The New Mexico Broadband Program

Summary of Pilot Region Engagement with Southwest New Mexico Council of Governments (SWNMCOG)

Version 1, January 8, 2015

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	
http://www.doit.state.nm.us/broadband/	http://www.ctcnet.us/

Summary of Tasks and Deliverables – Southwest New Mexico Council of Governments (SWNMCOG) Pilot Region Engagement

This document is a summary compilation of CTC Technology & Energy's tasks and deliverables related to the New Mexico Broadband Program (NMBBP) Regional Broadband Implementation Plan (RBIP) pilot program engagement with the Southwest New Mexico Council of Governments (SWNMCOG).

In addition to the tasks and analysis described here (and itemized in the table of contents on the following page), CTC has also had extensive conversations and engagements in the region throughout the pilot project:

- Speaking with potential private partners on SWNMCOG's behalf, we advised the partners on the federal government's rural broadband funding opportunity. We wrote a memo about the Rural Broadband Experiments during the brief time period when that program was a viable funding opportunity. That time has now passed, but we include the memo here because our analysis will have relevance for future funding opportunities from the Federal Communications Commission that will build on the Rural Broadband Experiments.
- Our team member Susan Oberlander held extensive meetings with stakeholders and facilitated stakeholder development efforts. The process of conducting the pilots thus enabled significant stakeholder engagement—working together and developing a basis for working together in the future.

Specifically, CTC performed the following tasks:

1. Developed a planning model for SWNMCOG;
2. Analyzed pilot area broadband supply and demand;
3. Created suggested pilot area technology, strategic and business plans;
4. Identified potential partners.

Activities

To both raise awareness and engage community members in the region, CTC conducted outreach in communities including press interviews, presentations to county commissioners and council of government boards. CTC also facilitated local group interviews focused on key broadband users such as healthcare institutions.

CTC further developed a business plan aimed at promoting broadband service through educational efforts and increased community-based access to digital resources. The focus of the approach was to expand the user base for broadband services throughout the region, leading to a greater demand for residential broadband service in the long run.

The plan sought to provide unserved communities with the tools and knowledge they need to become customers of existing carrier networks over the long term, while developing a strategy for increasing the communities' knowledge of broadband and its benefits, as well as their ability to use devices and connectivity during the short term.

In the SWNMCOG region, CTC and Cirrus Consulting, an expert on digital literacy training and programs, performed significant outreach to engage communities around the issue of digital literacy.

The focus of these efforts was on facilitating the development of digital literacy programs that broaden training beyond basic use of the Internet to include developing skills that enable users to navigate the digital world in the following sectors:

- Education opportunities
- Government services
- Employment opportunities
- Business skills and economic development
- Access to information – emergency and health
- Security and safety

Thus the goal was to teach practical skills such how to search for employment, complete an online application, and follow-up about the application. Without these types of skills, individuals will lack access to critical services and opportunities that can increasingly translate into a diminishing socioeconomic status and quality of life. These in turn become reasons for people to leave their communities and their state, leading to further decline in the economic development vital to a region.

Cirrus Consulting has focused on bringing the digital literacy value proposition to communities in the region. It has worked with councils of governments throughout the region to increase awareness of digital literacy; evaluate current community resources in digital literacy and local needs, and provide recommendations; and highlight existing training resources. In communities that expressed additional interest and motivation, Cirrus Consulting also provided an assessment and recommendations for more focused and targeted outreach on digital literacy initiatives and recommendations for program development.

In addition, CTC worked with SWNMCOG to release a request for Information (RFI). The purpose of the RFI was to optimize the pilot initiative by incorporating the knowledge, needs, and creative ideas of the local telecommunications industry. Information was solicited to assist the regions in defining the locations of the programming, any relevant network strategy, the content of educational and promotional materials, and the relationship between the regions and providers. In addition, the RFI sought providers interested in partnering with the regions and other partners at the New Mexico Department of Information Technology to determine what services and locations could be collaboratively developed.

Outcomes

The pilot was successful at significantly increasing engagement on broadband access and use in the regions. With the assistance of CTC, SWNMCOG formed a technology group that included schools, health providers, small businesses, government agencies, and service providers and held bi-monthly meetings. The meetings served as a vehicle to foster engagement at all point in the local broadband system and have already resulted in improving service to several of the regions public school.

The digital literacy activities have also yielded several positive outcomes. In the SWNMCOG region, several local councils of governments have been supportive. In Silver City, work is underway to coordinate and centralize digital literacy information to make resources more accessible to the public, develop assessments for the existing training programs, and increase the capacity of existing literacy trainers through a train-the-trainers model. Columbus is interested in creating a digital literacy training initiative as a way to address economic poverty and bring the community closer together.

In addition, the RFI received a response from the region's key telecommunication service provider, Western New Mexico Telephone Company, Inc. (WNMT), which engaged and cooperated with the project. WNMT expressed interest in working together with local officials and institutions on digital literacy in the pilot area. Another outcome of the RFI is the interest of WNMT in applying for new funding from the Federal Communications Commission to expand broadband service into unserved areas in the SWNMCOG region. CTC continued discussion with the provider on the potential to apply for support from the Federal Communications Commission's (FCC) Rural Broadband Experiments Program.

The pilot was successful at significantly increasing engagement on broadband access and use in the region. The digital literacy activities have also yielded several positive outcomes.

Lessons Learned

The positive outcomes of the RBIP pilot underscores the importance of facilitating engagement in local communities to develop local capacity to address their broadband needs. As the State considers how to incorporate the RBIP pilots into its long-term broadband strategy, CTC makes the two key recommendations based on its experience working with SWNMCOG:

Support coordination and planning in regions to encourage the development of local solutions

The RBIP played a critical role in facilitating coordination and planning among various stakeholders and policymakers around broadband availability and adoption. Such discussions are critical to developing opportunities for collaboration in the communities among government leaders, citizens, institutions, and service providers. Many of regions of New Mexico lack the capacity to more deeply engage on planning and coordination activities. The State should continue to support these discussions and provide both informational support (i.e., mapping data and related information) along with substantial technical support to aid communities in developing local solutions to address their broadband needs.

Support digital literacy efforts to increase demand and foster sustainable infrastructure

Digital literacy efforts have been very well received in the pilot areas, including by the regions telecommunications service providers. These efforts are critical to not only increase digital literacy for citizens, but to also create a stronger market for broadband and related services in underserved and unserved areas that in turn, may give providers more confidence that there will be sufficient demand to match their investment in broadband infrastructure.

There are several digital literacy challenges that are consistent across the communities in the pilot areas. First, there is often a lack of coordination around existing community resources in training (i.e. equipment, facilities, knowledge base). Second, many communities lack dedicated funding to pay training staff or have no dedicated staff positions. Finally, even in communities without the prior two challenges, they may not have to ability to create enough outreach and awareness to ensure a training program is well utilized by the public.

Thus many communities around the State would benefit from a sustained effort to facilitate engagement among civic leaders and institutions around digital literacy training. In addition, they would benefit from access to expert consultation to provide them with a scaffolding of the process to organize and develop digital literacy, including sharing training resources and best practices. Finally, the State could directly fund or assist with finding other funding (i.e. grants) to support dedicated digital life.

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Version 1, June 30, 2013

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
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Columbia Telecommunications Corporation
New Mexico Broadband Program
Regional Broadband Implementation Plan

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Memorandum

Date: June 30, 2013

From: Joanne Hovis
President / Director of Business Consulting

To: Gar Clarke
Broadband Program Manager
Department of Information Technology
State of New Mexico

Subject: *Selection of pilot regions for Regional Broadband Implementation Program*

The objective of the New Mexico Broadband Program (NMBBP) Regional Broadband Implementation Plan (RBIP) is to provide statewide broadband that is equally affordable, redundant, and abundant. In addition, it will demonstrate the use of technologies and strategies that are most effective for rural areas.

Following an application process in May 2013 (see Attachment 1), designated members of the NMBBP team have selected two regional organizations to participate in an RBIP pilot project. The regional groups selected for the pilots will receive technical assistance to help them achieve a solid framework for planning, funding, and technology. The pilot project will also identify future funding to expand this implementation concept throughout New Mexico. The pilot projects will begin in July 2013 and continue through September 2014.

This memo identifies the two New Mexico regional government groups that have been selected to participate in the RBIP pilot project. We also discuss the rationale for each applicant's selection, the entities' key contacts, and the next steps for the RBIP program.

Pilot Areas Selected

From a pool of four applicants (see Attachment 2 for the complete applications), two regional government groups were selected for the pilot:

1. Southwest New Mexico Council of Governments (SWNMCOG), comprising Catron, Grant, Hidalgo, and Luna counties

2. North East Economic Development Organization (NEEDO-NM), comprising Colfax, Guadalupe, Harding, Mora, Quay, San Miguel, and Union counties.

These successful applicants, and the two applicants that were not chosen, were notified by letters from Mr. Darryl Ackley, Cabinet Secretary and State Chief Information Officer, in mid-June. (See Attachment 3

for copies of the four letters.) A press release was prepared to announce the two pilot projects (see Attachment 4).

Selection Process

The applications were reviewed and the pilot communities were selected by two experienced leaders from New Mexico's technology and economic development communities:

- Mr. Charles Lehman, President of Employment and Economic Information Center of New Mexico LLC, an Albuquerque-based firm that conducts research on labor force and economic development issues

- Mr. Robert Tacker, Executive Director of the non-profit New Mexico Council for Higher Education Computing / Communication Services (CHECS)

These reviewers were supported by Dr. Susan Oberlander, a consultant to NMDOIT who drafted the pilot application.

Rationale for Selection

Each regional group's application was evaluated based on a range of specific criteria as documented in the application packet. The criteria were developed by the evaluation committee in advance of the announcement of the grant opportunity. They were then distributed by the State to potential grant applicants as part of the grant application. The criteria were:

- The region's demonstrated need for increased regional broadband and the benefits to be derived;

- Analysis of the challenges faced by the region in terms of the region's economic and geographic characteristics, why the region will be a good pilot site for overcoming these challenges, and how the region will work to sustain the work of the pilot project;

- The extent that the project's regional planning and development is supported in the region, as identified by surveys, community meetings, and public forums; and

- The region's level of experience and past successes in regional economic development projects, especially those concerning broadband.

The reviewers awarded the selected applicants the highest number of overall points. Both winning applications demonstrated specific areas of economic and community need for additional broadband availability. The selected applicants also made compelling cases that they have significant need for additional resources and assistance.

The reviewers felt that cost of service was the central issue in the Southwest Region, whereas facilities availability was the greater concern in the Northeast Region. All reviewers noted the particular lack of resources faced by the Northeast Region, both in terms of facilities and personnel to pursue greater

investment from the private sector. Where facilities do exist, there is a lack of redundancy among high-end connections; this severely limits the use of certain key applications, particularly within the health care industry.

The demographic profile of these regions, which are characterized by very low population density and low income levels, further illustrated to the reviewers the scale of the need in these areas.

Neither area has seen an extensive amount of central broadband planning; however, both communities show a clear interest in broadband development. A broad range of stakeholder groups have expressed concern with the lack of broadband in general, and interest in opportunities for regional broadband planning.

In summary, the reviewers expressed the following about the selected applicants:

1. **North East Economic Development Organization, Inc. (NEEDO-NM)**
   The applicant identified the need for broadband among a wide range of constituencies, and demonstrated a good understanding of what providers could be available to offer service. Major indicators of need included:

   - High level of rurality
   - High proportion of the population in underserved demographic groups (poor and Hispanic)
   - Low population density. All seven counties fall within a population density of less than seven people per square mile.

   The regional broadband project will:

   - Help rural residents maintain access to government and other services that are often now only offered online
   - Help to maintain rural population levels by offering online employment options
   - Bring opportunities for distance education and health care currently available only in more populated areas

   Challenges for the region include funding, lack of existing fiber and other facilities, and the cost of developing rural area service. During the region's BTOP grant process, among the lessons learned was that user fees may be insufficient to recover development costs in this area. The region is served by several separate telephone and electric companies and cooperatives that overlap in their coverage areas and own varying amounts of fiber infrastructure.

   In 2011, the region received a Rural Utilities Service (RUS) Stronger Economies Together (SET) grant. Broadband was identified as a major deficiency in the region. A working group collected information from stakeholders in the region. Letters of support came from numerous sources, including: one county, one school district, one provider, and the North Central New Mexico Economic Development District. A technology team was formed in 2012, currently comprising four county managers, one provider, and two telecom consultants, also working in support of addressing broadband deficiency.

NEEDO-NM is experienced in pursuing regional economic development projects, including those involving broadband. The SET grant project created a comprehensive analysis of the region's economic strengths and weaknesses. Previous work by the region demonstrated that 50 percent of all the region's jobs are related to government, tourism, and agriculture. Three economic clusters were singled out to emphasize for future economic growth–tourism, green energy, and value-added agriculture—all of which require broadband infrastructure to flourish.

2. Southwest New Mexico Council of Governments (SWNMCOG)

The applicant brought together a particularly wide range of user groups to meet and discuss existing need. Participating stakeholders included representatives from the following user groups, all attesting to a lack of broadband:

- Business
- Education
- Higher education
- Government
- Non-profit sector

Major indicators of need included:

- High level of rurality
- High proportion of the population in underserved demographic groups (poor and Hispanic)
- Low population density. All four counties fall within a population density of less than 10 people per square mile.

The applicant prepared a high quality Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis identifying specific benefits the region would see due to the project, including:

- Enabling Western New Mexico University to offer online classes
- Increasing service to Border Patrol offices in Luna and Hidalgo counties
- Retaining small businesses

Challenges for the applicant include the need for an inventory of all existing broadband resources and broadband costs, particularly in more rural areas. The topography of the region also presents a major challenge, particularly regarding capital costs for facility construction. The reviewers also identified local right-of-way requirements as a potential challenge.

The applicant showed experience in a number of other infrastructure development programs not related to broadband, but relevant to approaching a project of this scope. Based on this experience, they demonstrated an understanding of how to coordinate such an effort and bring relevant partners to the table. Broadband development efforts are strongly supported by the community, as demonstrated by the participation of many business, government, and non-profit stakeholders, letters from three county commissions and eight mayors, and documentation from the public schools identifying technology development as a major priority.

Key Contacts

The points of contact for the two pilot regions are as follows:

North East Economic Development Organization (NEEDO-NM)
Les Montoya, Vice President of NEEDO-NM
San Miguel County Manager
County Courthouse
500 W. National Ave
Las Vegas, NM 87701
505.429.4463
smcmanager@smcounty.net
http://www.needo-nm.org

Southwest New Mexico Council of Governments (SWNMCOG)
Priscilla Lucero, Executive Director
1203 N. Hudson, 2nd floor
Silver City, NM 88062
575.388.1509
priscillalucero@swnmcog.org
http://swnmcog.org

Plans Going Forward

NMBBP expects to launch the two RBIP pilots immediately. CTC, the State's consultant tasked with implementing and overseeing the pilot project, will meet with NEEDO-NM and SWNMCOG in June and July, and will begin to map out a methodical process for each organization. The pilot communities will receive technical assistance in the following areas:

1. Forming local technology teams to provide expertise and support
2. Assessing current regional demand for broadband
3. Assessing regional supply sources of broadband
4. Investigating technology solutions and partners
5. Identifying community resources
6. Developing strategic and business plans
7. Identifying funding solutions.
8. Developing implementation plans
9. Considering sustainability solutions

Attachment 1: New Mexico Broadband Program Press Release

June 2013

The New Mexico Broadband Program (NMBBP) is launching two Regional Broadband Implementation Plan (RBIP) Pilots within the State to be completed by September 2014. These Pilots will provide technical assistance to help the regional groups achieve a solid planning, funding and technology framework that will increase broadband availability. The objective of the RBIP is to provide statewide broadband that is equally **affordable, redundant,** and **abundant.** In addition, it will demonstrate the use of technologies and strategies that are most effective for rural areas.

From a pool of four regional applicants, two Pilots were selected: Southwest New Mexico Council of Governments (Catron, Grant, Hidalgo and Luna Counties) and North East Economic Development Organization (Colfax, Guadalupe, Harding, Mora, Quay, San Miguel and Union Counties).

Each regional group was evaluated based upon the needs of the region and the benefits to be derived from increased broadband; the challenges faced by the region in terms of economic and geographic characteristics; the level of experience and past successes in regional economic development projects especially concerning broadband; and the level of support for the regional group.

Technical assistance will be provided by NMBPP in the following areas to each pilot:

1. Form local technology teams to provide expertise and support.
2. Assess current regional demand for broadband.
3. Assess regional supply sources of broadband.
4. Investigate technology solutions and partners.
5. Identify community resources.
6. Develop strategic and business plan.
7. Identify funding solutions.
8. Develop implementation plan.
9. Consider sustainability solutions.

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The New Mexico Broadband Program

Develop a Planning Model for Pilot Regions

Version 1, June 30, 2013

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	
http://www.doit.state.nm.us/broadband/	http://www.ctcnet.us/

Memorandum

Date: June 30, 2013

From: Joanne Hovis
President / Director of Business Consulting

To: Gar Clarke
Broadband Program Manager
Department of Information Technology
State of New Mexico

Subject: *Planning Model for Pilot Regions*

Now that the pilot region selection process has been completed, the Regional Broadband Implementation Plan (RBIP) can proceed with initial planning and selection of strategic directions specific to the two selected regions. The two regions comprise different population and landscape characteristics, and are served by different broadband technologies and providers. They therefore will each begin with different phases of the planning process, and warrant different strategic approaches.

This memo identifies the planning approach for the remainder of the approximately 18-month pilot planning term for both regions. We will outline our recommended plan for supporting the Southwest Region and the Northeast Region as step-by-step guides to approaching the challenges in each region. The approach will include strategies for cost reduction, enforcement of existing legal standards, maximization of existing programs designed to benefit low-income New Mexicans, and centralizing assistance with funding support.

Initial Field Work and Identification of Regional Issues

CTC conducted an initial round of research and analysis of the Southwest regional pilot area during an onsite meeting at the **Southwest New Mexico Council of Governments (SWNMCOG)** on June 25, 2013 and in subsequent follow-up calls and e-mail communications. Additional stakeholder meetings were conducted on July 30 and 31, 2013.

Field work with regard to the **North East Economic Development Organization (NEEDO)** began on Thursday, August 1, when project team members met with NEEDO leadership and the stakeholders assembled by NEEDO.

In the Southwest Region, we identified a range of issues related to broadband for schools, hospitals, and unserved residential markets, with an additional focus on economic development. In contrast, based on what we learned in the initial Northeast Region stakeholder meetings and in conversation and consultation with NEEDO leadership, we anticipate and recommend a focus on residential broadband (and, specifically, on unserved pockets of population where there is no broadband availability at all) in the pilot planning process for the northeast counties of the State.

We explain the focus for each region below.

Southwest New Mexico Council of Governments (SWNMCOG)

What we learned in the Southwest Region is that there are a range of areas of concern in regard both to availability and affordability, and for both the community anchor institution (CAI) sector and the residential market.

In the anchor sector, there are wide disparities among schools with regard to their capabilities for broadband. In some areas, there are direct fiber connections to those schools (possibly as a result of subsidy from the federal High-Cost fund that has enabled fiber construction). Unfortunately, even with those extraordinarily robust fiber connections, some schools cannot afford to buy sufficient bandwidth to meet their needs—and indeed are only buying bandwidth that they can afford taking into account the E-rate subsidy (perhaps only a few megabits per second). Thus, even though they have fiber, they are incapable of tapping the fiber's potential. For those schools, the issue is not one of infrastructure; rather, it is the affordability of the actual service. Other schools are struggling with less capable infrastructure, and need planning and support in regard to potentially inducing private sector providers to build more capable infrastructure to their facilities.

Similarly, in the healthcare sector, there is a significant lack of adequate infrastructure, and a clear need for better infrastructure and services to enable communications among healthcare facilities in the Southwest Region, as well as communication with specialized healthcare professionals in the urban areas of the State (given the lack of specialists who are located in southwest New Mexico). The affordability question comes into play here, as well.

Southwest Region stakeholders also note the importance of broadband for economic development, including for enabling home-based businesses and enabling e-commerce by small businesses.

The stakeholders in the Southwest also expressed significant concerns around availability and affordability in the residential markets. Some rural stakeholders live several hours by road from the nearest town; obviously there is a complete lack of broadband infrastructure to such remote areas. At the same time, even in the population centers, stakeholders expressed the concern that low-income families are not making use of broadband—either because they cannot afford service, they do not know how to use it, or they do not understand what broadband can do for them.

Frankly, in our experience, these factors all interplay because adoption is a function of a combination of affordability and relevance. At lower prices, products become more relevant and accessible to low-income Americans; at higher prices, low-income residents have no means of engaging and learning about broadband.

As a result of these observations and conversations, we recommend a focus in the Southwest Region on residential broadband to unserved pockets of population, and also a focus on utilizing strategies to make broadband more affordable in the population centers. In addition, we recommend some attention to the healthcare and education sectors.

North East Economic Development Organization (NEEDO)

The feedback of the stakeholders at the initial NEEDO meetings was universally a request that this process focus on residential broadband, for a number of reasons.

The economic development professionals and organizations in the room feel strongly that enabling home-based business is an essential economic development priority. They believe that the availability of home-based broadband will serve as a mechanism to induce young people and other segments of the population to remain in these parts of New Mexico at a time when there is a net outflow of population from these rural areas. They also believe broadband availability will provide an incentive for former residents and potential new residents who are seeking the quality-of-life benefits that the northeast can offer to relocate to this part of New Mexico.

Interestingly, the community anchor institutions (CAI) represented at the initial meetings felt similarly that the focus should be on home-based broadband. The representatives of the education sector, for example, made a strong case for the importance of broadband in their students' homes as a means of facilitating and enabling the education process begun in schools, and the reinforcement of technical skills that are likely to be essential to the jobs that will be available to these young people when they reach adulthood.

Other members of the community who were represented in the room similarly made the case for home-based broadband. Those already served with some level of broadband noted their satisfaction, and that even modest broadband speeds enable them to live in northeastern New Mexico and access the services they need. Those in entirely unserved areas of the northeast expressed the critical need for new broadband services in their remote communities for purposes as varied as public safety, home-based education, and access to healthcare data.

Related to the stakeholders' focus on the need for residential service, we tentatively conclude that the region's CAIs are relatively well served. At least with respect to the stakeholders who were present at the initial NEEDO meeting, and the feedback received, as well as the NEEDO grant application, it appears that with respect to CAIs, many parts of the Northeast Region are relatively better served than are many similarly rural parts of the United States.

We believe that two phenomena have been at work to deliver the capability for high-capacity broadband to many, but not all, of the key CAIs in this part of the State.

First, the rural telephone companies in the State are eligible for subsidy from the High-Cost program of the Universal Service Fund (USF), managed by the Federal Communications Commission (FCC). As a result, some parts of the Northeast Region have received some fiber optic buildout—to the benefit of the anchor institutions in particular, which are key and important customers for the rural phone companies.

Second, ENMR-Plateau (ENMR Telephone Cooperative) received a significant federal Broadband Technology Opportunities Program (BTOP) grant from the National Telecommunications and Information Administration (NTIA) in 2010.[1] As a result, ENMR has built direct fiber optics to a significant

[1] See details on the ENMR website: http://www.plateautel.com/legal_arra.asp

portion of the CAIs within its traditional footprint in eastern New Mexico. All of the CAIs represented at the initial stakeholder meetings are connected over fiber optics. While we anticipate that there are other CAIs to whom we have not yet spoken who are not connected, the availability of fiber optics in the community anchor market seems relatively high by comparison to other similarly rural areas.

Statement of Work for Pilot Planning Engagement

Based on the findings of our interactions with stakeholders in each region, we have identified a number of areas of potential focus for strategies to impact broadband availability and affordability. Each of these strategies is described below and we recommend that these be prioritized for the planning work going forward as the focus for the upcoming 18 months of effort.

We note, too, that in the Southwest Region, each of these strategies has been vetted by the regional stakeholder planning group, in in-person meetings; as field work progresses in the Northeast Region, we will be vetting the strategies with those stakeholders as well.

We believe it would be most appropriate to conduct all of these steps in consultation with the local communities—with their input, buy-in, and help and support throughout—such that the projects are very much the regions' projects, with us as a consulting but not independent entity. And, of course, we would request and value the input of the State throughout the project.

Strategy 1: Maximize Potential of Existing Programs Focused on Lower-Income Residents of the Region

We suggest prioritization of the affordability issue in both regions. With our assistance, SWNMCOG, NEEDO, and their member jurisdictions should address broadband affordability concerns by evaluating strategies to increase participation in programs such as Comcast's Internet Essentials and Connect2Compete.

The Comcast Internet Essentials program offers "high-speed" Internet access[2] at $9.95 per month, with no installation, activation, or equipment charges. Participants can also purchase a "netbook-style laptop computer" for $149.99 when they enroll, and Comcast touts the availability of "free Internet training — online, in print and in person."[3]

Internet Essentials was created when Comcast hoped to convince the Federal Communications Commission (FCC) to approve its proposed merger with NBC Universal; the company voluntarily made a nationwide commitment to providing low-cost Internet access to low-income residents in its existing service areas.

The program launched in September 2011, and is slated to last for three school years.[4]

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[2] "Download speeds of up to 3 Mbps and upload speeds of up to 768 Kbps" per "Program Terms and Conditions" page, http://www.internetessentials.com/content/program-terms-conditions.
[3] "Internet Essentials" Web page, http://www.internetessentials.com/.
[4] "FCC Chairman Genachowski Remarks at Comcast Internet Essentials Event," FCC, Sept. 20, 2011. http://www.fcc.gov/document/fcc-chairman-genachowski-remarks-comcast-internet-essentials-event.

Eligibility for the Internet Essentials program is limited to households with at least one child receiving free or reduced-cost school lunches through the National School Lunch Program.

Comcast is the sole provider of cable modem service in the Southwest Region, but its service footprint is currently mostly confined to the population centers of Deming and Silver City. For families in those areas, however, Internet Essential could be an important tool to secure inexpensive broadband at home.

Unfortunately, it appears that Comcast has not aggressively advertised or publicized the program in the SWNMCOG region. (We will be further exploring this issue with NEEDO, as well.) With the exception of some limited overtures to the schools, local stakeholders report that they have not seen any significant efforts by Comcast to educate consumers in the region regarding Internet Essentials. We recommend that the COG strongly encourage Comcast, whose obligation it is to publicize this product, to find alternative methods to inform potential customers—whether through print and television advertising, public service announcements, or other means. Comcast has made a nationwide commitment; consumers in these two regions and elsewhere in the State should hear about the opportunity, and should have access to their fair share of the benefit.

In both regions, too, we will recommend that local jurisdictions that are served by other cable companies seek to ameliorate the issue of price as a barrier to broadband adoption by encouraging their cable providers to participate in the Connect2Compete program, a national initiative announced by the Federal Communications Commission (FCC) in late 2011.[5] The program, which was modeled after Comcast's Internet Essentials program, has support from high-speed Internet providers nationwide. It aims to provide low-cost Internet access, low-cost computers, and free digital literacy training to low-income families.[6] Participation in this program would cost the cable providers a nominal amount and could potentially allow many residents to secure the benefits of broadband access for their children.

Strategy 2: Evaluate Potential to Expand Residential Broadband in Population Centers through Cable Franchising Mechanism

SWNMCOG, NEEDO, and their member jurisdictions should evaluate whether there are elements of their existing cable franchise agreements that could be better enforced to expand broadband access. Communities should ensure that cable modem service is available to their residents and businesses in accordance with the provider's obligation to serve areas with specified population densities, as specified in existing agreements.

In consultation with the Town of Silver City, we learned that cable franchise renewal negotiations are underway. We certainly do not want to impose on that ongoing process. We propose, however, to serve as a resource to the jurisdictions that have cable franchise agreements, if they would like, in evaluating whether obligations created by the franchise agreement to build to certain densities of the population have been met—and if not, how meeting those obligations could enable the cable company to further broadband goals in the towns or cities.

[5] "Low-Cost Broadband, Computers for Millions of Students, Families," Official FCC Blog, Dec. 14, 2011. http://www.fcc.gov/blog/low-cost-broadband-computers-millions-students-families.
[6] Connect2Compete. http://www.connect2compete.org/faq/index.php.

Strategy 3: Evaluate Potential of Healthcare Connect Fund to Support Rural Health Clinics

We recommend prioritization of potential viability of the new Healthcare Connect Fund (HCFF) to support enhanced service to rural healthcare clinics in both regions. The HCFF, paid for by the Universal Service Fund, was launched in 2013, and is specifically tasked to providing resources to rural healthcare facilities and consortia. The regions should consider whether their rural hospitals would be interested in seeking federal support for broadband deployment.

HCCF will provide a 65 percent subsidy for broadband service to healthcare providers/facilities. While the focus is on serving rural facilities, we note that teaching hospitals and urban/suburban facilities will be eligible if they are part of an in-state consortium that includes rural facilities. HCFF could thus significantly support the rural healthcare facilities by incentivizing urban hospitals to participate in consortia—potentially creating connectivity from the rural communities to the urban hospitals and giving rural healthcare providers access to professionals at the urban facilities. (This is by design; a primary objective of the program is to encourage collaboration between rural and metropolitan healthcare providers as a means of providing superior healthcare through collaboration and educational opportunities, and by enabling rural facilities to tap into the resources of their larger counterparts.)

By supporting consortia of urban and rural providers, HCFF also leverages the spending power of urban facilities to improve pricing for rural hospitals. And, because HCCF offers a sustainable source of financial subsidy for rural healthcare providers (just as E-Rate does for schools and libraries), applying for these funds may very well be worth the initial dedication of resources required of participants.

Strategy 4: Evaluate Potential of Federal Distance Learning/Telemedicine Loan/Grant Program to Support Rural Schools and Health Clinics

We suggest an effort to evaluate the U.S. Department of Agriculture's Distance Learning and Telemedicine Loan and Grant Program (DLT) to determine whether it is a feasible option for improving equipment at rural health clinics and educational facilities. The DLT Program provides assistance to communities to meet both educational and health needs, and offers grants, loans, and grant/loan combinations. While DLT grants require communities to provide a 15 percent funding match, loans and grant/loan combinations do not. The regions should explore which of these options, if any, could be leveraged for further broadband deployment support.

The Distance Learning and Telemedicine (DLT) program[7] has historically provided both grants and loans, but appropriations have been limited to grants in recent years. Grants of $50,000 to $500,000 are given for equipment, rather than broadband facilities or service; however, this may provide a good way for the regions to support broadband communications and free up funds that otherwise would have gone for equipment (by helping finance video conferencing systems and medical units, funding otherwise allocated for those purposes can be reallocated for broadband connectivity). As such, this could be a good supplement to other strategies.

[7] United States Department of Agriculture, Rural Utilities Service, "About the DLT Program." http://www.rurdev.usda.gov/UTP_DLT.html.

Under the DLT program, funds can be awarded to both public and private entities (including corporations or partnerships, tribes, state or local units of government, consortia, and private for-profit or not-for-profit corporations), assuming they provide the requisite services.

Grantees must provide education or medical care via telecommunications. Eligible entities must either directly operate a rural community facility or deliver distance learning or telemedicine services to entities that operate a rural community facility or to residents of rural areas. Among the grant scoring categories are innovativeness, benefits and needs (including economic need), and availability of matching funds.

The strategy we recommend here would be to leverage existing connectivity to the greatest extent possible, to enable the education and healthcare sectors to maximize the value of their connectivity, both within the region and in connecting to peers and colleagues more broadly. In this kind of grant opportunity, Western New Mexico University, in particular, could serve as a key partner in the Southwest Region, given that it operates multiple facilities that share education and healthcare resources and its mission is entirely aligned with the purposes of the DLT grant program.

Strategy 5: Consider Community Connect Grant Application for Unserved, Low-Income Areas

The Community Connect grant program[8] is a modest-sized grant program for local governments and tribes that focuses on targeted deployment to completely unserved, very low income areas. The 2013 application window recently closed but we expect that the 2014 window will open in the early spring of 2014. The grant window usually closes 60 days after opening.

While Community Connect has a fairly broad mission, funding is geographically limited to a single community or a part of a community that does not currently have Broadband Transmission Service (as determined by the FCC National Broadband Map). Grants cannot duplicate any existing broadband services, nor can applicants charge for services to any critical community facilities for at least two years from the grant award.

Community Connect grants are potentially a good fit for some communities in the pilot regions, as priority is given to areas demonstrating "economic necessity."

The application process is rigorous and competitive (with awards given to only 10 percent of applicants) and once awarded, program requirements are demanding (e.g., requiring last-mile service for all households in the service area). Awards are fairly modest but are sufficient to build small broadband networks that have the potential to transform a small community's access to broadband.

Awards can be given to both public and private entities and eligible applicants include local governments and nonprofits such as The University of New Mexico Extended University.

The grants carry a modest (15 percent) match requirement that can be met with in-kind contributions and awards range considerably in size from $50,000 to $1 million.

[8] United States Department of Agriculture Rural Development, Rural Utilities Service, "About Community Connect Grants." http://www.rurdev.usda.gov/utp_commconnect.html.

Community Connect funds approximately 15 projects annually (from an application pool of 150). Eligible projects must offer basic broadband transmission service to both residential and business customers within the proposed service area. Examples of eligible projects include deploying broadband transmission service to critical community facilities, rural residents, and rural businesses; constructing, acquiring or expanding a community center (but only 5 percent of the grant or $100,000 can be used for this purpose); or building broadband infrastructure and establishing a community center with at least 10 computer access points, which offer free public access to broadband for two years.

We recommend a process in which each region charts an area within its unserved footprint, using the data provided by the New Mexico Broadband Program and further developed as part of this pilot process. A process should then be undertaken to determine the areas of greatest need, possibly aligning the lowest income portions of those areas in order to develop the most competitive grant application possible.

We would support the regions in this process by identifying unserved pockets of population, based on the maps created by the New Mexico Broadband Program, and—if the regions' applications appear to have merit—verifying that the areas are indeed unserved by conducting drive tests through representative sample portions of the regions.

Further, if such grants and loans are available and appropriate, we would offer guidance to the local community through the process of preparing a competitive grant application.

Strategy 6: Evaluate Potential for the State to Provide Support Mechanisms for Broadband Procurement

We would recommend evaluating whether the State can support public sector broadband users in the two regions. The State has already undertaken a considerable central effort to analyze and map broadband resources in each of its counties. The New Mexico Broadband Program can help achieve its goal of enhancing broadband adoption by bringing its resources to bear on behalf of the institutional needs of its local communities by helping them centralize their broadband efforts. Three specific areas stand out in this regard.

First, the jurisdictions should explore how the State can assist with aggregated procurement mechanisms. For public sector agencies, approaching broadband vendors as a consortium of users instead of individually can significantly enhance the community's buying power and lead to cost savings. The State could be well positioned to help organize such an effort on an inter-county basis.

Second, the jurisdictions (especially in the Southwest Region) should seek centralized support for federal Universal Service resources. The Universal Service funding available to schools and libraries (E-Rate) and healthcare providers (Healthcare Connect Fund) are significant, but require a heavy investment of time and effort on behalf of the institutions applying. For E-Rate, the specific amount of each school district or library's funding is determined by both (1) the rural nature of the community and (2) the community's degree of poverty, as measured by participation in the federal free and reduced-price school lunch program. The E-Rate program is notoriously high in bureaucracy; applications and compliance efforts are very paperwork-intensive and a challenge for any small, under-resourced entity. The Healthcare Connect Fund, which is modeled on E-Rate, will operate similarly. The State, through

central E-Rate planning and execution, can enable smaller institutions to participate in the program while relieving them of at least part of a considerable administrative burden.

Third, the regions should seek IT support from the State. Small rural institutions, including those in Catron, Grant, Hidalgo, and Luna counties and their various municipalities in the Southwest Region, are usually resource challenged. These small and remote communities often have problems attracting, affording, and retaining qualified IT staff to serve their schools, libraries, police stations, and other institutions. Affording the necessary network equipment is also a challenge. The regions should explore whether the State may be able to provide centralized resources to provide these communities with staff and other IT resources.

Strategy 7: Conduct Technology Analysis and Planning to Identify the Most Cost-Effective Means to Build Residential Broadband

In both regions, we recommend conducting technology analysis and planning to identify the most cost-effective means to build residential broadband in unserved pockets of population. We would do this by investigating two matters: First, most likely, would be the cost of building a wireless distribution network in the areas; the second issue would be the cost of a backhaul solution to get to that pocket of population, such that their small local wireless network would be connected to a larger network and the Internet.

Among the technical solutions we would evaluate are:

- The viability of using State-owned or locally owned towers for microwave backhaul
- The possibility of using the TV white spaces (TVWS) spectrum, which is potentially a cost-effective solution because it is very viable in rural areas and does not entail the cost of licensed spectrum
- The viability of fiber-to-the-home (FTTH) construction (although we preliminarily anticipate prohibitive cost around such a solution)

Strategy 8: Evaluate Governance and Ownership Mechanisms, and Develop RFP/RFI Documents as Appropriate

Given the likely cost of the most viable solutions, we would then evaluate the potential for either public or private ownership of such a mechanism, and would opine as to a potential governance structure. (As discussed above, we would also investigate funding sources for the buildout, including through grant and loan programs maintained by the U.S. Department of Agriculture (USDA).)

Then we would investigate the viability of a public-private partnership with private ownership and operation, either through one-on-one conversations or a request for information (RFI) to the private sector.

We would simultaneously evaluate the potential for local public ownership if there is a public entity able and willing to engage in such a process, and at the same time we would also evaluate the potential for a local cooperative structure—which, according to the stakeholders with whom we have met, is a very common mechanism for delivery of key utilities and services to the remote areas of the State, including, for example, the delivery of water services.

Depending on the ownership and governance strategies that seem most viable and likely, we world develop a business model and plan for the range of locations contemplated. As an alternative, in the event that there is greater viability for private sector ownership mechanisms, and that we believe there is a funding stream and interest on the part of potential private sector partners, we would develop a request for proposals (RFP) to identify a potential private partner.

The New Mexico Broadband Program

Pilot Area Supply and Demand Assessments

Version 1, July 31, 2013

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	
http://www.doit.state.nm.us/broadband/	http://www.ctcnet.us/

Memorandum

Date: July 31, 2013

From: Joanne Hovis
President / Director of Business Consulting

Andrew Afflerbach, Ph.D., P.E.
Director of Engineering

To: Gar Clarke
Broadband Program Manager
Department of Information Technology
State of New Mexico

Subject: *Pilot Area Supply and Demand Assessment*

The two Pilot Area regions that were selected comprise different population and landscape characteristics, and are served by different broadband technologies and providers. This memo provides an assessment of the available broadband technologies and demand challenges that exist in the Southwest and Northeast Regions.

Pilot Area Supply and Demand Assessment

Southwest Region

The Southwest Region, comprising the SWNMCOG jurisdictions, presents a mixed broadband picture, largely dominated by DSL and wireless coverage. Although cable modem service is present in limited areas around the population centers of Deming and Silver City, the vast majority of the region's geography is served by DSL and/or wireless service only. Some areas of all four SWNMCOG counties have no broadband service at all, with the exception of satellite, which covers the entire state.

The National Broadband Map (NBM) provides data on broadband coverage for each jurisdiction in the country by population. Figure 1 summarizes wireline broadband coverage as a percentage of population for the four SWNMCOG counties by technology type. Figure 2 does the same for wireless broadband coverage. The providers operating facilities in each county are listed on the New Mexico Broadband Map (NMBM).

Comcast is the exclusive provider of cable modem service in the region. Multiple service providers offer DSL service across the region, including Cyber Mesa Computer Systems Inc.,

CenturyLink, Inc., WNM Communications, and Valley Telecom Group. TransWorld Network, Corp. provides fixed wireless service in limited areas.

Figure 1: Wireline Broadband Availability in SWNMCOG Region

Broadband Technology	County	% Population with Service Available[9]	Operates Facilities in County[10]
Fiber	Catron	0.0	N/A
	Grant	0.0	N/A
	Hidalgo	1.3	Level 3 Communications, LLC Valley Telecom Group
	Luna	0.0	N/A
Cable	Catron	0.0	N/A
	Grant	63.7	Comcast
	Hidalgo	0.0	N/A
	Luna	54.5	Comcast
DSL	Catron	55.8	WNM Communications
	Grant	76.3	Cyber Mesa Computer Systems Inc. CenturyLink, Inc. WNM Communications
	Hidalgo	81.6	Valley Telecom Group WNM Communications
	Luna	66.8	CenturyLink, Inc. Valley Telecom Group WNM Communications

[9] Data provided by the National Broadband Map, last updated June 30, 2012. http://www.broadbandmap.gov/, accessed June 27, 2013.
[10] Providers listed on the New Mexico Broadband Map, http://nmbbmapping.org/mapping/.

Figure 2: Wireless Broadband Availability in SWNMCOG Region

Broadband Technology	County	% Population with Service Available[11]	Operates Facilities in County[12]
Wireless (Mobile and Fixed)	Catron	36.6	AT&T (Mobile) TransWorld Network, Corp. (Fixed) Verizon Wireless (Mobile)
	Grant	95.4	AT&T (Mobile) Sprint (Mobile) T-Mobile (Mobile) TransWorld Network, Corp. (Fixed) Verizon Wireless (Mobile)
	Hidalgo	96.2	AT&T (Mobile) Sprint (Mobile) TransWorld Network, Corp. (Fixed) Verizon Wireless (Mobile)
	Luna	99.6	AT&T (Mobile) Sprint (Mobile) T-Mobile (Mobile) TransWorld Network, Corp. (Fixed) Verizon Wireless

The New Mexico Broadband Mapping Program provides maps of the service footprint of each broadband technology type by county. The following figures show broadband coverage by technology type for each of the four SWNMCOG counties.[13]

[11] Data provided by the National Broadband Map, last updated June 30, 2012. http://www.broadbandmap.gov/, accessed June 27, 2013.
[12] Providers listed on the New Mexico Broadband Map, http://nmbbmapping.org/mapping/.
[13] Source: http://www.doit.state.nm.us/broadband/map_county_availability.shtml, June 27, 2013.

Figure 3: New Mexico Broadband Mapping Program—Broadband Availability in Catron County

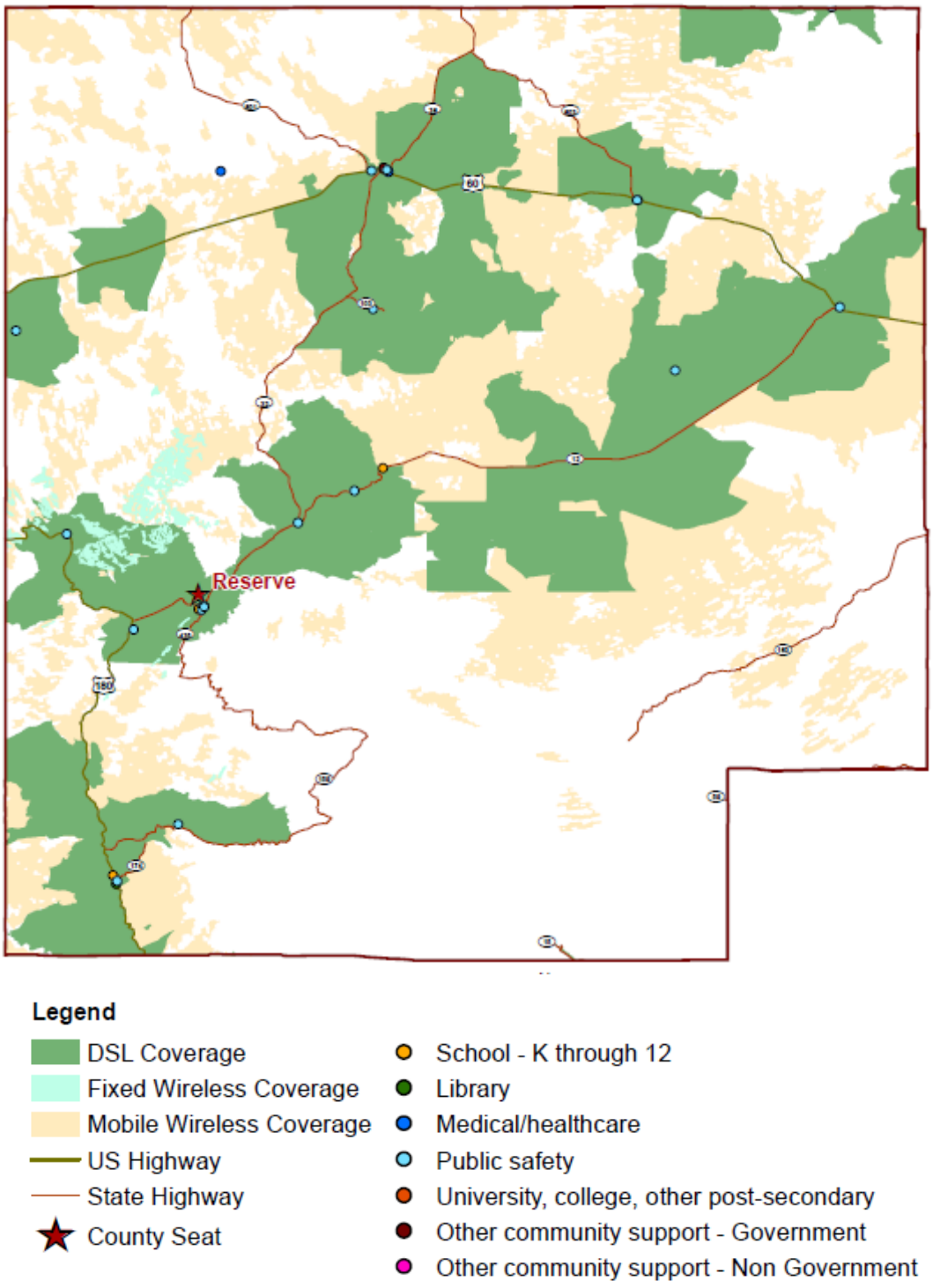


Figure 4: New Mexico Broadband Mapping Program—Broadband Availability in Grant County

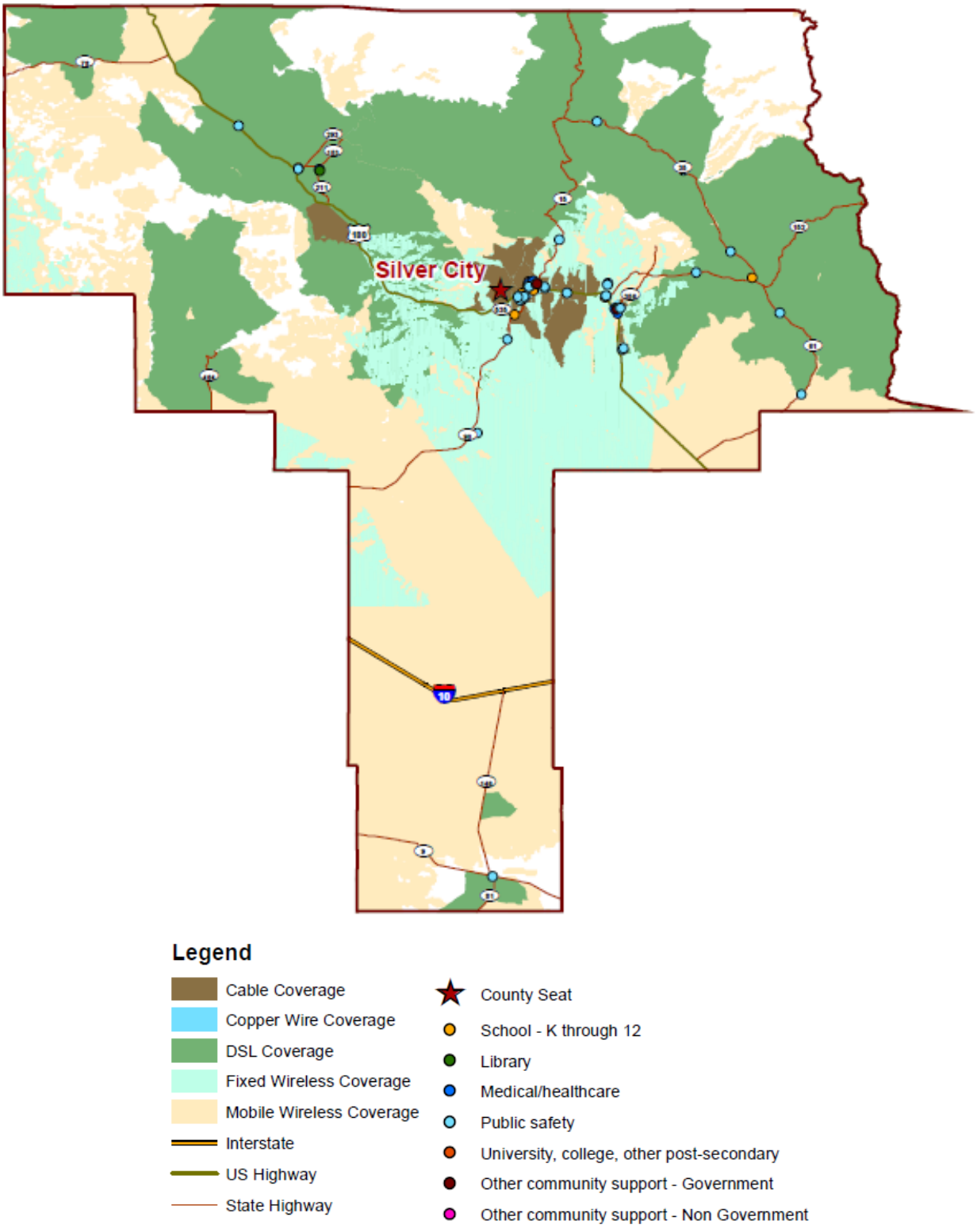


Figure 5: New Mexico Broadband Mapping Program—Broadband Availability in Hidalgo County

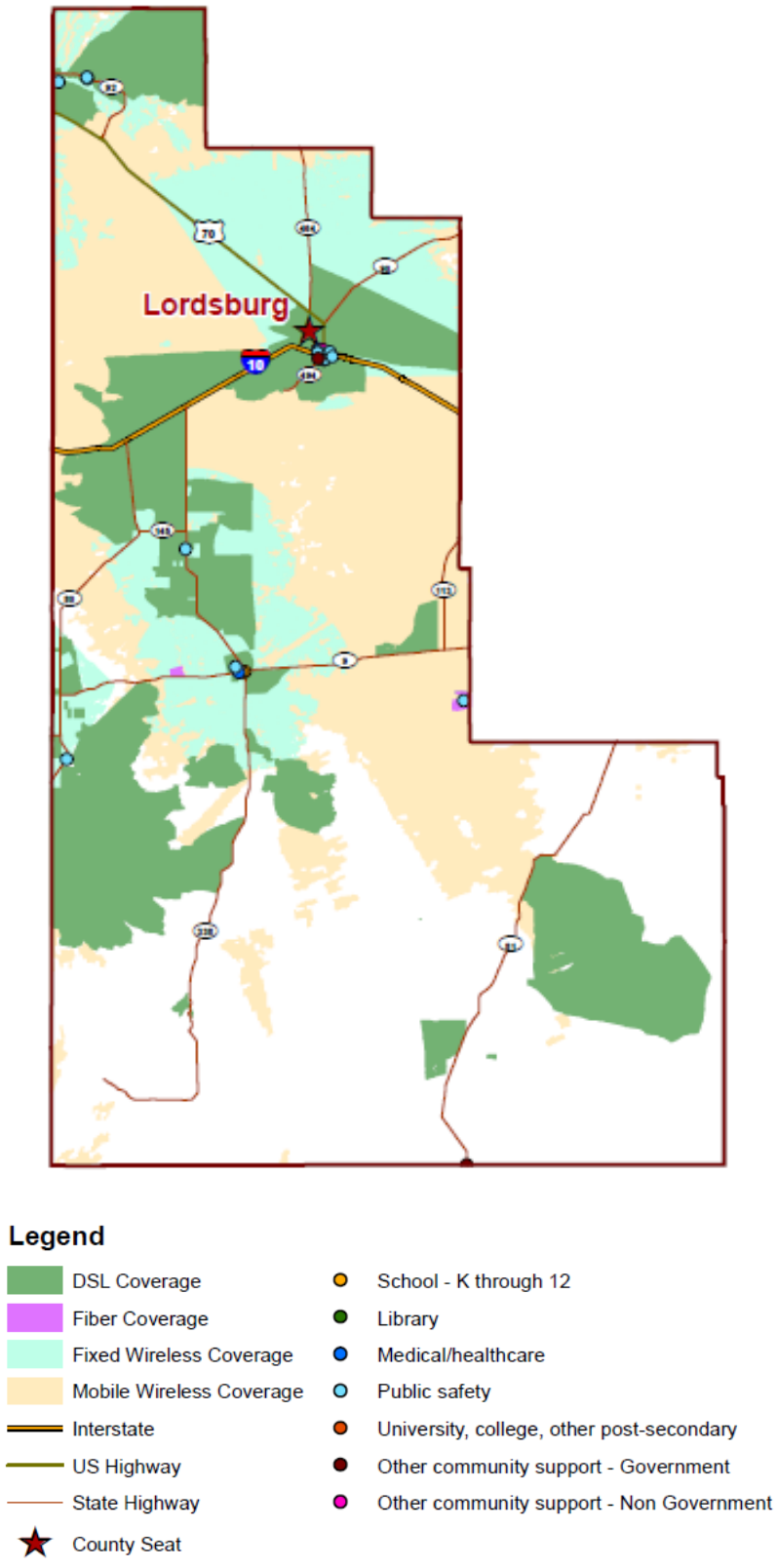
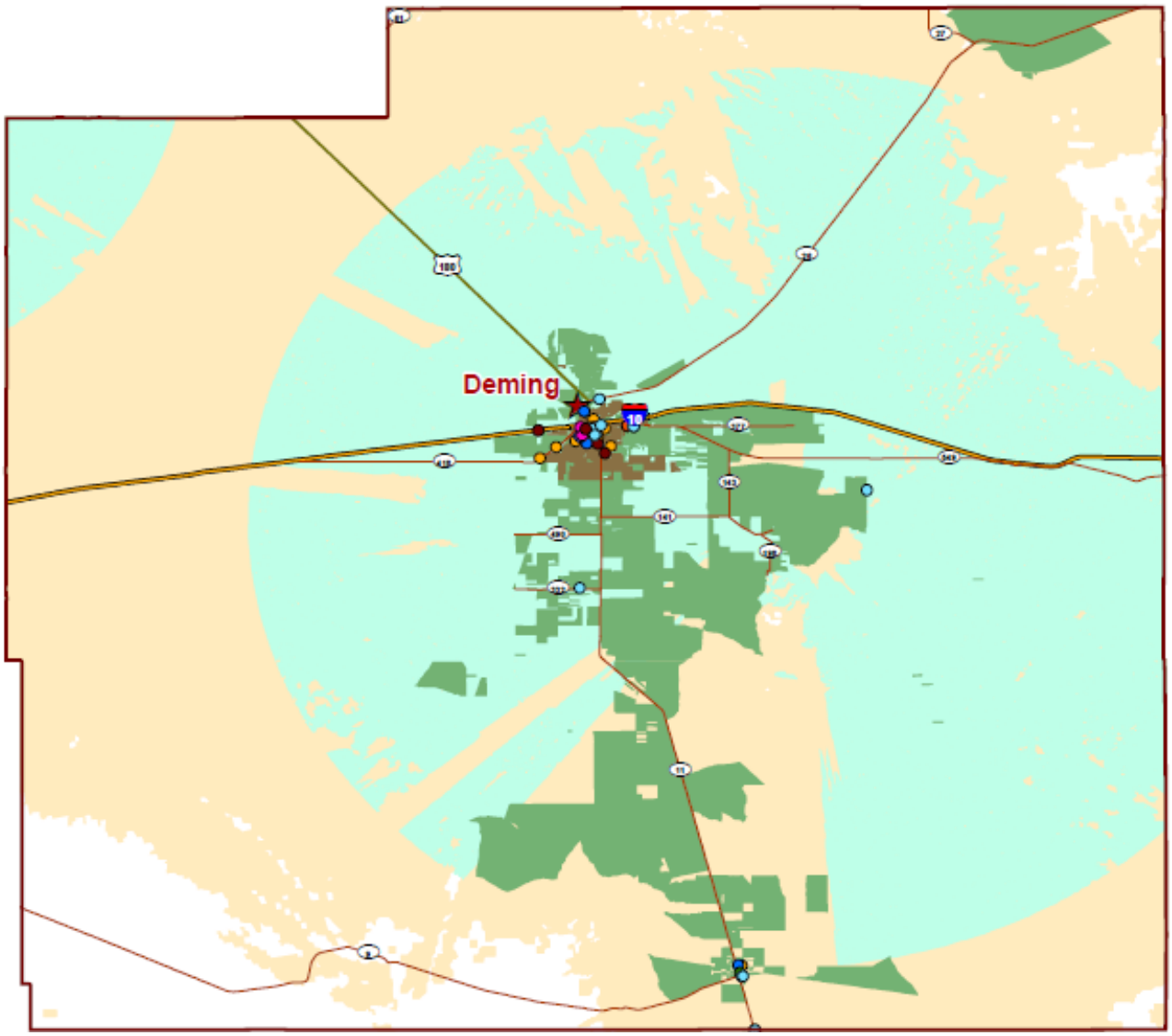


Figure 6: New Mexico Broadband Mapping Program—Broadband Availability in Luna County



Legend

- Cable Coverage
- Copper Wire Coverage
- DSL Coverage
- Fixed Wireless Coverage
- Mobile Wireless Coverage
- Interstate
- US Highway
- State Highway
- County Seat
- School - K through 12
- Library
- Medical/healthcare
- Public safety
- University, college, other post-secondary
- Other community support - Government
- Other community support - Non Government

These rural and sparsely populated counties show a pattern of broadband deployment consistent with many other underserved regions. The population centers, such as Deming and Silver City, include a variety of broadband offerings; in the more remote areas however, particularly within the mountainous regions, wireline broadband coverage is patchy, and carried on DSL circuits only. Wireless broadband is also inconsistent across the region. Fixed wireless service is available in limited zones in each county. Mobile wireless coverage is greater, but falls off in remote areas, and includes only a small amount of high end LTE service.

There is no fiber-to-the-home service in the Southwest Region. Cable modem coverage is, for the most part, limited to the population centers in these counties. Comcast, which is the sole provider of cable modem service in the region, serves the municipalities of Silver City and Deming, the county seats of Grant and Luna counties respectively. These communities, where population density is highest, (albeit still quite low), are outliers in an otherwise underserved part of the state. These population centers, almost exclusively, account for the cable modem availability in the region.

The following table shows the advertised download speeds and costs of home broadband services in the City of Deming for fixed wireless, DSL, and cable services. Since these services reflect availability in one of the few population centers throughout the four counties, this information reflects a best case scenario of service availability for a residential user in the region. Most users throughout the Southwest Region would not have all of these service options available, and many would receive DSL service from different telephone companies (listed above).

Figure 7: Residential Broadband Offerings in Deming[14]

Max. Download	Monthly Cost (Without discounts or modem rental)
Fixed Wireless – TransWorld Network, Corp.	
512 Kbps	$39.95
2 Mbps	$43.95
4 Mbps	$59.95
6 Mbps	$75.95
6 Mbps with increased upload speeds	$86.95
DSL – CenturyLink	
1.5 Mbps	$40

[14] Sources:
http://wi-power.com/rates-plus.html
http://www.centurylink.com/home/internet/
http://www.comcast.com/internet-service.html
Based on searches for service availability in zip codes 88030, June 27, 2013.

Max. Download	Monthly Cost (Without discounts or modem rental)
7 Mbps	$45
12 Mbps	$50
Cable – Comcast[15]	
3 Mbps	$39.95
6 Mbps	$49.95
20 Mbps	$42.95 to $64.95
50 Mbps	$74.95

Comcast's cable service options in Deming are comparable to those in larger urban areas, though some jurisdictions offer higher download speed tiers, and slightly more competitive prices. The following table shows cable service offerings in different jurisdictions for comparison.

Figure 8: Cable Modem Service Offerings in SWNMCOG Region[16]

Max. Download	Monthly Cost (Without discounts or modem rental)
Deming, NM: Comcast	
3 Mbps	$39.95
6 Mbps	$49.95
20 Mbps	$42.95 to $64.95
50 Mbps	$74.95
Denver, CO: Comcast	
3 Mbps	$39.95
6 Mbps	$49.95
20 Mbps	$42.95 to $64.95
50 Mbps	$74.95
105 Mbps	$114.95
Tucson, AZ: Cox Communications	
5 Mbps	$41.99
25 Mbps	$55.99
50 Mbps	$67.99
150 Mbps	$99.99

[15] Comcast modem rental is $7 per month; various discounts are available when bundled with TV and voice service.

[16] Sources:
http://www.comcast.com/internet-service.html
http://ww2.cox.com/residential/arizona/internet/internet-packages.cox?campcode=gntile_r_internet_preferred
Based on searches for service availability in zip codes 88030, 80219, 85716, June 27, 2013.

DSL service is far more prevalent in the region. However, the quality of DSL signal strength varies greatly, and diminishes in remote regions where central offices are farther from end users. In some cases, the signal degrades to the point where service is no longer truly available, though the provider's footprint may show availability that is reflected in the state's broadband mapping efforts. As a result, the true coverage of DSL in the Southwest Region is likely somewhat narrower than shown in the maps above. Finally, although DSL service is slower and less reliable than cable modem service, its price is often comparable to that of cable. It is, therefore, a wireline broadband service that typically only makes sense where no other option is available. The following table shows the advertised pricing for DSL services in the Southwest region.

Figure 9: DSL Service Offerings in SWNMCOG Region[17]

Max. Download	Monthly Cost (Without discounts or modem rental)
DSL – CenturyLink (Deming)	
1.5 Mbps	$40
7 Mbps	$45
12 Mbps	$50
DSL – Cyber Mesa (Silver City)	
1.5 Mbps	$35
3 Mbps	$45
7 Mbps	$59
DSL – WNM Communications - Residential (Silver City)	
256 Kbps	$42.95
512 Kbps	$52.95
756 Kbps	$34.95
1.5 Mbps	$62.95
DSL – WNM Communications - Business	
256 Kbps	$42.95
512 Kbps	$57.95
1.5 Mbps	$72.95
DSL – Valley Telecom	
3 Mbps, bundled with phone	$64.95
5 Mbps, bundled with	$74.95

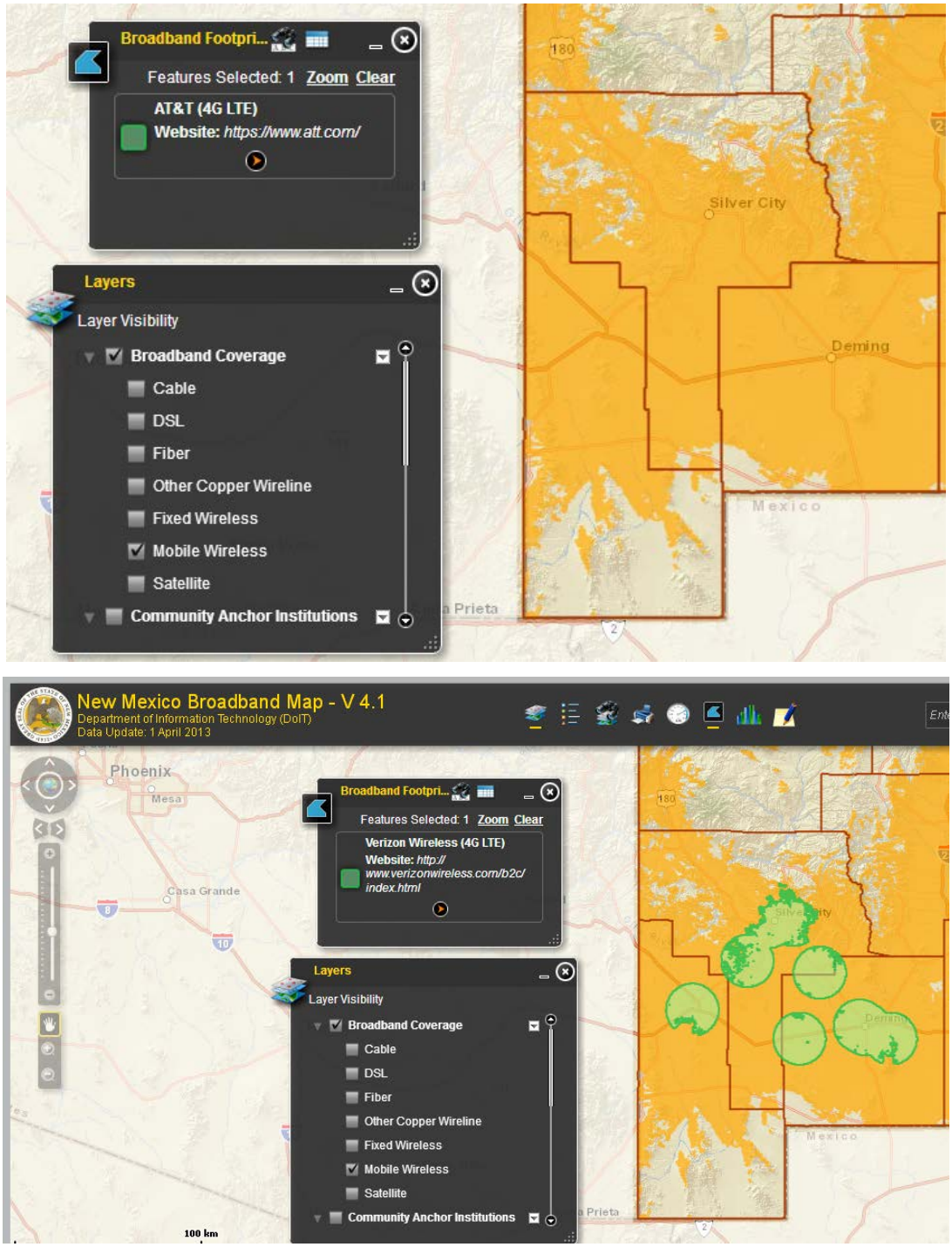
[17] Sources:
http://www.centurylink.com/home/internet/
http://www.cybermesa.com/Standalone.htm
http://www.wnmc.com/hspeed
http://www.vtc.net/page.php?page=internet
Based on availability in zip codes 88030, 80219, and 85716, June 27, 2013.

Max. Download	Monthly Cost (Without discounts or modem rental)
phone	

The service offerings listed in the figures above reflect broadband Internet service only. Discounts and price points vary for services when bundled with TV and voice service.

On the mobile wireless side, most of the region does not have access to 4G LTE service, the most high end mobile service currently available on the commercial market. Only AT&T and Verizon offer 4G LTE service in New Mexico. The following figures show the 4G LTE footprint of AT&T and Verizon within the Southwest Region. LTE coverage is shown in green, and all mobile wireless coverage is shown in orange. AT&T offers no 4G LTE service in the region, while Verizon offers limited coverage.

Figure 10: AT&T and Verizon 4G LTE Coverage in SWNMCOG Region[18]



[18] Source: http://nmbbmapping.org/mapping/, July 1, 2013.

Northeast Region

The Northeast Region comprises the NEEDO jurisdictions. This region is highly rural, and due to its sparse population and expansive, mountainous topography, has large areas that are entirely unserved by wireline broadband. There are, however, a few small swaths of fiber-to-the-premises service availability, provided by local telephone companies. Cable modem and fixed wireless services are also available only in small zones, while DSL service is offered more widely, though still with large areas unserved. Several areas within the region have no broadband service at all, with the exception of satellite, which covers the entire state.

The National Broadband Map (NBM) provides data on broadband coverage for each jurisdiction in the country by population. Figure 11 summarizes wireline broadband coverage as a percentage of population for the seven NEEDO counties by technology type. Figure 12 does the same for wireless broadband coverage. The providers operating facilities in each county are listed on the New Mexico Broadband Map (NMBM).

Comcast is the exclusive provider of cable modem service in the region, but has a very small service footprint. (Note that in San Miguel County, while Comcast does show a few small coverage areas, the NBM reports that 0.0 percent of the population of the county has cable modem service). Multiple service providers offer DSL service across the region, including CenturyLink, Inc., Plateau Telecommunications, Inc., and Sierra Communications.[19] MegaPath apparently offers T-1 circuits for businesses in a small portion of San Miguel County, though the population served is very small.

Figure 11: Wireline Broadband Availability in NEEDO Region

Broadband Technology	County	% Population with Service Available[20]	Operates Facilities in County[21]
Fiber	Colfax	0.3	Baca Valley Telephone Company, Inc. Plateau Telecommunications, Inc.
	Guadalupe	0.0	N/A
	Harding	0.0	N/A
	Mora	6.1	La Jicarita Rural Telephone Cooperative (via Northern New Mexico Telecom)[22]

[19] Panhandle Telephone Cooperative, Inc., though it is listed as a provider on the NMBM, advertises service only in Texas and Oklahoma, which is corroborated by the NBM. http://www.broadbandmap.gov/about-provider/panhandle-telephone-cooperative-inc./nationwide/#, July 3, 2013.
[20] Data provided by the National Broadband Map, last updated June 30, 2012. http://www.broadbandmap.gov/, accessed June 27, 2013.
[21] Providers listed on the New Mexico Broadband Map, http://nmbbmapping.org/mapping/.
[22] http://www.lajicarita.com/services/internet-services/, July 2, 2013.

Broadband Technology	County	% Population with Service Available[20]	Operates Facilities in County[21]
	Quay	28.2	Plateau Telecommunications, Inc.
	San Miguel	0.0	Plateau Telecommunications, Inc. (Appears on the NMBM, but NBM shows 0.0 percent of the population served).
	Union	44.4	Baca Valley Telephone Company, Inc. Plateau Telecommunications, Inc. Level 3 Communications, LLC[23]
Cable	Colfax	0.1	Comcast
	Guadalupe	0.0	N/A
	Harding	0.0	N/A
	Mora	0.0	N/A
	Quay	0.0	N/A
	San Miguel	0.0	Comcast (Appears on the NMBM, but NBM shows 0.0 percent of the population served).
	Union	0.0	N/A
DSL	Colfax	68.2	CenturyLink Plateau Telecommunications, Inc. Sierra Communications
	Guadalupe	91.9	Plateau Telecommunications, Inc.
	Harding	58.7	Plateau Telecommunications, Inc.
	Mora	43.6	La Jicarita Rural Telephone Cooperative
	Quay	75.3	CenturyLink Plateau Telecommunications, Inc.
	San Miguel	69.0	CenturyLink Plateau Telecommunications, Inc.
	Union	77.2	Sierra Communications
Other Copper	Colfax	0.0	N/A

[23] The NBM indicates that Level 3 offers service to a total population of 19 throughout the entire state. Actual availability in the region appears to be negligible. Source: http://www.broadbandmap.gov/about-provider/level-3-communications-llc/in-state-of-new-mexico/, July 2, 2013.

Broadband Technology	County	% Population with Service Available[20]	Operates Facilities in County[21]
(T-1)	Guadalupe	0.0	N/A
	Harding	0.0	N/A
	Mora	0.0	N/A
	Quay	0.0	N/A
	San Miguel	0.0[24]	MegaPath Corporation
	Union	0.0	N/A

[24] NBM reports MegaPath serves a total population of seven in San Miguel County. Source: http://www.broadbandmap.gov/about-provider/platinum-equity-llc/serving-san-miguel-county-in-new-mexico/, June 28, 2013.

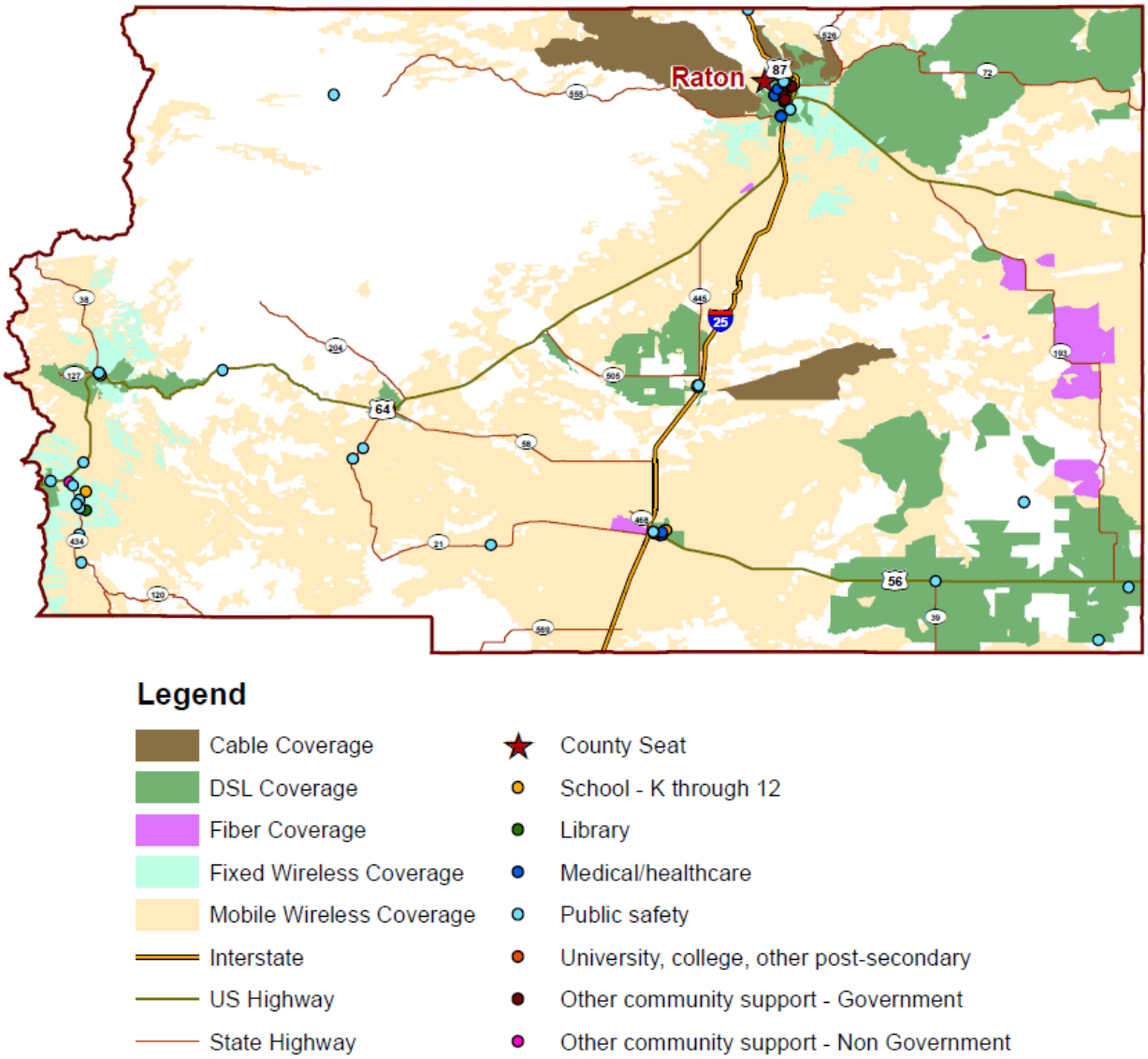
Figure 12: Wireless Broadband Availability in NEEDO Region

Broadband Technology	County	% Population with Service Available[25]	Operates Facilities in County[26]
Wireless (Mobile and Fixed)	Colfax	79.2	AT&T (Mobile) Kit Carson Electric (Fixed) T-Mobile (Mobile) Verizon Wireless (Mobile)
	Guadalupe	85.1	AT&T (Mobile) Sprint (Mobile) T-Mobile (Mobile) Verizon Wireless (Mobile) Southwestern Wireless (Fixed)
	Harding	85.5	Sprint (Mobile) T-Mobile (Mobile) Verizon Wireless (Mobile)
	Mora	20.8	AT&T (Mobile) CNSP, Internet (Fixed) Kit Carson Electric (Fixed) T-Mobile (Mobile) Verizon Wireless (Mobile)
	Quay	96.9	AT&T (Mobile) Plateau Telecommunications, Inc. (Fixed) Southwestern Wireless (Fixed) Sprint (Mobile) T-Mobile (Mobile) Verizon Wireless (Mobile)
	San Miguel	87.0	AT&T (Mobile) CityLink Fiber Holdings, Inc. (Fixed) CNSP, Internet (Fixed) Platueau Telecommunications, Inc. (Fixed) TransWorld Network Corp (Fixed) Verizon Wireless (Mobile)
	Union	89.5	AT&T (Mobile) T-Mobile (Mobile) Verizon Wireless (Mobile)

[25] Data provided by the National Broadband Map, last updated June 30, 2012. http://www.broadbandmap.gov/, accessed June 27, 2013.
[26] Providers listed on the New Mexico Broadband Map, http://nmbbmapping.org/mapping/.

The New Mexico Broadband Mapping Program provides maps of the service footprint of each broadband technology type by county. The following figures show broadband coverage by technology type for each of the seven NEEDO counties.[27]

Figure 13: New Mexico Broadband Mapping Program—Broadband Availability in Colfax County



[27] http://www.doit.state.nm.us/broadband/map_county_availability.shtml, June 27, 2013.

Figure 14: New Mexico Broadband Mapping Program—Broadband Availability in Guadalupe County

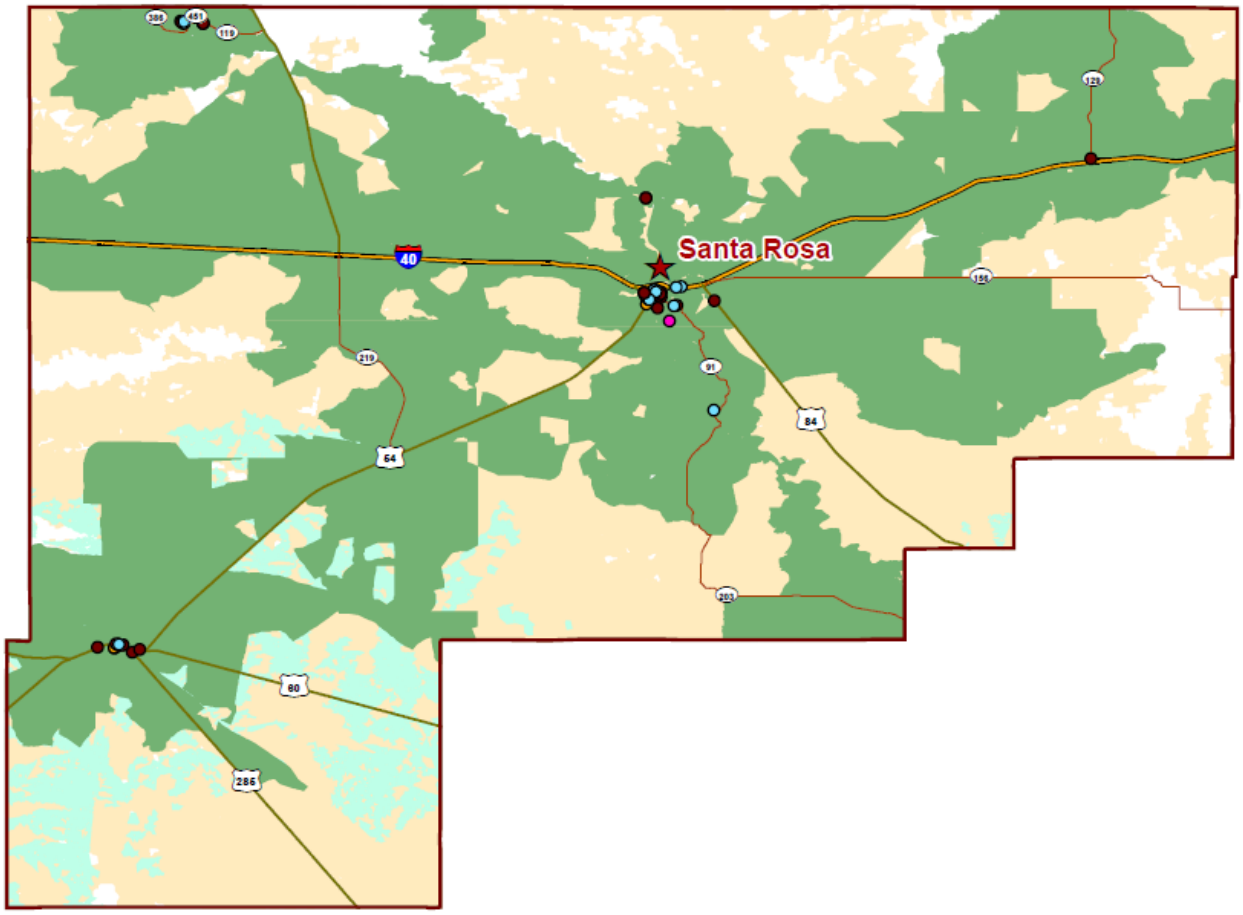


Figure 15: New Mexico Broadband Mapping Program—Broadband Availability in Harding County

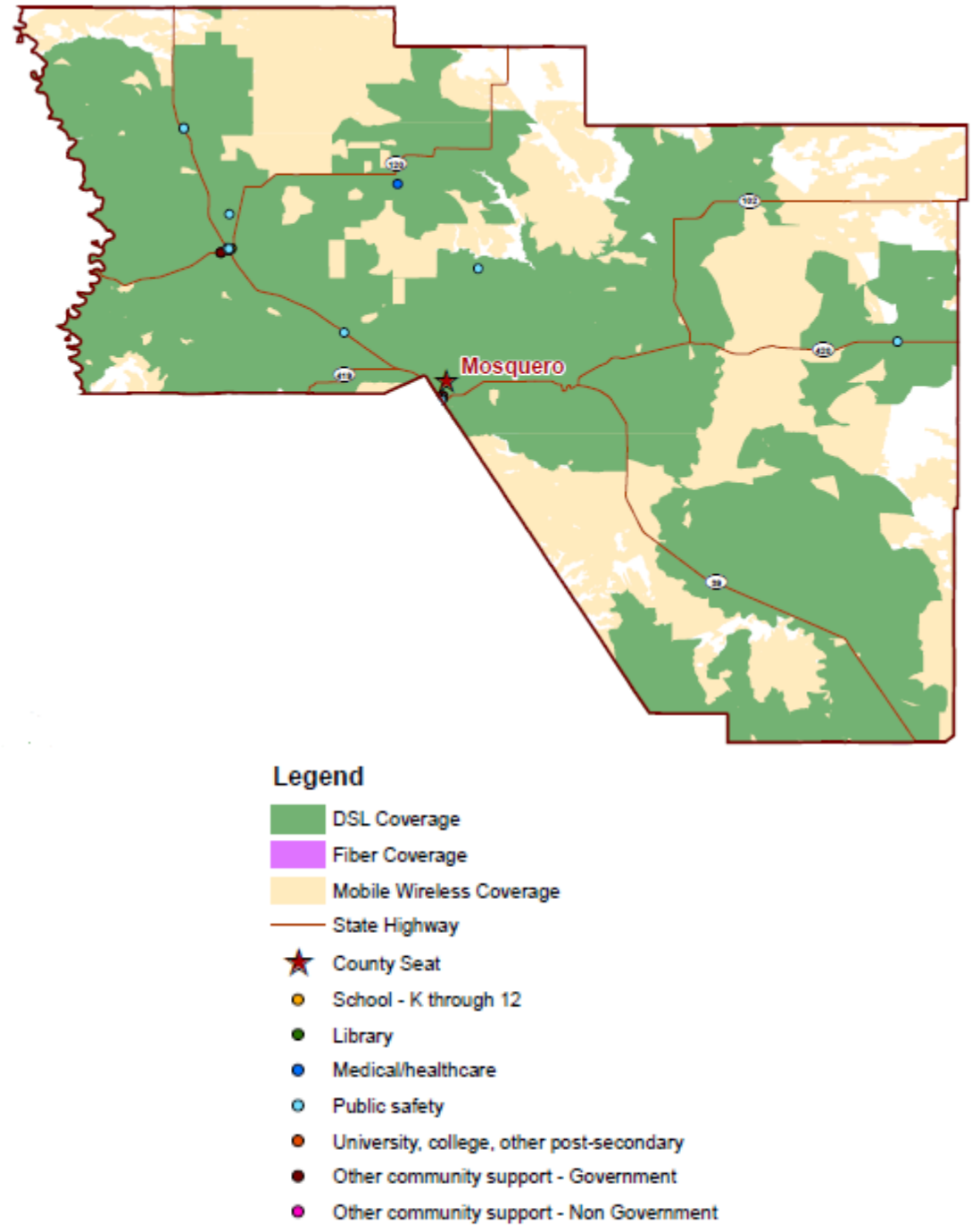


Figure 16: New Mexico Broadband Mapping Program—Broadband Availability in Mora County

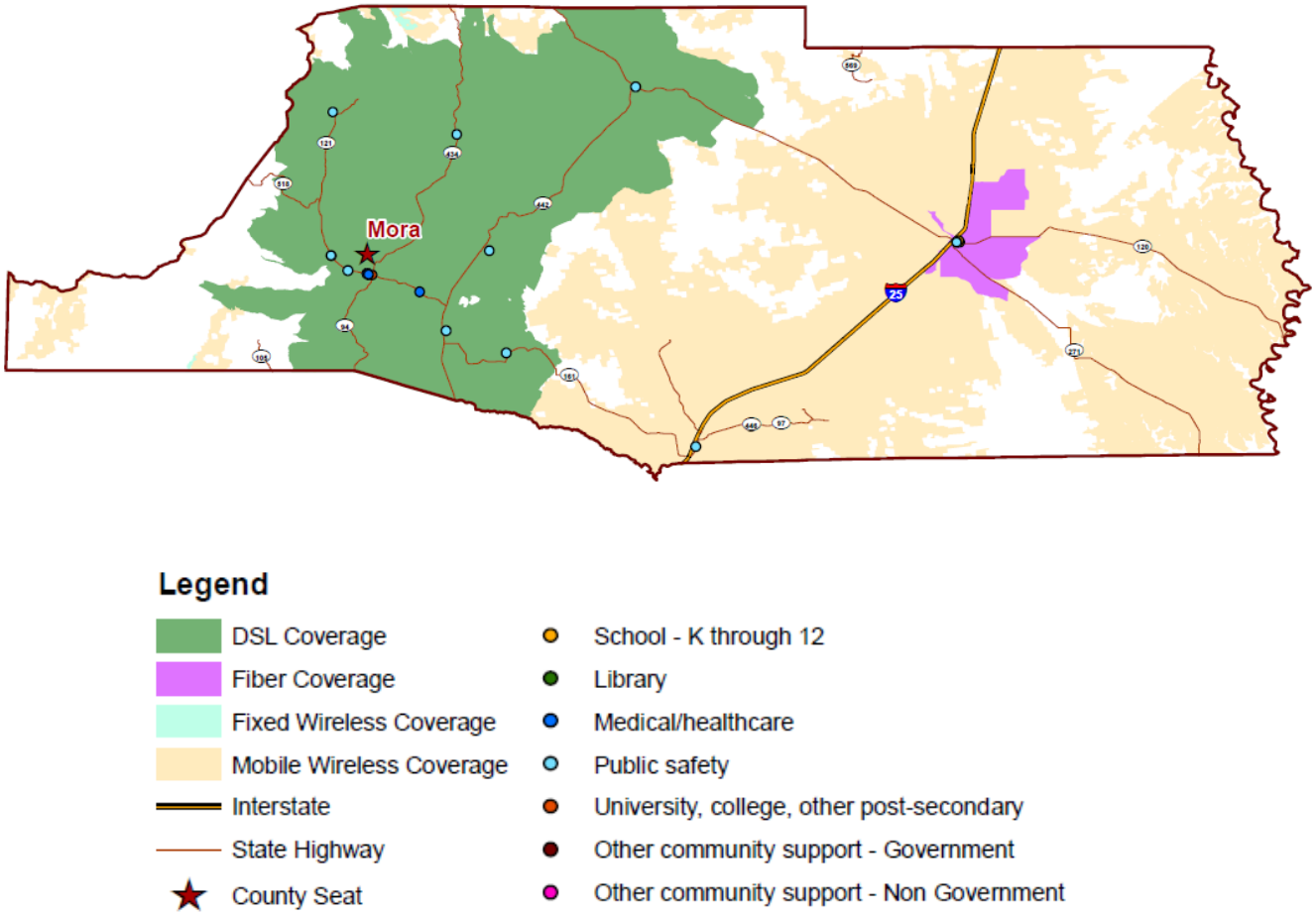


Figure 17: New Mexico Broadband Mapping Program—Broadband Availability in Quay County

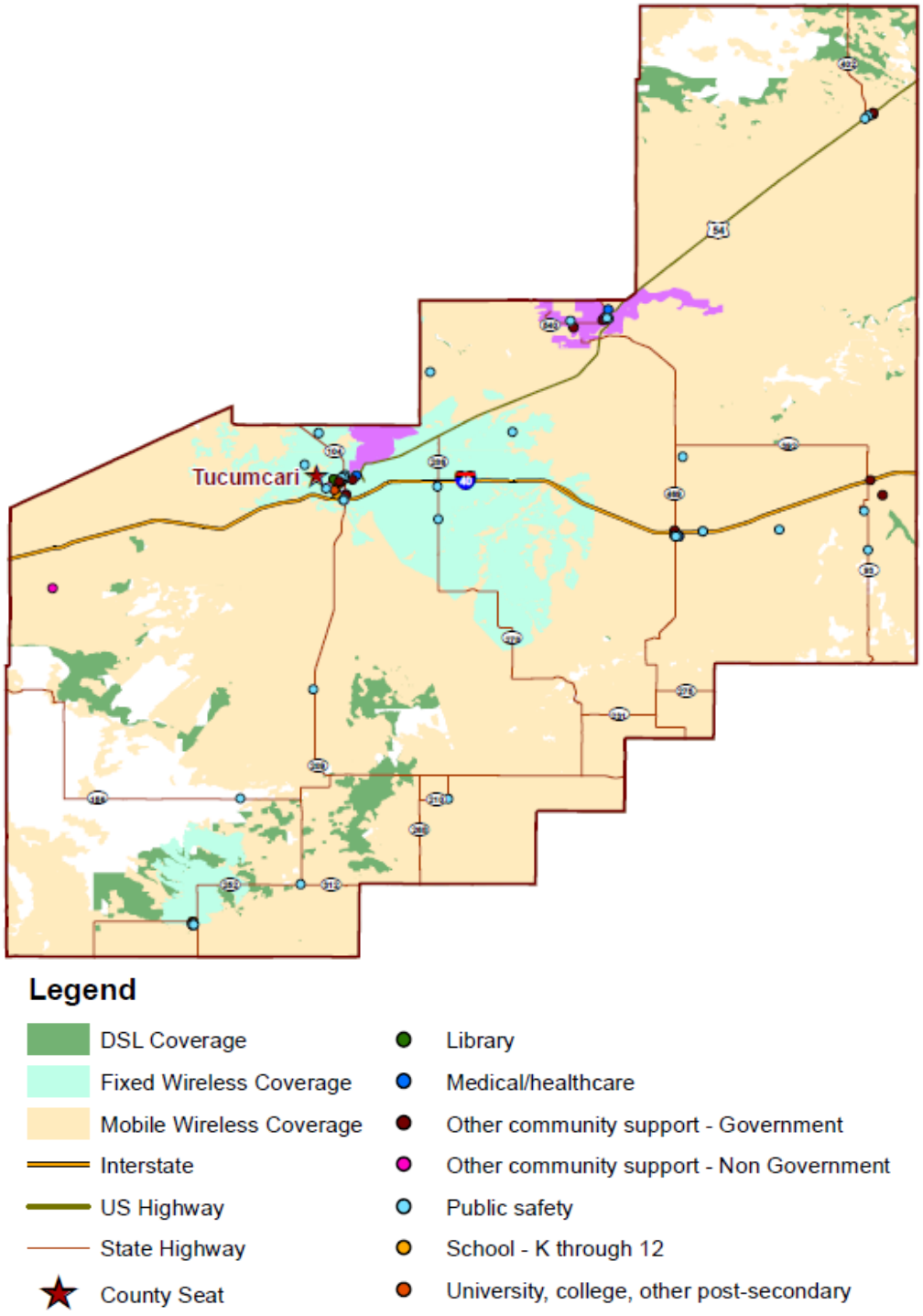
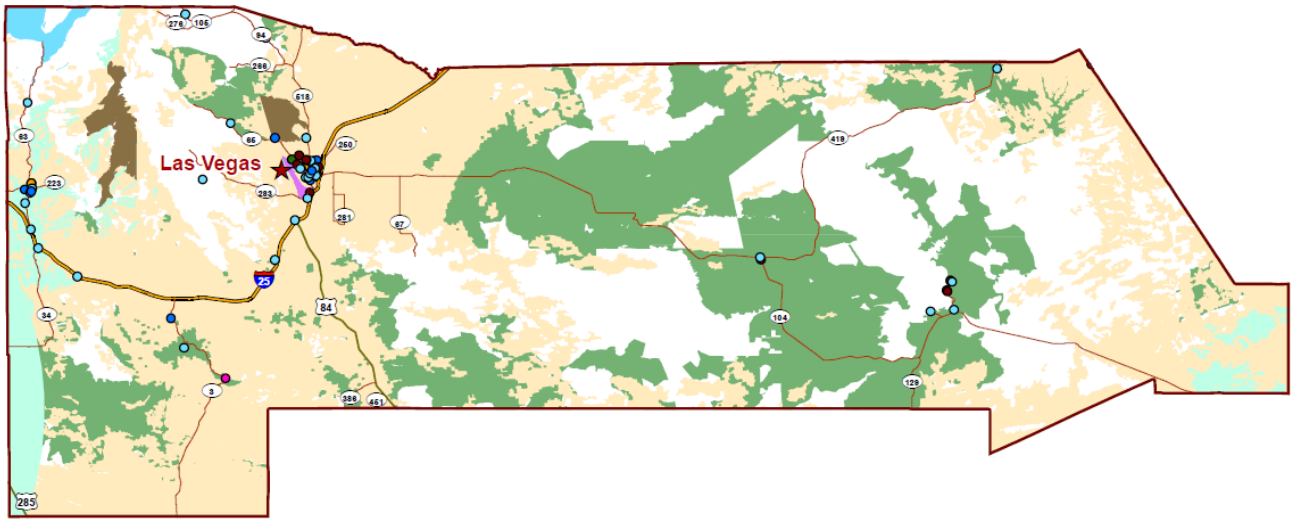


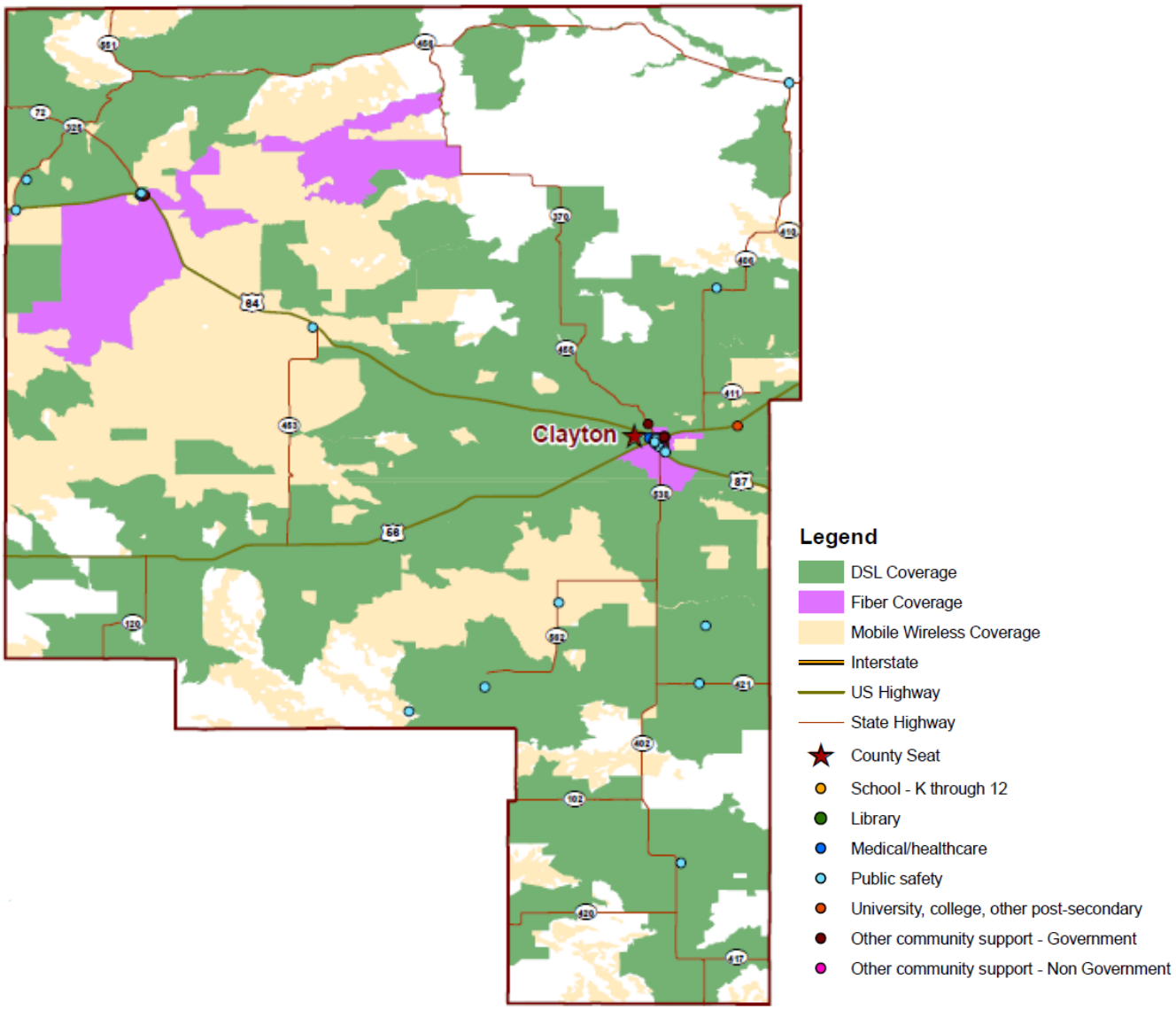
Figure 18: New Mexico Broadband Mapping Program—Broadband Availability in San Miguel County



Legend

- Cable Coverage
- Copper Wire Coverage
- DSL Coverage
- Fiber Coverage
- Fixed Wireless Coverage
- Mobile Wireless Coverage
- Interstate
- US Highway
- State Highway
- County Seat
- Library
- Medical/healthcare
- Other community support - Government
- Other community support - Non Government
- Public safety
- School - K through 12
- University, college, other post-secondary

Figure 19: New Mexico Broadband Mapping Program—Broadband Availability in Union County



These rural and sparsely populated counties show a pattern of broadband deployment consistent with many other underserved regions. The region does contain a few population centers, including Clayton, Las Vegas, Raton, and Tucumcari, which include a variety of broadband offerings; in many of the more remote areas however, particularly within the mountainous regions, wireline broadband coverage is patchy, and exclusively carried on DSL circuits. Wireless broadband is also inconsistent across the region. Fixed wireless service is mostly unavailable in the region; a number of providers do offer service, but the service footprint is quite limited and peripheral to the region as a whole. Mobile wireless coverage is greater, but falls off in remote areas, and includes only a small amount of high end LTE service. Fiber-to-the-home service is mostly unavailable in the Northeast Region; however, local telephone companies offer fiber service to a minority of the populations of Mora, Quay, Union

counties, and to a lesser extent, Colfax County. Fiber availability is scattered, but is generally concentrated in the small areas of greater population density, such as Las Vegas and Clayton. Nor does fiber serve all residents of these communities. The most comprehensive coverage appears to be in Clayton, where the NBM reports 70.3 percent access to fiber.[28] These communities, where population density is highest, (albeit still quite low), are outliers in an otherwise underserved region.

There is even less cable modem coverage. Comcast, which is the sole provider of cable modem service in the region, shows a service footprint in Colfax and San Miguel Counties, but the NBM shows that a negligible number of residents are served in those jurisdictions. Cable modem service is essentially not deployed in the Northeast Region.

The following table shows a sample of advertised download speeds and costs of home broadband services for fixed wireless, DSL, and fiber services. These offerings are based on advertised availability in Tucumcari, one of the better served communities in the region. Different services often do not overlap with each other in their specific coverage areas in this region. Most users throughout the Northeast Region would not have all of these service options available, and many would receive service from different providers (listed in Figure 11 and Figure 12 above).

Figure 20: Residential Broadband Offerings in Tucumcari[29]

Max. Download	Monthly Cost (Without discounts or modem rental)
Fixed Wireless – Plateau	
384 Kbps	$24.95
1.5 Mbps	$34.95
2.0 Mbps	$59.95
DSL – CenturyLink	
1.5 Mbps	$40
7 Mbps	$45
12 Mbps	$50
Fiber – Plateau	
3 Mbps	$29.95
5 Mbps	$39.95
10 Mbps	$49.95
20 Mbps	$69.95

[28] Source: http://www.broadbandmap.gov/summarize/state/new-mexico/census-places/clayton, accessed July 1, 2013.

[29] Sources:
http://www.plateautel.com/internet_plans.asp?ServiceType=Tucumcari
http://www.centurylink.com/home/internet/
Based on searches for service availability in zip code 88401, July 1, 2013.

The following table shows service offerings from fiber Internet providers La Jicarita Rural Telephone Cooperative and Plateau Telecommunications, Inc. in the Northeast Region. For comparison, Verizon FiOS fiber optic service offerings are displayed for the community of Colleyville, Texas. These offerings include greater speeds, and lower cost-to-speed ratios than those in the Northeast Region.

Figure 21: Fiber Broadband Offerings in Northeast Region[30]

Max. Download	Monthly Cost (Without discounts or modem rental)
Fiber and DSL – La Jicarita - Residential[31]	
256 Kbps	$19.95
1.5 Mbps	$39.95
3 Mbps	$59.95
6 Mbps	$79.95
15 Mbps	$99.95
Fiber and DSL – La Jicarita - Business[32]	
1.5 Mbps	$99.90
3 Mbps	$139.95
6 Mbps	$199.95
15 Mbps	$299.95
Fiber and DSL – La Jicorita - Preferred Business (Symmetrical Download/Upload)[33]	
5 Mbps	$400.00
10 Mbps	$800.00
Fiber – Plateau - Residential	
3 Mbps	$29.95
5 Mbps	$39.95
10 Mbps	$49.95
20 Mbps	$69.95
Fiber – Plateau - Business	
3 Mbps	$39.95

[30] Sources:
http://www.plateautel.com/internet_plans.asp?ServiceType=Tucumcari
http://www.plateautel.com/business_internet_fiber_clovis.asp
http://www.nnmt.net/hsi.shtml
https://www22.verizon.com/home/shop/shopping.htm
http://www.verizon.com/smallbusiness/bundleOverview.jsp?smbReferenceValue=SMBBBundlesRef#
Based on searches for service availability in zip codes 88401, 76034, July 1 and 2, 2013.

[31] Includes DSL rates as well (listed offerings do not distinguish by technology type). Additional $95 setup fee applies.

[32] Id.

[33] Setup fee is $60 per hour for Preferred Business.

Max. Download	Monthly Cost (Without discounts or modem rental)
8 Mbps	$69.95
10 Mbps	$129.95
20 Mbps	$259.95
Fiber – Verizon FiOS – Colleyville, TX (2-year contract)[34] – Residential	
15 Mbps	$69.99
50 Mbps	$79.99
75 Mbps	$89.99
Fiber – Verizon FiOS – Colleyville, TX (2-year contract)[35] - Business	
15 Mbps	$69.99
50 Mbps	$79.99
75 Mbps	$99.99
150 Mbps	$169.99
300 Mbps	$259.99

DSL service is far more prevalent in the region. However, the quality of DSL signal strength varies greatly, and diminishes in remote regions where central offices are farther from end users. In some cases, the signal degrades to the point where service is no longer truly available, though the provider's footprint may show availability that is reflected in the state's broadband mapping efforts. Therefore, the true coverage of DSL in the Northeast Region is likely somewhat narrower than shown in the maps above. Finally, although DSL service is slower and less reliable than fiber service, its price is often comparable to that of cable modem or fiber service. It is, therefore, a wireline broadband service that typically only makes sense where no other option is available. The following table shows the advertised pricing for DSL services in the Northeast Region. (Note: DSL offerings from La Jicarita Rural Telephone Cooperative are listed in Figure 21, as they are listed together with fiber offerings. Sierra Communications, Inc., an affiliate of Baca Valley Telephone Company, Inc., resells CenturyLink DSL service at unadvertised prices.[36])

[34] Higher rates for no contract plans.
[35] Id.
[36] http://www.bacavalley.com/highspeed.htm, July 3, 2013.

Figure 22: DSL Service Offerings in NEEDO Region[37]

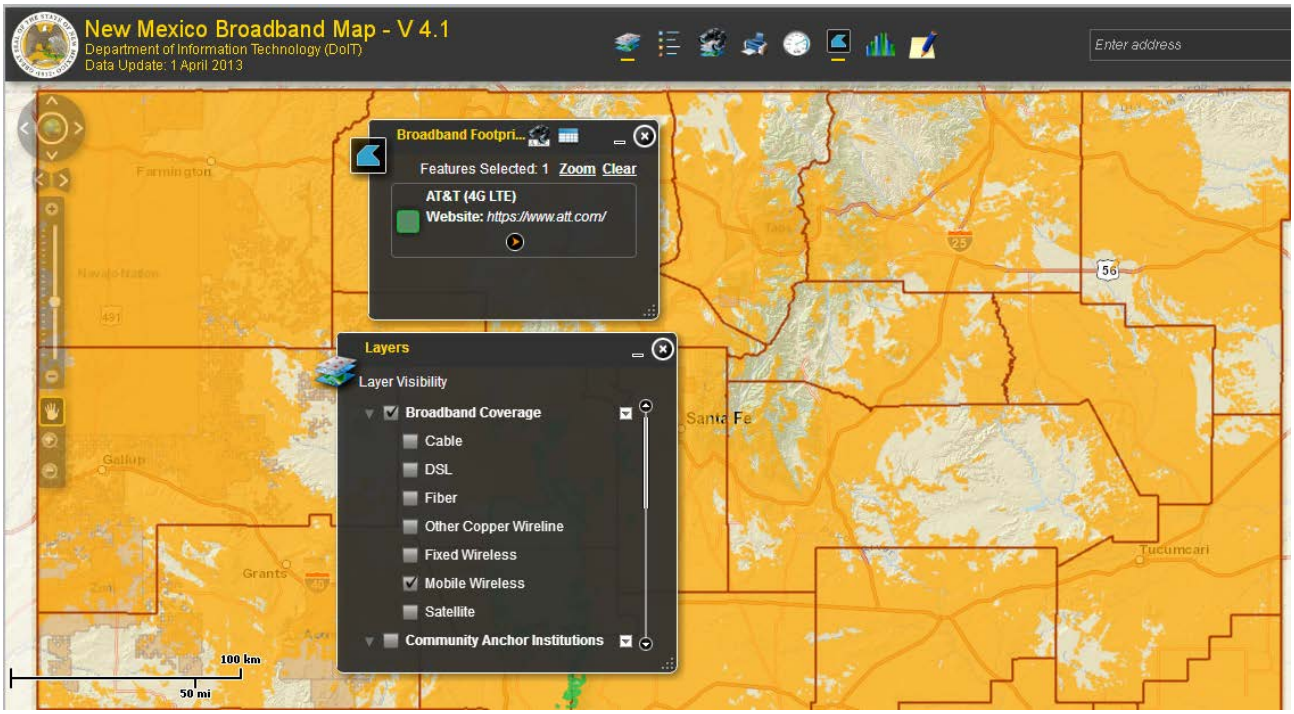
Max. Download	Monthly Cost (Without Discounts)
DSL – CenturyLink (Raton)	
1.5 Mbps or 3 Mbps	$29.95
DSL – Plateau - Residential	
1.5 Mbps	$34.95
3 Mbps	$39.95
6 Mbps	$59.95
10 Mbps	$99.95
DSL – Plateau – Business	
3 Mbps	$39.95
6 Mbps	$59.95
10 Mbps	$99.95
15 Mbps	$149.95
24 Mbps	$189.95

The service offerings listed in the figures above reflect broadband Internet service only. Discounts and price points vary for services when bundled with TV and voice service.

On the mobile wireless side, the region has virtually no access to 4G LTE service, the most high end mobile service currently available on the commercial market. Only AT&T and Verizon offer 4G LTE service in New Mexico. The following figures show the 4G LTE footprint of AT&T and Verizon within the Northeast Region. LTE coverage is shown in green, and all mobile wireless coverage is shown in orange. AT&T offers no 4G LTE service in the region; Verizon's 4G LTE coverage extends very slightly across the southernmost border of Quay County, but no further.

[37] Sources:
http://www.centurylink.com/home/internet/
http://www.plateautel.com/internet_plans.asp?ServiceType=coop
https://www22.verizon.com/home/shop/shopping.htm.
Based on searches for service availability in zip code 87740, July 3, 2013.

Figure 23: AT&T and Verizon 4G LTE Coverage in NEEDO Region[38]



[38] Source: http://nmbbmapping.org/mapping/, July 1, 2013.

The New Mexico Broadband Program

Pilot Area Technology Plans

Version 1, September 31, 2013

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	
http://www.doit.state.nm.us/broadband/	http://www.ctcnet.us/

Memorandum

Date: September 30, 2013

From: Joanne Hovis
President / Director of Business Consulting

To: Gar Clarke
Broadband Program Manager
Department of Information Technology
State of New Mexico

Subject: *Technology Vision for Meeting Broadband Needs of Unserved Pockets of Population in Pilot Regions*

Through the process of community meetings and stakeholder conversations, the Regional Broadband Implementation Plan (RBIP) team has determined and vetted with stakeholders the priorities for broadband planning in the two selected pilot regions. The goal of this deliverable is to provide a technology vision for addressing the key priority identified in both regions: unserved residential areas in which small pockets of population cannot access any form of broadband at all.

This memorandum describes the technology strategies and specific technologies we recommend for consideration in addressing these priorities. In broad outline, we recommend working with existing private providers to expand their existing cable, DSL, and wireless broadband offerings—each of which qualifies as basic (if not state-of-the-art) broadband for purposes of the federal definition of broadband and of federal funding programs.

In the event that these technical strategies do not expand broadband to the unserved areas identified, we recommend "Plan B," in which local communities and non-profits are empowered to build and operate small wireless networks that seek to fill these unserved gaps that are of no business interest to the private providers. This memorandum outlines both Plans A and B.

Background: Prioritization of Goals Based on Field Work Conducted During the Summer of 2013

CTC has now conducted multiple rounds of research and analysis of the both regional pilot areas during multiple meetings with leadership and stakeholders of the **Southwest New Mexico**

Council of Governments (SWNMCOG) and the **North East Economic Development Organization (NEEDO)** in June, July, and August, 2013.

In both regions, we anticipate and recommend a focus on residential broadband, specifically, on unserved pockets of population where there is no broadband availability at all.

The strategies we propose here are designed to provide service to currently unserved residences. We selected target areas for this implementation based on the State of New Mexico's broadband map, input from the stakeholders in the pilot regions, and our own drive test of broadband coverage in the regions. These areas are based on first cut analyses and we fully expect that further input from stakeholders, including the providers in these regions, will enable us to refine this map.[39] We have actively solicited stakeholder input in a range of ways:

1. We consulted with local officials and community representatives during on-site meetings in Las Vegas and Silver City.

2. We distributed a memorandum to leadership in both pilot areas for further distribution to their stakeholders seeking input as to the areas that are unserved. That memorandum is attached to this document as Appendix A.

3. We discussed existing and potential coverage areas with some providers in the pilot areas so as to benefit from their expertise and familiarity with the regions.

The initial sites we identified include the following:

Table 1: SWNMCOG Region Target Sites

Site Description	Latitude/Longitude
Animas (Hidalgo County)	32°37'33.79"N/107°52'12.79"W
Apache Hills Dr. NW (Luna County)	32°19'3.53"N/107°46'14.43"W
Faywood (Grant County)	32°37'33.79"N/107°52'12.79"W
NM-12, approximately 1 mile west of NM-435 in Reserve (Catron County)	33°42'58.23"N/108°46'18.47"W
Rodeo (Hidalgo County)	31°50'7.57"N/109° 1'52.86"W
Tennyson Drive NE, north of Deming (Luna County)	32°18'33.44"N/107°44'18.87"W

[39] We also note that we anticipate that some providers will assist us to further refine this map; for example, we were unable to include CenturyLink DSL coverage in our analysis of whether an area in the northeast is served because those data have not been provided to the New Mexico Broadband Program. As a result, some of the areas contemplated here may have DSL service available.

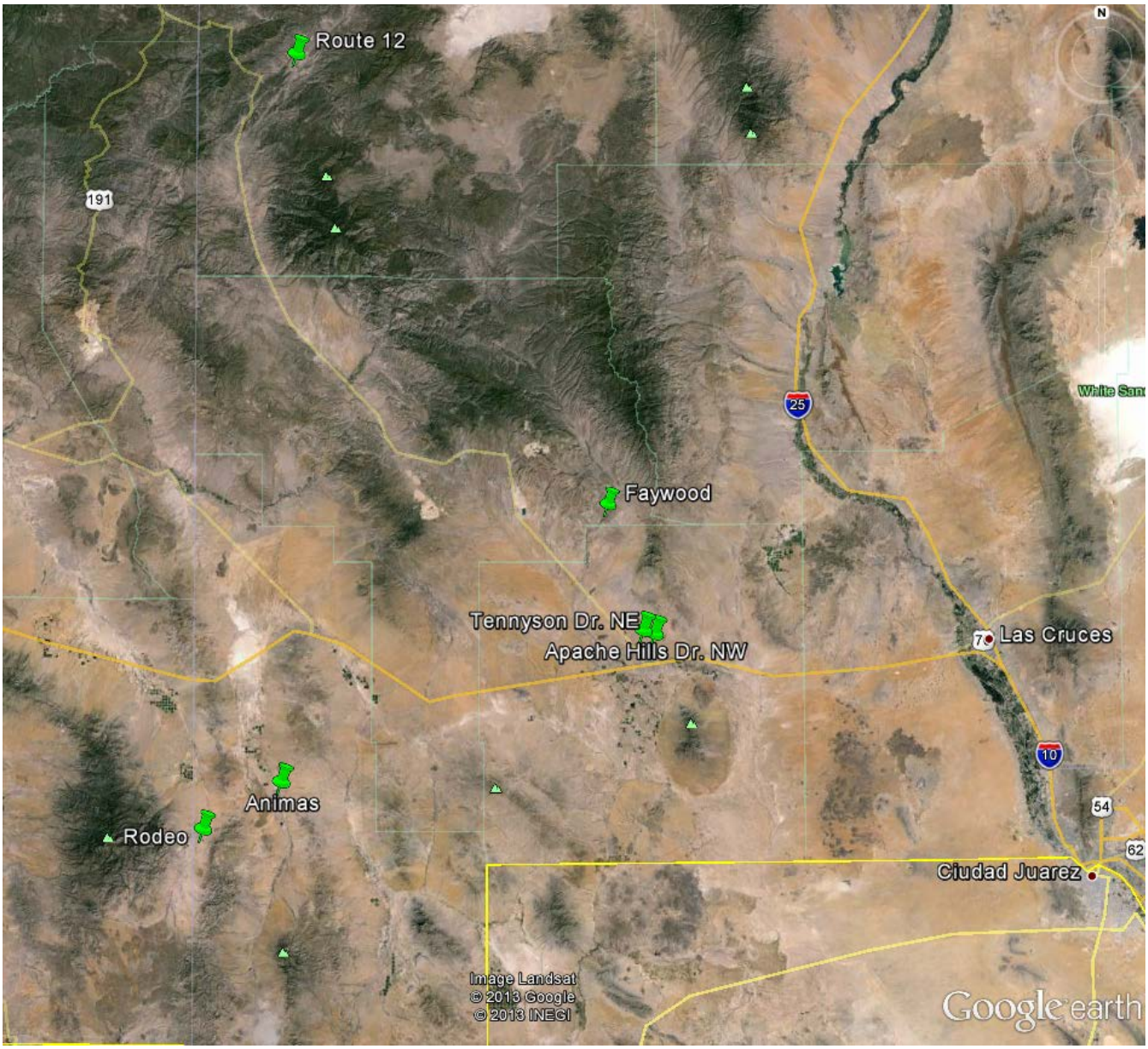


Figure 24: SWNMCOG Region Target Sites

Table 2: NEEDO Region Target Sites

Site Description	Latitude/Longitude
Capulin (Union County)	36°44'28.63"N/103°59'39.04"W
Calle de Leon Rd. (San Miguel County)	35°31'5.73"N/105°15'24.76"W
I-25 and US-84 Interchange (San Miguel County)	35°31'16.23"N/105°14'56.06"W
Miami (Colfax County)	36°21'0.13"N/104°47'34.98"W
Mosquero (Harding County)	35°46'37.14"N/103°57'23.90"W
Watrous (Mora County)	35°47'26.34"N/104°58'54.65"W

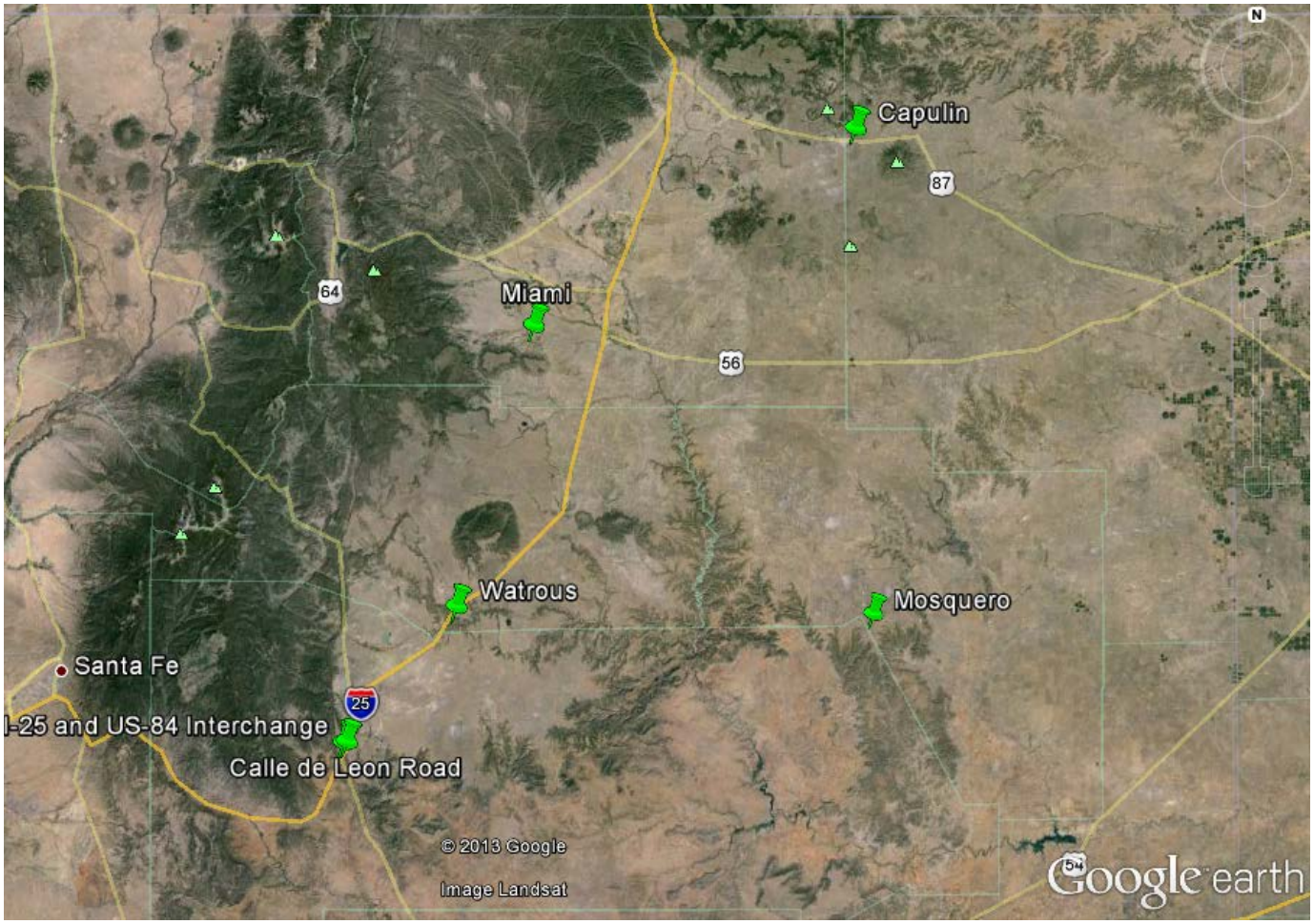


Figure 25: NEEDO Region Target Sites

Technology Plan A: Work With Local Providers to Expand Existing Cable Modem, DSL, and Wireless Broadband Service

The ideal model is for local service providers to expand services to the unserved areas. The best-equipped provider to reach an area is the one who is already adjacent or close to the unserved area. As we plan for how to address the needs of the unserved areas identified by the pilot regions, it is important to understand how different broadband technologies can support different uses and applications.

This section of the memorandum chapter will provide short discussions of the main types of broadband technologies that may be extendable to the unserved areas. Each sub-section will examine the properties of the technology in question, its advantages and disadvantages, the applications that it can or cannot support, its scalability to meet future demands, and the means by which it can be potentially be extended to unserved areas addressed in this project.

As a preliminary matter, we note that simple availability does not necessarily lead to a cost-effective, reliable, or even a useable service. In order to effectively implement Plan A, the service provider needs to provide a solution with 1) enough capacity for the community—with enough central office, cabinet capacity and backhaul for all potential customers, 2) affordable service and pricing options, and 3) service that are aligned with the community's needs.

Capacity can be limited even in areas that are claimed to be "served." For example, in our experience in New Mexico, we have observed some of the following challenges:

1. Insufficient equipment to provide DSL to all who demand it. In other words, DSL is "available" in the area but there is insufficient capacity to add new customers.

2. Old copper phone lines incapable of carrying adequate DSL. In this circumstance, the infrastructure appears to be present but is in actuality incapable of supporting the service needs of the community.

3. Heavily oversubscribed backhaul connections sharing a few megabits per second among hundreds of homes, businesses, and anchor institutions. In this case, customers pay for service and are promised "up to" certain broadband speeds, but the high number of users relative to the capacity result in actual speeds that do not meet the definition of broadband.

Affordability can be provided by offering lower priced entry-level services or making the services available in public libraries, community centers, or other public places for individuals who cannot afford to subscribe.

Finally, services need to align with the needs of the community for work, education, and other growth. A highly limited service with a monthly bandwidth cap will limit how people can do remote learning or telemedicine on the Internet, will put community schoolchildren behind in a world where paper textbooks are being phased out and curriculum posted online, and set communities back when the rest of the world is purchasing through e-commerce, and viewing entertainment on streaming video instead of renting videos and DVDs. A service with latency and frequent starts and stops and outages has the same limitation. Therefore there needs to be a service option that matches technically at least with the entry-level service available in serviced areas. This is the goal toward which we will work with local carriers.

Twisted-pair Copper/DSL Networks

One of the predominant physical media supporting communications within the U.S. continues to be twisted-pair copper wiring. These are the legacy copper lines used for traditional telephone service. Copper wiring conducts data as electrical signals at various frequencies. For example, dial-up internet service via the telephone network is provided on the same small band of lower-end frequencies used to transmit basic voice service. The relatively narrow spectrum is the reason for the slow speeds of dial-up connections. Because dial-up modems use the full voice circuit, they cannot be used simultaneously with traditional telephone calls on the same line.

Digital Subscriber Line (DSL) service utilizes the same legacy copper telephone lines as dial-up, but the technology transmits data at higher and wider frequencies separate from those used for voice calls. This enables DSL technology to provide speeds faster than dial-up and allow for simultaneous use with traditional telephone voice service.

The main advantage of copper based DSL technology is the wide availability of copper telephone lines. Traditional copper wire networks have proven to be highly adaptable, and various updates to DSL technology have allowed speeds to modestly increase over the past two decades.

Regardless of these incremental advancements, broadband over copper wiring will always be limited the physical properties of copper lines. Typical DSL lines can provide theoretical download speeds of up to 25 Mbps. Research and development continues to determine methods to deliver even higher speeds but any future developments will continue to be subject to the physical limits and security concerns for a network that relies on copper wiring for the whole or part of the broadband service.

As previously noted, DSL relies on electrical signals to transmit data. The signals degrade substantially over distances of a few miles, and higher frequency signals degrade more quickly. Thus, the *length* of a copper line is a key determinant of the performance of a

connection. The characteristic is especially relevant for DSL since it utilizes the higher frequencies that degrade over distance. The physical limit of electrical signals is why DSL service is only available relative to proximity to certain network operator equipment.[40] Residents who live more than 2 or 3 miles away from these locations will not be able to get DSL service at their home. Those residents within this radius can subscribe to DSL, but at download and upload speeds that will vary based on their location relative to the network equipment. Only those who live in very close proximity will be able to enjoy the highest speeds the network can deliver as actual speeds begin to decline after only a few thousand feet from certain network equipment.

In addition, DSL services typically offer far slower upload speeds than download speeds. The ratio of broadband download speeds to upload speeds varies, but most residential upload speeds are limited to 1 to 2 Mbps, compared to up to 10 Mbps for some DSL connections. The choice to design asymmetrical speeds was an engineering decision as copper-based networks are capable of offering symmetrical service. The assumption was that the typical residential broadband customer would consume much more data than they would share. Therefore network capacity was divided in such a way to prioritize downloading data over uploading it.

Slower upload speeds were less of a concern when broadband users were primarily consumers of data, i.e. browsing websites and downloading content, but use is increasingly shifting to applications that require faster upload speeds. In order to share pictures, videos, or other content, as well as use services like video conferencing, connections must have reliable upstream capacity. Businesses value higher upload speeds as well because they enable the quick transfer of large work product files for easy collaboration and review, use of cloud computing services, and high quality video conferencing applications.

Because of its physical limitations DSL is also not able to offer high levels of security or reliability as other broadband technologies. This can pose some concerns for applications and services utilized by police departments and first responders that require a reliable and secure connection. For example, data transmitted over copper lines is less secure. The same characteristic that causes “signal leakage” interference means it is possible to detect the signal and monitor the contents as it passes or to physically “tap” into a line.”

Finally, electrical signals running along copper lines are also susceptible to electromagnetic interference that can negatively affect performance. Such electrical interference can come from a host of sources including power lines, neighboring copper lines or even from the Sun in the form of electromagnetic solar flares. Copper lines must be properly insulated so that their

[40]Here the main piece of networking equipment is the central office terminal or a remote digital subscriber line access multiplexer (DSLAM).

signals are safe from interference, or from causing interference themselves through “signal leakage.” Finally, copper wiring, like other metals, can corrode physically over time. Metal conductors are also particularly susceptible to water damage, which disrupts electrical signals. Any physical degradation of the transmission lines negatively impacts the quality of the signal, reducing the broadband speeds the damaged copper line can support.

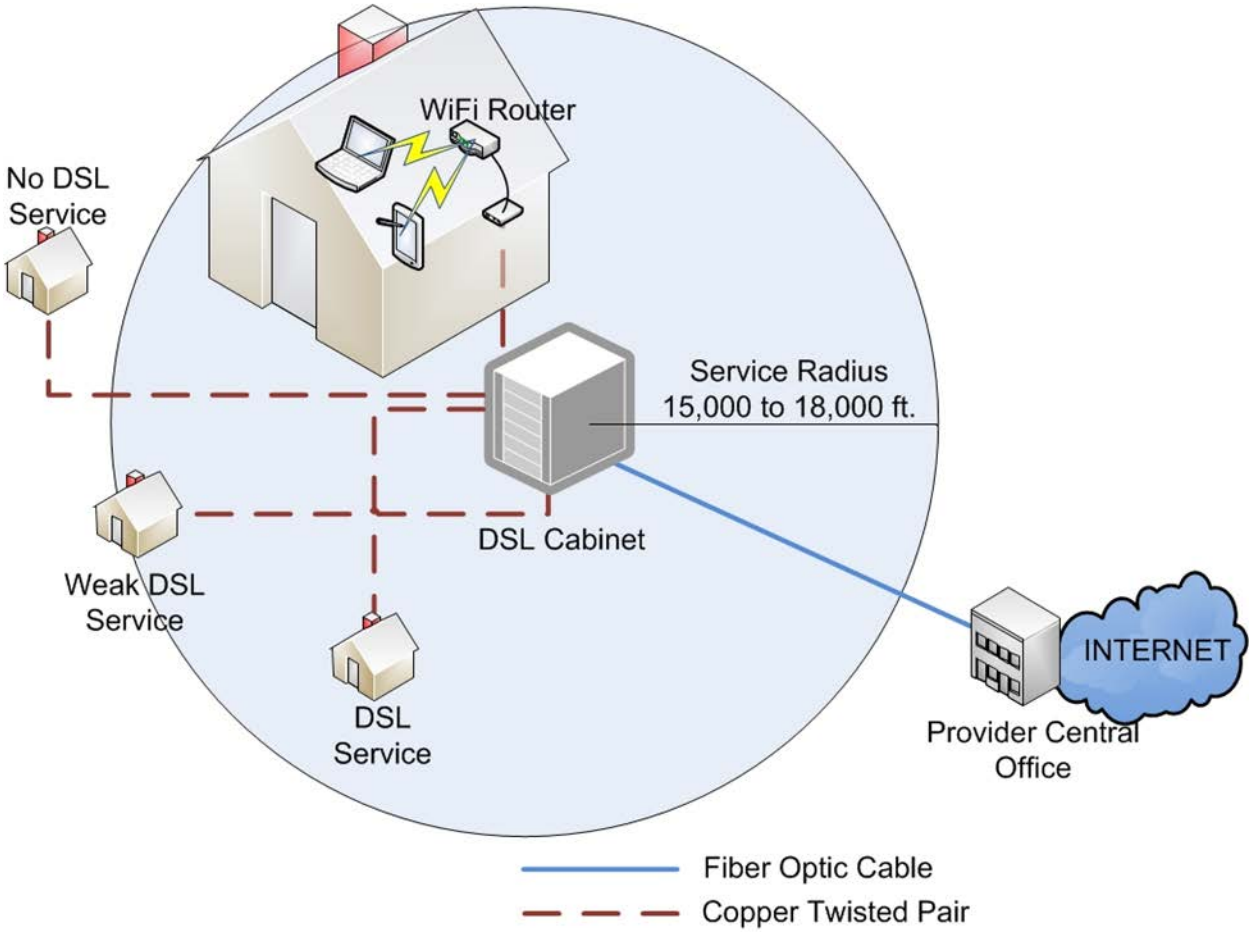


Figure 3: DSL Technical Capabilities

Table 3: DSL Technology's Capability to Support Various Online Activities and Applications

Good	OK	Bad
	• Online distance learning • Tele-commuting / working remotely	• Download large file [HD movie, ~5GB] • Tele-health • High-definition video conference

NOTE: Ratings based on speed range of 8 Mbps download, 1 to 2 Mbps upload.

Expanding DSL Networks to Serve Unserved Areas

In the case of a DSL provider, expanding service requires expanding wireline cable to the service area. This requires bringing fiber optics to within three cable miles of all the premises to be served and terminating the fiber optics in a large secure cabinet with reliable electricity (with battery backup) to power the DSL line terminal equipment. It may also require upgrading the copper telephone lines from the customer premises back to the cabinet. Finally, it will be necessary for the DSL provider to ensure that it has adequate Internet capacity from its cabinets and central offices back to the Internet backbone.

Coaxial Cable Networks

After twisted-pair copper lines, the next most recognizable telecommunications infrastructure is cable television. Cable television systems originated in the late 1940s and rose to popularity in the 1980s and 1990s. These systems were then retrofitted, like telephone networks, to provide internet service. Cable television programming is carried into the user's home via coaxial cable. The underlying conductive material for coaxial cable is aluminum, that transmits data as electrical signals.

One of cable networks main positives is that the technology is already widely deployed; however, the deployment is generally limited to urban and suburban areas and is traditionally focused on residential areas. Coaxial cable has more capacity than copper telephone lines. It is able to conduct higher electrical frequencies and therefore deliver higher capacity and faster internet speeds. Electronic hardware upgrades can also improve the speeds the network can deliver.

Yet because the base material of cable networks is the metallic cable, it is subject to a similar set of limitations as telephone lines. Cable networks are susceptible to having their electrical signals degrade sharply over distance. Therefore, cable networks must be operated with amplifiers to regenerate the electrical signal.

Cable technology is commonly called “hybrid fiber-coaxial” or HFC. This is because most cable systems consist of fiber connections from the headend or hub facility (the cable counterpart of the telephone central office) to a “node” within a mile or less of the customer premises. Because of the fiber to the node architecture, cable broadband service is not as contingent on a customer’s location relative to the provider’s headend or hub as DSL service.

Transmissions over coaxial cable lines are also subject to electromagnetic interference. Signal leakage can occur if cables are damaged or connectors are loose—under which circumstance there will also be interference to the signals in the cable. The protocols used in cable service broadcast the downstream signal to all users served through the same coaxial trunk cable, which could be hundreds of users. Although these signals are typically encrypted, they are accessible to any modem connected to that cable. Moreover by using metal as a conductor cable systems are subject to corrosion from environmental factors.

Another drawback is cable’s asymmetric speeds. When cable networks were first designed, signals only had to travel in one direction: downstream. The network’s purpose was to re-broadcast television channels through the coaxial cable from a central location (referred to as headend) to individual subscribers. A very limited set of frequencies were allocated for upstream transmission, generally limited to communication with cable set-top boxes. Even after the integration of broadband, the frequencies often utilized for uploading data by subscribers remain limited. Advances in cable broadband technology such as DOCSIS 3.1 allow cable providers to repurpose other frequencies for uploading data, but these technologies are still in development, and almost all cable systems have only five percent of the total capacity in the upstream direction.

As a result, cable networks are designed to offer much faster download than upload speeds. Typical cable broadband subscription plans offer download speeds of up to 20 or 50 Mbps or higher, but upload speeds of only 2, 4 or 10 Mbps. Like with DSL networks, this is an architectural design choice and the underlying infrastructure is capable of offering symmetrical service. Cable-based internet providers are in the process of upgrading speeds, and in some cases introducing speeds of 100 Mbps or more, though such speeds are available on a very limited basis. Future upgrades may allow cable networks to deliver theoretical download speeds up to 300 Mbps, but would also require cable companies to divert some capacity in the network away from television services.

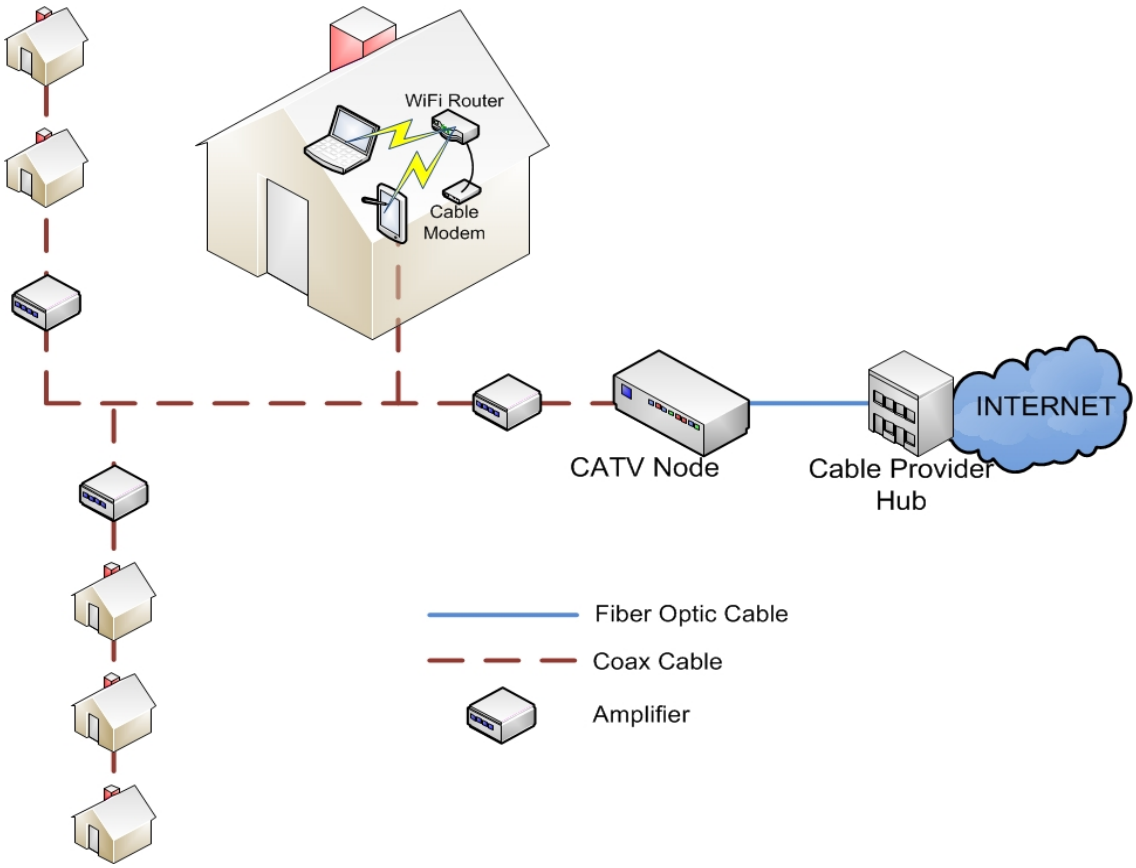


Figure 4: Cable Technology Technical Capabilities

Table 4: Cable Technology's Capability to Support Various Online Activities

Good	OK	Bad
• Simple web browsing • YouTube viewing • Download small file [Mp3, ~ 4MB] • Regular video conference [Skype] • Online distance learning • Tele-commuting / working remotely	• Download large file [HD movie, ~5GB]	• Tele-health • High-definition video conference

NOTE: Ratings based on speed range of 30Mbps download, 4 Mbps upload.

Expanding Cable Networks to Serve Unserved Areas

In the case of cable providers, expanding the network to reach the unserved area is similar to that of DSL. The cable provider needs to expand its fiber optics within a mile or two of the customer premises, but also needs to expand its coaxial cable to the homes—while almost all homes and businesses have copper phone lines, cable is rare in outlying areas, and construction will be needed to each premises. As a result, adding cable service would require new construction, rather than simply upgrading existing plant as in the case of DSL.

Because adding service is new construction, a cable provider may construct fiber optics to each new premises, instead of coaxial cable. This is because the new construction costs for fiber and coaxial cable are comparable, and therefore many cable companies (particularly small ones in rural areas) focus on fiber-to-the-premises in new "greenfield" areas.

Wireless Networks

Just like wireline infrastructure, wireless broadband services are made up of a range of different technologies each with their own advantages and disadvantages. This section will examine the most common technologies, like 3G/4G, Wi-Fi, satellite and others.

The quality of wireless connections is affected by several factors, such as:

- the over-the-air radio frequencies or spectrum utilized
- the user's proximity to a transmission tower or antenna
- physical barriers, such as:
    - buildings
    - trees
    - physical terrain
    - rain/weather
- type of wireline connection at the tower or router (i.e. is it connected to a DSL, point-to-point wireless or fiber-optic service and what is the speed of that connection)

The variable nature of all of these factors means that wireless service can be unpredictable. High speeds are possible but *only if* environmental and other conditions allow. It is also important to note that wireless networks are largely composed of wireline technology. For example, when a user accesses the Internet on a smartphone the initial connection is from the device wirelessly to the nearest provider's tower. But all subsequent data transmission from

the antenna onward through the network likely occurs via wireline copper or fiber networks. (Note: in some cases, mostly in rural areas, the backhaul connection to the tower can be a point-to-point wireless link.) Similarly in a residence, a Wi-Fi router provides wireless flexibility and allows multiple users to connect to the underlying DSL, cable or fiber broadband connection.

Thus wireless technologies are generally dependent on wireline broadband services once you move beyond the last mile, the connection between the user and wireless access point or tower. They can provide flexible, convenient, and mobile communication, but have tradeoffs with respect to data capacity and reliability. While the speed of mobile and wireless technologies are constantly improving, under most scenarios they are not capable of supporting applications for telehealth, interactive distance learning, or high-definition "virtual presence" video conferencing, all of which require very large amounts of bandwidth and reliable connections.

3G and 4G are titles associated with a cellular provider's mobile broadband offerings. However, 3G and 4G stand for "third-" or "fourth-generation" of mobile broadband and do not refer to specific mobile technologies. Different wireless providers employ different wireless technologies (see sidebar). The term 4G was originally intended to designate wireless services with 1 Gbps capability, but is now mostly a marketing term that can encompass a number of different mobile technologies. In practice, 4G refers to mobile technologies such as Evolved High Speed Packet Access (HSPA+), WiMAX and Long-Term Evolution Release 8 (LTE) employed by wireless carriers.

The greatest advantage of 3G/4G services is mobility. With cell phone, smart phones, and other mobile devices the user connects to a series of antenna and base stations that are attached to existing cell phone towers or, in more urban settings, located on tall buildings. If placed on a mountain top or high tower with minimal line of sight restrictions, wireless services have a transmission distance of up 70 km in rural areas. However, more typically networks are designed with coverage and data capacity as the main goal, not point to point distance. Therefore, the transmission radius for most 3G/4G towers is 1 to 2 km. The smaller radius is intended to ensure adequate bandwidth for all customers accessing that tower, avoid scenarios where too many individuals are competing for limited capacity, and to provide the capability for users to simultaneously connect to more than one antenna.

As is the case with all wireless technologies, the main limitation on 3G/4G networks is how the connection quality and speeds can vary. Typical 3G technologies have maximum download speeds of 1 to 2 Mbps and upload speeds of less than 1 Mbps. Typical 4G technologies have theoretical maximum download speeds from 42 Mbps to 100 Mbps and upload speeds from 11.5 Mbps to 50 Mbps. The speed users actually experience in everyday use may be significant

lower due to environmental factors or how many users are sharing access at a tower. Even designing a 3G/4G network in small-cell radius to decrease the number of subscribers falling within coverage of the cell, the number of other user devices trying to communicate with the antenna simultaneously can cause congestion. Likewise the technology used to connect the wireless antenna to the rest of the network, whether copper or fiber-optic, can influence the actual data speeds available to users. Recent testing has shown that typical 4G speeds are closer to 7 to 9 Mbps download and 1 to 4 Mbps upload.

Where 3G/4G networks are most limited is upload speeds. The limitation is a byproduct of the technology itself. Upload speeds will always be slower than download speeds given that 3G/4G wireless antennas are point-to-multipoint, in that a single antenna broadcasts a signal to many devices. This approach makes it simpler for transmission to go downstream, from the single point out to the many devices. It is more difficult to manage incoming traffic from multiple devices to the single antenna, as is the case with when users send data. In addition, power and battery limitations mean that the signal strength of transmissions from smartphones or other end-user devices is significantly weaker than signals from the tower, further limiting upload speeds unless a user is very close to a tower.

Thus 3G/4G networks will always be optimized to deliver significantly faster download speeds than upload. The asymmetrical service of 3G/4G networks will limit the types of applications they can sustain. High-definition video conferencing applications or large-scale online file backup services all require individuals to have access to high upload speeds. Such applications are currently best delivered over wired connections and not 3G/4G wireless networks.

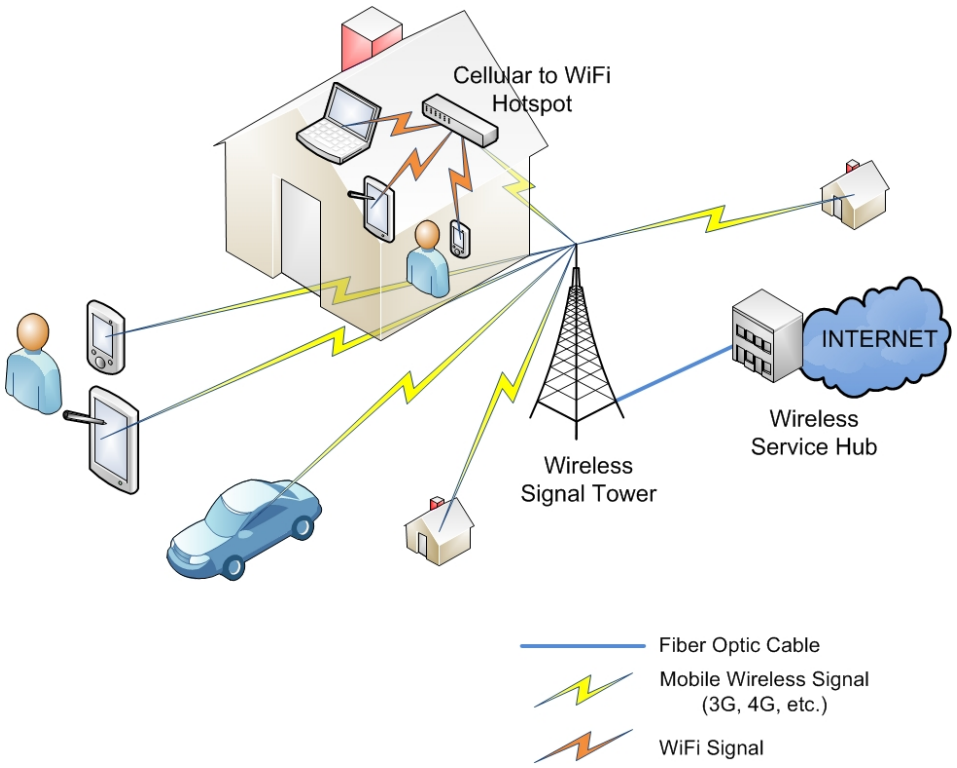


Figure 5: Wireless Networks

Table 5: 4G Wireless Technology's Capability to Support Various Online Activity

Good	OK	Bad
• simple web browsing • YouTube viewing • download small file [Mp3, ~ 4MB]	• regular video conference [Skype]	• online distance learning • Tele-commuting / working remotely • Download large file [HD movie, ~5GB] • Tele-health • High-definition video conference

NOTE: Ratings based on 4G speed range of 8 Mbps download and 3 upload.

Expanding Wireless Networks to Serve Unserved Areas

Fixed wireless providers can expand service by establishing a base station in the service area and connecting it to the Internet backbone though fiber optic or point-to-point wireless connections. The architecture is similar to the TV White Spaces architecture discussed in

Technology Plan B below (in fact, TV White Spaces is simply a type of fixed wireless). This approach may have the lowest cost of the various technological solutions.

Finally, mobile wireless broadband carriers can expand service to the unserved areas. This requires a new cellular base station, power and shelter at the base station, and a backhaul connection from the base station to the Internet backbone and public switched telephone network. If 2G or other non-broadband wireless broadband carriers serve an area, but do not provide broadband 3G or 4G LTE service, the carriers need to upgrade their systems to the newer technology and also upgrade their backhaul connection. In many cases, the reason an area is not upgraded is because of the absence of fiber optic or other reliable high-speed backhaul in an area for the high-speed services—so even a wireless upgrade depends on upgrading the wireline communications in an area.

Technology Plan B: Work with Local Communities to Deploy Non-Profit, Non-Competing Infrastructure to Unserved Areas to which Providers Do Not Plan to Expand

In the event that the providers are unwilling to expand their service areas, the two pilot regions' most direct option for increasing the availability of broadband services to their currently unserved residents is to build and operate a broadband network, potentially in partnership with community non-profit organizations or local higher education institutions, who have or can learn the technical and operational skills to operate the network.

In this section, we present a candidate network vision and design for constructing and operating a cost-effective wireless network using TV white spaces (TVWS) technology. Our intention is to create a model that is inexpensive, replicable, and operable by a local community. In addition, our intention is to develop a model that would bring funding and opportunity into the local communities, and slow the migration of people and skills out of the areas. This vision is intended to create not just expanded access to broadband for currently unserved areas, but also new opportunities and possibilities in the areas to be served.[41]

We recommend that the regions consider a potential strategy for building and operating a network, potentially operated by a non-for-profit agency or provider, which would make broadband service available to a portion of the unserved residents.

This document presents a system-level plan to support this recommendation. The plan was created to reach as many unserved homes as possible at the lowest possible capital cost. It focuses on unserved areas that have the densest development, which reduces capital costs and maximizes the number of homes reached with the public investment.

We recommend a wireless network that, to minimize costs and maximize reach, uses television white spaces (TVWS) technology, which enables small, non-profit wireless Internet service providers (WISPs) to offer fixed wireless Internet services. For a variety of reasons discussed below, this is the most cost-effective way to build wireless without incurring the costs of licensed spectrum infrastructure used by commercial carriers.

[41] Financial analysis related to the vision will follow in later deliverables.

Proposed Technology

We considered a range of technologies to determine the most suitable and cost-effective approach to meeting the stated needs. Point-to-multipoint WiFi would not work on this scale because it does not have the range that the regions need to cover; it is only effective over shorter distances. Licensed spectrum approaches would not be optimal because, if spectrum is available at all, the technology to operate it is typically very high cost. The 3.6 GHz spectrum typically available for wireless ISPs is not optimal in rural New Mexico, because the propagation characteristics of the high-frequency spectrum require a direct line-of-sight and make coverage difficult in mountainous terrain.

A point-to-point network, where each connected user had a dedicated radio link back to the base station (such as a microwave network) would also entail high costs—and it would also require line-of-sight connections.

In contrast, "TV white spaces" (TVWS) technology uses spectrum that does not require line-of-sight, and it can cover relatively long distances. It can also deliver connectivity at a level higher than available services; users would have access to download speeds of 3 Mbps and upload speeds of 1 Mbps. It is well suited to areas of low population density, but can be scaled for more users by adding base stations and using more highly directional antennas. Finally, TVWS base station equipment is inexpensive relative to the 3G, WiMAX and LTE technologies typically used in licensed spectrum.

"TV white spaces" are the unused channels in the TV broadcast spectrum; the Federal Communications Commission (FCC) has made that portion of the spectrum available for unlicensed use because, with improvements and efficiencies in broadcast technology, the white space is no longer needed by the broadcasters to fully broadcast their signals. Even in urban areas where the broadcast spectrum is congested, there are white spaces available for other uses.

Internet content producers and the equipment manufacturing industry, led by Google and Microsoft, advocated for the FCC to make the white spaces made available as open, unlicensed spectrum, with the expectation that there would be the same kind of growth and development of use of that spectrum as there was in the unlicensed spectrum that WiFi utilizes.

They targeted this spectrum not just because the white space was available, but because it has excellent propagation characteristics—including indoors. It is able to penetrate physical obstructions that cannot be penetrated by the spectrum used for traditional WiFi—from exterior building walls to broad-leaf trees and, in a limited way, larger physical obstructions such as hills.

An additional reason that TVWS technology may be a desirable approach relative to existing resources in New Mexico is the cost of carrier wireless services (i.e., Verizon and AT&T). These services are expensive on a monthly basis, and become even more costly if users have prepaid or non-contract usage or exceed their monthly data allowances (i.e., data caps)—meaning that heavy users (especially home-based businesses) are essentially unable to use AT&T or Verizon connections as their primary broadband connection. Although the proposed pilot service areas do not have these carrier services, it is worth noting that TVWS is potentially a desirable alternative even where carrier services do exist.

The main disadvantage of TVWS is that the technology is still in its early days of deployment. The FCC only approved TVWS in the past few years and formalized the rules that will make it possible in the past two years. So although there has been significant research and development, the current users are early adopters. In addition to the potential technical challenges of being an early adopter, launching a TVWS network has financial challenges. There are few manufacturers, and manufacturers have not yet realized economies of scale. User electronics are still in the $500 to $700 range. Eventually, as the technology is widely adopted, this cost will fall below $100, as with WiFi and cable modem equipment.

Network Design and Coverage Area

Within each service area, a TVWS base station would ideally be installed on an existing State-owned structure or tower. Each station would connect to the Internet backbone, either through the State's own network or by using a separate direct fiber or point-to-point wireless connection.

TVWS base station antennas are smaller and lighter than cellular mobile broadband antennas. In contrast to the panel antennas used by cellular carriers, TVWS antennas resemble rooftop television antennas.

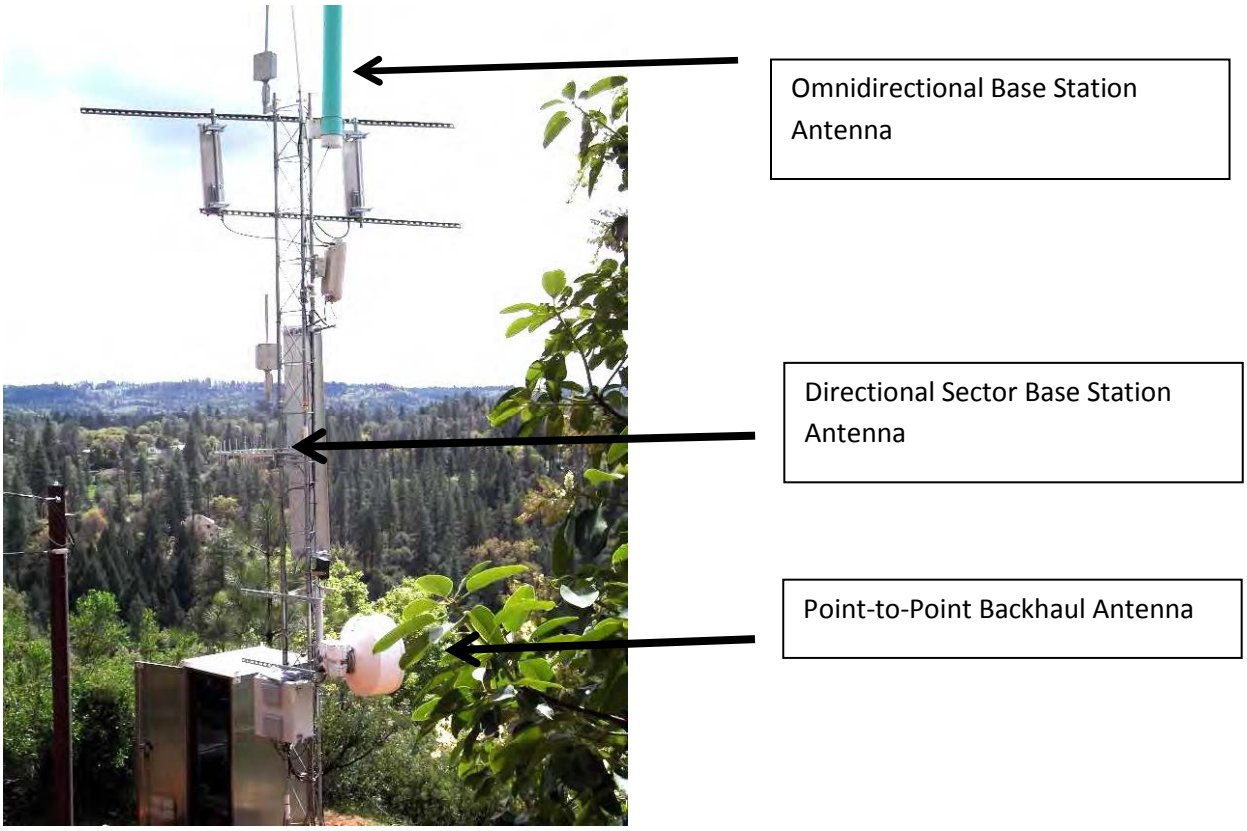


Figure 26: TV White Spaces Base Station Antennas

Each subscriber would have customer premises equipment (CPE) and potentially an external antenna to receive TVWS service. Within each home, connectivity to individual devices would be enabled by a wireless router, similar to the equipment commonly used with DSL or cable modem service. The design would support download speeds up to 3 Mbps or 4 Mbps for each residence, and upload speeds of approximately 1 Mbps.

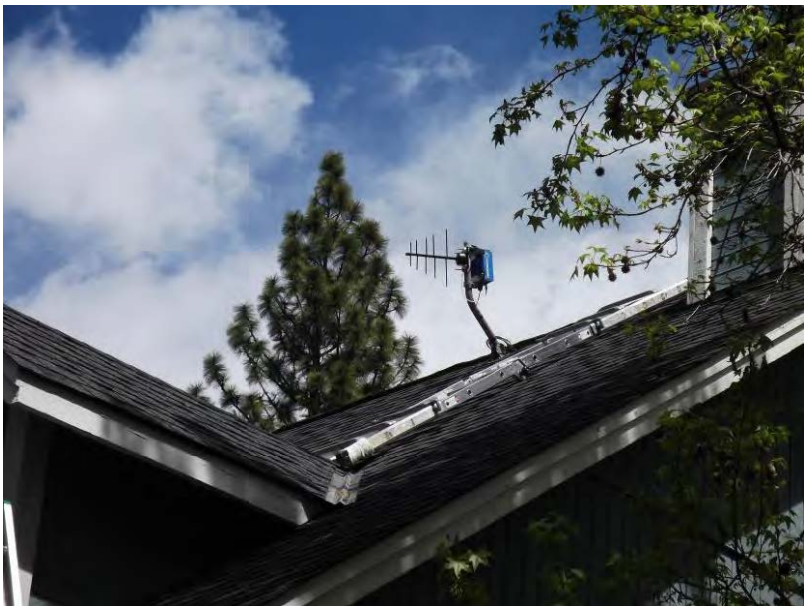


Figure 27: TV White Spaces Customer Rooftop Antenna

TVWS network design resembles the process for other small wireless Internet service providers. TVWS is limited to 106 m height above average terrain. TVWS cells are optimized for up to 60 subscribers, with the assumption of up to 10 simultaneous users.[42] The exact number depends on the speeds to be offered and the expected utilization at peak time.

Backhaul, or connectivity from the network base station to the Internet backbone, is a critical consideration. In the ideal scenario, there is fiber optic connectivity at the base station site. In most unserved areas, backhaul requires one or more point to point wireless connections back to a location with fiber optics.

The TVWS network design process is illustrated in Figure 3.

[42] Once the number of simultaneous users exceeds 10, the effective capacity per user drops below 3 Mbps.

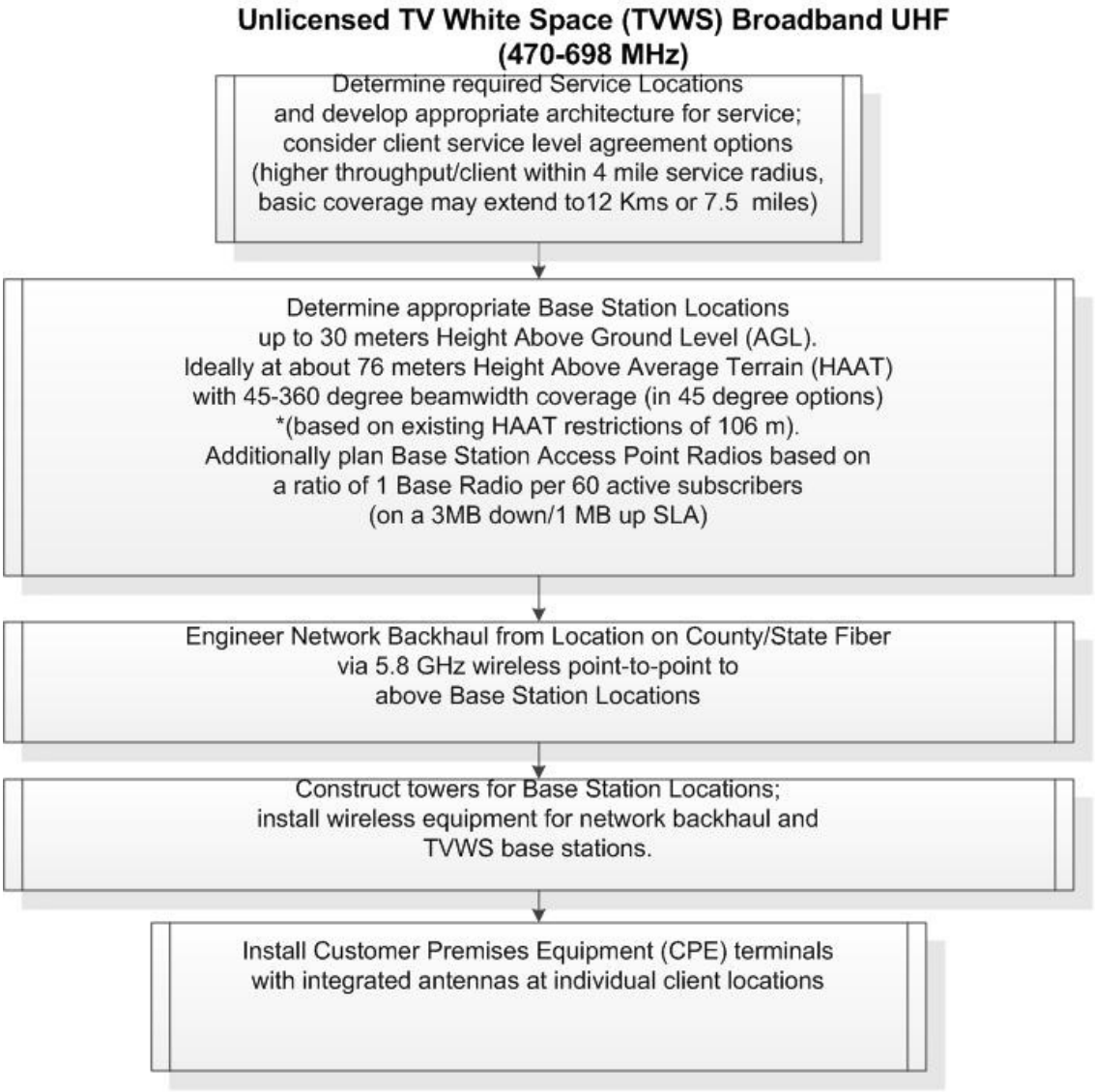


Figure 28: TV White Spaces Network Design Process

The TV White Spaces high level architecture consists of a base station that sits at the core of the service area. Base station antennas are on a tower or mast, with base station electronics on a rack in a shelter. Users are typically within a few miles of the base station. The architecture is scalable, with the ability to use sectorized antennas or multiple rings of antennas to scale capacity. Conversely, in areas with relatively few potential customers, an omnidirectional antenna can be used, and costs and complexity at the base station can be kept low.

The target speed is approximately 3 Mbps for peak download and 1 Mbps for peak upload. The speed compares favorably to most DSL services, 3G and fixed wireless services, but is less than cable or 4G LTE wireless. Future generations of the technology may be able to increase this speed, using more simultaneous TV channels.

Although the technology does not need direct line of sight, users on the edge of the service area or with some terrain obstructions may benefit from an external rooftop antenna. The antennas are essentially UHF television antennas optimized for broadband services, and are not complex or difficult to install.

At the moment the user electronics are costly, in the $500 to $700 range. One strategy where two or more residences are close, is to share the user electronics among multiple locations, using WiFi bridges between the locations. This is optimal when the houses are within about 100 feet or so of each other.

Each TVWS cell, covering several miles, needs to be connected to the Internet backbone. In an ideal configuration, the base station is co-located with high speed fiber Internet connectivity. A more likely approach in an unserved area is to use inexpensive high-speed point-to-point wireless connections, typically in the 5.8 GHz band, to connect the base station back to the Internet. This “backhaul” connection may require multiple hops to a state or municipal location or school.

One promising option is to connect the backhaul to the State backbone at the public safety radio locations. At the time of the digital upgrade of the State public safety radio network, extra capacity was created for IP data connectivity, independent of the public safety communications. This capacity can be activated to create separate non-public safety channels to connect from unserved areas back to the State’s fiber backbone, or to commercial Internet service providers in more populated areas.

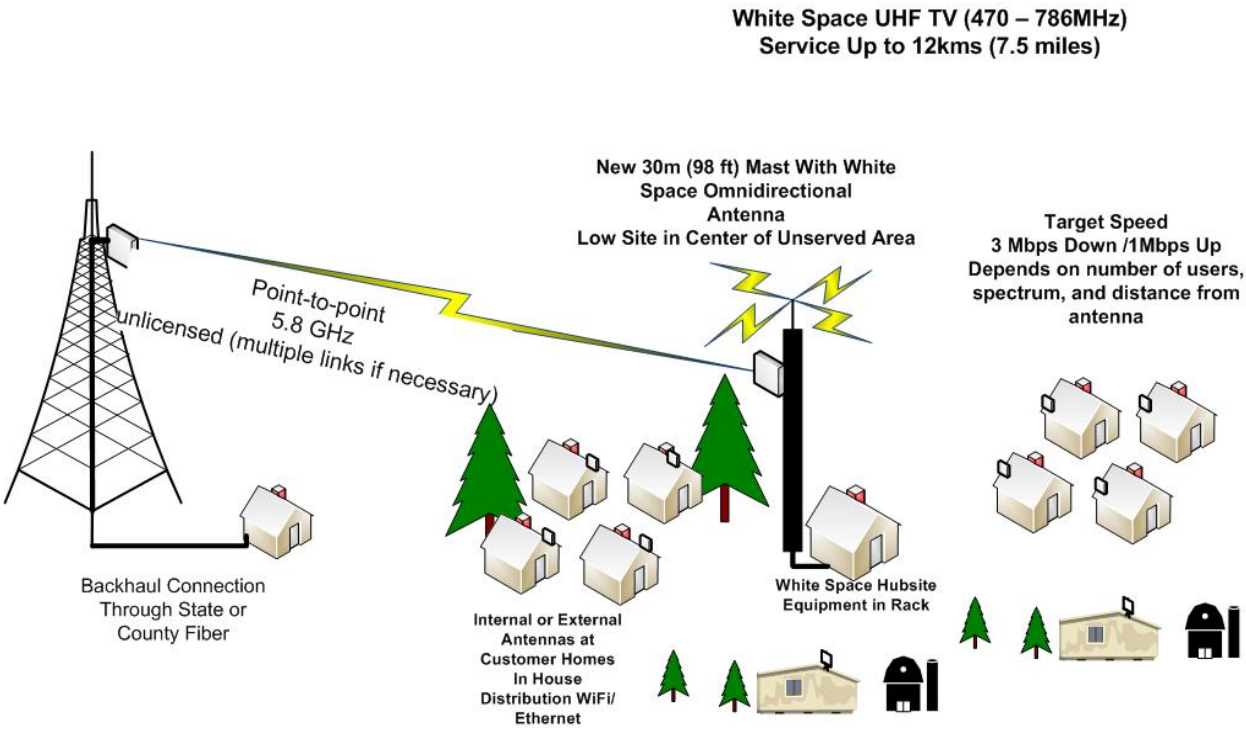


Figure 29: TV White Spaces Network Architecture

Overview of Network Capital Costs

The majority of the capital costs in a TVWS network is the customer premises equipment, between $500 and $700 per premises. The installation cost on average is $100. Base station electronics cost $5,000 to $8,000 per sector. Tower costs vary widely, with design, engineering, equipment, and installation starting in the few thousands for a mast mounted on an existing building—up to the low $10,000 range for a new structure. Backup power is also in the $10,000 range for each facility with a small generator.

There is a cost associated with setup of a new internet service provider operation in the $50,000 to $75,000 range. This covers software, core electronics, servers, office setup, a vehicle, and training.

Overview of Network Operating Costs

With respect to operating costs, labor dominates. For planning purposes, we estimate that a publicly-operated TVWS network would require, at a bare minimum, the following staffing levels in each region—which would cost an estimated $250,000 in year one and $200,000 in subsequent years (fully burdened labor rates):

Table 3: Staffing Requirements for Proposed TVWS Network

Position	Full-Time Equivalent (FTE)
Customer service representative	1.5
Installer	2.0 (year 1); 1.0 (year 2+)
Business manager	0.25
Sales manager/finance manager	0.25
Internet technician/engineer	0.25

The network's costs could be reduced significantly if existing staff of the owning entities could perform some of the necessary operational tasks or if operational tasks are reduced. Operating costs are significantly reduced if the network is provided free to users on a "best effort" basis, rather than a "carrier grade" basis that could command service fees. In this model (analogous to free public WiFi in public areas and libraries), the service is provided as a public service and consumers are not expected to pay. The owning entity, which is not realizing revenues from consumers, makes its best effort to provide high quality service but does not implement the service level (such as 24-hour customer service or guaranteed speeds) that one would reasonably expect from a pay-service.

However, a network that charges for services will need to do more than simply "best effort;" such a network would require significant levels of staffing for customer service roles. This is not just because staffing plays a key role in ensuring a network's success. The residents who would be served by this network do not currently have broadband, so they would likely need more "handholding" than customers who are more sophisticated in their understanding of broadband connectivity; the owning entity should thus expect higher-than-average numbers of customer service phone calls and truck rolls to help its customers.

In the event of such inevitable customer service, to address the inevitable need for after-hours support, we have factored in an overtime fund to pay for on-call customer service and technician labor, as well as labor during off hours (including weekends and holidays).

Our projections assume that there would be no rental costs associated with placing the TVWS base stations, and that monthly power costs would total $500. We also estimate $5,000 in annual transportation costs and that billing software would cost $3,500 per year. We do not include any costs for sales, marketing, or insurance—under the assumption that the owning entities' current operations could absorb any incremental expenses in those areas. Total non-labor operational costs would be approximately $100,000.

Appendix A

Regional Broadband Implementation Plan
New Mexico Broadband Program
State of New Mexico Department of Information Technology

September 2013

The State of New Mexico is in the process of identifying target areas for broadband development assistance in two regions as part of the Regional Broadband Implementation Program (RBIP) pilot project: the Southwest New Mexico Council of Governments (SWNMCOG) region, and the North East Economic Development (NEEDO) region. While various wireline and wireless broadband providers serve areas within each of these regions, some areas remain entirely unserved, with no access to broadband. For purposes of this project, we will target areas with no broadband service.

Our current goal is to identify those areas of the pilot regions that are both unserved and have pockets of population density. Where these conditions are met—lack of broadband despite a population base—the pilot projects will be able to have the most impact.

The purpose of this document is to solicit the support of local leaders and stakeholders in identifying these target areas. Government officials, business leaders, and community advocacy groups are all well positioned to gather information specific on the municipalities and counties within the pilot regions, and help identify specific areas unserved by broadband.

While the state has compiled considerable mapping resources showing the presence of various broadband technologies, we are seeking a level of granularity beyond what is currently reflected. The specificity of current broadband availability reporting varies by provider, location, and technology. Availability is generally reported at the census block level, but in some cases providers only offer information at the county level.

Specifically, the target areas we seek should have no wireline or wireless broadband service available (dial-up and satellite only), and include clusters of homes (10 or more) in close proximity to each other.

We have identified a number of areas in each RBIP region for exploration of development opportunities. Stakeholders and leaders from these communities are encouraged to submit comments about their understanding of broadband availability in these areas. Specific information about what services are and are not available will be used to help guide us as we

investigate these regional markets further. Additionally, we encourage community members to propose other areas within the SWNMCOG and NEEDO regions believed to meet the conditions described above.

The initial sites we have identified include the following:

Table 4: SWNMCOG Region Target Sites

Site Description	Latitude/Longitude
Animas (Hidalgo County)	32°37'33.79"N/107°52'12.79"W
Apache Hills Dr. NW (Luna County)	32°19'3.53"N/107°46'14.43"W
Faywood (Grant County)	32°37'33.79"N/107°52'12.79"W
NM-12, approximately 1 mile west of NM-435 in Reserve (Catron County)	33°42'58.23"N/108°46'18.47"W
Rodeo (Hidalgo County)	31°50'7.57"N/109° 1'52.86"W
Tennyson Drive NE, north of Deming (Luna County)	32°18'33.44"N/107°44'18.87"W

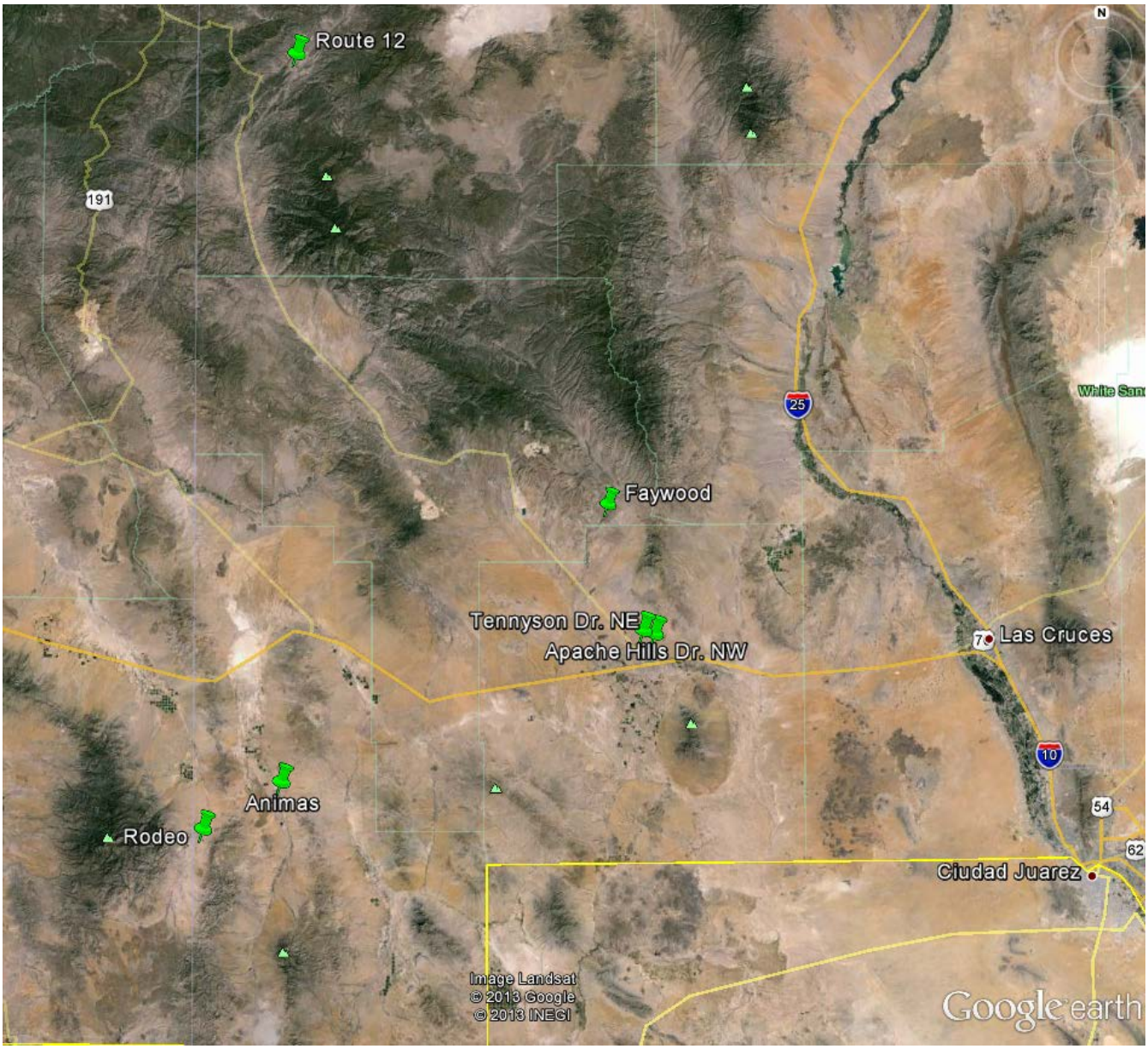


Table 5: NEEDO Region Target Sites

Site Description	Latitude/Longitude
Capulin (Union County)	36°44'28.63"N/103°59'39.04"W
Calle de Leon Rd. (San Miguel County)	35°31'5.73"N/105°15'24.76"W
I-25 and US-84 Interchange (San Miguel County)	35°31'16.23"N/105°14'56.06"W
Miami (Colfax County)	36°21'0.13"N/104°47'34.98"W
Mosquero (Harding County)	35°46'37.14"N/103°57'23.90"W
Watrous (Mora County)	35°47'26.34"N/104°58'54.65"W

The New Mexico Broadband Program

Pilot Areas Strategic and Business Plan

Version 1, December 31, 2013

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	http://www.ctcnet.us/
http://www.doit.state.nm.us/broadband/	

Memorandum

Date: December 31, 2013

From: Joanne Hovis
President / Director of Business Consulting

Andrew Afflerbach, Ph.D., P.E.
Director of Engineering

To: Gar Clarke
Broadband Program Manager
Department of Information Technology
State of New Mexico

Subject: *Pilot Areas Strategic and Business Plan*

The two Regional Broadband Implementation Plan (RBIP) pilot regions that were selected present a challenging landscape for increased broadband deployment. The combination of high levels of poverty that suppress market demand and the cost of rural infrastructure development do not indicate a business case for extensive last-mile network deployment. This document offers a recommendation for developing a business plan that we believe will increase demand and adoption long-term through education and increased digital access, as well as provide communities with much needed services quickly in a manner that does not compete with existing carrier networks.

Due to both the low population density (cost issues) and the economic conditions throughout the pilot regions (demand issues), commercial broadband providers have not built high-end network services in these communities. The return on investment for such an infrastructure investment would be too low to justify the expansion.

In order to provide residents in these areas with basic broadband services without an unreasonable amount of risk on the State's part, we recommend that the State facilitate the development of wireless Internet access available to the community at strategic locations in selected areas.

Potential actions that the State could consider in order to advance the availability (supply) of and demand for broadband services in these regions include (but are not limited to):

- Encourage providers to offer low-cost or no-cost broadband connectivity at community centers, senior centers, or other public places.
- Increase the number of computers available at community centers.
- Leverage existing connectivity assets, such as the State microwave backbone, to deliver direct Internet access (DIA) to unserved areas.
- Leverage existing State-owned towers and other assets to encourage private build-out of wireless and other broadband technologies.

- Provide “last-mile” broadband connectivity in a “public area” in the unserved regions.
- Develop and distribute computer and Internet training material to assist in educating citizens in unserved and underserved regions.
- Conduct broadband education sessions in the regions.

We propose making wireless Internet access locations open to the community with no service charges. In addition, we propose offering digital training and educational resources along with the Internet access, to give residents the tools they need to become regular users of broadband. Offering residents this service will meet both the immediate need of providing unserved residents with Internet resources, as well as the long-term goal of stimulating demand for home broadband service.

Market Demand Assessment

Since the selection of the Southwest New Mexico Council of Governments (SWNMCOG) and North East Economic Development Organization (NEEDO) regions for the implementation of the pilot projects, we have conducted a range of fact finding tasks to assess the current consumer landscape in these areas. We held meetings with local stakeholder groups and leaders; through online research and numerous site visits, we investigated the geographic and economic conditions that limit broadband development throughout the regions; and we discussed issues related to expanding broadband service with representatives from the local exchange carriers (LEC) and broadband providers currently serving the two regions.

Our findings suggest a lack of demand for high-speed Internet service throughout the pilot regions. This lack of demand is likely driven by low levels of income as well as lack of knowledge and training opportunities for residents in these areas. It is likely the case that many of the residents in these rural and remote communities have not had the opportunity to learn how to use Internet resources or develop basic computer literacy.

Though the carriers cover large areas within the pilot regions, some areas remain unserved due to low population density (i.e., the population density in some portions of the pilot regions is too low for broadband providers to be able to reasonably provide broadband infrastructure). This is within normal expectations in a highly rural landscape.

Additionally, even if more broadband options were made available throughout the pilot areas, there is no guarantee that a high percentage of residents would, at present, adopt service. Poverty and low population density, therefore, are both obstacles to broadband use in the two regions.

Both the SWNMCOG and NEEDO regions contain high levels of poverty.[43] A high proportion of households in many communities in these regions receive federal subsidies through cash assistance or the Supplemental Nutrition Assistance Program—a total of 17.1 percent in the SWNMCOG region, and 15.1 percent in the NEEDO region (see Table 1).[44]

Many of these residents are likely either to be priced out of the existing commercial broadband market, or not to have the knowledge, training, or resources to be interested in adopting service. The limitations of existing broadband infrastructure throughout the pilot regions may partly reflect knowledge on the part of the existing providers that demand is low among these communities, and therefore that building new infrastructure would not lead to a sufficient return on investment.

[43] Economic data throughout this memo supplied by the United States Census Bureau, December 2013. http://quickfacts.census.gov/qfd/states/ and http://factfinder2.census.gov/, accessed December 16, 2013.
[44] http://factfinder2.census.gov/, searches by county, accessed December 19, 2013.

Table 6: Pilot Areas Households with Cash Public Assistance or Food Stamps

County	Households with cash public assistance or food stamps	Total Households	Percent Households with cash public assistance or food stamps
Catron	182	1,681	10.8%
Grant	1,786	12,307	14.5%
Hidalgo	379	1,824	20.8%
Luna	1,909	9,105	21.0%
SWNMCOG	**4,256**	**24,917**	**17.1%**
Colfax	690	5,717	12.1%
Guadalupe	216	1,374	15.7%
Harding	26	243	10.7%
Mora	276	1,700	16.2%
Quay	529	3,509	15.1%
San Miguel	2,042	11,730	17.4%
Union	138	1,672	8.3%
NEEDO	**3,917**	**25,945**	**15.1%**

(2008-2012 American Community Survey 5-Year Estimates)

Per capita income levels further reveal a difficult economic picture in every county in the southwest and northeast alike. Income levels trail the U.S. average by a significant margin; in Guadalupe County, per capita income is 49 percent below the national average—the lowest among the pilot regions. Mora County has the highest per capita income among the pilot regions, but still lags the national average by 20 percent. Table 2 and

Table 3 below summarize the economically disadvantaged portion of each region's population. (The Census Bureau reports per capita income at $28,051 nationwide.)[45]

[45] http://quickfacts.census.gov/qfd/states/00000.html, accessed December 26, 2013.

Table 7: SWNMCOG—Population Below Poverty Level and Per Capita Income by County

County	Population (2012 estimate)	Persons below poverty level, percent, 2008-2012	Per capita money income in the past 12 months (2012 dollars), 2008-2012	Percent per capita income below national average
Catron[46]	3,658	18.8%	$19,549	30%
Grant[47]	29,388	18.4%	$22,415	20%
Hidalgo[48]	4,794	22.5%	$19,164	32%
Luna[49]	25,041	29.7%	$16,546	41%

Table 8: NEEDO—Population Below Poverty Level and Per Capita Income by County

County	Population (2012 estimate)	Persons below poverty level, percent, 2008-2012	Per capita money income in the past 12 months (2012 dollars), 2008-2012	Percent per capita income below national average
Colfax[50]	13,223	17.6%	$21,087	25%
Guadalupe[51]	4,603	23.7%	$14,189	49%
Harding[52]	707	18.5%	$19,401	31%
Mora[53]	4,705	16.2%	$22,561	20%
Quay[54]	8,769	18.3%	$18,775	33%
San Miguel[55]	28,891	26.7%	$18,576	31%
Union[56]	4,431	10.9%	$20,488	27%

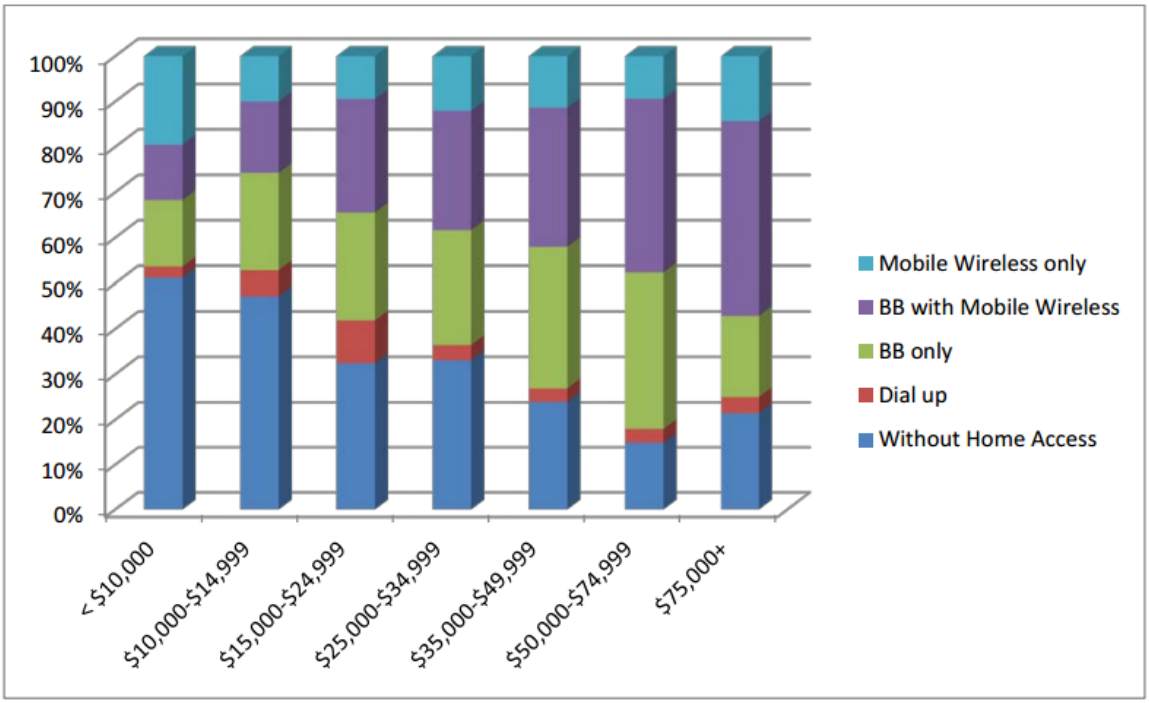
The Earth Data Analysis Center (EDAC) at the University of New Mexico is currently in the process of developing maps to illustrate the economic conditions throughout the pilot regions based on data at the census tract level. These maps will be made available at the New Mexico Broadband Program website when complete (http://www.doit.state.nm.us/broadband/).[57]

The Pilot Area Supply and Demand Assessments (Deliverable 3), submitted to the Department of Information Technology (DoIT) July 31, 2013, summarized the cost of DSL and other available residential

[46] http://quickfacts.census.gov/qfd/states/35/35003.html, accessed December 26, 2013.
[47] http://quickfacts.census.gov/qfd/states/35/35017.html, accessed December 26, 2013.
[48] http://quickfacts.census.gov/qfd/states/35/35023.html, accessed December 26, 2013.
[49] http://quickfacts.census.gov/qfd/states/35/35029.html, accessed December 26, 2013.
[50] http://quickfacts.census.gov/qfd/states/35/35007.html, accessed December 26, 2013.
[51] http://quickfacts.census.gov/qfd/states/35/35019.html, accessed December 26, 2013.
[52] http://quickfacts.census.gov/qfd/states/35/35021.html, accessed December 26, 2013.
[53] http://quickfacts.census.gov/qfd/states/35/35033.html, accessed December 26, 2013.
[54] http://quickfacts.census.gov/qfd/states/35/35037.html, accessed December 26, 2013.
[55] http://quickfacts.census.gov/qfd/states/35/35047.html, accessed December 26, 2013.
[56] http://quickfacts.census.gov/qfd/states/35/35059.html, accessed December 26, 2013.
[57] Note that income measurements include various sources of financial support, such as food stamps, welfare, unemployment payments, and other forms of non-earnings income. Therefore, areas where poverty rates are high can appear to have greater levels of income than would be expected absent these subsidies for residents in need.

and business broadband services in the pilot regions. While the offerings vary, we found that the cost of some of the most basic broadband services, such as a low-end 1.5 Mbps DSL connection, exceeds $60 per month ($720 per year) for residents in some areas. Residential broadband service would represent a significant portion of household income for many in these communities. (Seven-hundred-twenty dollars per year represents 4.4 percent of the average per capita income in Luna County). The economics of the regions, combined with the cost of broadband service, creates a marketplace where demand is not sufficient to see the construction of broadband circuits to serve more residences.

The report titled "Broadband Subscription and Internet Use in New Mexico,"[58] published by the University of New Mexico Bureau of Business & Economic Research (BBER) in June 2013, included an analysis of the broadband market throughout the State. By surveying residents, the report found that New Mexico significantly lags many other states in home Internet adoption. The report found that both income and urban/rural classification significantly impacted broadband adoption. The survey data presented in the report demonstrate that home Internet adoption depends heavily on household income, particularly for households with income below $35,000 per year.



Source: UNM BBER Survey of Internet Adoption and Use in New Mexico, 2012.

Figure 30: BBER Survey Data—Home Internet Adoption by Technology and Income

In addition, the BBER report provides valuable insights into the extent to which knowledge of the Internet contributes to lack of broadband adoption. Figure 2 shows the reasons respondents gave for not adopting home Internet service. For respondents in the middle-income groups in particular, a significant portion indicated "Don't know how to use Internet." Lower income respondents also checked this option with significant frequency, along with cost of service as a major barrier to adoption. Other

[58] Report available at: http://www.doit.state.nm.us/broadband/reports/NMBBP_bb_use_0613.pdf.

responses that indicate lack of interest in Internet service include: “Never considered” and “Don’t know how to get Internet.” Taken in the aggregate, all of these responses help make the case that lack of knowledge and training in Internet use is a significant contributor to suppressing demand for service.

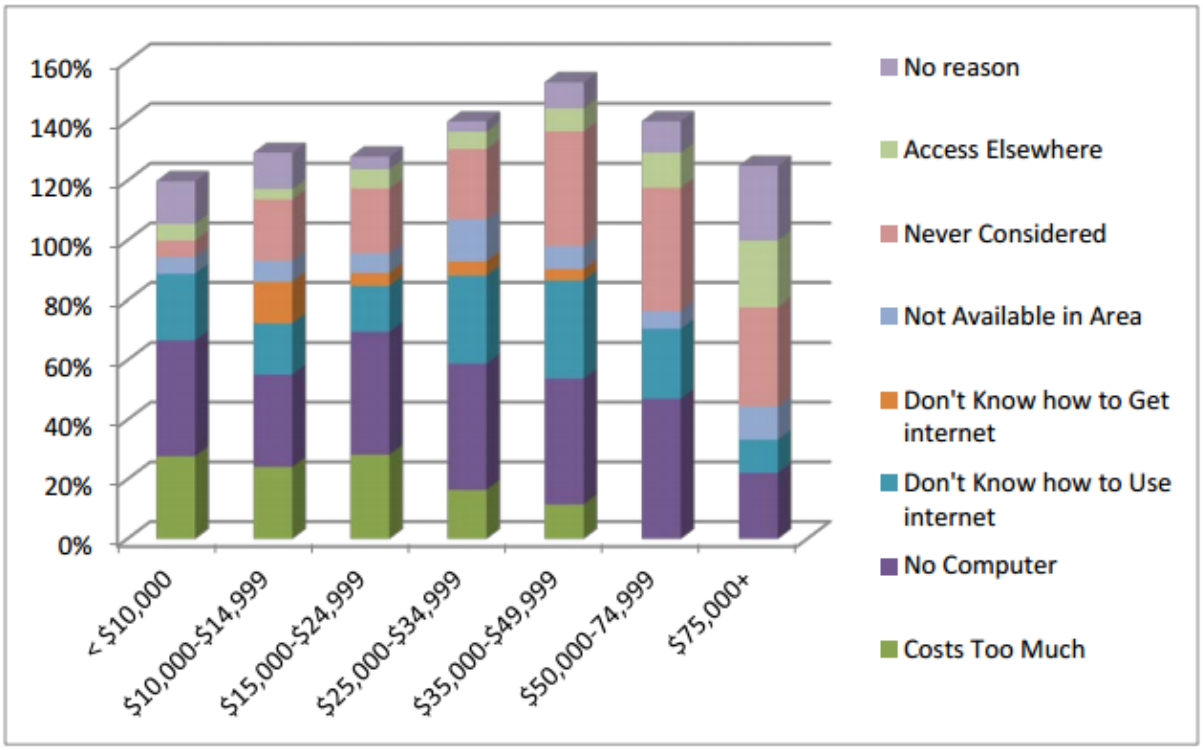


Figure 31: BBER Survey Data—Stated Reasons for Non-Adoption of Home Internet by Income

Site visits to both regions by CTC engineers revealed that the infrastructure challenges are considerable throughout these rural areas. Among those areas outside of the existing wireline broadband footprint, residences are separated by considerable distances, and in some cases appear not to have full access to basic utilities such as electric and telephone service. Some neighborhoods we have identified consist of temporary structures and mobile homes, such as the site near Cruzville shown in Figure 3 below.

Figure 32: Example of Pilot Region Residences—Cruzville

Many of the areas we have identified as unserved by broadband fit a similar profile. Generally speaking, these neighborhoods are either too remote, too economically challenged, or both for LECs to have built data circuits to offer broadband service.

Based on these realities, we believe it is unlikely that a paid residential broadband service offered by the public sector—rather than commercial providers—would produce the level of adoption and use required to justify the capital investment and operational cost. The apparent lack of demand for these services and the high cost of building to low-density populations would make any such venture by the State or local jurisdictions high in risk and potentially low in reward. We conclude that there is no evidence for a business case for community owned and operated last-mile broadband service to these residences.

However, we do believe an approach that makes broadband available outside of the home through wireless access points would be both affordable and rewarding to these communities. Such an approach would introduce new users to broadband access, provide communities with important online resources without requiring user fees, and stimulate future demand for residential network deployment. Since we conclude that lack of demand is a major obstacle to further broadband infrastructure deployment, we believe the business model in any subsidized network solution must include a component of stimulating demand to be successful.

Recommended Approach

To achieve growth in broadband use in these areas, it would not be enough only to invest in new infrastructure; an investment in education and community resources to give residents the interest and tools they need to use broadband resources is a necessary step to stimulate demand in the short and

long term. The economic and quality of life benefits of broadband adoption (as documented in the New Mexico Broadband Program Community Broadband Master Plan Guidebook[59]) would be of immense help to the growth of the pilot regions and the opportunities available to their citizens. Educating residents about these benefits and how they personally stand to gain from broadband availability and use is central to our recommended approach.

We recommend pursuing a business model with two complementary goals.

1. **In the short term, offer wireless broadband connectivity with no user fees to unserved communities.**

Although it is not realistic to provide free service for residences, it is feasible to provide a wireless Internet connection to a central community location, accessible via Wi-Fi. In addition, we recommend providing computers at these central locations for use by members of the community.

2. **Provide digital literacy and Internet training programs at these central locations.**

An educational component to this strategy is key to ensuring that residents take advantage of the no-charge service, and that they acquire the knowledge they need to become home broadband users over time. The State can provide communities with educational and training programs located at the broadband centers to teach residents how to use online resources to their advantage. The State should engage in an active marketing campaign to encourage the use of the services and to help residents understand the benefits of broadband adoption.

We believe these goals are realistically attainable with the resources currently available to the State, and can be pursued without a great deal of risk.

Based on our research, site visits, and discussions with community stakeholders and providers, we recommend pursuing service in the vicinity of the following unserved locations:

[59] http://www.doit.state.nm.us/broadband/reports/NM_Broadband_Guidebook_v1_1_final.pdf

Table 9: SWNMCOG Region Target Sites

Site Description	Latitude/Longitude
Cruzville (Catron County)	33°48'26.19"N/108°39'55.23"W
Dwyer Lane and NM-61 (Grant County)	32°37'33.79"N/107°52'12.79"W
Hanover – NM-152 (Grant County)	32°48'39.02"N/108° 5'38.57"W
NM-152 & NM-61 (Grant County)	32°47'34.62"N/107°55'15.37"W
Keeler Farm (Luna County)	32°19'3.53"N/107°46'14.43"W

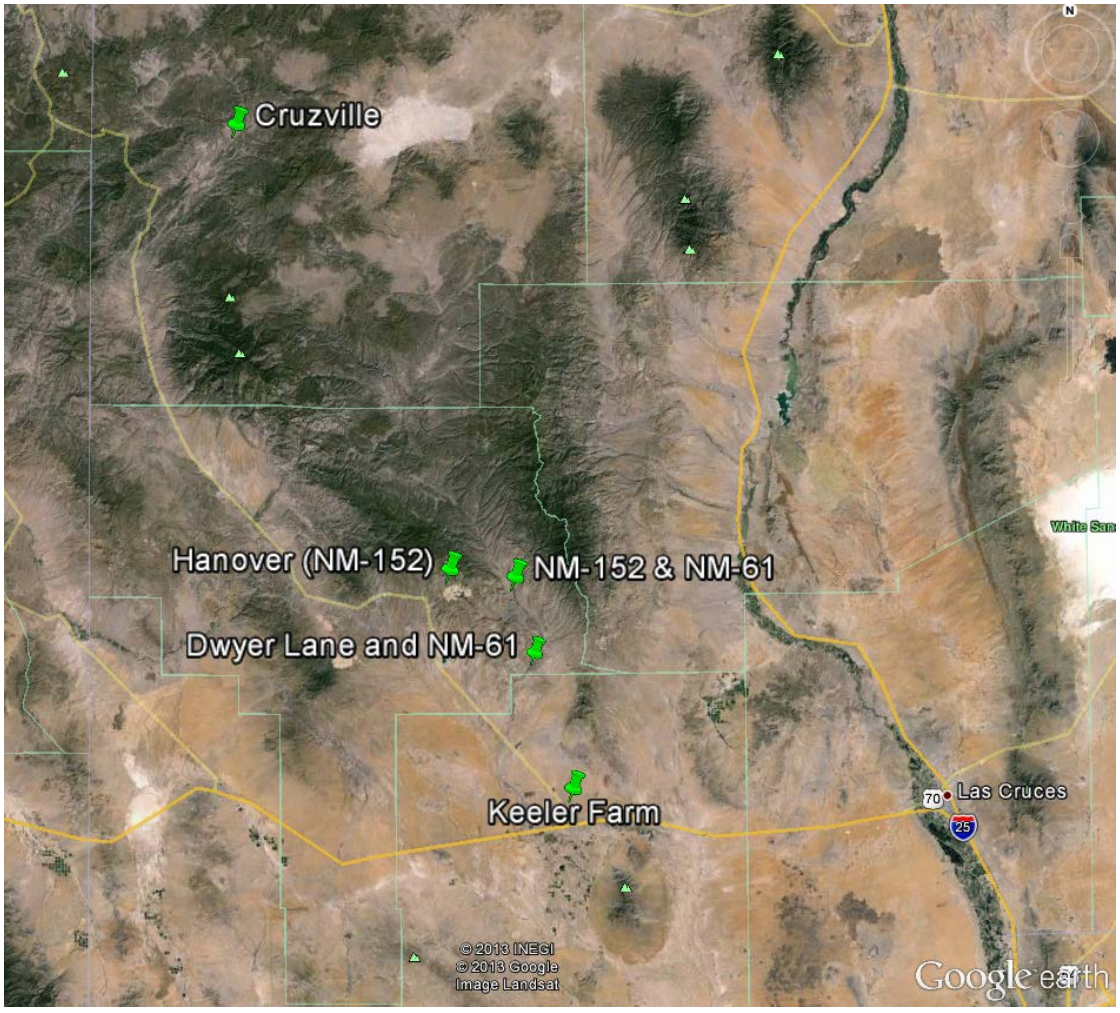


Figure 33: SWNMCOG Region Target Sites

Table 10: NEEDO Region Target Sites

Site Description	Latitude/Longitude
Miami (Colfax County)	36°21'0.13"N/104°47'34.98"W
Mills (Harding County)	36° 5'8.62"N/104°15'19.01"W
Solano (Harding County)	35°50'54.14"N/104° 4'2.91"W
Watrous (Mora County)	35°47'26.34"N/104°58'54.65"W
Forrest (Quay County)	34°47'41.23"N/103°36'4.86"W
I-25 and US-84 Interchange (San Miguel County)	35°31'6.49"N/105°15'15.44"W
Amistad (Union County)	35°55'8.06"N/103° 9'13.86"W

Figure 34: NEEDO Region Target Sites

We believe these sites are likely to have clusters of unserved residences, and unlikely to see significant carrier infrastructure expansion absent a noticeable increase in demand. We note that throughout both pilot areas, many other locations fit this description as well. The model we propose here can be applied to include different sites should state and local leaders determine suitable alternatives, and based on input from the providers themselves.

We will continue to pursue the possibility of commercial network expansion with the LECs that currently provide DSL and other services in the SWNMCOG and NEEDO regions. However, given the absence of a compelling case for the local commercial market to offer a paid subscription broadband service to these areas due to lack of demand and low population density, we believe the State should look at providing alternatives to home-based Internet subscriptions.

We recommend pursuing a community broadband development strategy that neither emulates nor competes with residential Internet service providers. As stated above, in many currently unserved areas, distance and income challenges make paid residential service expansion unrealistic. Since the private sector has chosen not to include these areas in their service footprints, State and local authorities can

make a strong case for treating basic broadband access strictly as a public service to a disadvantaged population. Therefore, we recommend using the State's existing broadband infrastructure to provide broadband service to select unserved areas in both pilot regions.

While building a last-mile network component to the target area homes would in some ways be preferable, this would require the placement of fixed antennas in the homes and depend on residents to adopt home service. As discussed above, given the type of communities in question and their general lack of amenities, we believe this would be too costly and inhibit service adoption. The approach we recommend—providing wireless service to community access and training facilities—addresses the goals of quickly providing a service to populations in need with no service charge, and of bringing new users into the broadband market to stimulate demand long-term.

Business and Technology Plan

Plan Overview

Our recommended business and technology plan includes the following central components:

- **Offer Wi-Fi Internet access with no user fees at a central location in selected target sites using the State microwave radio network for backhaul.**
- **Equip these locations with computers for community use, and enable users to connect their own devices.**
- **Provide computer and Internet instruction, classes, and technical assistance to users at each site.**
- **Provide educational materials about the benefits of broadband, government programs that assist with the cost of purchasing computers and Internet service, and other marketing efforts to stimulate demand for residential service.**

The Department of Information Technology owns and maintains a robust statewide wireless network, consisting of a ring of microwave towers and interoperable mobile facilities. This network is capable of transmitting broadband radio signals throughout the State, including to remote regions. Primarily, the microwave network's purpose is to serve public safety agencies and other government users with two-way radio and other communications services. However, its high amount of bandwidth and its statewide reach make the microwave ring capable of providing backhaul for additional broadband uses, including Internet access for communities.

Using microwave backhaul, the State can bring bandwidth to a central location in each target area's population cluster. These central locations can be developed as broadband access and training centers in consultation with local leaders, and can occupy existing community buildings or space where possible. Local institutions could provide computers, tablets, or other devices, as is now common in libraries and community centers in more urban areas. Residents will then be able either to bring their own Wi-Fi enabled devices to access the public Internet or use devices provided by the community. The locale may be a public building or government site in some cases, but the only requirements are that it be open to the public, accessible to the local population, and have a degree of security to protect the network and computer equipment from theft and the elements.

These locations can serve the additional purpose as venues for Internet education and training programs. The nature of a community "Internet café," provides an atmosphere where residents can not only connect online, but also among themselves, and access computer literacy and Internet training tools. Offering this kind of programming can have a significant positive impact on Internet demand and use. This approach embraces a long-term strategy of educating the community with the ultimate goal of increasing economic activity and helping digital participation permeate throughout the community. As more people use the Internet, many of them will seek to adopt home broadband service down the road. Ultimately, when the demand increases sufficiently, a new business case will emerge for a provider to expand its service area.

There are a number of benefits to using this community access approach for the pilot regions:

- **This model has been tested and proven successful in other communities.**

Wi-Fi networks open to the public have become commonplace, from the New York City subway to hospitals to libraries and community centers across the country. Over the course of other broadband business engagements, we have seen that providing Internet access at community sites is highly effective at stimulating broadband use and the future adoption of residential service.

For example, the Ohio-based and BTOP-funded Connect Your Community program operates centers in a number of cities that provide broadband resources to the general public. The centers offer Internet access, computer training classes, assistance finding online resources, and other digital assistance to job seekers and others. In Cuyahoga County, where Connect Your Community is headquartered, a third of adults lack home broadband service.[60] The program, therefore, has become a key resource in assisting community members in finding jobs, learning digital skills, and using online educational tools to support children in school. Connect Your Community has documented introducing broadband service to thousands of new users, and has received multiple recognitions for effectively serving populations in need.

Community access is already being implemented in the New Mexico RBIP pilot regions in more densely populated areas as well. Bell Elementary School, in Deming, provides free Internet access to parents while their children attend classes. School officials report that, for many families in the community, home Internet access is unaffordable, and parents therefore have difficulty obtaining materials relevant to their children's education. Providing access at the school therefore helps the school in its educational mission while helping educate parents about digital resources, including programs available for discounted computers and home Internet service.[61]

- **This approach focuses on existing gaps in the commercial broadband market.**

One of the great benefits of this approach is that it brings broadband service into areas the private sector has specifically declined to build. Each target site sits within the service territory of an existing LEC, which has the option of building broadband infrastructure in these communities. Since the providers have chosen not to build out to these locations, the sites are clearly candidates for non-

[60] http://www.connectcommunity.org/2013/04/25/third-of-cuyahoga-county-adults-lack-home-broadband/, accessed December 18, 2013.

[61] "School In Deming Offers Parents Help Against The Digital Divide," November 15, 2013, KRWG TV/FM, http://krwg.org/post/school-deming-offers-parents-help-against-digital-divide.

residential broadband alternatives. Commercial broadband providers must weigh the costs of new infrastructure with their anticipated return on investment. In this case, the State—which measures return on investment in different ways from for-profit providers—can help close the existing gaps without offering any services that overlap with private sector products.

- **In addition to providing service quickly, this approach is meant to increase overall broadband demand.**

The approach we recommend accomplishes both short-term and long-term goals. In the short term, it allows service to be set up quite quickly. Since the microwave backhaul component of the network is already in place, broadcast and receiver infrastructure can be installed far more quickly than if new towers, aerial or underground cables, and network hubs were required to be installed.

In the long term, introducing new users to the broadband market, and providing resources for learning about the Internet and becoming digitally literate, will lead to more consumer demand. Ultimately, this helps the communities promote themselves as potential future markets for commercial service and attract further investment, while offering citizens a form of connectivity in the interim. Since the private sector providers have thus far been unable to make the business case to connect these areas, our recommended approach is a way for the State to act as a catalyst for demand through educational and marketing efforts, possibly resulting in private infrastructure expansion down the road. Encouraging new broadband users so that they become potential buyers in the future makes this approach a win-win for consumers and commercial broadband providers alike.

- **The proposed approach fits well with the survey work and seminars the State plans to conduct in the coming months.**

For our approach to have the desired effects, both short and long-term, the State will need to actively market and advertise the new service. The Department of Information Technology is currently developing a community outreach strategy for the RBIP pilots regions. Over the coming months, the efforts will include market survey work in each region, as well as developing seminars on broadband availability and use. Our recommended approach would complement these additional efforts extremely well. Through the State's outreach efforts, residents will be receiving an increase in promotional materials and questionnaires related to broadband, which will help raise awareness of the State's efforts. These communications offer an excellent opportunity to provide information about the new access and training centers. Surveys could include questions asking about interest in community broadband access and digital training programs, and announcements of planned services in the target areas could be included in public communications.

We emphasize the importance of the educational and training components of this plan, which should be considered as important as the infrastructure and service aspects. The technology plan outlined above is straightforward, and can be implemented quickly and relatively inexpensively. Providing the outreach and education to the communities so that residents use the service and take advantage of the investment is potentially more challenging; we encourage the State to emphasize the importance of these tasks to local and regional stakeholders.

Business Model

The "business model" should be viewed as one that emphasizes the development of services to educate and train citizens ("customers") on the use and benefits of broadband, not one that focuses on

producing goods. The services offered at the broadband access and training centers will themselves be a valuable community resource, but they are a means to a greater end. These services will continually change, and should be structured to accommodate the evolving needs of customers. The ultimate measure of success is empowering citizens with the knowledge and ability to leverage broadband to create opportunities for employment, business ventures, and improving the quality of life in their communities.

We can think of the business as defined in these terms:

- Customer groups that will be served: **Citizens in unserved areas**
- Customer needs that will be met: **Basic broadband access, digital training, and resource education**
- Technology that will satisfy these needs: **Wireless broadband access, including laptops and software for customer use**

New business units generally follow one of four primary marketing strategies. Determining which strategy is appropriate depends on the nature of the identified market:

1. **Market Penetration**: Increase the market participation in existing services
2. **Service Development**: Introduce new services into existing markets
3. **Market Development:** Introduce existing services into new markets
4. **Diversification:** Introduce new services into new markets

As seen in the table below, the appropriate strategy depends upon the organization's current services and market position. The network services we propose offering are geared toward citizens who are not currently broadband users. However, these groups of citizens are already an existing "market" for numerous other economic development and educational programs run by the State. As the State targets communities in need with other kinds of development and social welfare programs, the broadband pilots should be viewed as an extension of these existing efforts. The existing outreach efforts the State undertakes in these regions should be leveraged however possible to enhance the success of the broadband project goals.

Viewed in this context—as an added social program on top of other existing State programs for communities in need—the **Service Development** strategy is most appropriate for the RBIP pilots. (From the perspective of State and local services, the network offering is a new service to an existing market of citizens already receiving support services from the State). The starting point for pursuing this strategy is addressing the State's readiness to deliver an added social service of this kind.

Table 11: Product/Market Expansion Grid

	Current Services (Existing social programs)	New Services (Community broadband)
Existing Markets (Citizens receiving State Services)	Market Penetration Strategy	Service Development Strategy **(RBIP Pilots)**
New Markets (Citizens not receiving State Services)	Market Development Strategy	Diversification Strategy

To move new services into existing markets, we encourage the State to leverage selected alliances. Alliances can bring technical, educational, and market expertise to assist in achieving goals and encouraging participation. The existing social programs the State delivers to the target area communities are a natural starting point for these alliances. Whatever existing tools the state uses to reach its citizens to bring educational, social, economic, agricultural, public safety, or other services to these regions should be viewed as potential partnerships. These partnerships can be used to advertise the new service and promote its use.

Business Goals

As indicated, in the market discussion above, the core premise of the challenge faced has to do with demand, not supply. Many citizens' do not see the value, do not have the tools (computers and devices), and do not have the financial resources to seek broadband connectivity. Without increasing demand, persuading an Internet provider to make an investment in these areas will be difficult if not impossible. Simply providing grants or other incentives to build infrastructure will not be sufficient, since one still must cover incremental operation and maintenance costs. Without an increase in demand, this is a difficult proposition in the identified unserved areas.

Table 12: Opportunity Matrix (Potential Models)

Attractiveness \ Success Probability	High	Low
High	o Develop programs to increase broadband access at community locations and provide training to increase demand and consumer benefits	o Find grants or other funding sources
Low	o Providers increase feedback on where service is and is not available (low attractiveness from the demand perspective)	o Continued sponsoring of discussion groups without more specific and detailed objectives and structure

Table 13: Threat Matrix (Training Model)

Seriousness	Probability of Occurrence: High	Probability of Occurrence: Low
High	o Unable to encourage participation in training programs o Unable to support on-going funding requirements of training o Increased demand is still insufficient to justify commercial broadband deployment	o State takes on a "build-it and they will come" strategy for promotion of community access locations and training programs
Low	o Providers increase marketing and other promotion activities spinning how well the region is served o Providers show that the identified unserved areas have some type of broadband available	o Existing providers object to business plan (out of concern with State becoming a competitor or subsidizing another competitor)

Training and Education Objectives

A key component of the proposed educational programming is digital literacy training—teaching participants how to use computers, understand available software, and how to use the Internet. This component, however, is secondary; the critical component is about persuasion—demonstrating how broadband Internet access can enhance citizens' quality-of-life, and how broadband provides access to important educational tools and economic resources. This component is not only critical in the training itself, but also in the promotion and marketing of use of the connectivity and training programs.

That broadband access enhances education, economic development, and overall quality-of-life is now a widely accepted and uncontroversial proposition. The National Broadband Plan website lists numerous examples of broadband's positive impacts. The State should tailor information about each of these advantages to the specific audiences and local conditions in each specific area during the implementation of its marketing efforts:

"Broadband can provide access to a wide range of resources, services, and products that can enhance your life in a variety of ways. These resources, services, and products include, but are not limited to:

Education, Culture, & Entertainment
Broadband can overcome geographical and financial barriers to provide access to a wide range of educational, cultural, and recreational opportunities and resources.

Telehealth & Telemedicine
Broadband can facilitate provision of medical care to unserved and underserved populations through remote diagnosis, treatment, monitoring, and consultations with specialists.

Economic Development/E-Commerce
Broadband can promote economic development and revitalization through electronic commerce (e-commerce) by:

- Creating new jobs and attracting new industries.
- Providing access to regional, national, and worldwide markets.

Electronic Government (E-Government)
Electronic government can help streamline people's interaction with government agencies, and provide information about government policies, procedures, benefits, and programs.

Public Safety and Homeland Security
Broadband can help protect the public by facilitating and promoting public safety information and procedures, including, but not limited to:

- Early warning/public alert systems and disaster preparation programs.
- Remote security monitoring and real time security background checks.
- Backup systems for public safety communications networks.

Broadband Communications Services
Broadband provides access to new telecommunications technologies such as Voice Over Internet Protocol (VoIP) allowing voice communication using the Internet.

Communications Services for People With Disabilities
Broadband permits users of Telecommunications Relay Services (TRS) to use Video Relay Services (VRS) to communicate more easily, quickly, and expressively with voice telephone users." [62]

[62] http://www.broadband.gov/broadband_advantages.html, accessed on December 27, 2013.

Getting Ready

To prepare for implementation of this business plan, we recommend using the Readiness Matrix provided in Table 9. Action items are displayed based on category and priority.

Table 14: Readiness Matrix for Pilot Projects

Area	Group	Action	Priority
Partners, Alliances, and Strategies	Administration	Finalize site locations	2
		Create oversight structure for each region	1
		Finalize operating budgets and allocations	2
		Select administration structure for each region	2
		Prepare reporting plan for each training center	2
		Finalize implementation schedule	3
		Coordination with local schools	1
	Resources	Obtain feedback from area providers on proposed access sites	1
		Obtain feedback from local groups (private and public) on business plan	1
		Seek feedback from local schools on how to tie-in training centers to district objectives and activities	1
		Assign tasks and responsibilities to local resources (private and public)	2
Marketing and Community Relations	Promotion	Create marketing plan for promoting access and creating interest	2
		Initiate training promotion	3
	Policy	Determine what hours will centers be available for access	3
		How to secure assets (laptops)	3
	Training	Develop training plan and curricula	2
		Outline training measurements (what is working, what is not working)	2
		Obtain feedback from regional groups regarding proposed material	3
		Create training schedule	3
Asset & Technical Management	Administration	Develop procedures to secure assets (laptops)	3
		Develop access use objectives and considerations	3
		Determine cost allocations for Direct Internet Access (DIA) and other shared resources	2
		Prepare acceptable use policies	2
		Prepare policies to identify and disconnect violators of policies	3
	Technology	Refine design for the selected locations	2
		Select vendors	3
		Deploy and test selected locations	3
		Perform benchmark testing	3
		Determine estimated community WiFi coverage for each access site (i.e. expected results for citizens accessing WiFi outside of training center)	3

Technology Plan

We propose that the state allocate a portion of its microwave network bandwidth for use by communities in the pilot regions. Since the network has considerable capacity, the extra bandwidth usage will not negatively affect other institutional or public safety uses of the facilities.

For transport, we recommend using a microwave radio broadcast in the unlicensed 5.8 GHz band to transmit broadband signal from the state microwave towers to the target communities.

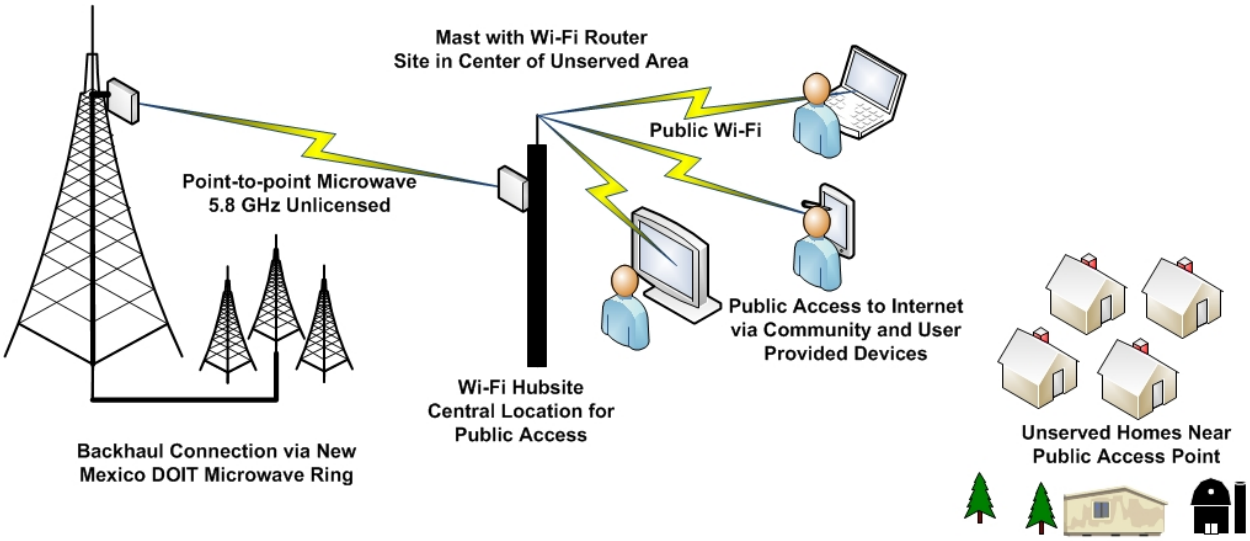


Figure 35: Proposed Pilot Network Model—Microwave Signal to Central Location

A necessary step in this approach will be to identify which towers on the microwave network will broadcast signal to the communities. The tower in closest proximity to each target site will provide the best signal strength. The New Mexico Broadband Program and EDAC have mapped the locations of each State tower site on the New Mexico Broadband Map.[63] The figures below show the distance of each target site from the closest state microwave tower.

[63] The mapping site includes a measurement tool that can be used to approximate the broadcast distance between the closest tower and the target site. Distances are approximations.

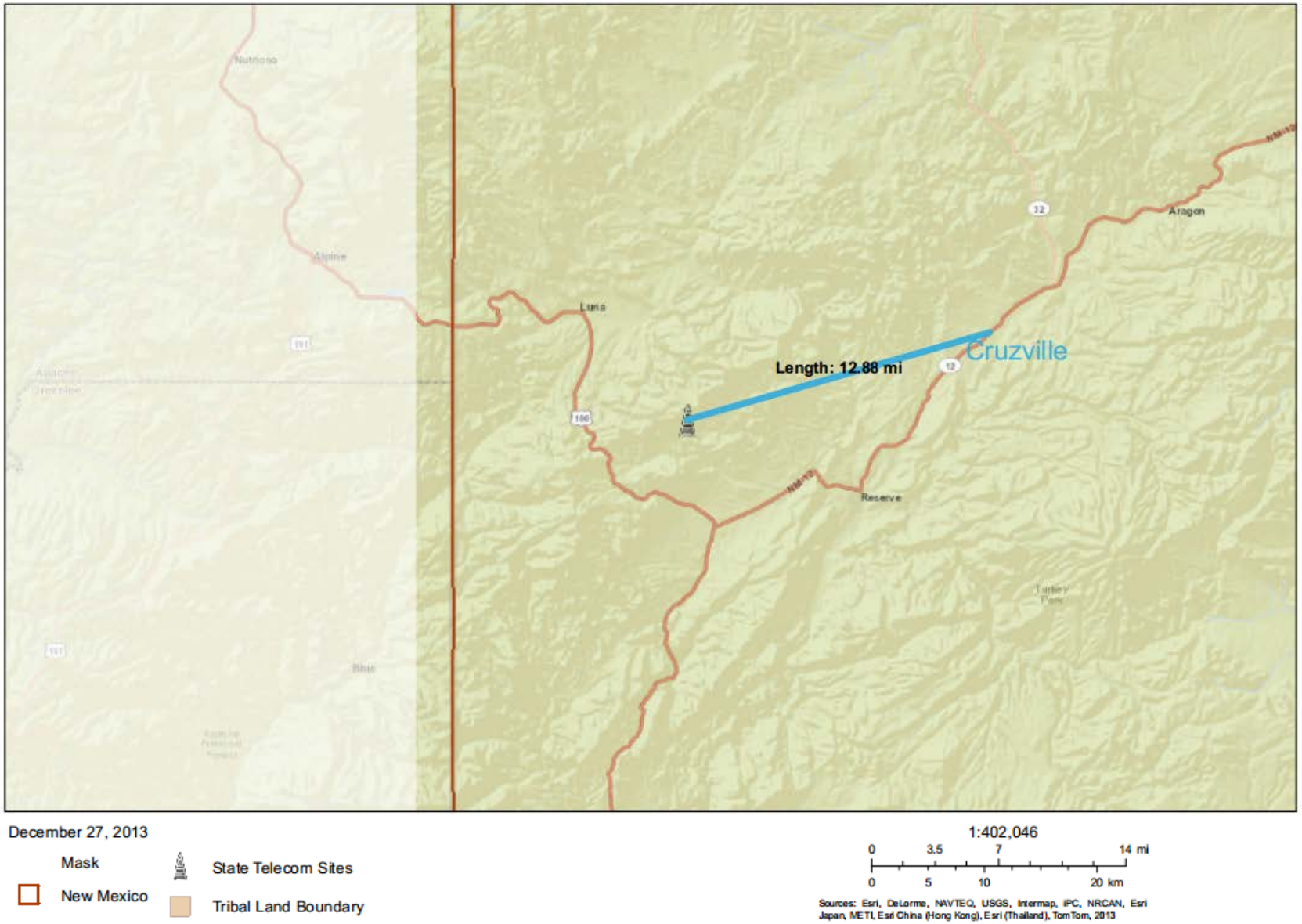


Figure 36: SWNMCOG—Distance of Microwave Tower to Cruzville (Catron County)

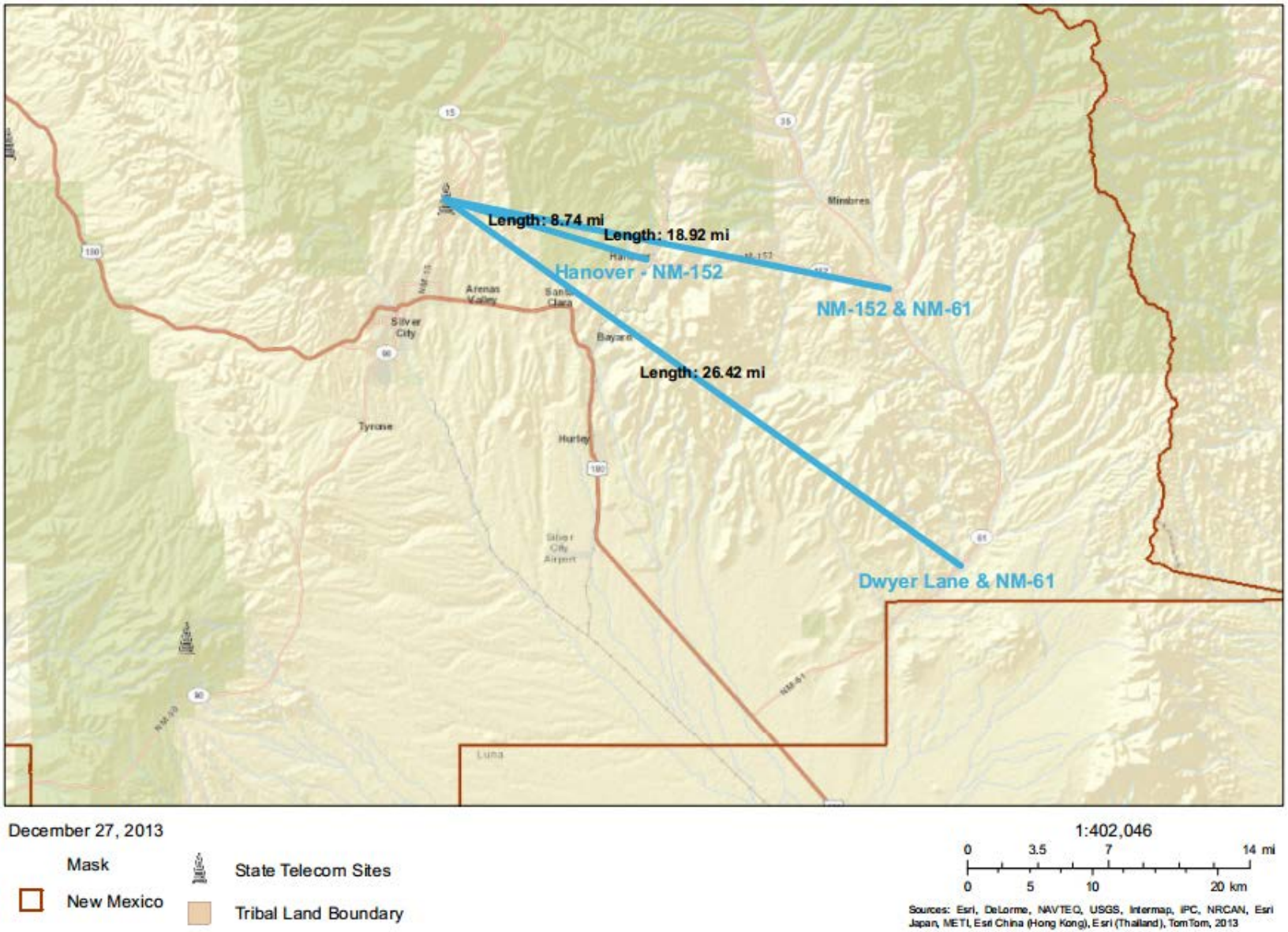


Figure 37: SWNMCOG—Distance of Microwave Tower to Hanover, NM-152 & NM-61, and Dwyer Lane & NM-61 (Grant County)

Figure 38: SWNMCOG—Distance of Microwave Tower to Keeler Farm (Luna County)

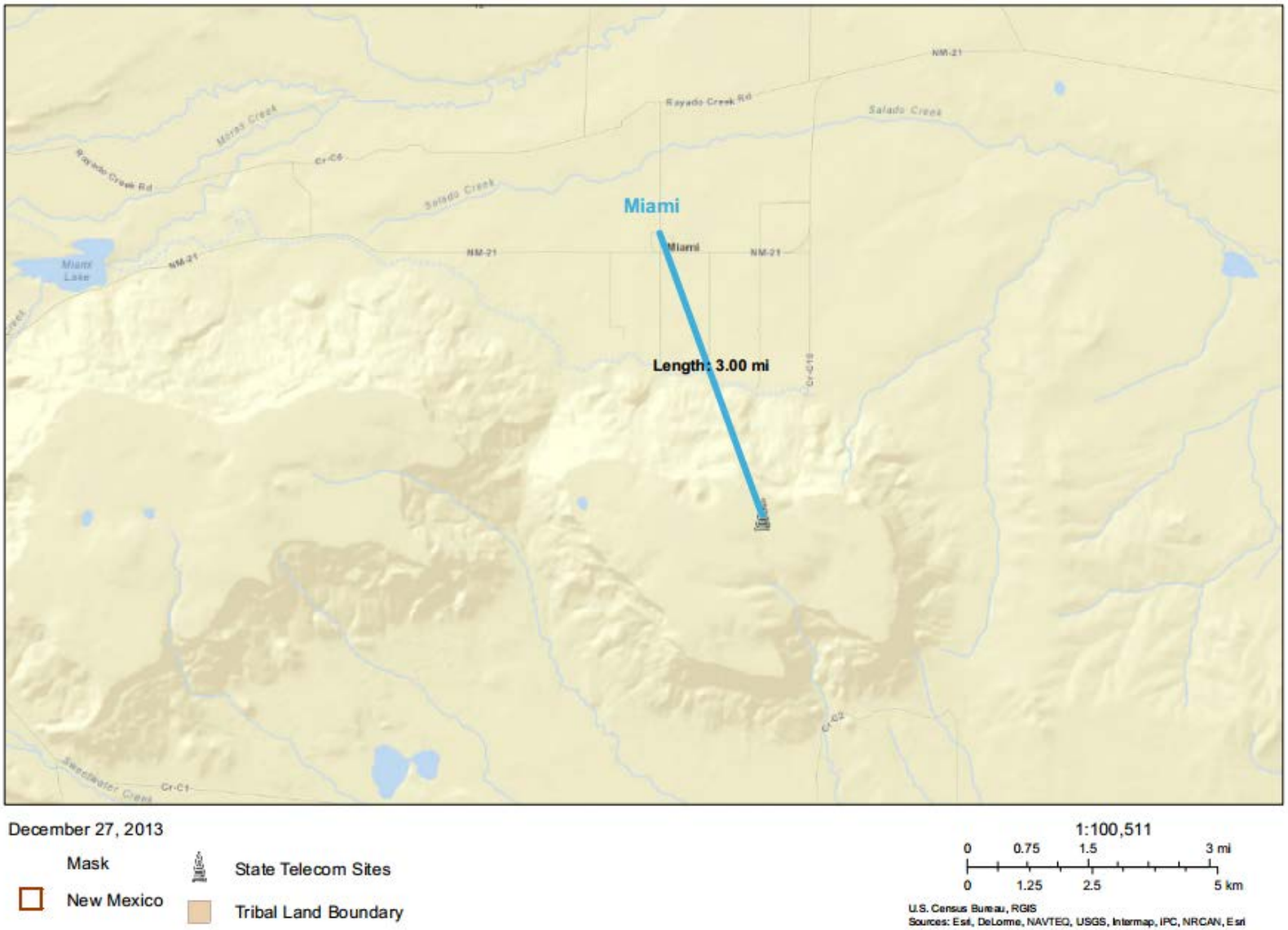


Figure 39: NEEDO—Distance of Microwave Tower to Miami (Colfax County)

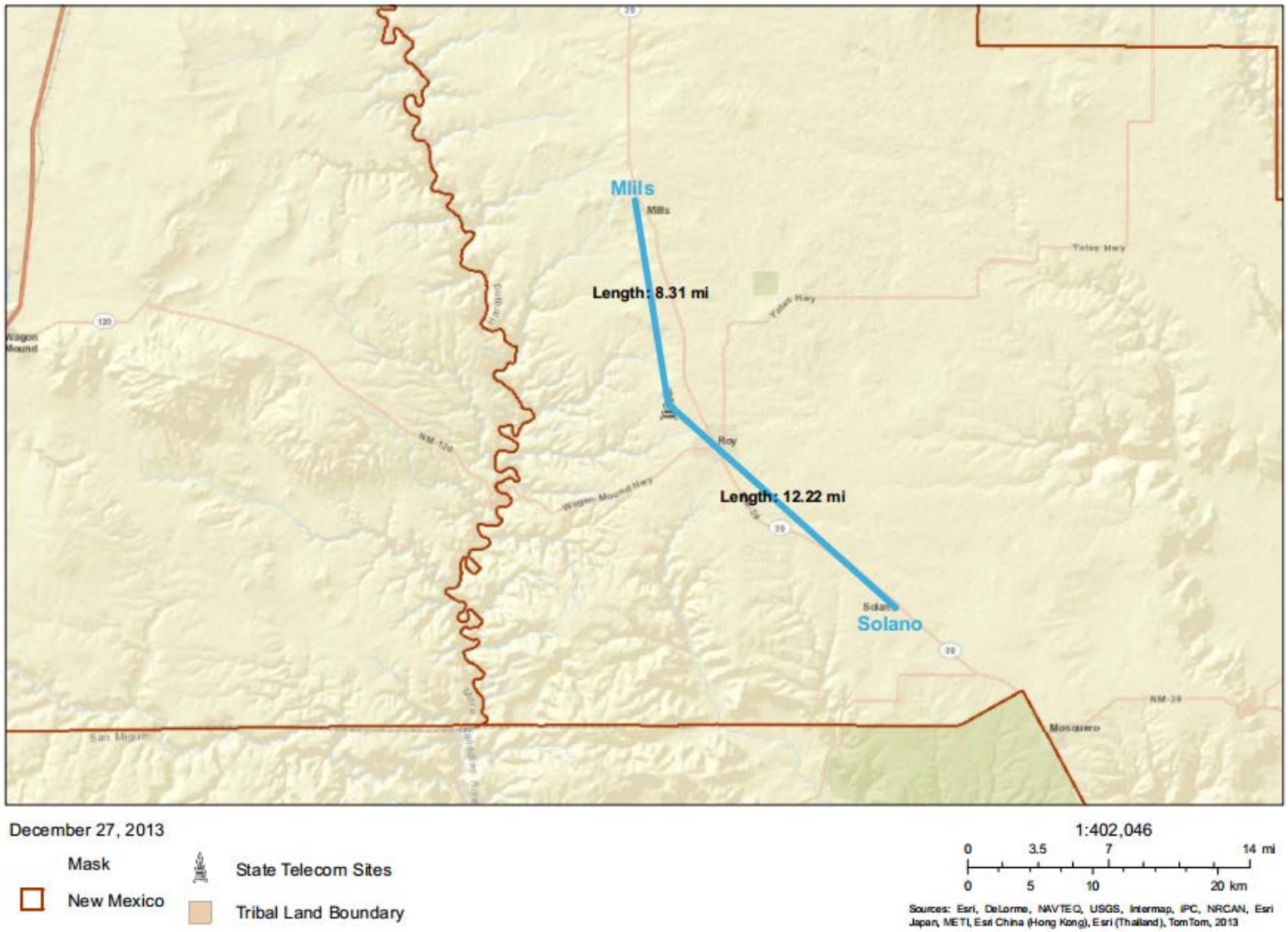


Figure 40: NEEDO—Distance of Microwave Tower to Mills and Solano (Harding County)

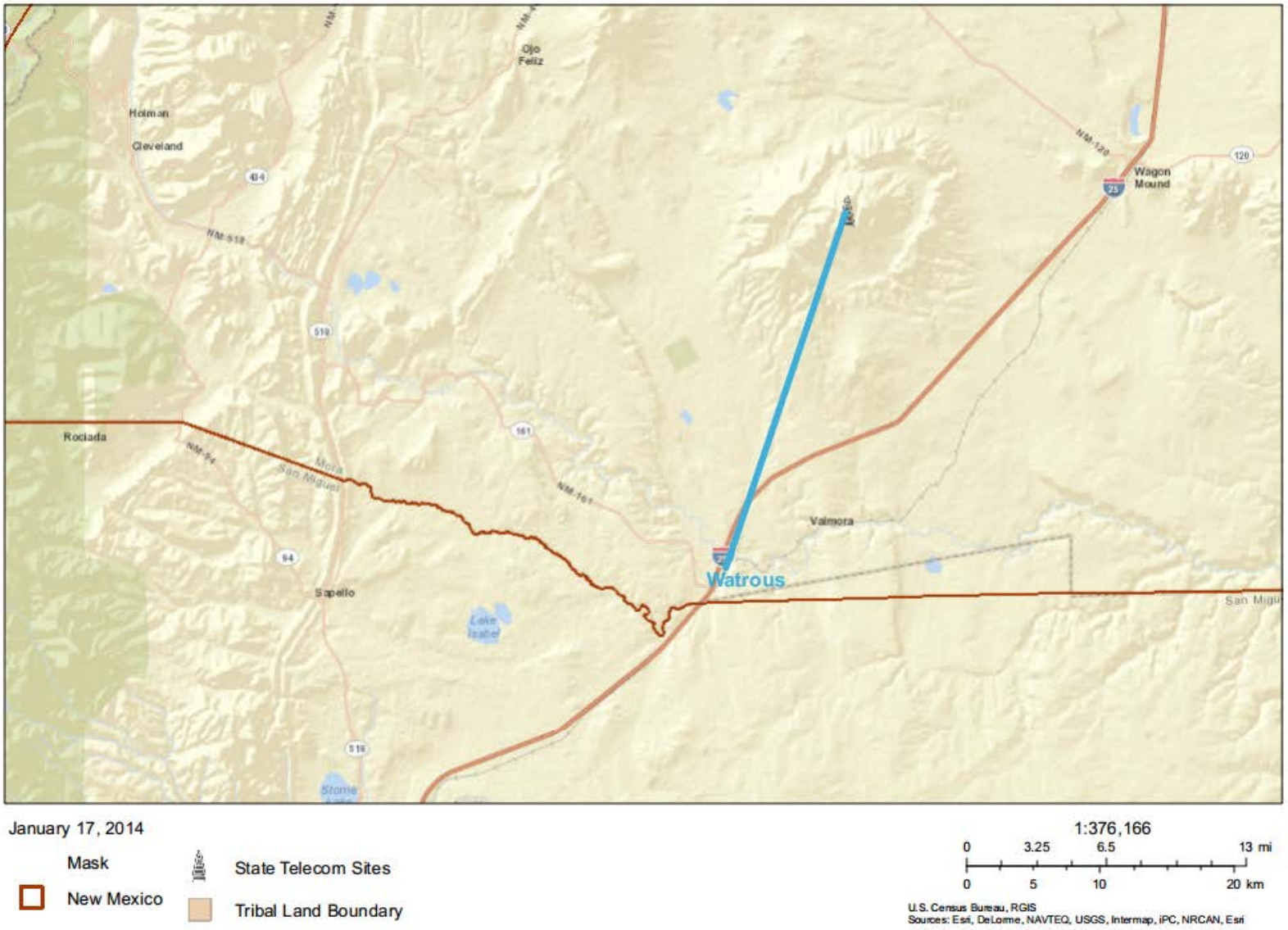


Figure 41: NEEDO—Distance of Microwave Tower to Watrous (Mora County)

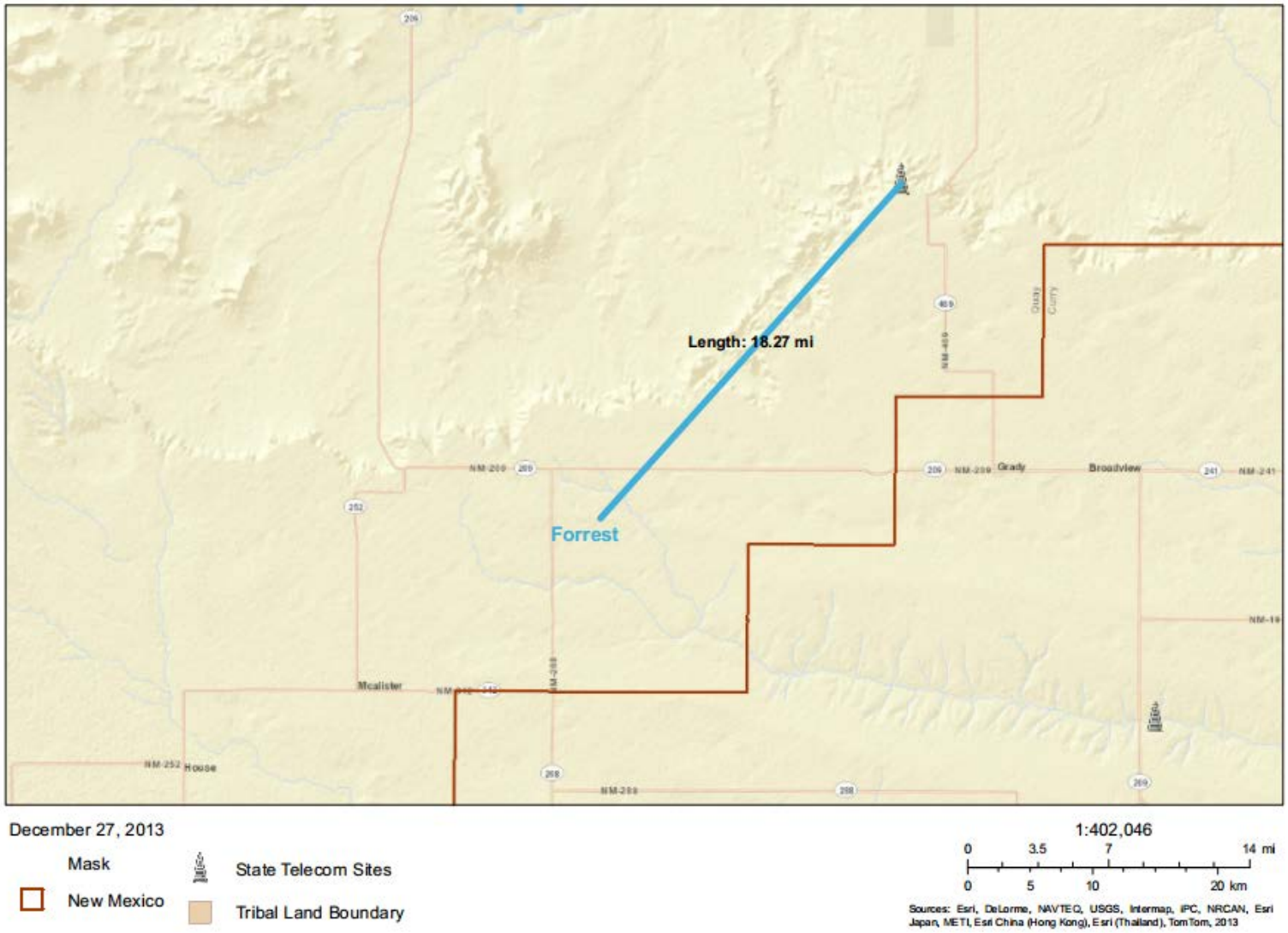


Figure 42: NEEDO—Distance of Microwave Tower to Forrest (Quay County)

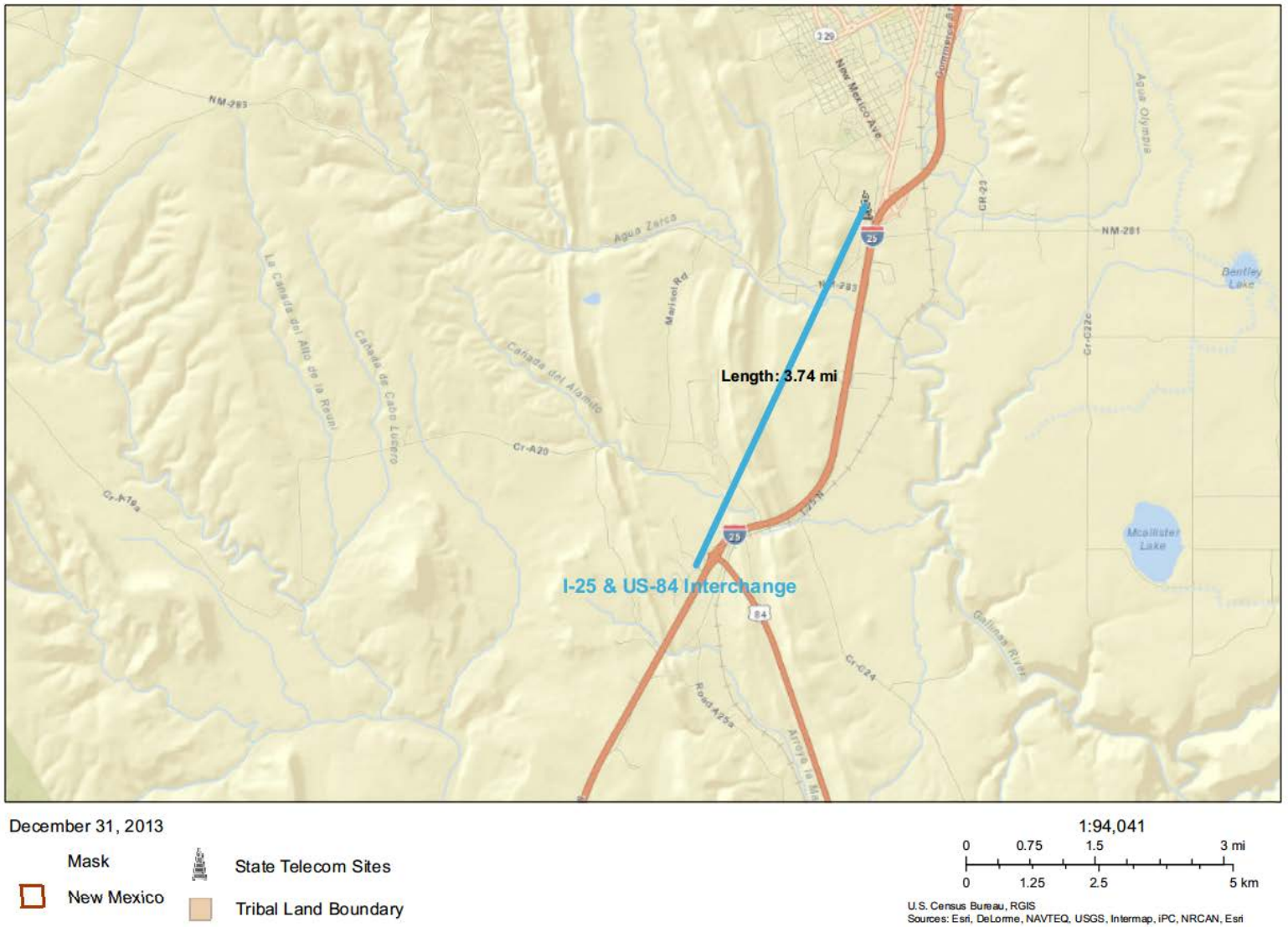


Figure 43: NEEDO—Distance of Microwave Tower to I-25 & US-84 Interchange (San Miguel County)

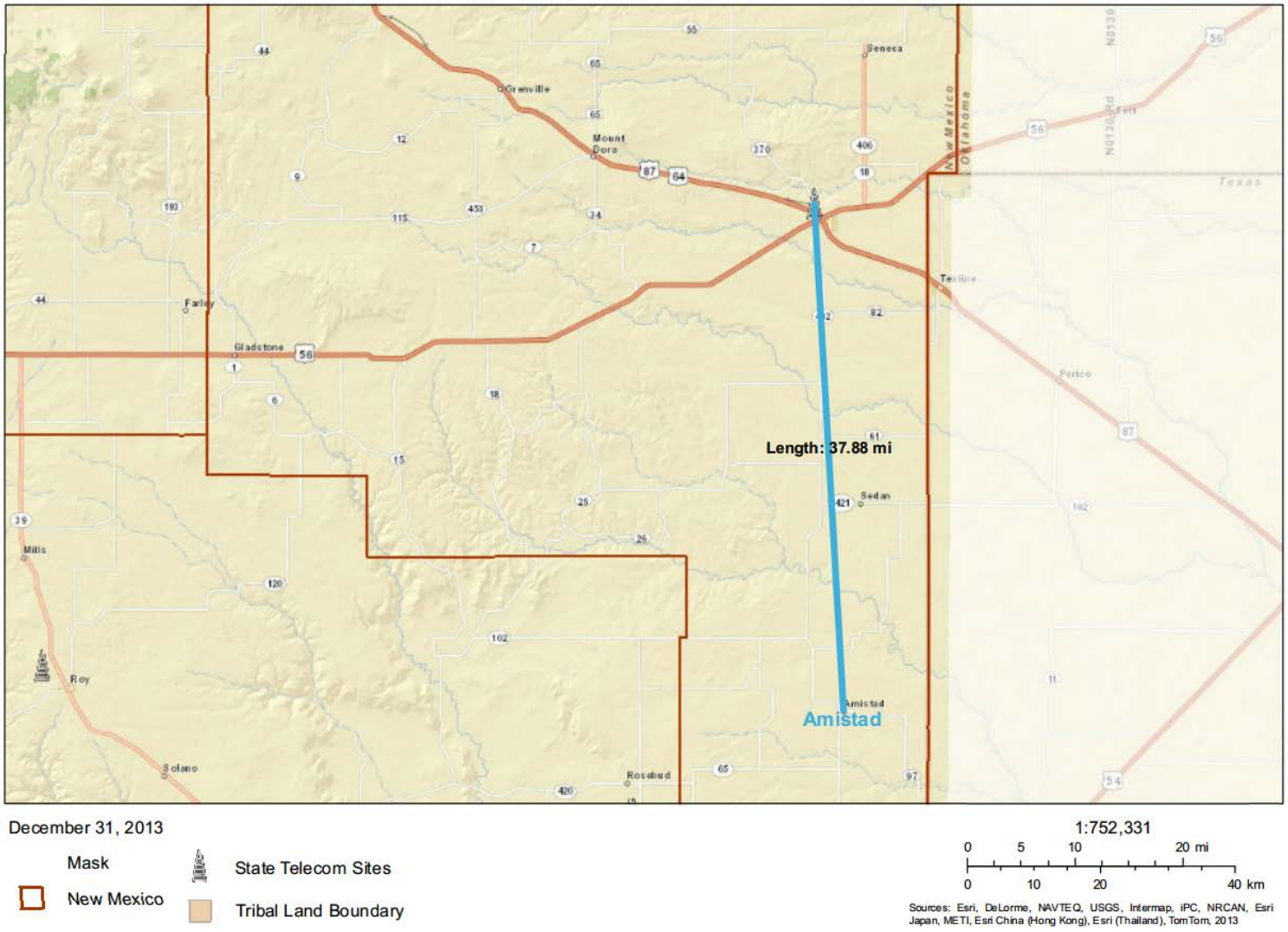


Figure 44: NEEDO—Distance of Microwave Tower to Amistad (Union County)

Cost Proposal and Rollout

We propose the following details with respect to the technology plan and its associated costs. We suggest rolling out the project in two phases, scaling upward over the two year course of the project.

Phase 1: Deploy two Broadband Access and Training Centers in each of the two regions in the first year of the project.

In the first year of the project, we propose developing a total of four Broadband Access and Training Centers. Each center will provide no-charge Internet access via Wi-Fi signal, and be equipped with 10 Wi-Fi enabled laptop computers for community use.

The technical approach to providing these centers with Internet bandwidth is determined in part by the distance of each center to the closest microwave tower. Most of the locations developed in the course of this project will implement a point-to-point broadcast configuration, in which a center can receive signal bandwidth from a master station located at a tower within a 20 mile distance. Given the geographic distribution of the target areas relative to the microwave towers, this type of configuration is appropriate.

In some instances, for centers located closer to a tower, it may be possible to use a point-to-multipoint configuration. Point-to-multipoint communication provides broadcast paths to multiple locations from a single station. It is appropriate only where centers are clustered together, and within five to six miles of a microwave tower site. Given these constraints, it is a less likely alternative for the current project, though may be used where possible to reduce cost.

At the tower sites, we project the unit cost for materials and installation for a single broadcast station configured for point-to-point broadcast to be $19,850. This assumption includes antenna hardware, power supply, engineering and testing, and the 5.8 GHz radio equipment.

At the receiving end—the Broadband Access and Training Centers—we project a total cost of $30,850 per center for materials and installation (for point-to-point). This includes the cost of the computers and software.

Phase 2: Expand deployment to additional centers and add additional resources.

In the second year of the project, we propose adding two additional Broadband Access and Training Centers per region. Learning from the successes and challenges from the first year's rollout, the State can tailor Phase 2 to address areas where the efforts will have the greatest impact.

We propose adding additional laptops to the centers during Phase 2 to significantly expand the capacity of each center's use. For budgeting purposes, we have estimated the addition of 40 laptops. In addition, we recommend encouraging residents to bring their own devices to access the Internet through the open Wi-Fi connection; some residents who live close enough to the centers may be able to gain access from their homes using their own computers or Wi-Fi enabled devices. This Phase of the project, therefore, is an opportunity to encourage residents to acquire their own devices, and consider adopting home broadband service.

Table 10 illustrates the aggregate assumed costs over the two year life of the pilot projects, including equipment installation, additions, and importantly, the training and educational programming to be introduced at each center—likely a considerable cost given the need for personnel to administer the centers and conduct training and maintenance tasks.

The assumptions used in this financial model include:

- Equipment maintenance and license fees—15 percent of the installed cost
- Training programming at $1,500 per session with two sessions per month per access site
- Dedicated Internet Access at $10 per megabit-per-second (Mbps) per month—assumes 20 Mbps per user with a 10 to 1 oversubscription
- A one-time cost of $50,000 for training development
- Administration costs of $75,000 per year per region

Table 15: Estimated Total Cost For Two Year Pilot Project Implementation

Description	Year 1	2	3
Technology Implementation	$ 163,100	$ -	$ -
Site Additions	-	163,100	-
Additional Laptops	-	48,000	-
Equipment Maintenance & License Fees	24,465	56,130	56,130
Training Development	50,000	-	-
Engineering & Project Management	18,000	18,000	-
DIA Allocation	9,600	28,800	28,800
Program Administration	150,000	150,000	150,000
Conduct Training	144,000	288,000	288,000
Total	$ 559,165	$ 752,030	$ 522,930

ctc technology & energy

engineering & business consulting

NEW MEXICO DEPARTMENT OF INFORMATION TECHNOLOGY

National Telecommunications and Information Administration

The New Mexico Broadband Program

Summary of Approach to RBIP Request for Information Process

Version 1, February 17, 2014

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	
http://www.doit.state.nm.us/broadband/	http://www.ctcnet.us/

Columbia Telecommunications Corporation

10613 Concord Street • Kensington, MD 20895 • Tel: 301-933-1488 • Fax: 301-933-3340 • www.ctcnet.us

Memorandum

Date: February 17, 2014

From: Joanne Hovis
President / Director of Business Consulting

Andrew Afflerbach, Ph.D., P.E.
Director of Engineering

To: Priscilla Lucero
Executive Director, Southwest New Mexico Council of Governments

Paul Jenkins
President, North East Economic Development Organization

CC: Gar Clarke
Broadband Program Manager
Department of Information Technology
State of New Mexico

Subject: *Summary of approach to RBIP Request for Information process*

In December, we submitted a Strategic and Business Plan for the Regional Broadband Implementation Plan (RBIP) in which we presented a strategy for addressing the demand in unserved areas in the Southwest New Mexico Council of Governments (SWNMCOG) and North East Economic Development Organization (NEEDO-NM) regions. Having found numerous obstacles inhibiting demand for broadband service in these areas, our plan aims at delivering a combination of training programs, promotional efforts, and community connectivity resources to give citizens the tools they need to become broadband users. Giving residents who are currently unserved by residential broadband an understanding of how to use online tools—and the economic, educational, and quality of life benefits they offer—works toward the goal of increasing demand for home access. This creates potential new market incentives for additional broadband service offerings.

Central to the plan is offering digital training and educational resources to residents. While this includes providing access to computers and online connectivity at public or other community facilities, the central focus must be on demonstrating to residents through training and education how they can leverage broadband for their benefit. The pilot project efforts should focus on helping residents learn to apply for jobs online, use online educational resources, create business opportunities, interface with online community resources, etc. This kind of digital education will give residents the tools and interest they need to become regular users of broadband.

The plan is designed to encourage residents who do not currently have home Internet service that using these resources is to their advantage. By offering (in a community setting) access to the basic tools of connectivity—computers, software, an Internet connection, and instructional resources—we remove

some of the costs and barriers associated with adopting broadband service initially. The aim is that ultimately, when residents realize the benefits of the available resources, they will become regular broadband users, thus increasing the demand for other residential broadband services within the regions. It is, therefore, a plan that we anticipate will attract the interest of existing broadband providers. If providing community access and broadband educational resources helps make residents into regular broadband users, eventually it will make them more likely to become customers of home Internet providers as well.

For the next phase of the RBIP process, we suggest that the pilot regions issue Requests for Information (RFI) aimed at soliciting provider input regarding those providers' potential roles in promoting broadband and providing service in these unserved areas. CTC Technology & Energy has prepared two separate RFIs—one to be issued by each region—in consultation with the New Mexico Department of Information Technology (DoIT). We plan to assist you throughout the process of publicizing the RFIs and soliciting responses from relevant providers. We will then evaluate each response received to assess the level of interest among providers in helping facilitate the goals of the strategic and business plan we have proposed. The responses and subsequent analyses will inform our strategy for developing potential partnerships with one or more private providers on behalf of the RBIP in each region. The RFIs and their responses will be non-binding, and will not include any bid language (as would typically be included in a more formal Request for Proposal). They will, however, enable interested private partners to lay the groundwork for a future procurement process.

The RFI documents have the following objectives:

1. Seek input from broadband providers on the proposed business plan.
2. Encourage providers to assist in meeting the business plan goals and suggest alternative or complementary strategies.
3. Obtain feedback from providers on how the State may encourage expanded deployment, including lowering barriers to market entry (e.g., by offering low-cost leases on tower space, facilitate site access, etc.)
4. Encourage providers to deliver no-cost or low-cost broadband to community centers, senior centers, libraries, schools, and other community anchor institutions or public spaces.
5. Encourage providers to participate in offering training and educational resources for citizens, and in promoting broadband use.
6. Seek contributions of computers and other resources in access locations and training centers (e.g., laptops, tablets, network equipment, software, etc.)

After we receive and analyze the responses, we will prepare a final report that will include recommendations for pursuing potential private partnerships for each region.

We seek your feedback, and that of your fellow regional stakeholders, on how best to execute the RFI process. We request the opportunity to meet with you and your organizations in the coming days to give you a formal presentation on our approach to the RFI, and to hear your thoughts. Our goal is for the RFIs to be released on February 24, with a response deadline of March 17.

Southwest New Mexico Council of Governments

Request for Information for Community Broadband Promotion

Issued: February 24, 2014
Response deadline: March 17, 2014

Issued in collaboration with the New Mexico Broadband Program
and the Regional Broadband Implementation Plan

Columbia Telecommunications Corporation
10613 Concord Street • Kensington, MD 20895 • Tel: 301-933-1488 • Fax: 301-933-3340 • www.ctcnet.us

Table of Contents

I. Introduction

This Request for Information (RFI) is being released by the Southwest New Mexico Council of Governments (SWNMCOG). We seek input from providers interested in partnering with the region to promote broadband use and adoption in currently unserved locations. We aim to give the residents in our communities the tools they need to become regular users of broadband.

New Mexico Broadband Program

The New Mexico Broadband Program (NMBBP) is a State initiative, launched with the objectives of *defining broadband availability* and *enhancing its adoption throughout New Mexico.* The NMBBP is accomplishing these goals through a number of statewide efforts, including:

- Mapping
- Planning
- Capacity Building
- Technical Assistance[64]

[64] Source: http://www.doit.state.nm.us/broadband/index.shtml

As a part of the NMBBP's technical assistance effort, the State launched the Regional Broadband Implementation Plan (RBIP), a targeted effort to bring regional stakeholders, providers, and the State together to facilitate the expansion and promotion of broadband use in unserved areas of New Mexico. The RBIP is currently undertaking two regional pilot projects within the State to provide technical assistance and help the selected regions achieve a solid framework for broadband planning, funding, and technology.

The Region

The SWNMCOG was selected as one of the regions to participate in the RBIP pilots.

The SWNMCOG comprises Catron, Grant, Hidalgo, and Luna counties in southwestern New Mexico. The region is served by several separate telephone and electric companies and cooperatives that overlap in their coverage areas and own varying amounts of broadband infrastructure.

Numerous obstacles to broadband deployment and adoption exist in the SWNMCOG region for both the community anchor institution (CAI) sector and the residential market. The region is characterized by low population density and difficult economic conditions. There is a complete lack of broadband infrastructure in many of the region's remote areas. However, even where service is available, many families are not making use of broadband—either because they cannot afford service, they do not know how to use it, or they do not understand what broadband can do for them. Lack of demand, therefore, is a major obstacle to further broadband use in our region.

II. Unserved Area Findings

Within the SWNMCOG region, we have identified several unserved areas to target for development through the pilot project. Attachment A shows maps and coordinates of these locations.

We believe these sites have clusters of unserved residences and are unlikely to see significant carrier infrastructure expansion for residential service absent a noticeable increase in demand. (We note that throughout both pilot areas, many other locations fit this description as well.) We seek input from providers familiar with the local broadband market (supply and demand)—insight into additional or alternative sites that may be integrated into our technology and business plan—as part of their RFI responses.

III. Pilot Goals

NMBBP's broadband consultants, CTC Technology & Energy, have recommended pursuing a business plan aimed at promoting broadband service through educational efforts and increased community-based access to digital resources. The focus of our approach is to use educational and recommend training resources to expand the user base for broadband services throughout the region, leading to a greater demand for residential broadband service in the long run.

We seek to provide unserved communities with the tools and knowledge they need to become customers of existing carrier networks over the long term, while developing a strategy for increasing the communities' knowledge of broadband and its benefits, as well as their ability to use devices and connectivity during the short term.

IV. Business Plan

Together with the NMBBP, we are pursuing a business plan of stimulating demand for broadband service through education and training. We seek to provide unserved communities with educational and training programs to teach residents how to use online resources to their advantage. We seek ways for the region, the State, and the provider community to collaborate to promote broadband interest and increase demand.

One possible tactical approach to this strategy is outlined in the NMBBP's recommended plan in Attachment B. This plan calls for using backhaul from the State microwave network to serve community locations with wireless service in a public or community location within the unserved areas. This service would then complement the educational and promotional programs designed to increase residents' interest in broadband use.

V. Purpose of RFI

This RFI is released for the purpose of optimizing the pilot initiative by incorporating the knowledge, needs, and creative ideas of the local telecommunications industry. This information will assist the SWNMCOG in defining the locations of the programming, any relevant network strategy, the content of educational and promotional materials, and the relationship between the region and providers. We wish to find providers interested in partnering with the SWNMCOG and our other partners at DoIT to determine what services and locations we can collaboratively develop.

The goals of this RFI are to:

7. Seek input from broadband providers on the proposed business plan.
8. Encourage providers to assist in meeting the business plan goals and suggest alternative or complementary strategies.
9. Obtain feedback from providers on how the State may encourage expanded deployment, including by lowering barriers to market entry (e.g., offering low-cost leases on tower space, facilitating site access, etc.).
10. Encourage providers to deliver no-cost or low-cost broadband to community centers, senior centers, libraries, schools, and other community anchor institutions or public spaces.
11. Encourage providers to participate in offering training and educational resources for citizens, and in promoting broadband use.
12. Seek contributions of computers and other resources in access locations and training centers (e.g., laptops, tablets, network equipment, software, etc.).

VI. Response Instructions

All interested service providers are strongly encouraged to respond. We welcome the responses of incumbent service providers, competitive providers, non-profit institutions, public cooperatives, and utilities, as well as entities that are not traditional Internet service providers.

Though no contracts or formal relationships will be established through this RFI, the responses will provide valuable information that will significantly influence the RBIP and enable the SWNMCOG to understand the capabilities and interests of potential partners and determine how to best include them in future efforts.

The SWNMCOG requests the following information—in as much detail as is practicable—from respondents:

A. **Statement of Interest:** Affirm that you are interested in this partnership and supporting the RFI goals listed in Section V. Keep response to a single page.

B. **Qualifications:** Provide a brief statement that discusses your experience, past performance, capabilities, and qualifications. Keep statement to two or fewer pages.

C. **Approach:** Summarize the technological and operational approach you would use as a partner on this project. In addition please provide a point-by-point response to the following questions.

1. What is your opinion of the proposed business plan to promote broadband in unserved areas of the SWNMCOG? Include an assessment of the approach described in Attachment B.
2. We seek collaboration with broadband providers to implement the business plan. Is your organization interested in partnering with us in this effort?
    i. What suggestions for alternatives or complementary tactics would you propose to pursue this business plan?
    ii. If you have alternative suggestions to the described business plan, describe the plan you would recommend pursuing and a related technical approach.
    iii. Suggest how you believe the State may encourage expanded broadband deployment, and what actions it may take that would best complement your own efforts as a provider.
        1. How could the State and region help lower any barriers to market entry you foresee (e.g., offering leases on tower space, facilitating site access, sharing bandwidth, etc.)?
        2. Do you see value in leveraging the State microwave network or other assets to offer broadband service to community centers in selected areas in the SWNMCOG region to facilitate the goals of offering training and promotional resources for residents?

3. What suggestions would you make for terms or strategies to be included in a Memorandum of Understanding (MOU) with the State for use of its facilities?

4. What risks, if any, do you foresee in integrating network service from the State microwave network or other assets? What strategies would you employ to alleviate these risks?

5. What actions could the State or the SWNMCOG take to reduce costs and burdens for a provider to deliver service to the unserved areas?

iv. Would you be willing to help deliver no-cost or low-cost broadband to community centers, libraries, schools, and other CAIs or public spaces?

1. What types of locations would you suggest equipping to best enable the community to take advantage of the service and other programs offered in conjunction with it?

2. A key component of the proposed plan is offering training and educational resources, and teaching residents about the benefits of using broadband and online resources. Would you participate in offering educational resources to help promote broadband use throughout the region's communities?

v. What contributions would you be able to make to the service locations in terms of equipment, including computers, tablets, network equipment, relevant software, or other?

vi. How could your organization facilitate and enhance education, training, and marketing of digital literacy and broadband use at each location and throughout the region?

D. **Conditions:** What conditions would you require the SWNMCOG and the State to meet in order for you to participate in the project? What, if any, are the financial requirements you have of the region or State in order to enter into a partnership? Keep response to fewer than 5 pages.

E. **Recommended Schedule:** Provide a high-level schedule for implementing your recommended approach. Offer a timeline with key milestones. Are there areas within the region where you would recommend beginning service and training programs before others?

Final RFI submissions must be received by 5:00 PM MST on March 17, 2014.

Please email RFI responses in PDF format to both Gar Clarke (george.clarke@state.nm.us) and Cheryl Johnson (cjohnson@ctcnet.us). An electronic submission is mandatory.

Please clearly identify any proprietary and/or confidential information.

Questions related to this RFI should be emailed to george.clarke@state.nm.us and cjohnson@ctcnet.us no later than **5:00 PM MST on March 7, 2014**.

The following is the schedule for responding to this RFI. The schedule is subject to change at the discretion of the SWNMCOG.

- February 24, 2014 – RFI Released
- March 7, 2014 – Deadline for Submitting Questions
- March 17, 2013 – RFI Responses Due

Attachment A: Unserved Areas

Based on our research, site visits, and discussions with community stakeholders and providers, we suggest pursuing service in the vicinity of the following unserved locations:

Table 16: SWNMCOG Region Target Sites

Site Description	Latitude/Longitude
Cruzville (Catron County)	33°48'26.19"N/108°39'55.23"W
Dwyer Lane and NM-61 (Grant County)	32°37'33.79"N/107°52'12.79"W
Hanover – NM-152 (Grant County)	32°48'39.02"N/108° 5'38.57"W
NM-152 & NM-61 (Grant County)	32°47'34.62"N/107°55'15.37"W
Keeler Farm (Luna County)	32°19'3.53"N/107°46'14.43"W

Figure 45: SWNMCOG Region Target Sites

Attachment B: NMBBP Business and Technology Plan Overview

The two Regional Broadband Implementation Plan (RBIP) pilot regions present a challenging landscape for increased broadband deployment. A high level of poverty (which suppresses market demand), low population density, and the high cost of rural infrastructure development together limit the business case for extensive last-mile network deployment. Due to these economic conditions, commercial broadband providers have not built high-end network services in these communities; the return on investment would be too low to justify the expansion.

Given this, we believe that the proposed business plan will increase demand and adoption over the long term through education and increased digital access, while providing communities with much-needed services in a manner that does not compete with existing carrier networks.

In order to provide residents in these areas with basic broadband services without an unreasonable amount of risk on the State's part, we recommend that the State facilitate the development of wireless Internet access available to the community at strategic locations in selected areas.

Potential actions that the State could consider in order to advance the availability of (supply) and demand for broadband services in these regions include (but are not limited to):

- Encouraging providers to offer low-cost or no-cost broadband connectivity at community centers, senior centers, or other public places.
- Increasing the number of computers available at community centers.
- Leveraging existing connectivity assets, such as the State microwave backbone, to deliver direct Internet access (DIA) to unserved areas.
- Leveraging existing State-owned towers and other assets to encourage private build-out of wireless and other broadband technologies.
- Providing "last-mile" broadband connectivity in a "public area" in the unserved regions.
- Developing and distributing computer and Internet training material to assist in educating citizens in unserved and underserved regions.
- Conducting broadband education sessions in the regions.

We propose making wireless Internet access locations open to the community with no service charges. In addition, we propose offering digital training and educational resources along with the Internet access, to give residents the tools they need to become regular users of broadband. Offering residents this service will meet the immediate need of providing unserved residents with Internet resources, as well as the long-term goal of stimulating demand for home broadband service.

Our recommended business and technology plan includes the following central components:

- Offering Wi-Fi Internet access with no user fees at a central location in selected target sites using the State microwave radio network for backhaul.
- Equipping these locations with computers for community use, and enabling users to connect their own devices.
- Providing computer and Internet instruction, classes, and technical assistance to users at each site.
- Providing educational materials about the benefits of broadband, government programs that assist with the cost of purchasing computers and Internet service, and other marketing efforts to stimulate demand for residential service.

The Department of Information Technology owns and maintains a robust statewide wireless network, consisting of a ring of microwave towers and interoperable mobile facilities. This network is capable of transmitting broadband radio signals throughout the State, including to remote regions. Primarily, the microwave network's purpose is to serve public safety agencies and other government users with two-way radio and other communications services. However, its high amount of bandwidth and its statewide reach make the microwave ring capable of providing backhaul for additional broadband uses, including Internet access for communities.

Using microwave backhaul, the State can bring bandwidth to a central location in each target area's population cluster. These central locations can be developed as broadband access and training centers in consultation with local leaders, and can occupy existing community buildings or space where possible. Local institutions could provide computers, tablets, or other devices, as is now common in libraries and community centers in more urban areas. Residents will then be able either to bring their own Wi-Fi enabled devices to access the public Internet or use devices provided by the community. The locale may be a public building or government site; the only requirements are that it be open to the public, accessible to the local population, and have a degree of security to protect the network and computer equipment from theft and the elements.

These locations can also serve as venues for Internet education and training programs. The nature of a community "Internet café" provides an atmosphere where residents can not only connect online, but also among themselves, and access computer literacy and Internet training tools. Offering this kind of programming can have a significant positive impact on Internet demand and use. This approach embraces a long-term strategy of educating the community with the ultimate goal of increasing economic activity and helping digital participation permeate throughout the community. As more people use the Internet, many of them will seek to adopt home broadband service down the road. Ultimately, when the demand increases by a sufficient amount, a business case will emerge for a provider to expand its service area.

The New Mexico Broadband Program

Overview and Analysis of Responses Received as a Result of Requests for Information

Version 1, March 28, 2014

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	
http://www.doit.state.nm.us/broadband/	http://www.ctcnet.us/

Memorandum

Date: March 28, 2014

From: Joanne Hovis
President / Director of Business Consulting

To: Gar Clarke
Broadband Program Manager
Department of Information Technology
State of New Mexico

Subject: Overview and analysis of responses received as a result of Requests for Information for community broadband promotion in the "SWNMCOG" and "NEEDO-NM" regions

This memorandum provides an overview of CTC's analysis of the responses to the requests for information (RFI) on community broadband promotion published for the Southwest New Mexico Council of Governments (SWNMCOG) and the North East Economic Development Organization (NEEDO-NM). Broadly, we recommend that:

- Plateau Communications is the most logical partner to increase demand through development of educational and training resources in the NEEDO-NM region.
- The State should hold additional conversations with WNM Communications to further evaluate potential State actions to assist with the expansion of broadband to currently unserved areas in the SWNMCOG region.

Background: Requests for Information on Community Broadband Promotion

In collaboration with the New Mexico Broadband Program and the Regional Broadband Implementation Plan, CTC issued two requests for information (RFIs) on community broadband promotion for the Southwest New Mexico Council of Governments (SWNMCOG) and the North East Economic Development Organization (NEEDO-NM) on February 24, 2014. The RFIs were sent to 15 recipients that were vetted and provided by the State and included a deadline of March 7, 2014 for submitting questions and a deadline for responses of March 17, 2014.

The RFIs sought input from providers interested in partnering with the regions to promote broadband use and adoption in currently unserved locations, including ideas of how providers in the two regions would give residents the tools they need to become regular users of broadband. In addition, the RFIs were released for the purpose of optimizing the pilot initiative by incorporating the knowledge, needs, and creative ideas of the local telecommunications industry.

The overall goal of the RFIs was to assist each region in defining the locations of the programming, any relevant network strategy, the content of educational and promotional materials, and the relationship between the region and providers. The RFIs encouraged responses from a wide variety of institutions

including incumbent service providers, competitive providers, non-profit institutions, public cooperatives, and utilities, as well as entities that are not traditional Internet service providers.

Overview of Responses

The RFIs for the SWNMNCOG and NEEDO-NM regions each received one response.

SWNMCOG Region

The SWNMCOG region comprises Catron, Grant, Hidalgo, and Luna counties in southwestern New Mexico. The region is served by several separate telephone and electric companies and cooperatives that overlap in their coverage areas and own varying amounts of broadband infrastructure. The SWNMCOG RFI received one response—from Western New Mexico Telephone Company, Inc. (WNMT) and WNM Communications Corporation (WNMC), collectively WNM Communications (WNM).

Qualifications

Western New Mexico Telephone Company, Inc. is a Rural Local Exchange Carrier (RLEC) and Eligible Telecommunications Carrier (ETC) that has been a service provider in southwestern New Mexico for more than 40 years. Its service area is 15,000 square miles and it serves approximately 5,000 customer locations in Catron, Grant, Hidalgo, and Socorro counties. Currently the company has broadband available to more than 85 percent of its customer locations. The company's current goal is to exceed 90 percent broadband availability by the end of the 2014 throughout the service area.

According to the RFI response, WNMT and its ISP affiliate WNMC collectively provide the last- and middle-mile facilities for broadband services. The company has more than 500 miles of fiber optics and deploys the latest generation Broadband Loop Carriers to leverage copper loops and deliver broadband services throughout its service area. WNMC connects to WNMT in Silver City, NM, and currently has middle-mile access to the Internet Cloud through three diverse routes to three service providers.

Overview of Responses to RFI Questions

WNM's technological approach is fiber and fiber-copper networks. WNM states these technologies are the most reliable and would be its first technological consideration. Wireless broadband, including fixed and mobile solutions, is the second most viable option, and satellite broadband service is the third most viable option.

WNM expressed support for improving digital literacy throughout the State, but also noted that the State should focus on supporting schools, libraries, rural health care, and community centers through recurring funding for broadband services, and developing community centers for access to Internet services. WNM also offered that one of the most significant barriers for broadband expansion is slow

and unpredictable permitting processes with federal and state agencies, including Essential Archeological and Environmental requirements.

WNM expressed interest in exploring collaborative efforts to implement the business plan. WNM noted it has limited resources as an RLEC to conduct education and training throughout the area, but it will support efforts of third parties. It also expressed interest in utilizing State assets such as the State's microwave network to offer broadband service to community centers in selected areas in the SWNMCOG region. However, it offered that an MOU needs to be for a sufficient period in order to ensure that the tenant has reasonable rights to deploy necessary infrastructure and the rights for renewal of any lease arrangements. It also stressed the importance of jointly agreed upon Service Level Agreements that provide interconnection standards and engineered standards.

Proposal for Collaboration

WNM is most interested in collaborating to quantify and qualify specific locations as unserved areas, including the determination of the availability of broadband. WNM stressed that any location that has access to broadband services should not be candidates for alternate solutions. Furthermore, in locations that are currently unserved, it would like to collaboratively develop solutions to meet the overarching goals of the State.

As a partner, WNM indicated that it will perform analysis of the following identified locations within its service area:

- Cruzville (Catron County) 33°48'26.19"N/108°39'55.23"W
- Dwyer Lane and NM-61 (Grant County) 32°37'33.79"N/107°52'12.79"W
- NM-152 NM-61 (Grant County) 32°47'34.62"N/107°55'15.37"W

WNM states that it believes that limited broadband services are available in each of these areas, and has included each of these locations in its five-year broadband build-out plan.

For the three locations, WNM proposes to:

- Evaluate technology alternatives and provide recommendations within 30 days of acknowledgement from the State and the SWNMCOG.
- Engineer recommended solution and complete all permits and rights-of-way applications within 60 days.
- Commence implementation of the selected solution(s) within 30 days of completion of permits and/or rights-of-way applications.

NEEDO-NM Region

NEEDO-NM comprises Colfax, Guadalupe, Harding, Mora, Quay, San Miguel, and Union counties in northeastern New Mexico. The region is served by several separate telephone and electric companies and cooperatives that overlap in their coverage areas and own varying amounts of broadband infrastructure. The NEEDO-NM RFI received one response—from Plateau Telecommunications, a wholly-owned subsidiary of Eastern New Mexico Rural Telephone Cooperative, Inc. (ENMR).

Qualifications

Plateau Telecommunications (Plateau) is a wholly-owned subsidiary of Eastern New Mexico Rural Telephone Cooperative, Inc. (ENMR) headquartered in Clovis, NM. It began operations in 1982 and operates one of the largest Internet Service Providers (ISP) in New Mexico and one of the largest wireless ISPs in the US. It operates in 25 counties in eastern New Mexico and western Texas covering 25,000 square miles. Plateau has over 3,000 miles of fiber buried in eastern New Mexico and west Texas. Plateau has offices in Santa Rosa, Logan, Clayton, Fort Sumner, Farwell, TX as well as Clovis, Roswell, Plainview, TX, and Levelland, TX.

According to the RFI response, Plateau is a licensed Competitive Local Exchange Carrier (CLEC) and provides local telephone service to approximately 10,000 residential and business subscribers. It also currently provides fiber and connectivity services to the Roswell Independent School District, Clovis Municipal Schools, Moriarty Schools, Estancia Schools and Mesalands College as well as broadband Internet access to many of the rural schools in the ENMR serving area. Plateau provides fiber-optic services to hundreds of companies throughout central and eastern New Mexico and west Texas. The service is backed by redundant connections to two different Tier-1 Internet providers along separate routes to help ensure maximum up-time and bandwidth availability. Plateau also provides cellular service under the Plateau Wireless brand in eastern New Mexico and west Texas with over 40,000 cellular subscribers in these markets.

Overview of Responses to RFI Questions

Plateau expressed support for the business plan and is interested in partnering with the effort. Plateau expressed interest in working with NEEDO-NM and the Department of Information Technology and other agencies such as the Cooperative Extension Service, colleges and universities, and local school districts to accomplish two goals:

1) Use educational and training resources to expand the user base for broadband services throughout the region, leading to a greater demand for residential broadband service, and

2) Seek methods for providing broadband services to unserved communities in the region.

Plateau stressed the importance of measuring the demand for broadband in the unserved areas before extending a huge effort and recommended that a survey of the residents in the unserved areas be conducted and evaluated before proceeding. It recommended the community of Miami as a pilot site to

establish a community center with computers and Wi-Fi and to conduct educational training and help understand the effort required and the impact on the community before trying it in other areas.

With respect to utilizing State assets such as the State's microwave network to facilitate broadband service, Plateau noted there are specific technical and political challenges. For example, how does the State network connect to the service provider network? Who offers the Internet (the State or the service provider)? What are the political ramifications for the State of New Mexico to offer end user services? It further noted that although use of the State microwave network may be a viable option, all options for backhaul should be evaluated. Finally, it offered that increasing the speed of the right-of-way process when dealing with State agencies would reduce costs and burdens for a provider to deliver service to the unserved areas.

Plateau expressed concerns with respect to delivering no-cost or low-cost broadband to community centers, libraries, schools and other CAIs or public spaces. It noted the recent completion of a $40 million project to provide broadband services to CAIs throughout its service area. A requirement of the project is to achieve a return on investment which would be contradictory to a no-cost option and may be contradictory to a low-cost option.

Proposal for Collaboration

Plateau is interested in participating with NEEDO-NM and the State on 1) a plan to offer training and educational resources to communities throughout the Plateau serving area, and 2) creating a plan to offer a pilot program in Miami, NM for broadband services to a community center.

More specifically, Plateau's RFI response includes the following:

<u>Training and Educational Resources</u>

1. This would need to be a joint effort to develop a training program where multiple parties are involved in the training. Plateau could provide portions of the training in conjunction with the State and NEEDO-NM.

2. Funding would need to be a joint effort between the State and Plateau.

<u>Pilot in Miami, NM</u>

1. Evaluate the demand and the cost for broadband in Miami and determine if it is sufficient to proceed.

2. Determine if the need for broadband is confined to the community of Miami or the expectation is beyond the community boundaries (i.e., understand the scope of the pilot).

3. Plateau believes the pilot should be funded by the State or NEEDO-NM or with outside funding.

A high-level schedule of Plateau's proposal is as follows:

- Kickoff meeting to define scope of training in unserved/underserved areas

- Gather data and evaluate broadband demand in Miami, NM
- Kickoff meeting to define project scope and cost for Miami, NM pilot program

Recommendations for Partnerships

This section of the memorandum provides recommendations for the NMBB Program regarding strategies for partnering with the two entities that responded to RFIs for the SWNMNCOG and NEEDO-NM regions.

The recommended business plan aims to promote broadband service through educational efforts and increased community-based access to digital resources. The focus of the approach is to use educational and training resources to expand the user base for broadband services throughout the region, leading to a greater demand for residential broadband service in the long run.

In the NEEDO-NM region, Plateau seems to be a qualified partner to increase demand through development of educational and training resources. Plateau proposed a specific plan to partner with NEEDO-NM and the State to offer training and educational resources to communities throughout the Plateau service area, as well as creating a plan to offer a pilot program in Miami, NM for broadband services to a community center. The one key challenge to this proposed partnership is Plateau's stated desire to share funding of both the training and educational materials and the pilot CAI site in Miami with the State, NEEDO-NM, or other outside funders.

Plateau also recommended measuring the demand for broadband in the unserved areas before extending a huge effort and recommended that a survey of the residents in the unserved areas be conducted and evaluated before proceeding. In conjunction with the above activities, or alternatively, the State, NEEDO-NM, and other relevant agencies could partner with Plateau to carry out an in-depth demand survey of currently unserved areas in the provider's territory. A survey may entail a more modest investment by the State, but could help improve the business case for expanding broadband infrastructure into certain unserved areas.

In the SWNMCOG Region, the single RFI respondent does not initially represent a qualified partnership, but its interest should be explored further. WNM Communications states it does not have resources to conduct education and training throughout the area, but it will support efforts of third parties that are focused on these efforts. WNM did propose to look at three locations in its service area that are unserved or have limited broadband access and evaluate technology alternatives and provide recommendations to the State and the SWNMCOG. WNMs willingness to deploy infrastructure appears to be contingent on the State expediting all permits and rights-of-way applications.

It is unclear from the WNM's response to the RFI what unserved areas it would expand to and what level of service it would provide given State action. WNM submitted a separate expression of interest to the Federal Communications Commission (FCC) on March 7, 2014 regarding the Connect America Fund's Phase II Experiments. The FCC invited comments from any entity interested in using Connect America

funding to conduct experiments to deploy high-speed, scalable, IP-based networks, using either wireline or wireless technologies, or a combination of technologies, in rural, high-cost areas (including on Tribal lands) .

In its expression of interest, WNM indicated that it was planning to offer fiber-to-the-home (FTTH) services including voice and high-speed broadband services of 10 Mbps, 20 Mbps, 50 Mbps, and 100 Mbps. It also stated that it planned to offer Gigabit services to certain customers including community anchor institutions. Finally, WNM stated that it was in discussion with Navajo Alamo Chapter and the Navajo Nation about preferred methods to achieve their broadband goals.

The State should thus consider reaching out to WNM to better understand its plans for deploying advanced broadband services in its rural, high-cost areas. Are they contingent on the additional funding from the Connect America Fund? Are they planning to only upgrade existing service areas, or unserved areas as well? If WNM applies for funding from the FCC's Connect America Fund (the application process has yet to be determined), access to State facilities or other accommodations on rights-of-way could be helpful in making the application more competitive. To the extent the State is willing and able to work out such arrangements, it should secure clear commitments from WNM regarding service areas and service levels.

The New Mexico Broadband Program

Pilot Area Funding Mechanism

Version 1, September 2014

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	
http://www.doit.state.nm.us/broadband/	http://www.ctcnet.us/

Pilot Area Funding Mechanism: FCC Rural Broadband Experiment

This memorandum represents our analysis of the FCC's instructions regarding the application process for parties interested in participating in the Rural Broadband Experiments program—a program that represents an important potential funding mechanism for the pilot areas.

This program is an opportunity for providers like public utilities, local and tribal governments, non-profits, electric coops, and other competitive service providers to compete in an auction for funding. A large goal of the experiments is to allow nontraditional providers a chance to obtain resources to offset the cost of building fiber, especially in difficult to serve rural areas.

Background

On July 14, 2014, the FCC released an order[65] that allocated up to $100 million as an initiative to support rural broadband. The initiative – the Rural Broadband Experiments – divides the funds into three groups:

- $75 million to test construction of networks offering service plans providing 25 Mbps downloads and 5 Mbps uploads for the same or lower amounts of support than will be offered to carriers in the Phase II program of the Connect America Fund (CAF).
- $15 million to test interest in delivering service at 10/1 speeds in high-cost areas.
- $10 million for 10/1 service in areas that are extremely costly to serve.

On July 18, 2014, CTC released an analysis[66] of the newly created program to provide guidance in regard to strategic considerations, give an in-depth description of the funding opportunity, and provide preliminary direction on the application planning process.

On August 19, 2014, the FCC's Wireline Competition Bureau released a public notice[67] outlining the process that will be used to award funding to winning bidders. A brief summary is below.

Application Materials and Timeline

Applications are due 90 days from the release of the original Rural Broadband Experiments order on July 14, 2014. However, because that date falls on the weekend prior to Columbus Day – a national holiday – the deadline for submitting application materials is **Tuesday, October 14, 2014 at 6:00 p.m. ET.**

[65] The full order is available at http://www.fcc.gov/document/rural-broadband-experiments-order

[66] The full memorandum is available at http://www.ctcnet.us/blog/ctc-guidance-on-fcc-rural-broadband-experiments/

[67] The public notice containing instructions is available at http://www.fcc.gov/document/rural-broadband-experiments-application-process-public-notice

Applications will be submitted during a filing window of at least fifteen days, which the Bureau will announce by releasing a public notice. They will also make available any necessary forms and supplemental documentation for potential applicants. Applicants can make adjustments to completed applications during the filing window, but no modifications will be allowed after the submission deadline.

All applications must be submitted over the Internet via the FCC Auction System**.** Applications filed through any other means, including hard copy or through the Electronic Comment Filing System, won't be accepted. Screen shots of the FCC's auction site are included as Appendix A below.

More than one bid may be included in the application, but only one application will be considered for each applicant. If an applicant submits more than one application, only the most recent submission prior to the deadline will be considered for award. We encourage applicants to focus on one, thorough application.

There are two distinct phases for the application process:

1) The first step is for applicants to file an application under **FCC Form 5610**.[68] In this step, applicants must provide comprehensive information supporting their application. This information includes details about an applicant's identity and legal classification. Applicants also must designate a contact party who will be notified in the event an application is chosen. This form certifies that the applicant is wholly qualified to complete the work for which they have requested funding through the experiments. Applicants must be able to prove their technical, legal, and financial abilities. Any direct or indirect ownership interest of 10 percent or more must also be disclosed.
2) The second step applies only to winning bidders, and information will submitted via **FCC Form 5620**.[69] For those applicants who are selected, supplemental information must be provided within ten days to substantiate an applicant's technical and financial ability to participate fully in the funding opportunity. This information will then be reviewed to determine whether the proposed projects are feasible. Again, this comprehensive information will be required only of winning bidders.

Bid Forms and Descriptive Data Forms

[68] This form is not yet available, but will be among data released when the Bureau opens the filing window.
[69] This form is not yet available.

Each bid requires a separate bid form,[70] which will be used to rank proposals based *solely* on cost effectiveness. Other information provided in the Form 5620 will not be used to select winning bidders.

Individual bid forms must contain:

- Bid Project Identifiers to denote individual bids. These will be numbers 1,2,3,4 and so on, identifying the number of the bid within the application.
- A unique FCC Registration Number, known as an FRN. This number will allow applicants to log in to the FCC auction system, and it will be combined with the bid project ID to ensure that each bid has a uniquely identifying number. If multiple entities are submitting an application together, only one of them must register for an FRN.
- Funding category identifiers (one, two, or three). This allows for easy identification of which category the project belongs in.
- Census block identifiers or CBFIPS, which denote the census blocks the project intends to serve.
- The total number of eligible locations to be served, which will be used in calculating the cost of a project.
- The total number of extremely high-cost locations to be served, which will be used in calculating the overall cost of a project.
- The total amount of support requested.

Both bid forms and descriptive data forms must be uploaded in .csv file format. However, the descriptive data forms must be provided *prior to the filing window.* For each individual project, applicants must provide:

- The applicant's unique FRN. Again, this number will be used to allow applicants access to the FCC's online auction system.
- Funding category of specific project.
- Entity type.
- Provider type.
- What type of technology will be deployed.
- Whether it has it has already been designated as an Eligible Telecommunications Carrier (ETC) for the proposed service area that the project covers.
- Whether, if selected, it will elect to receive 30 percent of its funding upfront with a commitment to deploy to 25 percent of eligible locations within 15 months.

[70] To be released prior to the opening of the filing window.

All bidding agreements and arrangements must be disclosed on the application.

For an application to be considered, all delinquent debts must be settled.

Winning Bids and Post-Selection Procedures

Bids will be ranked from most cost-effective to least cost-effective within each funding category, taking into consideration bidders claiming eligibility for a Tribal bidding credit.[71] Until the funds are exhausted from each category, winning bids will be selected based on objective measures of cost effectiveness. Once all selections have been made, the Bureau will issue a public notice announcing the results, and the challenge process will begin.

The FCC has forbidden communications among applicants about bids or bidding strategy, beginning on the bidding deadline of October 14, and extending through the date by which winning bidders must submit the required technical and financial materials. All bids will be confidential, though winning bids will be made public after the full process is completed and final awards have been made.

Winning bidders are required to submit the most recent three consecutive years of financial information within *10 business days* of the public notice announcing winning bidders.

Winning bidders must submit a letter from an acceptable bank committing to issue a letter of credit (LOC) in the amount of the winning bid to that entity within *60 days* of the public notice establishing post-selection review deadlines for winning bidders.

Winning bidders must submit appropriate documentation of their ETC designation within *90 days* of the public notice establishing post-selection review deadlines for winning bidders. For those winning bidders who face challenges or long time-periods to secure ETC designation from state authorities, the FCC will provide an alternative process.

The Challenge Process

A challenge process has already been conducted for Connect America Phase II, and challenges are currently being reviewed. Once the FCC has made a final determination, it will use the existing challenges to determine if any census blocks submitted as part of a Rural Broadband Experiments application should be evaluated. In preparing your application, you should verify whether the areas you intend to serve have been challenged as part of Phase II. If they have not

[71] Applicants seeking support for proposed experiments in Tribal areas are eligible for a 25 percent bidding credit, assuming these bids exclusively serve Tribal census blocks.

been challenged, you should assume that the census blocks for which you are applying will not be challenged in the context of this process.

Applications submitted as part of the experiments will be evaluated by considering the proposed census blocks with those that have been challenged in CAF Phase II. If you are planning to bid, we recommend you review the Phase II challenge process to compare your proposed census blocks to those challenged in Phase II -- such existing challenges are a strong indication that any winning bid for those census blocks will be challenged in this process. More information about the Phase II challenge process can be found at http://www.fcc.gov/encyclopedia/connect-america-phase-ii-challenge-process.

Guidance on the Application Planning Process

Because the key metric for success under this program is pure cost-effectiveness, we encourage you to exhaustively consider the actual costs and potential revenues associated with serving the proposed blocks. As we mentioned in our August memo regarding the original order, we believe quick action is warranted for those who want to explore the opportunity. If you have not yet done so, we recommend that you take affirmative steps to begin the necessary analysis, build the relevant technical and financial analysis, and develop the preliminary documents necessary for an application.

The FCC's map of eligible locations is available at: http://www.fcc.gov/maps/fcc-connect-america-fund-phase-ii-initial-eligible-areas-map. The FCC's spreadsheet of those locations, together with the cap on bidding prices per census block is available at: http://www.fcc.gov/wcb/CAM411ExpEliTribalYes72514.zip

We are available to offer comprehensive guidance as necessary about the application process, including providing assistance with technical and business planning. Please feel free to contact us if you have any questions or concerns.

The New Mexico Broadband Program

Guidance on Pilot Area Organization

Version 1, September 2014

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	http://www.ctcnet.us/
http://www.doit.state.nm.us/broadband/	

Guidance on Pilot Area Organization

CTC is engaged in ongoing discussions with potential private partners that could take a role in the two pilot areas. In that case, broadband development would be private ownership and private risk—which, frankly, is the best-case environment for these areas. In the event that the private partnerships do not come to fruition, and in the absence of complete business models for the two pilot organizations, we present here a range of proven organizational structures that represent potential best practices for the projects going forward. As with any guidance of this sort, the final plan would need to be tailored to the pilot organizations' unique circumstances—but the scenarios outlined here provide many potential roadmaps for future decision-making, development, and implementation.

Overview

This memo summarizes a range of structures for organizing public broadband projects. The model selected by the pilot organization should be based on the needs, resources, and goals of the local community. Ideally, it should be based on existing organizational and governance structures that enable the local community to build on strong existing relationships. This memo addresses models that range from a centrally coordinated government initiative to a shared partnership between a private entity and local government.

Related to the organizational structure is the ownership model, which can include public ownership, public-private partnerships, or cooperative ownership. This memo provides an overview of these organizational, governance, and ownership models in order to enable organizations and communities to think about how to structure broadband projects while also satisfying the policy goals of the community—goals that relate to control, risk, and reward. The models are not meant to be definitive but to provide the pilot organizations with a number of examples and to highlight the benefits and challenges of several ownership and governance models.

Balancing Control, Risk and Reward

The pilot organizations should consider three primary issues when first considering the organizational structure of a public broadband project:

1. Control—who owns the network and decides how it operates
2. Risk—the costs associated with developing and running the network balanced against the revenue it generates
3. Reward—the benefits achieved through successful implementation of the project

Not surprisingly, these three metrics come with their own trade-offs. Achieving all three—the desired level of control, minimum risk, and maximum reward— is difficult. Officials should consider carefully which components of these three items are important, and be prepared to make sacrifices where appropriate. An organization or community can maintain substantial control and earn high rewards

relatively easily if it is willing to take on all of a project's risk. Giving up some of the risk will likely also result in giving up some control. The degree to which a community chooses to balance these issues relates directly to the goals of the project, which should be decided at the outset.

Control is an issue that requires trade-offs. An organization or community may or may not wish to control an entire network or even parts of a network. In some instances it is beneficial for a municipality, county, or tribal government to become a service provider itself and to sell services over the infrastructure it has built. In other cases, the community has no interest in this level of control, as long as it can guarantee that a private partner is meeting certain goals for the project such as affordability, level of service, or serving a specific constituency.

Achieving these goals does not necessarily require the local government to control or provide the service. However, ensuring sufficient accountability for the private partner will require developing a strong governance model. A locality seeking partners should therefore: figure out the specific goals of the project, determine what kind of control or accountability measures these goals require, and evaluate its risk tolerance. This analysis will help decide what kind of ownership and governance models are most suited for a project.

Every organization or community will define risk differently, but most often, the term "risk" refers to financial commitments. Some communities have no tolerance for financial risk at all, while others can afford to spend significant resources for a potential long-term payoff. If a community has a significant financial stake in the network being built, it will likely need to have strong assurances that it will be able to break even on the investment, or that the network will pay for itself over time, or at minimum will service debt from bonds or other financial instruments.

Non-financial risks also exist, including the risk of falling short of stated goals. Local governments can reduce financial risk with a good private partner, but without the right arrangement, there can be a high risk of failing to achieve a number of goals that led the community to pursue a broadband project in the first place. Community-driven goals such as open access, increased competition, affordable pricing, universal service, economic development, and service to public institutions are potential aspirations that may not be realistic without taking a greater financial risk. Organizations and communities should seriously consider that it is also a risk to do nothing. Entering into a costly infrastructure project with or without private partners is certainly a risk, but so is the prospect of citizens and businesses lacking sufficient access to high-speed Internet and the associated benefits it provides.

With respect to reward, as is true with risk, the most common measurement of success is financial. However, with due consideration to financial goals and constraints, communities can also measure success based on other benefits such as spurring economic development or improving educational and healthcare outcomes. After all, building a network that prioritizes these aspirations is often among the reasons for public sector involvement in broadband planning and provisioning. Yet these types of rewards for a community are not specifically reflected in the financial statements of the community broadband enterprise. It would be unusual for a municipality, county, or tribe to enter the broadband market simply to generate income like a private company. Such community benefits can be more difficult to evaluate than revenues and profits, but they should not be ignored.

Public Ownership

In a public ownership model, a local government takes the lead in building and operating the broadband network. Generally speaking, publicly led projects use bond financing to pay for capital construction costs and revenue from subscribers or from leasing capacity to private providers to pay for operational costs. As a result of taking on much of the financial risk, these communities enjoy high levels of control over the project. The local governments design the network, determine service offerings and prices, operate the network, and control future decisions including when to expand the network or upgrade services. Even when a local government decides to organize a broadband project itself, the project structure can vary depending on the resources and local organizations available. In addition, there are a number of models where the locality builds and operates the network, but opens the network to private providers to offer retail Internet access or related services to the public.

Municipal Electric Utility

Some of the most successful examples of community broadband networks have been those where a locally owned municipal electric utility plays a central role in the project. The networks in Chattanooga, TN and Lafayette, LA[72] are both examples of this situation. Bristol Virginia Utilities (BVU) was among the nation's first municipal utilities to build a fiber-to-the-premises (FTTP) network to serve residents, local businesses, and community institutions such as schools and libraries.[73] BVU, similar to many other networks built and operated by municipal electric utilities, offers a full suite of retail services— including broadband, cable television, and telephone—directly to the public.

Part of the reason for the success of municipal electric utilities in deploying broadband services is that they already have experience in managing infrastructure. They own repair trucks and employ field engineers who can perform installations and conduct maintenance. Utilities also have experience with customer service, managing individual accounts, and staffing call centers to handle questions or complaints. With a local electric utility as a partner, the network automatically has an important anchor tenant to financially support the network. Finally, they also have established institutional structures to provide for local oversight. Public utilities have boards of directors to guide their activities as well as mechanisms for oversight by a city council or other governing body. Since local supervision is a natural component of public utilities, community control and input are likely to be built into the network.

City Department

[72] Christopher Mitchell, Broadband At the Speed of Light: How Three Communities Built Next-Generation Networks, [Institute for Local Self-Reliance, April 2012]. Available at http://www.ilsr.org/wp-content/uploads/2012/04/muni-bb-speed-light.pdf

[73] Christopher Mitchell, Broadband At the Speed of Light.

Not every community has a locally owned electric utility to serve as the lead for their project. However, it is still possible for localities to operate their own broadband networks. Instead of a branch of a power utility, the networks can be operated as a division of local government, perhaps within an information technology (IT) department. Since local utilities provide significant resources and experience that help lessen some of the financial and operational risks associated with broadband projects, communities that wish to proceed without the possibility of a utility as a partner will have to address these risks in a different way. The choice is usually to use a more cautious approach. For example, communities may choose to build out the network slowly over time, or choose not to issue large and project-specific bonds. In these instances, there is more of a focus on serving the connectivity needs of local government and community anchor institutions before considering a full FTTP network to serve residents.

Santa Monica, CA is an example of a successful community network operated by the municipality through an IT department.[74] Santa Monica chose to implement a community network in a cautious manner. Build-out of the network occurred gradually, focusing first on serving communications needs of the local government and community anchor institutions such as libraries and a local university. The network expanded over time by following a local 'dig once' strategy, a process that took advantage of already planned construction to install fiber when road maintenance occurred. The city further leveraged its fiber network to support local businesses by working with commercial building owners and property managers to cover the up-front costs of build-out to those locations. The Santa Monica City Net now offers up to 10 Gbps broadband service to at least 19 commercial buildings. Businesses in these buildings can choose from over 160 Internet Service Providers (ISPs), providing a range of services including IP transit, virtual private networks, and cloud services, all of which are interconnected to the Santa Monica network Internet exchange point in Los Angeles.[75]

Another example is Farmington, a city in northwest New Mexico. The city already has about 80 miles of fiber in its possession. Currently, the municipality's electric utility, the Farmington Electric Utility System, is the only user of this fiber, but the city is exploring expanding the use of the fiber to provide service to residents and businesses. After studying possible business models, the city determined that leasing the municipally owned fiber to existing ISPs is the best option. The resulting partnership model therefore is public ownership and private operation, allowing the city to offer use of the fiber at a low cost while guaranteeing an open access network to private providers. The city stands to benefit financially, both from leasing the fiber and from the economic development benefits of better broadband service in the community.

Leverett, a small town in rural western Massachusetts, is in the process of building its own FTTP network. Leverett received a support grant from the Massachusetts Broadband Institute to do initial feasibility planning for a local broadband network. When asked whether to move forward with the

[74] For a case study of Santa Monica's network, see Eric Lampland and Christopher Mitchell, Santa Monica City Net: An Incremental Approach to Building a Fiber Optic Network [Institute for Local Self-Reliance, March 2014] Available at: http://www.ilsr.org/santa-monica-city-net/

[75] "Santa Monica Information Systems," City of Santa Monica, Santa Monica City Net, http://www.smgov.net/departments/isd/smcitynet.aspx

proposal, Leverett voters overwhelmingly supported a referendum to request bond funding financed by an increase in property taxes to pay for the network.[76]

Leverett then issued a Request for Proposals for network design and construction and selected a vendor. The network is currently under construction with the goal to have the network complete and providing service by the end of 2014.[77]

Public-Private Partnership

Santa Monica, CA, Farmington, NM, and Leverett, MA all illustrate how many local broadband projects can be considered both municipal networks and public-private partnerships. In some sense, every infrastructure project involves both public and private participation. In traditional business models used by incumbent providers, infrastructure still must be built in public rights-of-way and often on publicly owned or regulated utility poles. In public ownership models, private entities are hired to build, operate, or maintain the network (or some combination of the three). Therefore, even in models where infrastructure is owned, operated, and maintained by a municipality, county, tribal government, or another local public entity, the private sector will play some role and will benefit from the public investment.

However, not every community has to finance or operate a local broadband network on its own. In some cases, it makes sense to share the risks, rewards, and control of the project across several parties. Partners can include private for-profit companies, local non- profits, and even local residents. The variety of public- private partnership models reflects the diversity of interests, goals, and resources among communities. In some cases the locality plays only a limited role in a partnership and may only provide access to rights-of-way or other city infrastructure such as light poles or local government buildings. In other cases a local government may agree to become an anchor tenant and pay for service on the network for an extended period, providing business case stability for the network project partner. In more extensive partnerships, the locality can play a larger role, such as paying for part or all of the network construction and leaving the operation of the network to the project partner.

When capital or operational costs of the local network are shared between the public and private partners, the public entity is in a better position to drive its policy goals (and the private partner is able to address its business goals). Sharing the risks and benefits of a project allows communities to pursue projects that may otherwise be unattainable. It can be a formidable challenge for a local jurisdiction to conduct a costly build-out to unserved areas and the same can be true for private providers; a public-private partnership can help control costs for all parties. Yet, public-private partnership models are relatively new for broadband and are in a constant state of change largely driven by the business needs

[76] Lisa Gonzalez, "Network Moves Forward in Leverett, Western Massachusetts," Community Broadband Networks, December 20, 2012. http://www.muninetworks.org/content/network-moves-forward-leverett-western-massachusetts

[77] Susan Crawford and Robyn Mohr, Bringing Municipal High-Speed Internet Access to Leverett, Massachusetts, [Harvard University - Berkman Center for Internet & Society, December 2013]. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2366044

and interests of companies that are willing to partner with local communities. For that reason, communities should approach them with a certain amount of caution and apply a critical lens to partnership models as well as to claims that any financial or other risks to the community can be removed entirely.

The most talked about example of a public- private partnership is the Google Fiber project in the Kansas City area. After a public search and application process, Google chose Kansas City, KS and Kansas City, MO as partners for a public-private broadband project because of their commitment to facilitate access to local infrastructure and rights- of-way.[78] Kansas City, MO also committed to waive local permitting fees and even provided Google with dedicated city staff to support the project. Some commenters point out that these terms amount to public subsidies for Google Fiber.[79]

In return, Google has agreed to build and operate the network and provide Internet access service with 1 Gbps speeds. Google Fiber will not serve all households in the Kansas City metropolitan area; rather, Google will build the fiber only in neighborhoods (called 'fiberhoods') where enough residents (between 5 and 25 percent of households, depending on the estimated cost of construction in the fiberhood) pre-register for service. At the end of the registration period in the Kansas City area, 90 percent of neighborhoods qualified.[80] Google has indicated a willingness to offer fiberhoods another opportunity to qualify for service, but only recently provided details for such a process.[81]

An emerging, smaller-scale example of a public- private partnership for a local broadband network is Westminster, MD. In 2013, the Westminster City Council voted to fund two FTTP pilot projects, one in a business area and another in a large residential senior community. The city is building fiber optics to all premises in the pilot areas and is in the process of seeking private providers who are interested in selling competing services to residents and businesses over that fiber. The council left open the possibility of expanding the network to other areas of the city at a later point.

Westminster and Kansas City are both examples of a municipal partner facilitating access to local infrastructure in return for varying levels of commitment from private partners to build a fiber network and/or offer next-generation broadband service. This approach reflects the reality that municipalities and other local governments control local rights-of-way and conduit while private firms have more experience providing telecommunications services to customers. In the Kansas City model, the local governments do not commit funds to build the network and, as a result, face limited financial risks associated primarily with transaction costs and forgone revenues. However, it is important to note the

[78] Testimony of Milo Medin, Google Inc., Field Hearing before the Committee on Oversight and Government Reform, 112 Cong., 1st sess., April 18, 2011. Available at: http://oversight.house.gov/wp-content/uploads/2012/01/TestimonyofMiloMedin_1.pdf
[79] Timothy B. Lee, "How Kansas City taxpayers support Google Fiber," Ars Technica, September 7, 2012, http://arstechnica.com/tech-policy/2012/09/how-kansas-city-taxpayers-support-google-fiber/
[80] Kevin Lo, "Congratulations, Kansas City!" Google Fiber Blog, September 9, 2012, http://googlefiberblog.blogspot.com/2012/09/congratulations-kansas-city.html.; also see Stacey Higginbotham, "Google Fiber is coming to 90% of eligible Kansas City neighborhoods," GigaOm, September 10, 2012, http://gigaom.com/2012/09/10/google-fiber-is-coming-to-90-of-eligible-kansas-city-neighborhoods/
[81] Carlos Casas, "More KC-area residents can sign up for Fiber this afternoon," Google Fiber Blog, March 11, 2014, http://googlefiberblog.blogspot.co.uk/2014/03/more-kc-area-residents-can-sign-up-for.html

relative uniqueness of Google Fiber's projects in Kansas City and other locations. In many examples, despite favorable rights-of-way policies, most incumbent broadband providers have not been willing to provide a level of service on par with Google's commitments. In contrast, by owning the fiber itself, Westminster is able to ensure that fiber- based services are extended to all areas it selects.

There is also another trade-off: in the Kansas City- area arrangement, the communities have ceded control over the projects to their partners. Google leads the projects and makes all current and future operational decisions. Local leaders cannot determine how the network is designed, the services offered, or the prices charged to customers. Nor do they control whether the network will be built out to all residents, upgraded in the future, or even if it will operate at all over the long-term. Those decisions ultimately will rest with the private partner.

In contrast, Westminster has taken more financial risk but has secured more control over the network. The community determined that it can better ensure meeting its goals by funding part of the infrastructure. In a related model, the community can provide an alternative form of funding by agreeing to provide the private operator with a steady revenue stream through a long-term agreement to use the network. A local government could agree to share some portion of capital or operating costs with the private partner to incent the private partner to offer next-generation service. It is up to the community to negotiate any service level requirement or other conditions on the local investment. This type of partnership makes sense in communities where the subsidy for a private provider is relatively modest compared with the economic benefits for small businesses, institutions, or residents.

Cooperative Model

In many rural parts of the country, electricity is provided by electric cooperatives. Several of these member-owned organizations can trace their history back to the push for rural electrification in the 1930s. At that time, the newly formed cooperatives received targeted loans and technical support from the federal government to build out electric transmission lines to unserved areas. Some communities also formed cooperatives to operate local telephone networks. Today, some cooperative electric utilities and cooperative phone companies are constructing broadband networks within their existing service areas. Similar to municipally owned electric utilities, cooperative utilities are in many way natural partners for public broadband projects. Working with a co- op enables benefits such as access to utility poles, existing maintenance crews, and experience with customer support. Many of the cooperatives building these broadband networks have received, or are eligible for, federal loan and grant support from programs targeted to broadband deployment and other rural development initiatives.

Kit Carson is a cooperative electric utility in New Mexico serving nearly 30,000 members. Kit Carson applied for and received $63.7 million in combined grant and loan funding from the USDA's Broadband Initiative Program to build a 2,400-mile FTTP network.[82] Prior to receiving the funding, Kit Carson offered dial-up and limited DSL service to its members. The fiber project will connect thousands of

[82] "New Mexico Broadband Program – BTOP Grantees in New Mexico," New Mexico Department of Information Technology, http://www.doit.state.nm.us/broadband/btopsnm.shtml

households, businesses, and nearly 200 community anchor institutions that are located in the cooperative's service area.

Co-Mo Electric Cooperative is a 25,000-member cooperative utility located in central Missouri. Co- Mo attempted to secure federal funding for a FTTP network but was denied on several occasions. However, through door-to-door outreach and member-to-member conversations, Co-Mo received 25 percent pre-sale commitments from existing electrical customers to also purchase broadband services, enough to justify building an FTTP network with its own funds.[83] Co-Mo is constructing the network in a phased deployment over the next few years. The end goal is to expand the network through Co-Mo's entire electricity service area. In December 2013 the cooperative announced a series of speed increases on its broadband service tiers, including upgrading its top speed offering to 1 gigabit per second.[84]

There are currently only a few viable examples of cooperatives formed specifically for broadband service (rather than phone or electric service) and most depend upon local governments for support rather than individual subscribers. East Central Vermont Community Fiber Network (ECFiber) is a cooperative project between 24 towns in rural Vermont to build an FTTP network in their communities.[85] ECFiber is organized with an inter-local contract according to Vermont law, where municipalities contract with each other to provide services and the cooperative has a governing board consisting of delegates appointed by the select board or city council in each of the member towns. ECFiber contracts with ValleyNet, a local non-profit with extensive experience bringing Internet connectivity to residents and businesses in the region, to operate the network.

Another example is WiredWest, a project among towns in western Massachusetts to build and operate a regional FTTP broadband network. WiredWest is an inter-municipal cooperative according to state law, which will allow it to issue municipal bonds.[86] Founded in 2011 by 22 member communities, the project now boasts 42 municipalities. Each municipality that joins WiredWest is given a representative on the cooperative's board of directors and the project is led by an executive committee that is elected from existing board members. WiredWest is planning to build a last-mile fiber network by capitalizing on improved access to middle-mile fiber thanks to the MassBroadband 123 project, a middle- mile network in western Massachusetts with state funding and federal support from the Broadband Technology Opportunities Program. The cooperative has received support from a network planning grant from the Massachusetts Broadband Institute as well as membership dues, donations, and in-kind staffing support contributions from volunteers. Like other cooperative broadband projects, WiredWest has also been collecting pre-subscription pledges for service from area residents and businesses in order to prove market demand and bolster the project's business planning.

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[83] Masha Zager, "Electric Co-ops Build FTTH Networks," Broadband Communities Magazine, March/April 2013, 18-20. http://bbcmag.epubxp.com/i/118605/8.; also see Lisa Gonzalez, "Electric Cooperatives Expand Broadband In Missouri," Community Broadband Networks, May 23, 2012, http://www.muninetworks.org/content/electric-cooperatives-expand-broadband-missouri

[84] "Co-Mo Connect Announces Gigabit Pricing, Free Speed Upgrades," Co-Mo Electric Cooperative, http://www.co-mo.coop/news/newsdetail.aspx?itemID=256

[85] Christopher Mitchell, "Community Broadband Bits 9," Community Broadband Bits Podcast, Institute for Local Self-Reliance, http://www.muninetworks.org/content/community-broadband-bits-9-leslie-nulty-ecfiber-vermont

[86] Lisa Gonzalez, "WiredWest Makes Significant Progress in 2012," Community Broadband Networks, February 3, 2013, http://www.muninetworks.org/content/wiredwest-makes-significant-progress-2012

The New Mexico Broadband Program

Broadband Goals for SWNMCOG Comprehensive Economic Development Strategies

Version 1, September 2014

Prepared for:	Prepared by:
The New Mexico Broadband Program	**Columbia Telecommunications Corporation**
NM Department of Information Technology	
http://www.doit.state.nm.us/broadband/	http://www.ctcnet.us/

Broadband Goals for SWNMCOG Comprehensive Economic Development Strategies

SWOT analysis indicates a number of weaknesses and threats that, either directly or indirectly, might be addressed by broadband strategic planning, expansion of broadband infrastructure, and broadband adoption/training efforts in the communities. These weaknesses include lack of broadband, obviously, as well as:

- Undertrained local labor pool
- Need for vocational education/training
- Lack of employment diversity
- Long distances between communities

Also:

- High poverty rates
- High unemployment rates

Broadband also plays a role in the identified opportunities, including:

- Arts and culture
- Tourism
- University with outreach campuses throughout region

The Southwest New Mexico Council of Governments (SWNMCOG) has established a strong basis for future broadband initiatives through its regional collaboration efforts on economic development.

Broadband ties into the strategies identified to meet SWNMCOG's infrastructure and land use goals, including advertising the trail system and the region's recreational and tourism opportunities, lobbying Congress to provide funding for wilderness maintenance, and educating the public about the difference between the National Forest and Wilderness.

Similarly, broadband initiatives could support additional SWNMCOG strategies, including but not limited to marketing the region's industrial parks and natural resources; educating future homebuyers; conducting open meetings and gathering public input; encouraging residents to save water; and educating the public about the proposed AWSA projects.

Based on this interplay between broadband and the region's other goals, we propose the following broadband goals for inclusion in the comprehensive economic development plan:

Broadband

Goal #1: Support broadband adoption to build demand and create individual benefits

Strategies	Timeline
1. Using a variety of methods in a number of settings, educate population on benefits of broadband use (e.g., education, job training, personal finance, civic engagement)	Ongoing
2. Expand broadband access (connectivity and hardware) at libraries,	1 – 5 years

community centers, and other central locations in region's communities	
3. Identify and promote opportunities for low- or no-cost broadband access and computer equipment through regional or national non-profit partners or corporations	1 – 5 years

Goal #2: Expand availability of broadband access

Strategies	Timeline
1. Identify private sector partners to invest in broadband infrastructure expansion in targeted areas based on identified demand	Ongoing
2. Explore feasibility of innovative technological solutions (e.g., TV White Spaces networks) to meeting broadband demand in low-density / high-construction-cost areas	1 – 2 years
3. Develop regional programs to capitalize on available regional, state, and federal funding for broadband infrastructure expansion (including E-Rate and Rural Broadband Experiment programs)	1 – 5 years

Goal #3: Develop broadband-based job training programs and centers

Strategies	Timeline
1. Educate population on job training opportunities available through distance learning or online modules	Ongoing
2. Identify public or private sector locations for hosting public computing centers dedicated to job training and other skill-building opportunities	1 – 2 years
3. Expand broadband infrastructure with targeted construction to extend reach to currently unserved areas	1 – 5 years

The New Mexico Broadband Program

Digital Literacy Training Pilot Regional Report—Southwest New Mexico Council of Governments

Version 1, December 21, 2014

Prepared for:
The New Mexico Broadband Program
NM Department of Information Technology
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Executive Summary

The Digital Literacy Training Pilot Regional Report for the Southwest New Mexico Council of Governments (SWNMCOG) is part of the Regional Broadband Implementation Pilot Project of the New Mexico Broadband Program. The report articulates the importance of digital literacy skills training for the southwest region, identifies the uses of these skills that are of particular value to the region, and highlights existing resources for providing training in these tools. The report reflects the growing importance of digital literacy capabilities in building community assets that ensure quality of life and viability within a region and provides guidance for the SWNMCOG in planning and developing enhanced digital skills in the population of southwest New Mexico.

The report is based on a wide range of resources and methodologies. It considers information from national and statewide resources as well as from regional documentation and local reports. The report also relies heavily on input from a wide array of regional and community leaders, as well as from local residents. Through meetings, email exchanges, phone conversations and informal surveys, communities of the southwest region helped identify resources and barriers for digital skills education and suggest local solutions. These resources together inform the information and recommendations made in the Digital Literacy Training Pilot Regional Report for the Southwest New Mexico Council of Governments.

The report finds that, as in the other areas of New Mexico, the southwest region presents high levels of need for digital literacy knowledge and skills. Statewide economic and educational patterns combine with a population pattern that scatters communities across remote regions and places overlapping pressures on resources. Digital literacy training programs share these challenges, generally lacking funding for trainers and support for leadership to coordinate activities and sustain project goals. The report recognizes that the southwest region has been unique in its ability to meet these challenges with a combination of successful strategies, including leadership, collaboration at the local level, the ability to harness existing resources, and the capacity to shape delivery and programming to meet the needs of the region.

To continue and broaden the use of these successful strategies for digital literacy training in the southwest region, the report makes the following recommendations:

- Leadership for digital literacy training has been strong in the southwest region, including political, community, and educational entities, and has been seminal in moving digital literacy training forward in the region. This leadership should be continued, supported, and enhanced. Transferring leadership from the individual level to the institutional level of department or committee would institutionalize the effort and mobilize institutional systems of resources in support of digital literacy training.
- Collaborative efforts and partnerships built at the local level have allowed the region to consolidate efforts, build momentum, and broaden the base of support for digital literacy in the region. These collaborative approaches should be continued and extended to other institutions in areas needing training, such as those along the I-10 corridor and those along US Highway 180 north of Silver City. Collaborations between key agencies, such as the local libraries and Adult Basic Education programs, could take advantage of shared funding opportunities. Additional

collaborative efforts between agencies and local telecommunication providers should be pursued and leveraged for addressing the needs in the region.

- Use of existing resources to build training tailored to community needs is essential for successful regional programs. This goal should be pursued by developing a mobile training unit to serve remote communities in the southwest region and to reach out to isolated populations within Silver City. A mobile unit could extend training to segments of the population currently underserved, such as seniors, residents of *colonias,* and students in remote rural areas. The southwest region should continue to develop other creative training solutions that are flexible and responsive to the needs and profile of the region.

The southwest region has developed a successful model for building and implementing digital literacy training that has the potential to be replicated in other sections of the state. The ability to harness existing community strengths, work in partnership, and construct regionally appropriate solutions for delivery are all hallmarks of the model. The application of this model in other areas will depend largely on the leadership that can be found in other regions to develop and drive a digital literacy training program.

I. Introduction

The New Mexico Broadband Program (NMBBP), a $4.8 million statewide grant from the National Telecommunications and Information Administration (NTIA), provides mapping, planning, capacity building, and technical assistance of and for broadband access and services. The grant, awarded for a period of five years and managed by the New Mexico Department of Information Technology, includes, as a component of technical assistance, support for digital literacy training. Digital literacy supports broadband use by providing the knowledge and skills that allow individuals to leverage broadband for a range of benefits, including greater economic, and health opportunities. To help build this enhanced capacity for broadband use, the NMBBP has supported digital literacy efforts, developing curriculum resources, delivering a train the trainer program, and providing targeted outreach and support to a range of communities and groups.

Digital literacy is also a component of the New Mexico Broadband Program's Regional Pilot Plans. The pilot plans were created to provide support and guidance to targeted communities in order to help move them move forward with broadband infrastructure. A complementary digital literacy pilot project developed to support communities with digital literacy training efforts. The Digital Literacy Regional Pilot Plans were designed to explore the resources and needs for digital literacy training within targeted communities and develop a community-wide assessment and report that could help guide regions in developing digital literacy training programs in the area. The three regions selected for the pilot were the Southwest New Mexico Council of Governments (SWNMCOG), the Northeast Economic Development Organization (NEEDO), and the Northwest New Mexico Council of Governments (NWNMCOG).

The report for the Regional Pilot Plan for the Southwest New Mexico Council of Governments develops from a contextual understanding of the area and explores ways in which digital literacy training can support positive change within that context. The plan takes as its starting point a broad view of the region and considers three key elements of a community: economic development, educational achievement, and community health. It outlines existing and potential needs in relation to those elements and considers the ways in which digital literacy can help the region meet those needs. The final sections of the report explore opportunities and barriers, and provide a summary of best practices and recommendations for creating digital literacy training in the region.

II. Southwest New Mexico Council of Governments Regional Profile

Community Demographics

The area served by the Southwest New Mexico Council of Governments is spread across the lowest southwest portion of the state, hugging the border with Mexico from Arizona eastward, past Deming and Columbus, and sweeping northward across I-10 and state road 60, south of I-40 and west of I-25. The region is comprised of a large grouping of entities, including four counties, nine municipalities, three school districts, four special districts, and one Head Start program. The complete membership is given in the table below and comprises a combined population of over 70,000. The region is largely rural with no large metropolitan centers within or near to its boundaries.[1]

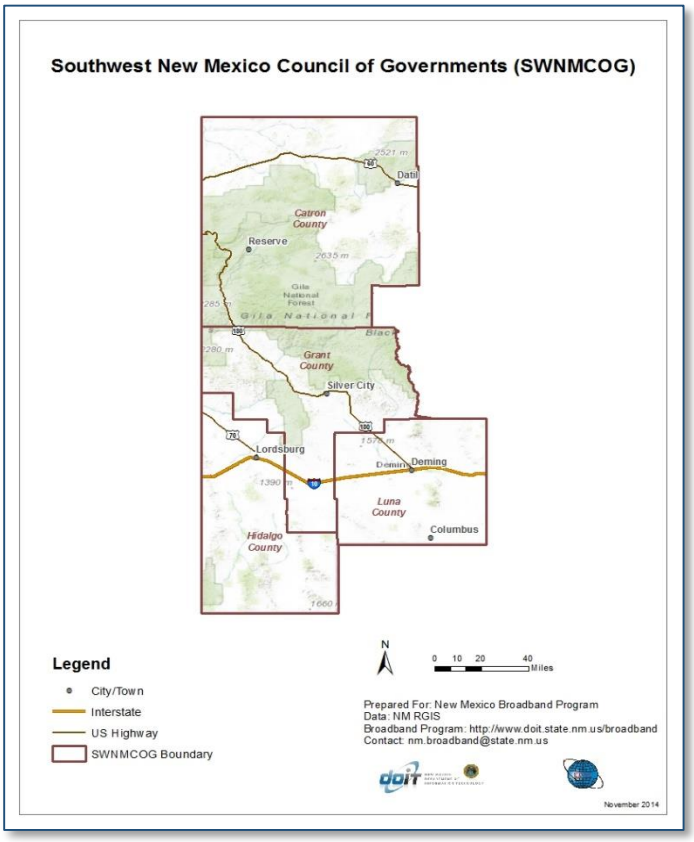


Figure 1: Counties served by the Southwest Council of Governments

Table 1: Entities Served by the Southwest New Mexico Council of Governments

Counties	Municipalities	School Districts	Special Districts	Other
Catron	Village of Reserve		Black Range Resource Conservation and Development (serves all counties)	El Grito Head Start
Grant	City of Bayard Town of Hurley Town of Silver City Village of Santa Clara	Cobre Consolidated Schools		
Hidalgo	City of Lordsburg Village of Virden	Lordsburg Municipal Schools	Hidalgo County Soil and Water Conservation District	
Luna	City of Deming Village of Columbus	Deming Public Schools	Deming Soil and Water Conservation District	

Demographically, the region is strongly marked by factors that characterize many portions of New Mexico. Poverty is one of those factors and is pronounced in this region: anywhere from 20% up to as much as 30% of the population in this region live below the poverty level.[3] Those identifying as Hispanic by birth represent anywhere from 20%–64% of the population. Like much of New Mexico, a large

percentage of the region is comprised of seniors aged 65 and over. An average of 20% of the population falls into this age group, but the number climbs to over 30% for Catron County. Overall, the region can be described as one consistent with New Mexico's demographic profile.[4]

Table 2: Demographic Information for SWNMCOG [5]

Data item	Catron	Hidalgo	Luna	Grant	New Mexico State
Population	**3,607**	**4,654**	**24, 659**	**29,328**	**2,085,287**
65 and over	32.7%	18.7%	20.6%	23.5%	14.7%
Hisp/Lat birth	19.4%	56.7%	63.8%	49.1%	47.3%
Native	3.3%	1.1%	2.3%	2.1%	10.4%
Mixed	2.7%	1.2%	1.5%	2.3%	2.4%
Below poverty	18.8%	22.5%	29.7%	18.4%	19.5%

The region of service also includes many areas that are designated as *colonias*. *Colonias* in New Mexico are defined as "nonmetropolitan, unincorporated neighborhoods and incorporated communities within 150 miles of the US-Mexico border that lack sewer, water or decent housing…," inadequate roads or flood control.[6] In New Mexico *colonias*, poverty levels are mostly higher than that of the surrounding regions, with some reporting 30-50% of the population at or below poverty level.[7] As the SWNMCOG Community Economic Development Strategy report from 2010 points out, these areas fall far below state standards in terms of basic infrastructure and services, and increase the extremity and pressing nature of the circumstances in this region.[9] The low quality of life and poor services in these areas reinforces the overall profile of scarcity in the southwest region.

Citizens of this area exist in a deeply and essentially rural environment. Population density ranges from .5 persons per square mile in Catron County to a high of 8.5 in Luna County. Even this high end figure is only half of the 17 residents per square mile reported as the average population density for the state. For residents of this region, life is lived far from conventional resources and standard support services; a grocery store or library might be 30 miles away, while the nearest airport could be a three hour drive. For children, commutes by bus to and from school can take close to an hour and many children live over forty miles from their school and their friends. For adults, the nearest reliable, large, or high-paying employer may be equally distant.

Not surprisingly, one consequence of this rurality is that educational and employment levels in the region are generally below state averages. Two of the four counties report numbers for those achieving high school degrees below the state average of 83.4%. Figures for those with a 4-year college degree or higher show that only Grant County, at 24.2%, comes close to the state average of 25.6%, with all other counties falling below this figure. Unemployment rates tell a similar story. Only Hidalgo County at 6.3% reports unemployment at a rate close to the state average of 6.2%. All other counties record unemployment rates above this number, with Luna County recording 17.2 % unemployment for the county. Even within counties for which the overall unemployment numbers may appear high, regional variations exist. The Village of Santa Clara, for example, located within Grant County, has a reported unemployment rate of 15.9%.[10]

Table 3: Education and Employment Data for SWNMCOG [12]

Data item	Catron	Hidalgo	Luna	Grant	New Mexico State
HS graduates	85.7%	78.7%	70.1%	84.2%	83.4%
BA or higher	16.1%	15.3%	13.3%	24.2%	25.6%
Mean travel to work time in minutes	19.1%	18.2%	19.0 %	18.9%	21.7%
Unemployment rate 2012	7.1%	6.3%	17.2%	6.9%	6.2%

Economic Development

In a region of deep poverty, high unemployment, low educational achievement levels, and a widely rural profile, the need for new and sustainable patterns of economic development is high. Economic development programs that plan and build models of sustainable recovery based on regional assets can leverage local strengths and build new opportunities for growth in the region. These programs can have immediate impacts by increasing employment and creating a stronger environment for small businesses. In addition, they create long term viability in an area by stabilizing and fortifying economic and social institutions and drawing people to the area for increasing tourist and commercial activity.

Despite this overall profile of the region as one that is under-developed on a range of levels, there are pockets of growth, revitalization, and resurgence. Silver City is one of those pockets. As one of the largest cities within the SWNMCOG region,[13] the city acts as both a regional business center and an engine for driving activity and development in the region. In this role, it has developed a thriving and award winning MainStreet corridor and Arts and Cultural district, combining traditional arts and culturally-based businesses with historic downtown structures and walkways. In alignment with the mission of the MainStreet project, the community seeks to "explore sustainable methods for building both [its] … economy and culture – ways that honor diverse traditions and stay true to community values."[14] The city has integrated this development with the wider tourism draw of several regional attractions and events, such as the Gila Wilderness, the Tour of the Gila bike race, and the summer bluegrass music festival, to build a multi-faceted and rich base of tourism, small business development, and local arts and culture. The town has added to this by establishing niche micro-industries that build on historical architecture and regional food products. Examples of such niche businesses include the renovated Murray Hotel, remodeled to replicate its Art Deco style of the 1930s, and the Little Toad Creek Brewery and Distillery, a downtown brew pub that serves New Mexico and house brand liquors and beers in a remodeled, industrial style, downtown tavern setting.

Similar efforts to rebuild community based on natural attractions and unique local assets exist across the SWNMCOG area. The city of Deming has re-established its MainStreet program in an effort "to bring their commercial corridors back to life" and "enhance the historic downtown neighborhood commercial district."[15] As in Silver City, the Deming MainStreet project allows the community to build positive economic change by leveraging "the district's historic and cultural value" and linking it to larger regional attractions.[16] The Deming project highlights local assets including state parks, numerous rock collecting locales, and exquisite collections of Mimbres pottery, blending the appeal of the historic downtown

region with wilderness, geological and cultural attractions. This fabric of regional interest draws visitors to the area and creates a developing tourist trade. As in Silver City and other communities across the state, small businesses form the heart of the Deming MainStreet project, and local business corridors constitute the central attraction of these redevelopment projects. Similar efforts to rebuild local economies around small businesses, local traditions, regional history, and a sense of place, exist as far south as Columbus, where the proximity to the border, historical state parks, and nearby wilderness areas all provide a potential hub for developing natural and cultural tourism. [17]

Other economic development initiatives in the region are strong. In addition to small business development and tourism, there is widespread interest in small-scale, value-added food based industries. Grants to support "food manufacturing entrepreneurship in rural and low-income areas"[18] were provided to Grant County, and the large scale chili and chili processing industry in the southern part of the region continues to be a strong source of economic strength and planned growth.[19] The prime location along I-10 and the transportation business opportunities it offers also provide important avenues for economic development in the region.

Education

Education is a significant factor in building regional strength and increasing economic opportunity. Improved educational levels are shown to lead to higher employment rates and increased earning potential,[20] factors that can drive economic growth, improve economic stability, increase tax contributions and create more traffic for local businesses. Higher education levels are also important in drawing new businesses and industries to the region, as a well-educated regional workforce is an indicator to potential businesses that the area provides a pool of knowledgeable employees who can be easily trained and able to staff a range of positions. A 2013 report from the Economic Policy Institute summarizes the value that increased educational levels bring to a region and a state:

> States can build a strong foundation for economic success and shared prosperity by investing in education. Providing expanded access to high quality education will not only expand economic opportunity for residents, but also likely do more to strengthen the overall state economy than anything else a state government can do.[21]

Table 4: Wage Correlation with Educational level [23]

Wages are higher for better-educated workers: Median annual earnings of U.S. workers, age 25+, by education, 2011. From the Economic Policy Institute

Education level	Median Annual Earnings
High school dropout	$20,329
High school graduate	$28,659
Associate degree	$36,853
Bachelor's degree	$49,648
Master's degree	$60,709

Higher education achievement is also likely to create greater success for new economic initiatives in the region. Businesses built through MainStreet and downtown renewal projects will be managed with greater expertise if owners and entrepreneurs possess strong communication, math, and organizational skills, as well as business-specific training in accounting or marketing. New key employment sectors are also likely to benefit and grow more if the educational level of the community workforce is raised. Jobs in in administration, transportation services, or retail trade will lean heavily on a facility with communication, numeracy and cultural awareness that an educated population is more likely to possess. New sectors of industry growth will be successful only if the educational level of the community can rise to meet the demands of these technical industries. Without a growth in education and training levels, economic initiatives of all sorts are less likely to succeed.[24]

The counties within the Southwest New Mexico Council of Governments region benefit by the educational opportunities provided by Western New Mexico University (WNMU). The only institution of higher education in the region offering four-year degrees, Western is based in Silver City on a small campus of Spanish-style buildings overlooking the downtown area and adjacent to the nearby Gila Wilderness. The university serves over 3700 students and awards close to five hundred degrees each year, providing certificates, Masters and Bachelor's degrees in a rich selection of offerings, many tailored to the needs of the area and the student body. The campus also supports two satellite campuses in the SWNMCOG region - the Hidalgo Learning Center in Lordsburg and the Mimbres Valley Learning Center in Deming, the latter of which runs an outreach center in Columbus. WNMU also works in partnership, through the Gila Instructional Consortium, with high schools throughout the region, including those in Animas, Reserve, Magdalena, and Quemado, to provide college credit classes to high school students.[25] Through their Adult Education Services program and the Western Institute for Lifelong Learning (WILL), the campus also offers non-credit classes to community members in basic math, language, and computer skills, as well as topics of other topics of interest.

Western New Mexico University also runs a Small Business Development Center (SBDC). Housed in Watts Hall in the business district, the center supports local businesses with training and consulting services, including instruction in creating and using a business plan, tools for financial management, and networking opportunities in the area. The center provides these services at no cost and works to help them become more successful contributors to their communities' economies.

Healthy Communities

Communities frame the environment in which people live and work and are recognized as important factors in the overall population health in a region. Increasingly, individual health is seen within this larger context of community health and more "community leaders understand that improving the health and well-being of individuals and families" entails "a community's ongoing capacity and resolve to work together to establish, advance, and maintain effective strategies that continuously improve health and quality of life for all."[26] Healthy communities are now seen as ones that "promote access to health care as well as information, education and awareness about health and healthy lifestyle practices."[27]

Healthy communities have become of increasing concern in New Mexico. As statistics continue to support the correlation between healthy communities and their overall strength and success, state and

local policy makers have devoted more attention to addressing issues of community health. For rural regions such as southwestern New Mexico, meeting the basic requirements for healthy communities can be a challenge. Low population densities and poor economic circumstances limit the number and availability of primary care physicians in rural regions and create challenge to providing adequate medical services. Because of low population and low physician density, many rural residents must travel long distances for medical services. In addition, rural residents typically travel long distances for medical care. This factor is likely to decrease the number of visits an individual makes to a physicians and increase the time before treatment is sought. As noted in a 2005 publication by New Mexico State University research Darrell Pehr, "Just getting people to make regular visits to the clinic … is difficult. Many patients put off treatment until conditions become acute."[28] These delays are exacerbated when compounded by other factors, such as poverty or lack of access to transportation.[29] These patterns of access to medical care in rural communities decreases the opportunity for building ongoing relationships between physicians and clients and contributes to an overall decline in the quality and quantity of medical service.[30] This decline is exacerbated by low income levels and educational levels, both of which increase the likelihood of delaying physician visits or ignoring critical symptoms at the early stages.[31]

In the southwest region, there are a range of medical and health care providers across the four counties. Gila Regional Medical Center in Silver City offers complete treatment services including surgical and emergency units. They also provide a wellness center with a team of personal trainers and an "Active Alive" program that includes a walking club, line dancing and Tai Chi classes. Hidalgo Medical Services provides care in the Silver City region and beyond, with clinics in the surrounding communities of Bayard, Gila/Cliff, Animas, Lordsburg, and the Mimbres Valley.[32] Through local health agencies, some centers also offer support for the indigent as well as health education programs for diseases such as diabetes. Deming is served by the Mimbres Memorial Hospital and Nursing Home, which provides long term nursing as well as intensive care and surgical services. Deming also has several other medical clinic providers, including Ben Archer and Silver health care facilities.

In order to address the current and future health profile of the region, the health needs of the large and growing population of seniors must be considered. According to the 2014 New Mexico Department of Health State Health Improvement Plan, "the number of New Mexicans over the age of 65 increased by 26 percent between 2000 and 2010….[and] this number is expected to increase even more rapidly in the next decade."[33] For this group of older adults, access to quality medical care, timely medical information and education about healthy choices is of primary importance. Accurate medical information and quality treatment, combined with lifestyle choices that promote well-being and health, can dramatically improve the quality of life for seniors, enable better management of end-of-life choices, and save both individuals and taxpayers money by avoiding the high costs of emergency interventions. The region provides a strong network of support for seniors, an important element of service in a region with a high number of residents over the age of 65. There are senior centers in Bayard, Cliff, Silver City, and Deming that provide support services for seniors including meals and referrals. Support for seniors is also provided by several of the larger medical and health care providers as described above.

III. Digital Literacy Uses and Applications in the SWNMCOG Region

Digital Literacy and Economic Development

The high rate of poverty and rurality in the southwest region work in tandem with low education and high unemployment rates to handicap a large percentage of the population. For many, these factors coalesce to create a series of seemingly insurmountable obstacles to improving the quality of life. Low services, isolation from education and training opportunities, and poor employment options all make it difficult for individuals and communities to escape the recurring patterns of decline. Economic development for these regions may be difficult to envision or lead without access to tools of empowerment. Yet in all these areas, economic recovery and community revival are occurring, built on the strength of regional leadership, community engagement, and the small business community. Providing ongoing growth and sustainability for these efforts requires proven tools that can also carry these efforts forward into a 21st century economy.

Digital literacy is commonly recognized as a tool that can build and support economic development along a range of fronts. Once seen as a more limited component of economic growth that mostly impacted development in the telecommunications industry, digital skills are now recognized as vital tools for leveraging economic opportunity through a rich variety of channels. Specifically, it can increase employment levels by raising the education and skill level of both the community and the workforce. For these regions of relative economic stability and positive development, digital literacy can enhance existing efforts and improve the success of small businesses. In areas still struggling for development, digital skills can create new opportunities by increasing and attracting employment opportunities by improving the skills of the workforce.

Digital literacy training can improve workforce skills in the population overall by equipping individuals seeking work with the technical skills needed to find employment and compete in today's workforce. Basic proficiency with computer and internet tools is widely recognized as an essential qualification for completing a successful job search and acquiring gainful employment. From searching for opportunities to filling out online applications and forms, from resume creation to email follow-up, competency with computers and online tools improves employment opportunity. Developing a strong base of digital capacities is also important for retaining work and building a career, and the same skills that help individuals find work increase chances for success once hired. As one website noted, "no matter where you find employment, there is a good chance a computer will be a basic tool you will have to use."[34] The University of Florida department of Continuing Education echoes this view:

> *Employers seek and reward employees with the skills and knowledge to send messages across the country via e-mail; use a spreadsheet to create a graph and paste it into a report; add and edit data in a database; understand the implications of file sizes, memory limitations, and network arrangements; and recognize the function and features of modern computer components. Any job candidate who already possesses these skills will stand above those who do not.*[35]

For New Mexicans starting out in the professional world, searching for career advances, or re-careering at mid-life, learning these skills is no longer a choice but a necessity.

A digitally skilled workforce will further increase employment opportunity by attracting potential employers to a region or a state. Companies seeking a viable location for a new business or for a branch of an existing enterprise will be looking for a workforce with strong digital capabilities. The New Mexico Economic Development Department (EDD) recognizes the importance of workforce training as a factor in attracting companies to an area and recommends digital media and technical support as two key industries for focused economic development.[36] More technically sophisticated companies, which will create jobs requiring high levels of digital ability, will also be more attracted by a workforce that shows basic proficiency and has a proven capacity to learn.[37] The importance of digital literacy skills will thus expand over the coming years.

Providing digital literacy as an element of workforce training boosts preparation for employment and also lays the groundwork for workforce training opportunities that are offered online. Several college and universities in the region offer workforce training programs, such as those run by Western New Mexico University's workforce development programs. These programs provide certifications and degrees in a variety of fields and many deliver all or part of their program online. Accessing and participating in these workforce training opportunities requires a background of basic digital literacy skills.

Digital skills are also vital for the success of small businesses, helping them to better represent, promote and successfully market a business in an online environment. Developing and maintaining an online presence, creating an integrated online marketing plan, and staying up to date with the latest social media trends will enable local businesses to present and promote their products and services to a global digital audience. This is especially important for businesses associated with redevelopment and downtown revival projects and acting as "tourist hubs" for the region. For those businesses, an online profile will help draw outsiders to the region and establish

Digital Literacy Initiatives in European Nations

Canada
Canada launched Digital Canada 150 to provide high-speed Internet to 98% of Canadians. The program includes an education effort to close the gap in digital skills for all Canadians.
Digital Canada 150

United Kingdom
Concerned by the inability of many to access key government information and services as more and more of these go online, the country has adopted a program to decrease number of British without digital skills by 25% over the next 1½ years. Recent studies in the UK also suggest gaps in IT training for as many as 11,000 new jobs per year requiring digital skills.
Government Digital Inclusion Strategy

European Union (EU)
The EU is developing a digital agenda for Europe that acknowledges need for digital skills in "90% of jobs in the near future" and for government services and includes steps to open Social Fund for digital skills training.
Digital Agenda for Europe

Scotland
Noting that digital skills promote economic growth in all areas and noting a projected increase of 15% in jobs involving IT skills, Scotland proposes plans that include improvements in digital skills training within education and better IT skills for workforce training.
Skills Development Scotland

online identity for the area as a whole. As a recent article in the Houston Chronicle put it, "In this electronic era, more people search online for the products and services they need as opposed to searching through a phone book. Ignoring this important potential marketing platform is akin to saying, 'I don't need any new business.'"[38]

Digital literacy has become the key element of most professional services, providing both the platform for production as well as the location for business and marketing. Financial information, marketing materials, structural and conceptual designs, and medical records are all produced with digital tools and stored in digital formats. This and other information is shared, communicated and utilized on computer and online platforms. Traditional forums for most of these service and service activities, such as print documents, face to face meetings, and publication based marketing, are in decline, while web and online platforms, such as websites, social media outlets, and teleconferencing, are becoming standard. To engage in these services, as a consumer or a provider, requires a strong basis of digital skills and increasing comfort and familiarity with more sophisticated digital tools.

Digital Literacy and Education

Digital literacy can further support community economic development by improving educational access and achievement. As was noted earlier, educational levels work in synergy with economic development by raising the qualifications of workers and bringing greater skills to the deployment of local economic initiatives. Digital literacy can feed this synergy by facilitating and increasing student success. In fact, digital skills are now seen as necessary for achieving successful completion of even two-year college programs. In the words of one online resource for teachers, "Students need to learn how to be more computer literate."[39] At York County Community College in Maine, the university tells students outright that they will need regular access to, and the ability to use, both a computer and the Internet in order to be successful in their junior college programs.[40] According to the education minister of Wales, "*it is clear that new technologies are crucial in driving up learner performance and ensuring they have the best skills for life."*[41] Those lacking solid digital competencies will be at a clear disadvantage, either receiving lower grades or failing to complete the full range of learning activities.

For younger students, digital literacy education is sometimes available through the K-12 and higher education systems. Through the technology requirements in the new common core curriculum, schools are able to narrow the gap in digital skills between students by integrating technology into the classroom more effectively. Reiterating the importance of technology for students at all levels, the common core articulates strong support for digital skills and training:

> *To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create a high volume and extensive range of print and non-print texts in media forms old and new*.[42]

Yet despite the promise that these new standards offer, the focus of common core programs remains on basic curriculum standards, using technology to better meet these standard but not necessarily learning meeting new standards of essential digital capabilities. Increasing the presence of technology in the

classroom may improve exposure and awareness of technology but will of its own necessarily increase the digital literacy capabilities of high school graduates.[43]

Digital literacy also improves educational success on the secondary level by enabling both GED (General Education Department) completion of the high school equivalency test and high school credit recovery, both now done through computer-based or online platforms. The GED exam is now offered fully on computers and is, according to the GED testing service, better for adult learners.[44] However, because the testing "require[s] the use of twenty unique computer skills" and requires familiarity with the instructional and questions screens," strong keyboarding skills and familiarity with computer-based testing are now needed for GED completion.[45] Digital skills will improve both the comfort levels of test-takers with the format of the exam and the speed with which progress through exam sections, questions, and writing can be achieved. Those with strong computer competencies will be less engaged in detangling screen navigation and directions and able to devote more time to the content and writing portion of the test, thereby earning higher scores. Computer literacy skills thus become a positive indicator of increased success in passing the GED high school equivalency exam.

Technology Applications in NM Schools

The following technologies are being used in classrooms across New Mexico, but without specific standards:

- Educational software
- Keyboarding
- Testing
- Teacher paperwork
- Individualized Education Plans
- Teaching materials and tests
- Drawing and illustration programs
- Smart Boards
- Classroom websites
- Video streaming
- Presentations (PowerPoint, video, websites, digital projection, etc.)
- Family resources (homework, teacher communication, grades, etc.)

Figure 3: Technology Applications in New Mexico Schools

From the NMBBP Digital Literacy and Strategic Sectors Report

Similarly, high school credit recovery for students provides a greater opportunity for high school completion for those with digital skills and the ability to use online learning platforms. Credit recovery programs provide "an opportunity for a student to retake a course in which he/she previously was not academically successful in earning credit towards graduation."[46] Developed in response to the increased graduation rates required by No Child Left Behind (NCLB), most credit recovery classes are offered fully online and by 2012, credit recovery programs had become the "fastest growing area of online learning."[47] The ability to leverage the widest and most flexible options for high school completion through credit recovery is dependent on a high level on digital, computer and Internet skills; those who are digitally literate will have a better chance of earning a high school diploma.[48]

Digital skills become increasingly important when post-secondary education is pursued. Over the past five to ten years, the number of online classes offered by post-secondary institutions has grown, with enrollments in online classes reflecting the trend in offerings. In the 2007-2008 school year, over 20% of the students taking post-secondary classes were enrolled in courses online.[49] By the fall of 2001, over 6 million students, roughly one-third of those enrolled in post-secondary classes, took at least one online class.[50] Between 50% and 70% of post-secondary institutions (private, public, and for profit) "now offering full academic programs (as opposed to merely freestanding courses) online, far more than were doing so a decade ago."[51] This means that it is now possible to complete a large range of Associates and Bachelor's degrees fully online, as well as Masters, professional degree programs, and Doctorates. Due to online delivery, the educational opportunities accessible to those living in remote or rural regions has expanded enormously. Anyone able to enroll in the program and possessing adequate digital skills can now complete an advanced course of study, regardless of location. The ability to take advantage of this access, and to achieve the associated educational goals, can only be accomplished by those with strong competency with digital skills.

Figure 4: Types of Online Offerings – 2012. [52]

Digital Literacy and Healthy Communities

As noted earlier, healthy communities are ones that provide access to reliable health information and quality care while offering opportunities for healthy life. The well-being of individuals and of communities as a whole depend on the ability to meet these basic quality of life standards. Digital skills are of vital importance for healthy communities because they increase information about health care and improve access to quality health services. Digital skills also broaden education about healthy life choices and enable more informed decision making around health and wellness issues.

Provision for and maintenance of healthy populations relies on access to reliable health care information and services. This information is most available to those with proficient digital skills, who

are able to "use … emerging information and communications technology to improve or enable health and health care".[53] The ability to find a reputable local physicians able to address individual needs requires the ability to search for that information using the Internet. Recognizing symptoms of disease and illness or being aware of dangerous drug reactions and counter-indications all necessitate searching for and vetting online resources accurately and quickly. In the case of personal or local emergencies, locating recent information and contacting the nearest emergency center can literally make the difference between life and death.

Digital literacy also impacts the well-being of communities in assuring that individuals get support for the medical care and social services that are needed. This is especially important in regions in which poverty and unemployment are high and the number of individuals dependent on benefits or subsidies is commensurately inflated. For those receiving unemployment benefits or Supplemental Nutrition Assistance Program (SNAP) funds, timely access to these resources is essential for providing shelter, heating, and meals. As a region in which poverty levels are among the highest, within a state that is amongst the poorest in the nation,[54] the importance of rapid access to services is increased, as individuals lack the resources to carry them through periods of delay caused by errors in the application process. For these populations, digital proficiency is necessary for navigating social service websites and completing and submitting forms accurately. Digital literacy can make the difference between a warm and a cold house, or between a cold meal and no meal at all. Additional information about nutrition and fresh food options, a critical component for health, is readily available through agency and service websites to those who have the necessary digital skills.

Health Care and Technology

In addition to the high-level technical needs of the medical profession and medical education, advances in technology impact medical care and access for everyone:

- Medical office staff need increasing skills working with data and digital records.
- Medical providers need increasing support from technically expert staff.
- Patients need increasingly high levels of technical skills to maintain the "health literacy" needed to access medical information and quality care.

For more on health literacy and its economic costs, consult the National Library of Medicine report, *Low Health Literacy: Implications for National Health Policy.*

Rapid and efficient access to services becomes increasingly important if we consider the large population of retirees and seniors in the region. For this group, many of whom will lack employer support for the using health insurance, the need to navigate agency, provider, and pharmacy sites accurately and efficiently can become a crucial step in receiving safe, effective, and timely health care. Without strong digital skills, those populations most at risk, the low-income, elderly, or ill, will be put in positions of even greater disadvantage and risk experiencing potentially life-threatening errors or delays in needed services.

The importance of digital literacy as a tool for finding health information, especially for seniors, is attested to by the development of the National Institute of Health Senior Health website. "This site was developed by the National Institute on Aging (NIA) and the National Library of Medicine (NLM) both part

of the National Institutes of Health (NIH)."[55] As stated on the website, "NIHSeniorHealth makes aging-related health information easily accessible for family members and friends seeking reliable, easy to understand online health information."[56] The site provides information on a wide range of aging-related health issues in text and video format. It also offers a Trainers Toolkit to help providers teach older adults how to "find reliable, up-to-date online health information on their own."[57] The toolkit includes an introduction as well as lesson plans for topics ranging from basic computer skills to finding and evaluating information about doctors and medicines.[58] The training teaches computer skills within the context of health and wellness for seniors, while also building skills for independence and engagement.

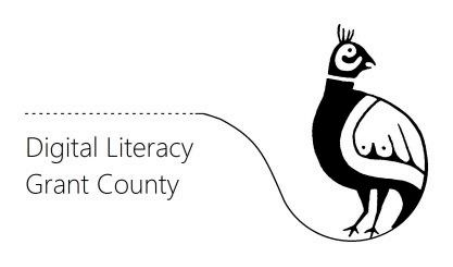
IV. Resources for Digital Literacy in the SWNMCOG Region

The SWNMCOG region is already providing considerable resources to support economic development with digital literacy. A number of training opportunities exist for adults to learn the basic computer and Internet skills that will improve their success in finding work and give them a strong opportunity to excel in the employment they find. Through a range of regional agencies, community members can attend classes or receive one-one-one coaching and support to help them achieve digital literacy.

One of the best sources of digital literacy training in the area is the local public libraries. The libraries often provide classes in basic computer and Internet skills at no charge to the public and assist clients individually with computer tasks to the extent that their staffing limitations allows. The Silver City Library has been an active promoter and provider of digital literacy and a leader for these efforts in the community. In 2012, they participated, together with the other libraries in the region, in a statewide digital literacy training program that brought two months of digital literacy training to selected communities. More recently they have built a "broad partnership" in the region to provide digital literacy over the coming year. The library sought and was awarded a Community Investment Fund grant from Freeport McMoRan, a local mining company and major employer in the region. It is currently offering regular classes in topics ranging from basic computer and Internet to email, Word, and Excel, and also provides classes for businesses wanting to market online and job seekers needing to create an online resume.

Silver City Library
Digital Skills for Sustainable Grant County

Project:	Digital Literacy Training
Grant funder:	Freeport-McMoRan Community Investment Fund
Grant amount:	$15,000
Time frame:	Mar 2014–Mar 2015
Leadership:	Silver City Public Library, in partnership with ABE (WNMU), SWNMCOG, Silver City SBDC, Workforce Solutions, Literacy Link Leamos, Bayard Public Library, Silver City Arts and Cultural District
Goals:	Increase community opportunity and sustainability through training



In Deming, the library director has also continued the training work begun by the Fast Forward project. Although the library is not yet able to offer trainings using their own facilities and staff, they have retained a partnership with the Community Action Agency of Southern New Mexico (CAA), the agency which had provided training in Deming during the Fast Forward program. Trainers from CAA continue to come to the Deming library annually to provide several weeks of classes in basic computer and Internet skills, as well as showing patrons how to select and set up a computer and how to practice online security and safety. The CAA trainers are bi-lingual and are able to deliver instruction in both English and

Spanish. The Deming Library is also working with the city to convert an unused space in the library building into a dedicated computer training lab where they would be able to deliver classes on their own, using public access computers.[59]

Other smaller libraries in the region, including those in Bayard, Columbus, and Gila, provide public access computers to the public and host open computer labs. The labs are times during which individuals can receive one-on-one help with digital skills from library staff, as staffing time permits. Libraries vary widely in the number of computers they can make available and the range of hours over which they can provide this service. Some of the smaller rural libraries, such as that in Gila, have only three public access computers and two part-time staff members working a few days a week. Others, such as the library in Columbus, have over a staff of almost eight full and part time employees and provide over thirty public access computers for their patrons' use and are open six days a week. [60]

Free basic computer and Internet skills classes are also offered by Western's Adult Education Services (AES). The program director believes strongly in the importance of digital literacy as a component of basic adult education and has updated and re-equipped the learning center with over 20 computer work stations. The lab also procured a new set of laptops that are used for mobile training to deliver classes at remote locations. On campus, AES provides free classes in digital skills to both Western students and the community, on topics ranging from keyboarding to online learning.[61] Through Western's satellite campuses in Deming and Lordsburg, as well as its outreach site in Columbus, AES is planning to offer similar classes in both English and Spanish. The need for additional trainings in Spanish is especially keen at the satellite locations, where the population of native Spanish language speakers is high.[62] Currently, through partnership with the Community Action Agency of Southern New Mexico (CAA), the Hidalgo Learning Center in Lordsburg provides digital literacy classes in Spanish and English for two weeks during the summer. Classes in Spanish are also needed in areas in which poverty and low English language skills overlap, as they do in many of the *colonias*.

For those actively preparing for or seeking employment, digital literacy training is offered by the Workforce Solutions network, which staffs twenty offices across the state, including centers in Silver City and Deming. The Silver City office provides assistance to individuals learning to use the computer and Internet for finding and applying for jobs. Individuals receive one-on-one support and have access to open computer labs and small informal classes to help with job searches, online applications, resume building, and email. The offices also offer online Work Keys assessments and trainings, which allow individuals to measure their workplace skills and to access free online training for improving skills. Through the "CollegeCentral.com" online network, the Career Services Office at Western New Mexico University offers similar training opportunities for students seeking employment, including classes in online resume building and job searching. However, these trainings are all offered on an online platform that requires that students already have good digital literacy skills.

Training in online business skills for business owners, entrepreneurs, or those interested in starting a business, is provided by the Small Business Development Centers (SBDC) across the state. SBDCs offer classes at low or no cost and workshops frequently provide instruction in digital business skills such as social media marketing.[63] In the southwest region, the SBDC at WNMU serves both Silver City and the surrounding region, with outreach to Deming, through the Mimbres Valley Learning Center, and limited

support to Lordsburg, through occasional educational newspaper articles.[64] Other trainings in digital skills for businesses are sometimes provided by local Chambers of Commerce. Both the Chamber and the SBDCs near the border leverage digital technologies to help local businesses enlarge their reach by participation in international trade. The International Business Accelerator, part of the New Mexico Small Business Development Network, provides free online webinars to help businesses understand the history, legalities and opportunities of participating in international trade.

WNMU offers classes in Computer Literacy for credit to registered students. These courses teach fundamental computer and Internet skills and introduce students to the larger impact of digital technology on the academic and professional world. Because these courses require registration at WNMU and are available at a cost of over $650 for a three credit class, they are unlikely to draw community members who are unemployed, struggling with poverty, or did not earn a high school degree.[65]

Western offers many classes and programs online and provides support for those students enrolled in or wishing to take online classes. Through their online programs web portal, they give training in the online learning management system (LMS), including a free mini-course that introduces the platform, instructional videos, a list of FAQs, and access to 24/7 online tutoring.[66] Students interested in taking online courses in order to earn high school recovery credits or a college degree can benefit from the training provided in online learning through these resources.[67]

Those who are not currently enrolled in school and who wish to complete their GED can receive training in basic online skills through the regional literacy organizations. In the southwest, Literacy Link Leamos offers basic computer skills as part of their GED preparation course. The course introduces the computer based test, familiarizes students with the technical skills needed for taking the exam, and explores more closely particular digital literacy needs for the online math test. As a partner organization of the New Mexico Coalition for Literacy, Literacy Link Leamos focuses on the traditional literacy skills of reading and writing. However, they do provide “computer learning and keyboarding to individuals and small classes” [sic] and often include computer-based programs in their traditional literacy tutoring sessions.[68]

Programs that target digital skills as a means for building healthy communities or improving information and access to health care exist in the southwest region. Silver Health Care, with clinics in Bayard, Silver City, and Deming, uses online tools to provide patients with access to medical records through WebView. Mimbres Memorial Hospital and Nursing Home, in Deming, offers, in addition to their medical services, an extensive online health library with information about diseases and conditions, tests and procedures, preventive medicine and healthy recipes. Additional online resources include a full set of online interactive and educational tools including short animations, podcasts, medical measurement calculators and videos. Much of the information focuses on prevention and wellness. The hospital also offers an online “Senior Circle” a membership and activity group that encourages healthy lifestyles and health education for older adults, providing information, discounts, educational programs and some regionally based social events. [69] Senior centers across the region provide some training in basic computer skills or popular software applications, but education in online health resources and information has been promoted only within the physician outreach system and does not extend to other senior support institutions.

V. Opportunities and Barriers

As in the other areas of New Mexico, there is a high need for digital literacy knowledge and skills in the southwest region. High poverty rates, low employment and educational levels, populations scattered across remote rural regions - these factors, combined with a large numbers of aging and underserved inhabitants, place pressures on the region to find ways to address these issues. Several of the regions in the southwest are exceptionally well positioned in regard to digital literacy education and offer opportunities for further program growth. Silver City and surrounding areas have established success in creating digital literacy learning opportunities. That success has been built with strong leadership and collaborative effort. This success provides a positive model that could be replicated in other regions and communities. Identifying other local regions in which leadership for digital literacy is strong and open to collaboration would be a first step in applying this model for success in other areas.

In the corridor of communities grouped along state road 180 running north of Silver City provide another opportunity for digital literacy training. This cluster of communities is well situated to benefit from a mobile computer training lab that could be shared across the region. Mobile computer labs have a history of successful implementation and have been utilized by a variety of New Mexico institutions, including public libraries and Small Business Development Centers. By reaching into these smaller, underserved communities along the highway, the mobile training lab would provide skills and also build capacity for the small libraries in the region. Leadership and partnerships among participating library directors would allow coordination and sharing of resources. When not engaged at a remote location, the mobile unit could be utilized for other outreach efforts such as delivering training at local senior centers or classes in Spanish at low income projects or *colonias*.

Opportunities for making digital literacy training available in Spanish also exist in the region. The strong need for providing these classes is apparent in the border region communities in which over 85% of the population is Hispanic and many have low English language skills. The Deming Comprehensive Plan for 2010 to 2015 noted the need for "better outreach to … the Latino community" in the region and listed increased educational opportunities in Spanish language as a key objective.[70] Partnership opportunities for Spanish language digital literacy training exist through collaboration with the Community Action Agency (CAA) of Southern New Mexico. Their educators have years of experience in providing digital literacy education in the southern region of the state and their trainers combine high levels of technical expertise and fluency in Spanish with experience working with rural populations in the southwest and border region.

While opportunities for developing digital literacy education in the region are plentiful, barriers to this development also exist. In general, the greatest barrier to digital literacy training is the lack of dedicated funding for training positions or instruction. This gap requires that responsibility for training either be added to existing workloads or be provided on a voluntary basis. Neither of these are viable options for work that requires full time effort to meet the demand for classes, necessitates a high level of technical skills, and relies on instructor expertise to create successful classroom experiences.

Lack of successful outreach is another factor that may impede the success of any digital literacy initiative. Successful outreach is a challenge even for established institutions such as libraries, which are

often unable to draw adequate numbers to training classes that they offer. Inadequate outreach often simply reflects the fact that those providing or managing training are not themselves prepared or skilled in marketing and outreach strategies. Another factor in unsuccessful outreach is inadequate targeting of appropriate market sectors for the service that is offered. This leads some digital literacy initiatives to incorrectly conclude that there is no demand for training in their region.

One of the greatest barriers to those enrolling in training is the cost associated with many digital literacy classes. Fees such as tuition at community colleges are prohibitive to many potential clients of digital literacy training who are proportionally more likely to be unemployed or living on a restricted budget and thus less able to afford even minimal costs. Classes offered on college campuses pose additional obstacles for students who may be uncomfortable with a more academic atmosphere or anticipate a more technical approach to the topic for which they are unprepared. Courses offered with long meeting times or over an extended time period may also prevent people from enrolling as they feel unable to commit large periods of time to a program.

VI. Best Practices and Recommendations

Digital Literacy education can make important contributions to economic development, educational achievement levels, and community health in the southwest region. How digital literacy training programs are built and how effective they are depends on the degree to which they are able to work with the available resources and around existing obstacles. Identifying resources, needs and barriers will help communities develop successful programs with the fewest setbacks. The following best practices may be useful for regional agencies or communities planning and developing digital literacy programs in their area.

- **Provide free training classes in digital literacy**

  To be successful and to attract students, digital literacy classes should be provided at no cost. Those sectors of the community with the lowest skill levels and most in need of such training are proportionately more likely to be unemployed, underemployed, living in poverty, or of low educational achievement. This population will be the least be able to pay for instruction, even at a relatively low cost.

- **Create regionally based and locally appropriate solutions for training**

  Communities in the region are widely dispersed and are often varied in their characteristics as well as in their needs for digital literacy training. Working with these patterns to develop regional and local training plans and implementation strategies will produce the most successful outcomes that are the best suited for the community. When possible, bring the training to the audience.

- **Align and partner with existing institutional bases and networks within the local community**

  The different cultural, economic and institutional complexions of local regions will each provide different strengths from which to build digital literacy education programs. Working with existing resources and structures will create strong and easily accessed programs most efficiently and effectively.

- **Coordinate regional training efforts to eliminate redundancy and build capacity**

  Creating a network for sharing training information, schedules, marketing materials and curriculum will help streamline processes, enhance resources, and provide opportunities to increase participation in training across community or sector boundaries.

- **Design and deliver customized training content for important target user markets**

  Training that is designed to address specific user needs has the most value for users and delivers the highest return on investment. Selecting and training important target user groups with similar and significant needs, such as MainStreet small businesses, will build skills quickly and create direct ties between digital literacy training and economic development.

- **Create organized and developed outreach plans suited to individual regions**

  Many communities identify outreach and marketing as significant obstacles to building strong attendance for trainings and making classes successful. Clearly articulated marketing plans that create and organize information releases and media outlets on a schedule will provide effective outreach and produce strong interest in training sessions.

- **Centralize leadership and effort on a local as well as a regional level**

  Digital literacy education programs will benefit from centralization in leadership and oversight at the local level. Centralization provides consistency of information, coherence of effort, and eases efforts to track patterns, resolve problems, and direct efforts forward to the next step.

- **Pursue targeted funding and public/private partnerships that are aligned with regional institutional bases or networks**

  Most resources for digital literacy funding exist indirectly through the institutions and networks that support digital literacy efforts, such as libraries, schools, and institutions of higher education. Partnership and grant opportunities with these and other regional institutions provide opportunities for funding digital literacy training.

- **Seek funding sources for digital literacy trainers**

  In order for classes to be offered at no cost, trainers must be compensated from sources other than tuition or charges. Communities will need to fund trainers by creating dedicated training hours within existing positions, creating and hiring trainers into new positions, receiving grant awards, or directing budget dollars for these tasks.

- **Document and capture progress**

  Community support, ongoing interest, grant dollars and program recognition all depend on documenting the work that has been done and successes that have been achieved. Capturing this in images, interviews, stories and surveys will provide promotional information and allow self-assessments for improving existing programs and processes.

- **Create an interim committee to review report, identify priorities, and determine next steps**

  Appointing an interim committee to review the report and plan next steps will move the program forward from concept to process. Possible next steps could include: crafting a program mission and goals; articulating objectives; identifying pilot regions; selecting initial primary content for training; creating a schedule or calendar for associated activities.

Appendix A: Digital Literacy Mobile Training Unit Proposal

Introduction

Technology has become a large part of the world in which we live and work, and the ability to use that technology has become increasingly essential. Whether it's sending an email, searching for jobs online, or completing homework for school using the Internet, more and more of us are expected to be able to perform basic computer and online tasks as part of our everyday activities. We refer to these basic tasks as "digital literacy."

Growth in digital literacy can have a dramatic impact on both individuals and communities. As small businesses promote their products to a larger audience through expansion into new online markets, they become more successful. As students gain access to online learning, they are able to attain a broader, better education. And as the local workforce becomes more digitally sophisticated, employees can be more successful in their jobs and ready to take advantage of new opportunities. By enhancing educational levels, promoting economic growth, and boosting workforce preparation, digital literacy can improve the quality of life for individuals and create stable and thriving communities.

Becoming digitally literate requires that we have access to training and to the technical equipment on which to learn, practice and apply new skills. For those who reside in remote or rural communities, locating digital training resources may be difficult or impossible, as fully equipped computer labs are not available or affordable by most small or rural entities. For these outlying communities, a mobile computer lab dedicated to digital literacy training can present an efficient and viable way to overcome a paucity of local resources.

Mobile computer labs have a history of successful implementation in small towns or rural areas, and have been utilized by a variety of New Mexico institutions, including public libraries and Small Business Development Centers. Outside of the state, mobile computer training labs have been used with great success by libraries in Colorado, New York, and California to reach populations at the point of need.[1] By reaching into smaller, underserved and targeted communities, the mobile digital literacy computer training lab can create access to the rich opportunities provided by the digital age for all individuals, regardless of location, need, or income level. This is especially important in regions in which low income or cultural barriers may limit computer access in the home. [2]

[1] See the discussion of the mobile training program at the Poudre River Public Library district out of Fort Collins, Colorado reviewed in TechSoup http://techsoupforlibraries.org/blog/edge-benchmarks-mobile-computer-labs. For information about the digital vans run out of the New York City Housing Authority, see http://www.nyc.gov/html/nycha/html/community/education_digital_vans.shtml.

[2] Studies show that "teenagers who have access to home computers are 6 to 8 percentage points more likely to graduate from high school than teenagers who do not…." http://www.iza.org/en/webcontent/publications/papers/viewAbstract?dp_id=1912

In addition to the ability to provide training, mobile computer labs create an efficiency of resource use and consolidation of effort that lowers the burden on any single town or community. Benefits derived from this aspect of a mobile computer lab are many and varied, including the following points:

- By sharing resources and expenses across communities, a mobile computer lab for digital literacy training would distribute the cost of equipment and training amongst several small entities, lowering the cost burden for each;
- By creating a network of resources for training in the region, a mobile computer lab for digital literacy training would establish a framework for collaboration and resource sharing within a region that can enable more efficient and effective use of resources for other shared goals and "reduce geographic and economic isolation"[3];
- By creating a larger composite audience through extended reach into several small communities, the mobile digital literacy training lab makes it possible to attract a higher level of expertise to small, outlying communities, each of which alone could not provide adequate audience participation to support specialized trainers or professional experts.

Proposal

We propose establishing a mobile computer lab for digital literacy training to serve the southwest region of New Mexico. The lab would consist of 15-20 laptops plus additional equipment needed to set up and deliver training sessions. Portable and easily moved from site to site, the lab would allow digital literacy training to be delivered at communities distant from urban centers or educational hubs. A trainer, selected from local areas, would transport and set up the equipment at each location; by coordinating training events in communities of relative proximity, remote regions could receive regular training sessions on a rotating schedule. In addition to providing training, the lab could serve as an open computer facility during the hours following training, allowing participants and others to practice skills, receive one-on-one assistance, or complete professional or educational projects requiring computer and broadband access.

The lab would begin by serving selected regions in the state as determined by the community training project partners. If successful, the mobile model could be adopted by other communities and used to reach remote or underserved areas throughout state.

Regions of Service

Based on current initiatives, community need, and regional support of potential partners, the following areas of services are proposed for this mobile training unit:

- The 180 corridor north of Silver City, including Gila, Cliff, Glenwood, Reserve

[3] From http://www.publicsphereproject.org/node/276 describing a digital computer bus system in South Africa.

- Populations within Silver City, including senior centers, community centers, and other un- or under-served populations for which training is not otherwise accessible;

Facilities

Provided by each community and varying in type with location (e.g. library, community center), every training facility should include:

- Tables and chairs for set-up
- Adequate electrical outlets
- Open wall space for projection
- Broadband wire access or Wi-Fi source

Equipment

- 15-20 basic full-functioning, reliable laptops with peripherals and software, including mice, mouse pads, charging cables, and carrying cases;
- Windows, Adobe, Microsoft software installed on each laptop;
- Additional single-item peripherals, including printer, headphones, speakers,
- Portable projector and screen for training presentations;
- Rolling carts for transporting laptops from vehicle to training locations
- Surge protectors, heavy weight extension cords, gaffer tape
- Mobile wireless access points, as needed

Training topics

Training should include an array of subjects ranging from basic to more advanced areas of digital literacy, depending on community needs. Areas of instruction might include Basic Computer Skills, Introduction to the Internet, Introduction to Microsoft Office, Online Job Searches, Digital Skills for the Workplace, Online Tools for Small Businesses, Social Media Marketing, Media Literacy, and Online Security and Safety. Curriculum for classes is available and can be customized to the audience and use.

Sample Training Schedule

The mobile lab allows for a variety of training schedules that will vary depending on regional needs, community schedules, trainer availability and local demand. In general, the greatest benefit is gained from regularly scheduled and repeated contact hours, so that skills can be practiced and new information can build effectively on what has been previously learned. A sample schedule for the region might look like that outlined below:

Sample Training Schedule

Week 1 – Highway 180 Corridor North of Silver City (Repeat Week 3)	
Travel RT Silver City to Gila/Cliff	1.5 hours
Deliver class and open lab	5 hours
Travel RT Silver City to Glenwood	2.5 hours
Deliver class and open lab	5 hours
Travel from Silver City to Reserve	4 hours
Deliver class and open lab	5 hours

Week 2 – Silver City Community (Repeat Week 4)	
Silver City Community Center - class and open lab	5 hours
Silver City Senior Center - Class and open lab	5 hours
Silver City High School - Class and open lab	5 hours
Week 3 – Highway 180 Corridor North of Silver City	
Travel from Silver City to Gila/Cliff	1.5 hours
Deliver class and open lab	5 hours
Travel RT Silver City to Glenwood	2.5 hours
Deliver class and open lab	5 hours
Travel RT Silver City to Reserve	4 hours
Deliver class and open lab	5 hours
Week 4 – Silver City Community	
Silver City Community Center - Class and open lab	5 hours
Silver City Senior Center - Class and open lab	5 hours
Silver City High School - Class and open lab	5 hours

Given the long distances and commuting times, travel to training locations would be most efficient if two or more of the communities were combined into a single training trip.

Budget

Equipment

Estimates for the expense of mobile training labs generally come in under $30,000, depending on the number and quality of the computers purchased, and on the type and standard for peripherals chosen. We recommend purchasing full service laptops and standard peripherals, as well as additional items that will allow for easy transport of equipment as well as for protection during travel. The following table provide a line budget for the key items required for a mobile computer lab.

Proposed Mobile Computer Lab Line-Item Budget for Key Items

Item	Cost per item	# Items	Total Cost
Surge protectors – for 6 plugs	$15/2 pack	3	$45
Extension cords – 10', 3-prong	$13 each	6	$78
Gaffer tape – 2" x 90'	$17 each	10	$160
Rolling carrying carts	$30 each	4	$120
Training laptops	$800	20	$16,000
Extended warranty/replacement coverage	$150	20	$3,000
Soft carrying cases	$25 each	20	$500
Wireless mice and mouse pads	$25	20	$500
Software (Microsoft Office and Adobe)	$250	20	$5,000
Projector	$500	1	$500
Projector screen	$130	1	$130
Printer	$150	1	$150
Initial set up and imaging, extra batteries, bulbs, wires	$1000		$1,000
Mobile wireless access points	Negotiable/TBA		
		TOTAL	**$27,183**

While some savings can be realized from purchasing refurbished computers, this is not recommended for training equipment. Learning is most effective when equipment works as efficiently as possible, with relatively few problems, and newer equipment equipped with the newest software is more likely to produce a smooth and seamless learning experience. Because some users of training equipment may be relatively inexperienced, the machines are often subjected to non-standard treatment that can be more taxing on systems. Newer equipment tends to be more resilient and able to handle this treatment more effectively. It is also an asset to work with training computers that are all identical in form and functionality. This similarity will make maintaining and updating the equipment more efficient and will also allow greater ease of instruction for basic skills classes, as user interfaces will present identically on all machines.

Refurbished computers are a good solution for providing low-cost equipment to those unable to afford a new computer but are not recommended for training purposes.

New laptops can generally be expected to last 3-5 years, depending on use and maintenance schedules. Benefits of the initial investment in equipment will be best realized when computers can be used frequently, over an extended period of time.

Training Costs

Training Hours

Based on the sample schedule above and excluding travel, training costs are outlined below. Note that this schedule reflects a part-time trainer schedule of 3 days/week.

Estimated Training Costs for Part-time Trainer

Task	Description	Hours	Cost
Class	2-hour session, including prep time, set up, follow up, and breakdown, offered for one week, 3x/week	6 hours	$240
Open lab	3 hours, offered for one week, 3x/week	9 hours	$360
Total per week	(Excluding travel time and expenses)	15 hours	$600
Total per month	(Excluding travel time and expenses)	60 hours	$2,400

Travel

The cost of travel has two components: the cost of trainer hours spent traveling and the expense of the travel in mileage.

Cost of Trainer Travel Hours

Based on the sample schedule given, a trainer based in Silver City would spend 8 hours on weeks 1 and 3 traveling between Silver City and the destination locations.

Estimated Travel Costs for a Part-time Trainer

Task	Description	Hours	Cost
Travel week 1	RT to Gila/Cliff, Glenwood, and Reserve	8 hours	$320
Travel week 3	RT to Gila/Cliff, Glenwood, and Reserve	8 hours	$320
Total per month	(Excluding travel time and expenses)	16 hours	$640

Expense of Travel in Mileage

The following mileage cost estimate is based on the sample route of the highway 180 corridor and gives average mileage between communities in a one-week sample training route.

Estimated Mileage Cost Example

Mileage	Cost per unit and trip	# Units	Cost
30	.56/mile Silver to Gila/Cliff	60	$34.72
62	.56/miles Silver to Glenwood	124	$69.44
100	.56/miles Silver to Reserve	200	$112
Total	Weekly travel for weeks 1 and 3 each	384	$216.16
Total	Monthly travel	768	$532.32

Total Costs

Based on the calculations and schedule above, the following is an estimate for total costs of training, including equipment, for one month and one year.

Estimated 13-Month Total Cost

Item	Description	Cost (per month)	Cost (per year)
Equipment		$27, 183.00	$27, 183.00
Training			
Training hours cost	In class or lab	$2,400.00	$28,800.00
Travel hours cost	Travel to and from site	$640.00	$7680.00
Mileage cost	Based on $.56/mile	$532.32	$6387.84
Total		$30,755.32	$70,050.84

Creative, community-based solutions, coupled with the institutional supply of certain assets (e.g. company vehicle to offset mileage expenses), could reduce the costs of training and make it possible to deliver more classes for the same or similar cost.

Challenges

The profile of any individual training program will vary with region and partnering organizations. Each community will and should create a program that utilizes its unique resources and allows it to meet community needs. In developing a training program, communities will all face challenges and need to answer specific questions. A few common challenges are outlined below:

Ownership of Equipment

Equipment must be inventoried, stored, licensed, and maintained (and possibly insured) by a single entity. Identifying the responsible entity with the adequate resources to manage the mobile training equipment will be a regionally specific decision. Providing adequate support to the responsible entity for successful maintenance and oversight must be factored in and will be an important part of creating an effective and smoothly operating unit. Planned maintenance should include updates, cleaning after training, security patches, troubleshooting, as well as ordering and installation of replacement parts. In addition, equipment used for training will need to be checked out and tracked. Establishing protocols for

safe storage and effective check out will be an important part of smooth and effective use of equipment for training.

Trainer Employment, Schedule, and Travel Cost

While training will generally be most effective if trainers are hired locally, the entity responsible for hiring and paying the trainer will vary, depending on specific regional arrangements and support. In general, training from a contracted trainer would cost ~ $250/day, based on either two full sessions (including set up and break down) or one session plus one open lab (including setup and break down) at a rate of $40/hour. However, this does not include the cost of time for travel or the expense of the travel itself. For these reasons, instruction would be most economical if it were included in the duties of full or part-time position rather than contracted out on an hourly basis.

Travel

Because of the remoteness of the areas generally served by mobile computer units, the expense of travel to and from communities can easily become a large portion of overall operating costs (see travel costs in sample budget above). Precise calculations of travel expenses will vary and can be minimized by finding regionally efficient solutions. In general, travel expenses can be reduced most when agency vehicles can be used for training trips. In some instances, it might be less costly to reduce mileage by eliminating daily return trips and instead providing overnight lodging and per diem to trainers. These solutions will vary depending on trainer, location, and the capacities of the supporting agencies.

Conclusion

Mobile computer training units have an established record as a successful model for delivering digital literacy training to regions and populations unable to access these opportunities in other ways. Challenges of logistics, such as those surrounding equipment maintenance or trainer travel, can be addressed by each communities, depending on their resources for supporting maintenance, travel and training. In rural states such as New Mexico, in which populations are dispersed and distances between communities large, a mobile digital literacy training unit offers an effective way to improve computer and online skills for all residents, opening the door to greater opportunity for every New Mexican.

Additional Resources

http://www.watertowndailytimes.com/article/20110112/NEWS03/301129996

A mobile computer lab in Watertown, New York, run by Jefferson Community College Continuing Education and funded by NTIA in 2011, promoted employment and economic opportunity and stressed the importance of the mobile lab for rural communities.

http://www.cnn.com/2013/04/04/us/cnnheroes-pyfrom-brilliant-bus/

In Palm Beach, Florida, privately funded computer van, “provide[s] free, computer-based tutoring for thousands of students since 2011” and serves 3000 people each month. See http://estellasbrilliantbus.org/ for more information about the van.

Appendix B: Acronyms and Abbreviations

Acronym	Definition
AES	Adult Education Services
CAA	Community Action Agency
EDD	Economic Development Department
LMS	learning management system
NCLB	No Child Left Behind
NEEDO	Northeast Economic Development Organization
NIA	National Institute on Aging
NIH	National Institutes of Health
NLM	National Library of Medicine
NMBBP	New Mexico Broadband Program
NTIA	National Telecommunications and Information Administration
NWNMCOG	Northwest New Mexico Council of Governments
SBDC	Small Business Development Center
SNAP	Supplemental Nutrition Assistance Program
SWNMCOG	Southwest New Mexico Council of Governments
WILL	Western Institute for Lifelong Learning
WNMU	Western New Mexico University

Appendix C: Digital Literacy Funding Opportunities

There are few dedicated sources of direct funding for independent digital literacy education and training programs. Opportunities that existed several years ago through NTIA and BTOP grants have vanished from the funding landscape. In addition, digital literacy education continues to lack an institutional base of its own, making it difficult to apply for direct funding for programs through targeted institutional funds. Instead, most funding for training in digital skills exists as part of larger grant programs or broader organizational goals. Funding opportunities for digital literacy are thus best sought through grants and resources available to the specific institution to which digital literacy programming is linked. Primary providing institutions are most often libraries, and grants for these entities will or can often include money for digital literacy education. Additional funding opportunities may also be available if the target audience for training is an underserved group for which educational grant resources are available. A small selection of such potential funding sources is given below. Communities should consider funding options based on their unique location and demographic. They should also consider support available from state and local business and industry, as well as regional partnerships that combine resources to build viable programs.

Title	Description	Sector
Library Services and Technology Acts Awards (LSTA)	Administered by the Institute of Museum and Library Services as part of a larger state awards program, LSTA funds are provided to state libraries in order to support ongoing delivery of library services within the changing environment which information technology has created. States must meet broad LSTA guidelines within a flexible structure that allows individual states to set priorities and key goals that are in alignment with the guidelines. According to the description provided on the IMLS website, one key purpose of the program is to "promote literacy, education, and lifelong learning and to enhance and expand the services and resources provided by libraries, including those services and resources relating to workforce development, 21st century skills, and digital literacy skills."[71] In recent years, states have used these funds for a variety of programs related to digital literacy education, including targeted projects that provide digital and traditional literacy skills for children in schools, as well as equipment purchases, mobile computer labs, and training classes in basic and workforce skills for the community.http://www.imls.gov/programs/default.aspx	Local libraries in New Mexico; tribal libraries
Institute of Museum and Library Services (IMLS)	In addition to LSTA funds, the IMLS offers a range of grant and funding opportunities to libraries, some of which include support for digital literacy. Most grants are directed to target institutions, such as Native American libraries. Funds are largely dedicated to libraries and museums, but some grants are available for other institutional entities including higher education and state and local governments. IMLS grants provide good opportunities for communities in which local culture or regional programming aligns with specific IMLS programs. To view a complete list of available grants, go to: http://www.imls.gov/applicants/available_grants.aspx	Libraries; some tribal and government agencies such as historical societies

Department of Education Innovative Approaches to Literacy **Program**	The program began in 2012 and replaced the previous U.S. Department of Education (DOE) Literacy through School Libraries (LSL) award, last funded in 2009. The program provides funds to high-need local educational agencies (LEAs), LEA consortia, national non-profits (NNPs) and NNP consortia, with preference to rural LEAs and to the use of technology in improving literacy achievement levels. Funding was at $24 million for 2014 and is projected at $25 million for 2015, with average awards of $500,000 for LEAs or LEA consortia and $4.5 million to NNPs or NNP consortia. A minimum of half of all funds are dedicated to awards for high-need LEAs. Eligibility criteria include the requirement that applicants must "Coordinate with school libraries in developing project proposals." 2012 applicants were predominantly schools and school districts, and applications addressed the need to improve school library resources (print and digital) as well as a need for mobile facilities from the local public library. http://www.gpo.gov/fdsys/pkg/FR-2014-06-17/pdf/2014-14050.pdf	High-need LEAs and consortia; NNPs and consortia; school libraries are often included in grant proposals; technology favored in awards
Title III and Title V Education Grants	Run by the U. S. DOE, Title III and Title V grants provide funding for the support, improvement, and expansion of opportunities for low-income, Hispanic, and Native American students at appropriate institutions of higher education. These grants offer resources for building programs that may include digital literacy education and resources, and were the source of funding for the five NMSU Grants Outreach Centers in the northwestern region of New Mexico. These grants must be applied for by institutions of higher education and offer the opportunity for digital literacy training to be built in partnership with these institutions. For more information about these grant opportunities, see http://www2.ed.gov/programs/idueshsi/index.html and http://www2.ed.gov/programs/iduestitle3a/index.html.	Institutions of higher education, including two- and four-year colleges; branch campuses; partnerships and consortiums that include leadership from higher education institutions.
Free and low-cost computers for programs	There are several programs for acquiring free or low-cost computers for individuals or programs. Some are offered by large technology companies, such as Dell, which provides low-cost equipment, and Microsoft, which supplies free software to non-profits and offers a "localized grant program that focuses on educating underserved communities to use basic computing skills to advance their economic well-being, including getting a job and starting a business." Microsoft also provides access to low-cost refurbished computers in partnerships with other agencies and programs. In general, larger companies work with larger programs or partner with existing grant-funded projects. Other organizations, such as ComputerswithCauses.org and Digital Wish, provide computer equipment to classrooms, teachers, and schools. Interconnections.org is a Washington-based company that offers low-cost equipment to low income and non-profits. http://www.dell.com/learn/us/en/uscorp1/power-possible-learning?c=us&l=en&s=corp&cs=uscorp1 http://www.microsoft.com/about/corporatecitizenship/en-us/nonprofits/ http://www.microsoft.com/about/corporatecitizenship/en-us/nonprofits/faq/#cash http://www.computerswithcauses.org/computer-donation-contact.htm http://www.digitalwish.com/dw/digitalwish/about http://interconnection.org/store/	Non-profits, sometimes restricted to those that are considered charities; schools and classroom teachers

Free and low-cost computers for individuals	Other companies provide access to low- or no-cost refurbished computers for individuals. Often this equipment is linked to package offers that bundle the equipment with low-cost broadband subscriptions rates. Typically, equipment is available to households with children on reduced or free lunch programs. Connect to Compete, now EveryoneOn.org, is one such program, which provides low-cost equipment through Right2PC. While there are good opportunities for getting low-cost or free computers, it is best to vet sources carefully before applying or purchasing. http://right2pc.com/en/overview	Individuals and families with children qualifying for eligibility through free- or low-cost lunch program at public schools
USDA Rural Development Business and Cooperative Assistance	"The RBEG program provides grants for rural projects that finance and facilitate development of small and emerging rural businesses help fund distance learning networks, and help fund employment related adult education programs." Smaller projects have priority and are likely to be funded in amounts ranging from $10 to $500 thousand. Rural non-profits and public entities, as well as tribes, are eligible for funding. "Examples of eligible fund use include: …training and technical assistance; distance adult learning for job training and advancement." Any project funded under the RBEG program should benefit small and emerging private businesses in rural areas." May be ideal for training programs in digital skills for small business and agencies within rural regions. http://www.rurdev.usda.gov/BCP_rbeg.html	Rural non-profits, rural public entities, and tribes.

End Notes

[3] Cite the CEDS report for the SWNMCOG that highlights poverty. At the time of the report, the frequency was 1 in 5 overall, based on data from 2010 or before. Current county data, combined and weighted for population percentages, suggest an average rate of 1 in 4 living below poverty level for the region as a whole.
[4] See http://quickfacts.census.gov/qfd/states/35000.html for comparable state statistics for 2013.
[5] Sources of this data - Catron county http://quickfacts.census.gov/qfd/states/35/35003.html; Hidalgo county http://quickfacts.census.gov/qfd/states/35/35023.html; Luna county http://quickfacts.census.gov/qfd/states/35/35029.html; Grant county http://quickfacts.census.gov/qfd/states/35/35017.html
[6] See http://portal.hud.gov/hudportal/HUD?src=/states/shared/working/groups/frmwrkcoln/history For New Mexico *colonias*, see http://www.nmlegis.gov/lcs/handouts/NMFA%20072412%20*Colonias*%20Infrastructure%20Fund%20Overview.pdf Accessed 21 October 2014. Thanks to Priscilla Lucero, Executive Director, SWNMCOG, for refining the definition of *colonias* provided here.
[7] For detailed data on *colonias,* see the excellent resource provided by the University of New Mexico Bureau of Business and Economic Research: https://bber.unm.edu/*colonias*.htm Accessed 21 October 2014.
[9] See the 2010 -2015 Comprehensive Economic Development Strategy (CEDS) report for the SWNMCOG at http://swnmcog.org/images/Approved_CEDS_2010-2015.pdf Accessed 21 October 2014.
[10] This number derives from the postal code census data and may reflect information for a somewhat different population profile than that reported to the census. See https://www.census.gov/epcd/www/zipstats.html
[12] See data sources for note 5.
[13] Note size of Silver and next largest city, Deming, with source.
[14]See http://nmmainstreet.org/event/building-creative-communities-conference/ announcing the upcoming conference highlighting the links between economic development and cultural preservation.
[15] http://demingmainstreet.org/about/
[16] Ibid.
[17] Conversations with the mayor of Columbus indicate an interest in revitalizing this area, especially the border crossing.
[18] See www.hidalgocounty.org/index.php/download_file/view/1388/1/
[19] Border Foods, a chili processing plant in the region, is a large employer in the Deming area. See http://swnmcog.org/images/demingcomplan-7-10final.pdf
[20] See the 2013 report from higher education https://www.insidehighered.com/news/2013/06/26/oecd-education-glance-report-considers-relationship-between-recession-education-and as well as the U.S. Bureau of Labor Statistics Data http://www.bls.gov/emp/ep_chart_001.htm a 2013 report from the College Board emphasizes a broad range of benefits that accrue to those with higher educational levels, including better overall health and better access to health care.
[21] View a summary of the report or download the complete report at the Economic Policy Institute website: http://www.epi.org/publication/states-education-productivity-growth-foundations/ The report also notes that increasing the number of well-educated workers is likely to increase tax contributions to further boost local economies.

[23] From the Economic Policy Institute website: http://www.epi.org/publication/states-education-productivity-growth-foundations/.
[24] The report released by New Mexico Governor Richardson's Green Economy Cabinet listed lack of workforce readiness as a weakness in New Mexico's ability to successfully adopt new energy industries. See
[25] See http://wnmu.edu/ for more information about WNMU.
[26] Excerpted from the CDC website and information on healthy sustainable communities: http://www.cdc.gov/nccdphp/dch/programs/healthycommunitiesprogram/pdf/sustainability_guide.pdf

[27] Recommendations from the CDC Strategic Alliance for Health on improving community health, given at: http://www.cdc.gov/nccdphp/dch/programs/healthycommunitiesprogram/communities/sah/index.htm#guides The quote is not exact but too close a paraphrase to not be represented with quotation marks.
[28] http://aces.nmsu.edu/pubs/resourcesmag/spring05/vital.pdf
[29] The number of adults over 65 who experience homelessness or food insecurity is predicted to rise dramatically over the next 40 years. See the publication of the National Senior Citizens Law Center, "Half in Ten," at: http://www.nsclc.org/wp-content/uploads/2014/08/HiT-SeniorPoverty-profile1.pdf
[30] For a detailed analysis of health care in rural communities, see http://sph.tamhsc.edu/centers/rhp2010/03Volume2accessprimarycare.pdf
[31] http://www.cdc.gov/disparitiesanalytics/Docs/CHDIR13_factsheet_nov_20_2013_final_508.pdf
[32] http://www.hms-nm.org/about-hms/hms-area-maps.html for maps
[33] http://nmhealth.org/publication/view/plan/411/
[34] http://careerplanning.about.com/od/importantskills/a/comp_literacy.htm
[35] http://www.ce.ucf.edu/Program/3121/Computer-Skills-For-The-Workplace/
[36] More economic development recommendations can be reviewed at the EDD website, http://www.gonm.biz/default.aspx.
[37] http://cdn.news.o2.co.uk.s3.amazonaws.com/wp-content/uploads/2013/09/The-Future-Digital-Skills-Needs-of-the-UK-Economy1.pdf
[38] http://smallbusiness.chron.com/reasons-small-business-needs-online-presence-27742.html
[39] http://www.teach-nology.com/teachers/subject_matter/computing/
[40] http://www.yccc.edu/LinkClick?fileticket=44d3AGbNFP0%3D&tabid=859
[41] http://wales.gov.uk/newsroom/educationandskills/2012/120621digitaltechnology/?lang=en
[42] http://www.sde.com/technology/core.asp
[43] While a positive step, the uses of technology suggested for meeting common core standards remain aligned to traditional perceptions of knowledge, literacy and numeracy. See https://docs.google.com/document/d/1-5el3aJjDd9j0WlJGA2gdtKQ8jwwuOCP98vx5zzJI6s/edit?pli=1 for examples of ways in which technology is integrated into the classroom through common core. There is increasing awareness both that
[44] See http://www.gedtestingservice.com/educators/what-is-cbt for discussion on the assets and requirements of computer based testing for the GED.
[45] See the report on the usability study for the computer based version of the test at: http://www.gedtestingservice.com/uploads/files/c3a2d3d5add2727066df6cfc99dfecb4.pdf
[46] http://www.gacreditrecovery.org/
[47] http://www.centerforpubliceducation.org/Main-Menu/Staffingstudents/Credit-recovery-programs/Credit-recovery-programs-full-report.html
[48] With relatively low graduation rates across the state of 70% and lower rates for students from Hispanic and low-income households, credit recovery is an important element in improving educational achievement levels for New Mexicans.
[49] http://nces.ed.gov/fastfacts/display.asp?id=80
[50] https://www.insidehighered.com/news/2013/01/08/survey-finds-online-enrollments-slow-continue-grow
[51] Ibid.
[52] http://www.onlinelearningsurvey.com/reports/changingcourse.pdf. Published in I. Elaine Allen and Jeff Seaman, Changing Course: Ten Years of tracking Online Education in the United States, Babson Survey Research Group and Quahog Research Group, LLC., 2013.
[53] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3374546/
[54] As noted in the Huffington Post article on poverty from the 2012 census statistics. http://www.huffingtonpost.com/2012/09/12/us-poverty-census_n_1877197.html?utm_hp_ref=impact&ir=Impact
[55] http://nihseniorhealth.gov/background.html
[56] Ibid
[57] http://nihseniorhealth.gov/toolkit/toolkit.html
[58] Ibid
[59] Phone interview with Deming library director Angela Wilds, 20 October 2014.

[60] The Columbus library is exceptionally well equipped in terms of both equipment and staffing. Most rural libraries manage with much lower levels of technical and personnel support.
[61] http://www.wnmu.edu/old/aes/
[62] Personal interview, June 2014.
[63] See for example the upcoming class on "Advertising your business on Facebook," http://www.nmsbdc.org/silvercity/showevent.html
[64] See, for example, the February 2014 articles in the Hidalgo County Herald at http://hdg.stparchive.com/Archive/HDG/HDG02282014P03.php
[65] http://admissions.wnmu.edu/tuition/
[66] See http://online.wnmu.edu/canvas/ . The resources offered are equal to or better than similar resources for online classes at other institutions in the state.
[67] The training is limited to skills with COMPASS, the LMS used by Western. Not all online courses use this platform and Blackboard is more commonly used for online classes.
[68] See Literacy Link Leamos' website http://www.literacylinkleamos.org/ to view a full range of types of support offered by the organization for literacy.
[69] For more information about the Mimbres Memorial Hospital, go to the website: http://www.mimbresmemorial.com/mimbres-memorial-hospital/aboutus.aspx
[70] See page 34 of the plan, http://swnmcog.org/images/demingcomplan-7-10final.pdf
[71] See the website for a full description of the program - http://www.imls.gov/programs/ Accessed 13 October 2014.