of school computers is typically reserved for students. Schools could extend school library hours so that people have access to computers on weekends, evenings and summer, which would help address the digital divide.
- Expand programs such as Fremont County's Board of Cooperative Education Services (BOCES) Cyber Café, a public computing center.
- Wyoming has 79 library service outlets through their county-based library system. These outlets could be leveraged to expand broadband access and training to low-income residents.
- Wyoming has seven community colleges that are independent from the University of Wyoming. These institutions are involved in workforce development efforts; however, more coordination and focused programs among these colleges could strengthen Wyoming's workforce, with a particular focus on training more health care workers.

Health Care Resources

Several current health care technology efforts can be leveraged to improve health care delivery in Wyoming:

- The Wyoming Telehealth Consortium is a public/private partnership that operates a health information exchange and video conferencing.
- Wyoming Health Information Organization (WyHIO) is a non-profit health care information/education resource for the state. They have educational processes for administrators and medical personnel.
- The Quality Improvement Organization has a major federal contract to provide services across Montana and Wyoming to physicians, working jointly with WyHIO to convert them over to electronic medical record systems.

- Wyoming will receive approximately \$596,000 in federal matching funds to implement electronic health records (EHRs) to improve efficiency of Wyoming health care.
- The University of Wyoming has an FCC grant to connect 42 rural health care sites with broadband access. They are connecting most small hospitals, a few primary care clinics, and several mental health substance abuse clinics throughout the state, which will address their ability to offer and participate in telemedicine and telehealth programs.
- There are Regional Extension Centers funded by federal grants that provide electronic medical record system selection, guidance and implementation to primary care physicians.
- The University of Wyoming has a health sciences center with a strong nursing program and other health care programs. The University of Utah, University of Washington and University of Montana provide robust programs for continuing medical education in Wyoming, and Wyoming is part of WWAMI, a multi-state medical school program.⁶
- Wyoming has 14 critical access hospitals.

⁶ ----- <http://uwmedicine.washington.edu/Education/WWAMI/Pages/default.aspx>

Actions for Success

This assessment discovered a definitive preference for a coordinated effort to increase broadband in Wyoming. The following is a summary of some strategic actions Wyoming can take to improve use of and access to broadband, organized by theme:

Government

A collaborative effort (public and private) is needed to improve broadband connectivity across Wyoming. Overall, it appears that there is a desire for state leadership to coordinate and encourage investment in Wyoming's broadband development. The state could provide leadership in bringing providers and businesses together to determine forward looking strategies.

Most interviewees indicated that some kind of state leadership, incentives or investment is necessary to encourage infrastructure build-out in Wyoming. Public/private partnerships could be established to improve broadband availability, and laws may need to be changed to support these kinds of partnerships. Revenue from mineral resources could be leveraged to improve broadband infrastructure.

Several people suggested Wyoming's network could be structured so that the state puts in network assets initially with the objective to turn it over to telecom providers to manage once it is built. A similar approach taken in Alaska was cited as a good model. They gave private enterprise the opportunity to build networks, and if they didn't, the state made the investment.

But interviewees had conflicting perspectives regarding state involvement in Wyoming broadband projects. Some business leaders and legislators said the state needs to stay out of the private realm and let the market drive investment. However, experience has shown that in some rural and sparsely populated areas, private entities are unwilling to invest; in these cases, many interviewees suggested that the state needs to step in, invest and encourage collaboration for the public good to improve broadband availability. Some interviewees suggested an anchor tenant approach, like with NCAR, where the state identifies projects in key development areas, which could ensure that lighting up dark fiber would be a worthwhile investment.

State government leadership could define, promote and support a comprehensive vision for broadband development. This vision could include:

- Direction for administrative, legislative and regulatory agendas.
- Expectations for education, workforce, economic and community development.

- Encouragement of private sector involvement; framing and improving the business case to make investments.

Specific ideas for governmental action to expand broadband access and adoption are detailed below:

- The Public Safety Communications Commission can advise the CIO's office on the broadband needs for public safety in Wyoming. Local and state taxes for health, safety and welfare are easier to pass. Local sales tax can be raised to support public safety efforts.
- Some legislative actions may be needed to promote broadband infrastructure investment, such as approving tax increment financing and establishing a method to support development and funding of public/private partnerships.
- At a federal level, state and business leaders should educate themselves about and advocate for elements of the FCC broadband plan that are most likely to promote affordable rural access and enhance public safety.
- Rural telecom interests are already working to ensure that proposed rule changes do not adversely affect rural states like Wyoming. Rural telecom providers may oppose reverse auctions and changes to the USF that are detrimental to investing in and maintaining rural broadband infrastructure. They are seeking to provide input into FCC cost model discussions so they can share the real world costs. Some recommend the following USF modification: *Increase the size of the USF fund to support operating expenses. Change the base on which revenue is collected, such as \$1/month as opposed to 15% of interstate communication bills.*

Leadership

Strong leadership is needed to build awareness about the benefits of broadband in Wyoming. An advocacy effort is needed to improve fixed and mobile broadband access in Wyoming and enable it to be competitive with other states. A coordinated effort involving education, business and health care organizations could encourage the state to invest in and provide leadership for improved broadband. Regional groups could voice and prioritize their desires and recommendations relating to regional business and economic development, community development, and workforce development. A broadband advisory group with representation from diverse stakeholders could bring all sides to the table.

Many interviewees suggested that the Wyoming Legislature needs to be convinced that broadband is a worthwhile investment. Stakeholders need to clearly communicate with

legislators the benefits broadband can bring to the state. Examples of issues mentioned by interviewees include:

- Using a broadband network and business assessment, stakeholders should engage and persuade legislative members to invest state funds into a consolidated broadband network that is used by education, health care, businesses and other interested entities.

The Wyoming Business Council could coordinate and possibly implement a broadband connectivity project. They or the state could work with companies to bundle demand and negotiate with broadband providers. Wyoming's broadband mapping effort by LinkAMERICA should help make the business case for infrastructure investment in the state. Additional interviewee recommendations for broadband planning follow:

- Efforts to engage the people of Wyoming for increasing broadband adoption should consider the following: 1) be pragmatic and not grandiose; 2) be realistic; 3) use approaches to increase stakeholder input and ownership; 4) engage local champions of the plans to travel around the region sharing the plan and spreading awareness; and 5) ensure plans include information about ways to positively change the quality of life (e.g., keeping young adults in the state). The plan should take into consideration key issues within Wyoming, such as proximity costs and centers of influence.
- New gubernatorial candidates will need to learn about the status of broadband and efforts and opportunities already in motion to improve broadband in the state. There is an expectation that newly elected state officials will perceive ongoing technology and broadband initiatives critical to Wyoming's future.

Awareness and Outreach

Interviewee data indicates that an education or awareness campaign is needed to demonstrate the importance, relevance and availability of broadband to individuals and to the state for economic competitiveness and improving the quality of life for Wyoming residents. Businesses, the general public and legislators are key targets for an awareness-building campaign that demonstrates the possibilities of broadband technologies. Schools, anchor institutions, health clinics, businesses and law enforcement could conduct open houses to demonstrate how broadband is being used. Outreach strategies could include notices in the newspapers and local publications, and announcements on radio and public television. Organizations could collect success stories to promote the benefits of new technologies. The more people that have reliable, successful experiences with new technology and broadband, the more they will spread the word, thereby increasing demand. Some training efforts will be needed to promote adoptions, as well:

- Many people will need to improve their technology skills to be able to leverage broadband. Non-profit organizations, community colleges, businesses and workforce training providers could assist in helping people gain the technology skills they need.
- Wyoming Association of Municipalities could do Internet-based training on how municipalities could leverage broadband.
- Training and outreach is needed to promote and support delivery of health care via broadband. There should be an effort to engage the medical professional societies to highlight the importance and value of medical care delivery via broadband.

There is a lack of awareness about broadband availability in some regions that may be affecting uptake rates as well. A coordinated campaign to generate awareness about availability and benefits of use could promote adoption.

Health Care

Strategic adoption of health care technologies could improve access to high quality health care in Wyoming. Following is a summary of some recommendations from interviewees:

- Wyoming could improve access to high-quality health care by developing a reciprocal licensing agreement with other states so that telemedicine and telehealth programs can cross state lines. This would enable access to care in critical shortage areas, such as mental health.
- To convince insurers to invest in supporting telehealth technologies, research data is needed to demonstrate the cost savings.
- There is a need for a governance structure that will allow the medical service providers to sustain service delivery and broadband access once the federal grants are done.
- State decisions should support the funding for electronic health records, both infrastructure and implementation, as an attractor for businesses and industries requiring good access to health care.
- Reimbursement to providers of telemedicine and telehealth services should be promoted and supported by state law, backed by the threat of the loss of licensing to provide insurance to Wyoming residents.
- The University of Wyoming or other organizations should offer a training program to help hospitals and clinics use technologies and learn how to treat patients over a distance. The training could be online.

- Appropriate statewide organizations should be re-aligned to provide technology help and basic IT services to small hospitals.
- Business models and demonstration projects should be created to study and identify areas where more revenue can be generated (and retained) by health care providers and hospitals.
- WyHIO can develop the business case for hospitals to participate in telehealth and telemedicine.
- Two-year colleges need to expand options for educational paths and degrees for health care related professions.

Energy and Public Safety

These actions and considerations could promote use of broadband for energy development and public safety:

- Smart grid technology could help manage the electric utilities infrastructure investment better. It would enable use of more intelligent energy-saving appliances.
- More power transmission lines are needed to carry power out of the state.
- Mineral extraction companies could use real-time data access via streaming broadband to monitor operations and to help mitigate impact on wildlife.
- If WyoLink towers are used for any other purposes, sharing must be implemented in such a way as to address technical concerns and prevent interference with public safety communication networks. Site sharing specification agreements must be established up front and followed.
- Wyoming could advocate at a federal level to maintain the “D Block” broadband spectrum for public safety purposes, or include it in auction with proceeds earmarked for public safety broadband improvements.
- The national emergency communication plan may determine parts of the Statewide Communications Interoperability Plan for Wyoming. The state should remain apprised of developments at the national level to ensure supportable interoperability features. The Interoperability Workgroup of the Public Safety Communications Commission should consider the issue of mobile broadband at a future meeting.
- Public safety entities should monitor how other regions use the existing 700MHz public safety broadband spectrum.

- A comprehensive statewide assessment should be conducted to determine how public safety entities currently use mobile broadband and how they could use it in the future. Data could be used to support collaboration and interoperability between entities.
- Where there is a clear public safety interest, the U.S. Forest Service should consider expediting the permits of radio towers on their federal lands.

Education

Some considerations are needed to advance K-12 and higher education opportunities in Wyoming. For Wyoming to achieve its education and workforce development goals, there will need to be innovative collaborations between public education institutions, state and local agencies, community organizations, and libraries. The technological resources needed include distance learning programs, extended video conferencing capabilities, and cloud computing. Below are specific ideas for action in education:

- The Wyoming Education Network (WEN) has the potential to improve access to teaching and educational resources statewide. Some believe the WEN bandwidth should be available for other purposes, as well; for example, after-hours usage of school computer resources for workforce development programs. Some schools need to increase their bandwidth to be able to better leverage the WEN.
- The funding model and systems that support distance learning need to be examined and modified to promote greater use. The Florida virtual school model was referenced as a possible example. The Governor's Task Force on Distance Education, Video Conferencing, and IP-Based Communications could work on this issue.
- The funding model for schools needs to keep pace with the use of technology. Funding should support infrastructure costs and technical support, not just the procurement of equipment. Schools could advocate for this change to occur during the recalibration period.
- The schools can gain great cost savings as a result of moving to cloud computing applications and technologies. For example, one school district is switching to Microsoft Live, which will save over \$200,000. They will leverage the cloud for email, collaboration tools, storage and backup. This switch, however, does increase the district's need for bandwidth.
- Increased use of video technologies in schools will require increased bandwidth.

- The Governor’s Task Force on Distance Education, Video Conferencing, and IP-Based Communications needs to come up with a better financial model for videoconferencing. It should be a state-funded operation for state needs, and businesses should be charged reasonable fees based on usage.
- The state needs to provide resources for the video conferencing enterprise. They will need to merge the WEN system with the state video conferencing network and discuss how the University of Wyoming and department of transportation get integrated into that.
- Schools could offer public computing access on weekends, evenings and summer to help address Wyoming’s digital divide.
- A satellite usage bill could remove restrictions in 18 of 23 counties from receiving Wyoming PBS.
- Wyoming PBS could partner with libraries to promote literacy programs for families to get people into libraries.
- With legislative oversight, prompting and incentives, broadband companies could reserve space for educational entities like Wyoming PBS and other distance education content. Wyoming PBS could negotiate agreements with broadband providers to carry the station.

Economic Development

There was an overall concern among interviewees that Wyoming is too dependent on energy and mineral resources. Many interviewees recommended that the state leverage mineral revenues to encourage investment in broadband for economic diversification.

- The extension of fiber through Togwotee Pass would increase western Wyoming's ability to attract businesses, including data centers. It would also provide diverse network routes (redundancy) for larger businesses and agencies on both sides of the Continental Divide.
- The governor should push the state to develop technology businesses in the state.
- The Wyoming Association of Municipalities could increase their involvement in economic development related projects.
- Wyoming Economic Development Association (WEDA) could assess level of broadband awareness among their members and determine interest in an effort to improve broadband access and adoption.

Infrastructure

Following are some infrastructure recommendations from interviewees:

- Wyoming needs models for solutions and partnerships from other states to guide plans to improve public and private infrastructure. Information is needed about how to encourage infrastructure investment.
- There is a need to aggregate demand to make the “business” case for broadband infrastructure investment.
- State and Federal Governments should provide dollars for “big pipe” connectivity to local communities, encouraging local wireless companies step in for the “last mile.” Wyoming needs more last mile implementation for students and businesses to access high-speed Internet.
- Leadership should examine how existing networks, such as WEN can be used to increase broadband access for others.
- There needs to be discussions about sharing networks and establishing partnerships to promote redundancy.
- There will need to be future conversations and negotiations between the mineral industry, municipalities and state government around usage and communications between networks.
- Wyoming needs to figure out a way to increase mobile broadband coverage in the state. This need is expressed by businesses, public safety and tourism stakeholders.
- Wireless companies want more fiber backbone to serve their primary tower sites.
- Utilities licensing concerns can impede fiber build out. It is important to have a well thought-out strategy for licensing of underground work near highways to ensure future access for infrastructure deployment is not impeded.
- Communities through which non-terminating fiber routes run are interested in accessing that resource; examples include Kemmerer and Diamondville.

Appendix A: NTIA Grant Summary

Wyoming Broadband Data and Development Grant Program

LinkAMERICA/Puget Sound Center for Teaching, Learning and Technology⁷

Designated entity on behalf of the State of Wyoming

LinkAMERICA/PSCTLT is the designated entity for the State of Wyoming to apply for grant funding through the NTIA's State Broadband Data and Development Grant Program. CostQuest Associates, the lead mapping entity for LinkAMERICA/PSCTLT, conducted a successful previous mapping project for the State of Wyoming. The State of Wyoming's previous broadband mapping initiative was a landmark study that helped shape the federal broadband mapping program and other federal broadband analysis initiatives. LinkAMERICA/PSCTLT and the State of Wyoming will build on previous efforts, conducting broadband mapping and developing a sustainable plan for increasing access to and use of broadband across Wyoming.

Budget Summary

The proposal called for a two-year total federal grant of \$1,792,805, of which \$1,293,968 is allocated for mapping and \$498,837 for broadband planning purposes. Wyoming and the LinkAMERICA/PSCTLT have committed matching funds and in-kind services valued at more than \$358,561. Items contributed to meet this requirement include existing statewide maps and GIS data, as well as salaries and benefits for state employees working on the project.

Mapping Summary

Previous projects conducted by LinkAMERICA and the State of Wyoming resulted in initial maps of broadband access throughout Wyoming, including an economic model showing costs to deploy services in unserved areas. With the maps and prior studies serving as a foundation, the LinkAMERICA/PSCTLT team will work to develop a new interactive map with more complete and current information obtained from multiple sources. Sources will include, but are not limited to:

- Broadband provider surveys and data requests.
- Objective third-party data sources.
- End-user surveys and web research.

⁷ -----The Puget Sound Center for Teaching, Learning and Technology is undergoing a renaming process. Its new name is The EdLab Group (<http://www.edlabgroup.org>).

Final output of the project will be an online statewide interactive map showing served and unserved (or underserved) areas throughout the state and the type of access provided (i.e. wireless, cable, DSL). Maps will be made available to the general public, broadband providers, policy makers and the NTIA via a public website. Additional programs included in the mapping budget will also help broadband providers apply for future infrastructure grant funding, leading to a more rapid build-out of broadband capacity across the state.

Planning Summary

The planning portion of the project is designed to identify key factors that will drive the adoption and sustainable use for broadband in Wyoming. The planning work for Wyoming includes the design and implementation of a statewide collection and analysis of relevant planning data, development and implementation of regional planning teams, and on-going coordination with broadband mapping project components. Data collection activities include a series of structured site visits, regional forums and workgroup meetings. Planning activities will include 1) assessment and integration of available planning data, 2) development support of demand side data for anchor institutions, 3) facilitation of regional actions, and 4) on-going support of broadband planning teams.

About LinkAMERICA/PSCTLT

LinkAMERICA/PSCTLT was chosen to manage and execute this project because of their successful deployment of prior mapping efforts for the State of Wyoming, for their experience and technical expertise in broadband mapping, and experience in managing federal and state contracts. The PSCTLT is a nationally-recognized, private, non-profit organization supported by federal and state governments, private foundations, corporations, and individuals. LinkAMERICA is a partnership of experts in geospatial, economic and network modeling; developing demand-side strategy formation in telecommunications and telehealth sectors; engineering and GIS mapping conversion; and business development strategies (<http://www.linkamericaalliance.com>). The PSCTLT serves as LinkAMERICA's fiscal sponsor and is a national leader in innovative technology adoption solutions for education, workforce and community development.

Conduct Initial Series of Regional Planning Meetings – Each Regional Team will meet during the Fourth Quarter of 2010 with the goal of producing an initial draft of a regional broadband development plan.

Release Regional Plans – By mid-December, each regional planning team will release an initial draft of their broadband development plan. During the first half of 2011, these plans will be further developed into fundable and actionable business plans.

Appendix C: What is Broadband?

Broadband is an always-on, high-speed connection to the Internet. Broadband makes it possible to have instant two-way exchange of data, video, audio, voice and text communications. Broadband is delivered to consumers in a number of ways, including over telephone lines, cable, fixed wireless, mobile wireless, over power lines and by satellite. The LinkWYOMING initiative will map the availability of broadband across the state.

All Internet services identified on the maps will meet the minimum Federal Communications Commission (FCC) definition for broadband service – 768kbps download speed. A number of engineering and usage variables impact the actual speeds required for applications, such as photo sharing, streaming audio/video, online gaming, distance education, telework, telehealth and other bandwidth intensive applications. However, the following provide general guidelines for broadband speed tiers and capabilities that are enabled within each tier:

- 768kbps – 1.5mbps: generally considered sufficient for basic Internet applications, including email, light web surfing, sharing of lower resolution pictures, etc. The FCC definition of broadband ‘starts at’ 768kbps. Speeds below this level are not considered broadband in today’s marketplace.
- 1.5mbps – 3.0mbps: generally considered a quality broadband service speed range. Enables a more robust web surfing experience (few noticeable delays), the sharing of larger files (in a timely fashion), and reasonable quality Internet Protocol television (IPTV) and streaming audio/video.
- 3.0mbps – 6.0mbps: generally considered a strong broadband service speed range in today’s market. May only be available via technologies such as cable, fiber and the latest generation wireless services. Typically sufficient for good quality two-way video streaming and IPTV, large file transfers (in a timely manner), a high quality web surfing experience and online gaming.
- 6.0mbps – 10.0mbps: considered a very strong/fast service speed in today’s market. Enables commercial grade file transmission, a very robust web surfing experience, high quality video/audio streaming for education and telehealth applications, and robust online gaming.
- 10.0mbps – 25.0mbps: a very high-end consumer or commercial grade service in today’s broadband market. Provides for very high quality (high definition) streaming audio/video experience, very fast file transfer capability, multi-player gaming and other high bandwidth applications.

Appendix D: Wyoming Telecommunications Providers

360 Networks USA, Inc.
Advanced Communications Technology, Inc. (ACT)
All West Communications
Bresnan
CenturyTel
CenturyTel & Embarq
Cerrento
Contact Communications
Chugwater Telephone Company
DigitalBridge Communications Corp.
DSL.net, Inc. dba Megapath
FiberPipe (Surf Communications)
Golden West Communications
JAB Wireless, Inc. / LP Broadband
James Cable (CommuniComm)
LARIAT
Level 3 Communications, LLC
Level 3 Communications, LLC dba Broadwing
NE Colorado Cellular, Inc.
Nemont Tel. Cooperative / Project Telephone
New Edge Holding Company / New Edge Network
OneEighty Networks / OrbitCom
Qwest
Qwest Communications International, Inc.
Dubois Telephone Exchange Inc
Range Telephone Cooperative

RT Communications

Silver Star Communications

Silver Star Communications dba Columbine Telephone

Sprint

Sweetwater Cable

Tri County Telephone Association

Tri County Telephone Association dba TCT West, Inc

Union Telephone

Union Wireless

Verizon Communications Inc. Cellco (Wireless)

WERCS Communications

Windjammer Communications, LLC

Wyoming.com

Appendix E: Wyoming Broadband Proposals

Union Telephone Company

Mountain View, Wyoming

Project title: Wyoming Broadband from Union Wireless

Program: BIP/BTOP

Project type: Last Mile Remote Area

Funding Round: Round 1 - Summer 2009

Loan request: \$ 30,030,185

Status: Application Not Funded

Description: The Wyoming Broadband Project will expand the footprint of the Union Wireless network to cover all areas of Wyoming be it served, underserved or un-served with high speed wireless services. This network, will utilize the latest in 3G technology to provide speeds up to 7.2 mbps. Union Wireless will expand our network from 200 cell sites in Wyoming to over 400 cell sites in five years.

Advanced Communications Technology, Inc.

Sheridan, Wyoming

Project title: Northwest Wyoming Broadband Improvement Initiative - ACT Segment

Program: BIP

Project type: Middle Mile

Funding Round: Round 1 - Summer 2009

Grant request: \$ 2,308,034

Status: Application Not Funded

Description: This middle mile project "closes the gap" in an existing 960 mile fiber network enabling robust, redundant broadband network opportunities for 11 counties and 26 communities in Wyoming. The project constructs approximately 34 miles of fiber facilities between Togwotee Pass and Moran to connect with a partnering project proposed by Silver Star Telephone Company, Inc. connecting Jackson to Moran.

Silver Star Telephone Company, Inc.

Freedom, Wyoming

Project title: Northwest Wyoming Broadband Improvement Initiative - Silver Star Segment

Program: BIP/BTOP

Project type: Middle Mile

Funding Round: Round 1 - Summer 2009

Grant request \$ 2,820,000

Status: Application Not Funded

Description: This middle mile project "closes the gap" in an existing 960 mile fiber network enabling robust, redundant broadband network opportunities for 11 counties and 26 communities in Wyoming. The project constructs approximately 44 miles of fiber facilities between Jackson and Moran to connect with a partnering project proposed by Advanced Communications Technology connecting Moran to Togwotee Pass.

Hot Springs Greater Learning Foundation

Thermopolis, Wyoming

Project title: Big Horn Basin Technology Center

Program: BTOP

Project type: Public Computer Center

Funding Round: Round 1 - Summer 2009

Grant request: \$ 680,216

Status: Application Not Funded

Description: The technology center is the driving engine of a proposed complex to develop a creative approach to a sustainable rural economy. Central components: community/regional education, job training; e-commerce business training & services; entrepreneurial think-tank; technology applications and jobs related to statewide travel/tourism, economic development, natural sciences research, technology.

Wyoming Health Information Organization

Cheyenne, Wyoming

Project title: Wyoming Telestroke, Emergency Department Network (WyTED Net)

Program: BTOP

Project type: Sustainable Broadband Adoption

Funding Round: Round 1 - Summer 2009

Grant request: \$ 823,324

Status: Application Not Funded

Description: WyTED Net will expand an existing pilot telestroke program to all hospitals in Wyoming and provide training and technical support. This program will be based on "best practices" in stroke treatment through telehealth, and leverage telehealth resources, infrastructure, leadership and experience. Future services will be expanded to include cardiac, trauma and other clinical services.

Central Wyoming College

Riverton, Wyoming

Project title: Wyoming PBS Digital Learning Library

Program: BTOP

Project type: Sustainable Broadband Adoption

Funding Round: Round 1 - Summer 2009

Grant request: \$ 513,000

Status: Application Not Funded

Description: The Web accessible Wyoming PBS Digital Learning Library (DLL) will be developed and on-line training for in-service teachers provided. Video curriculum resources on western history, culture, natural resources and the Native American tribes in Wyoming will be added to the collection with newly produced Wyoming social studies resources for grades 4-12, including a module on tribal government.

Hot Springs Greater Learning Foundation

Thermopolis, Wyoming

Project title: Big Horn Basin Wyoming Center

Program: BTOP

Project type: Public Computer Center

Funding Round: Round 2 - Winter 2010

Grant request: \$ 4,000,000

Status: Application Received

Description: Big Horn Basin Center is an innovative multi-partner approach to sustainable economic development -- job generation, training, education, entrepreneurial innovation and social services delivery -- using a broadband technology hub. Based on five years of

planning and best practices, our "who-we-are, what-we-do, where-we-live" approach can be replicated in other regions.

Wyoming Health Information Organization (WyHIO)

Cheyenne, Wyoming

Project title: Southeast Wyoming Telehealth Network: Telecardiology Program (SEWTNTCP)

Program: BTOP

Project type: Sustainable Broadband Adoption

Funding Round: Round 2 - Winter 2010

Grant request: \$ 404,856

Status: Application Received

Description: SEWTN provides telehealth educational and clinical programs for 8 member hospitals. Members also established weekly ambulatory cardiology clinics. The proposed program is an expansion and integration of both programs into more effective cardiovascular care utilizing a broadband network connecting member hospitals. It will serve as a model for future statewide telecardiology programs.

Silver Star Telephone Company, Inc.

Freedom, Wyoming

Project title: Delivering Opportunities: Investing in Rural Wyoming Broadband

Program: BTOP

Project type: Comprehensive Community Infrastructure

Funding Round: Round 2 - Winter 2010

Grant request: \$ 5,063,623

Status: Application Received

Description: This middle mile project constructs approximately 33 miles of fiber facilities between Jackson, Wyoming and Victor, ID. The project 'closes the gap' in an existing 159 mile fiber network that, when completed, will enhance the broadband network opportunities for households and businesses within 11 counties and 26 rural communities in Wyoming and Idaho.

Silver Star Telephone Company, Inc.

Freedom, Wyoming

Project title: Expanding Greater Yellowstone Area Broadband Opportunities

Program: BTOP

Project type: Comprehensive Community Infrastructure

Funding Round: Round 2 - Winter 2010

Grant request: \$ 5,608,179

Status: Application Received

Description: This middle mile project "closes the gap" in an existing 960 mile state-wide fiber network enabling robust, redundant broadband network opportunities for 11 counties and 26 communities in Wyoming. The project constructs approximately 86 miles of fiber facilities between Jackson Hole, Wyoming and Togwotee Pass, Wyoming.

Appendix F: Summary of the National Broadband Plan

On March 16, 2010, the Federal Communications Commission (FCC) released "Connecting America: The National Broadband Plan." The plan was requested by Congress, who required the FCC to examine how broadband could be used to advance "*consumer welfare, civic participation, public safety and homeland security, community development, health care delivery, energy independence and efficiency, education, employee training, private sector investment, entrepreneurial activity, job creation and economic growth, and other national purposes.*"

In addition, the statute dictated that the National Broadband Plan should include "*an analysis of the most effective and efficient mechanisms for ensuring broadband access by all people of the United States; a detailed strategy for achieving affordability and maximum utilization of broadband infrastructure and service by the public; and an evaluation of the status of deployment of broadband service.*"

The resulting plan, which can be found at www.broadband.gov, includes 6 goals and 220 recommendations to the FCC, Congress, the Executive Branch, and state and local governments. The plan makes four main recommendations on how the government can influence broadband availability and use:

1. Design policies to ensure robust competition and, as a result maximize consumer welfare, innovation and investment.
2. Ensure efficient allocation and management of assets government controls or influences, such as spectrum, poles, and rights-of-way, to encourage network upgrades and competitive entry.
3. Reform current universal service mechanisms to support deployment of broadband and voice in high-cost areas; and ensure that low-income Americans can afford broadband; and in addition, support efforts to boost adoption and utilization.
4. Reform laws, policies, standards and incentives to maximize the benefits of broadband in sectors government influences significantly, such as public education, health care and government operations.

Long-Term Goals

The plan recommends the following six long-term goals to guide efforts over the next decade:

1. 100 million U.S. homes should have affordable access to actual download speeds of at least 100 megabits per second.

2. The United States should lead the world in mobile innovation.
3. Every American should have affordable access to robust broadband service, and the means and skills to subscribe.
4. Affordable access to at least 1 gigabit per second broadband service to anchor institutions.
5. Every first responder should have access to a nationwide, wireless, interoperable broadband public safety network.
6. Every American should be able to use broadband to track and manage their real-time energy consumption.

The Importance of Broadband

As broadband becomes more prevalent, so do the applications and services that are delivered via broadband and the number of devices that are broadband enabled. Broadband is improving business productivity, access to health care and education, improving energy efficiency, and enabling greater communication and participation in the democratic process. As information delivery shifts to an online format, there is an expectation that people will be able to access broadband to gather and receive information. However, approximately 35% of Americans do not use broadband at home. Low-income households, racial and ethnic minorities, senior, rural residents and people with disabilities are less likely to have broadband at home (p.167). The FCC points to broadband as method to enable economic and social opportunity regardless of where people live.

The National Broadband Plan recommends some targeted investments and activities to encourage adoption of broadband, including addressing cost, digital literacy, and relevance barriers, improving accessibility, expanding support for regional broadband capacity building, program evaluation and sharing of best practices, and coordinating with Tribes on broadband issues (p.168).

The infrastructure access goals include improving utilization of the existing infrastructure to support broadband through actions such as rule-making on pole attachments, gathering information about location of conduits, ducts, poles and right-of-way, and developing guidelines for rates and conditions for public rights-of-way. The second major goal related to infrastructure improvement is to maximize the impact of federal resources through encouraging laying conduit as part of Department of Transportation projects, expediting placement of wireless towers on federal government property and buildings, and enacting “dig once” legislation for federally funded projects (p.109).

Some recommendations in Chapter 8: Availability, have sparked some controversy. Rural telecommunications companies contend that rural communities do not have the population base nor financial resources to support the initial target of 4 Mbps or higher broadband

service by 2020 without a strong cost-recovery system. They also contend that broadband speeds of 4 Mbps are insufficient for many telemedicine, education, business and entertainment applications and that the proposed goal structure would perpetuate and deepen existing disparities between urban and rural areas, hindering economic development in rural America.

The plan calls for shifting the Universal Service Fund, which provides subsidized phone service throughout the U.S., to also include broadband. Smaller telecoms fear that changes to the Universal Service Fund (USF) may negatively impact them and discourage their investment in rural connectivity. Rural telecom companies have depended on USF loans to expand and build their networks. The federal broadband speed definition also influences access to USF funding. One megabyte up and four megabytes down is the new standard, and if an area has that capacity, USF funds cannot be used to upgrade them beyond that standard. The National Broadband Plan may lead to the elimination of the rate of return legislation and a change to incentive-based regulation price caps. According to rural telecoms, this will limit companies' ability to make profit on their investments.

The plan also calls for reforms to spectrum policies to accommodate delivery of wireless services and making more of the spectrum available within 10 years for licensed and unlicensed use. In addition, much of the revenue for the National Broadband Plan would be raised by auctioning spectrum.

The FCC has announced more than 60 rulemaking and notice-and-comment proceedings for the National Broadband Plan. Additional information can be found at <http://www.broadband.gov/plan/broadband-action-agenda.html> and <http://www.broadband.gov>.