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Katherine Miller
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MEMORANDUM

Date: April 24, 2018

To: Board of County Commissioners

From: Chris Hyer, Economic Development Manager *CH*

Via: Penny Ellis-Green, Growth Management Director *PEG*
Katherine Miller, County Manager

Item: Presentation and Report from Crestino, LLC on Improving Broadband Access

SUMMARY:

The purpose of this presentation is to fulfill a requirement of a contract between Santa Fe County and Crestino, LLC (Crestino) regarding broadband and its expansion. The contract lists two different times this contractor is to address the commission. The first presentation was a report on what broadband assets exist within the County. This second presentation is on four recommendations that could become policy for the County and some suggested implementation projects. A copy of their report is included in the packet.

BACKGROUND:

On May 30th, 2017, Santa Fe County entered into a PSA with Crestino for professional services related to broadband within the County. Deliverables for this contract include a report and presentation to the BCC on the various types of technologies used for broadband within the County. Crestino continued their work and focusing on ways to expand knowledge of where the existing coverage is and how to increase coverage moving forward. Thus, Crestino would like to present various ideas that could be adopted as policies for the County on the enhancement of broadband service (included in the packet). Included in this report are some suggested implementation projects with cost estimates as well. Any of these projects would enhance broadband in specific parts of the County.

Action Requested:

This is an informational presentation only. No action is requested.

Exhibits:

Exhibit A – County Broadband – “Improving Broadband Access”

Exhibit B – County Broadband - “Improving Broadband Access” (Presentation Slides)



Santa Fe County

Improving Broadband Access

March 12, 2018

Prepared for:
Santa Fe County, NM
Growth Management Department



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Executive Summary

Santa Fe County is positioning itself to ensure that improving broadband access takes a larger role in County government. This role may include directed investment in fiber optic cable installation, building public awareness, engaging the ILEC's and the CLEC's to increase fiber optic installation, thus improving fiber optic connectivity at fiber nodes, fixed wireless locations and cellular data sites.

Many municipal and county governments have taken the role of broadband provider with varying degrees of success. The County would like to build public-private partnerships without being an owner of the facilities. The County would like to provide a "stimulus" to providers that are pushing fiber optics to the node, and in turn to the greater community. This stimulus may be through various methods that remove the barriers to improving broadband access.

The ILEC's control most of the access in rural areas to the businesses and residences of the County. They must be continuously engaged to determine how fiber optic installations can be improved. Once we have the "low hanging fruit" construction list, the County should keep the engagement with the ILEC's to provide improvement to broadband access. The County should continue the engagement, so that as federal funding (such as CAF II) is being accessed, the priorities of the County may be followed.

Also, the County can work closely with the CLEC's that have a business plan to extend fiber optics in rural areas. These CLEC's such as Plateau, Conterra and others have previously received federal funding for large projects in the County, and will continue to be a viable partner. Partners such as these can assist in penetrating the market and improve broadband access.

Fixed wireless providers are a very active market in the County. Projects extending fiber optics to County facilities, and then making the towers available, can increase service to rural areas that cannot obtain direct fiber connections. These providers can access locations that can't otherwise be properly served by the ILEC's.

Cellular data providers are quickly becoming an option for broadband service. The County can again assist in extending fiber optic connects to the towers for these providers, and thus increase speeds for all cellular data connections.

The County should establish a "Dig Once" policy. This policy will dictate when and where that fiber optic conduit, pull boxes, splice points are installed when roads and utilities are built or upgraded. This policy should follow the State of NM policy, and provide for its use by providers through fees, similar to pole attachment fees for electric and telephone poles. The working group must determine the cost delta to install the facilities, and determine how this will be paid.

The County can prioritize the improving broadband access projects based on the funding available. Grant funds may also be available through Federal and State programs.

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Section 1. Introduction

The Growth Management Department of Santa Fe County has engaged Crestino Telecommunications Solutions to develop a course of action for achieving the County's broadband and access goals described in the County's Economic Development Plan (EDP) and the Sustainable Growth Management Plan (SGMP).

The SGMP identifies an issue of limited broadband service in the County caused by insufficient infrastructure. The initial report *Broadband Availability: Current Status* provided an overview of existing service that can be improved by increasing the reach of fiber optic connections throughout the County.

This *Improving Broadband Access* report is taking direct aim at the goal to provide policy and implementation options to improve broadband access in the County. The previous report identified opportunities to achieve real success. This report examines each area to develop successes in improving broadband access, though a collection of near and longer term options in four areas:

- Extend Fiber
- Engage Providers
- Build Awareness
- Dig Once

Each of the four areas covers several topics, as shown in Figure 1-1. This report will discuss each of the four areas in turn. All of the broadband policy practices recommended in this report are actions that the County can take to extend the reach of fiber optics in the rural areas of the County and achieve the goal of greater broadband availability and uptake.

The last section of this report provides a general design and implementation plan for each the four areas. All are actions that can improve broadband access in the County.

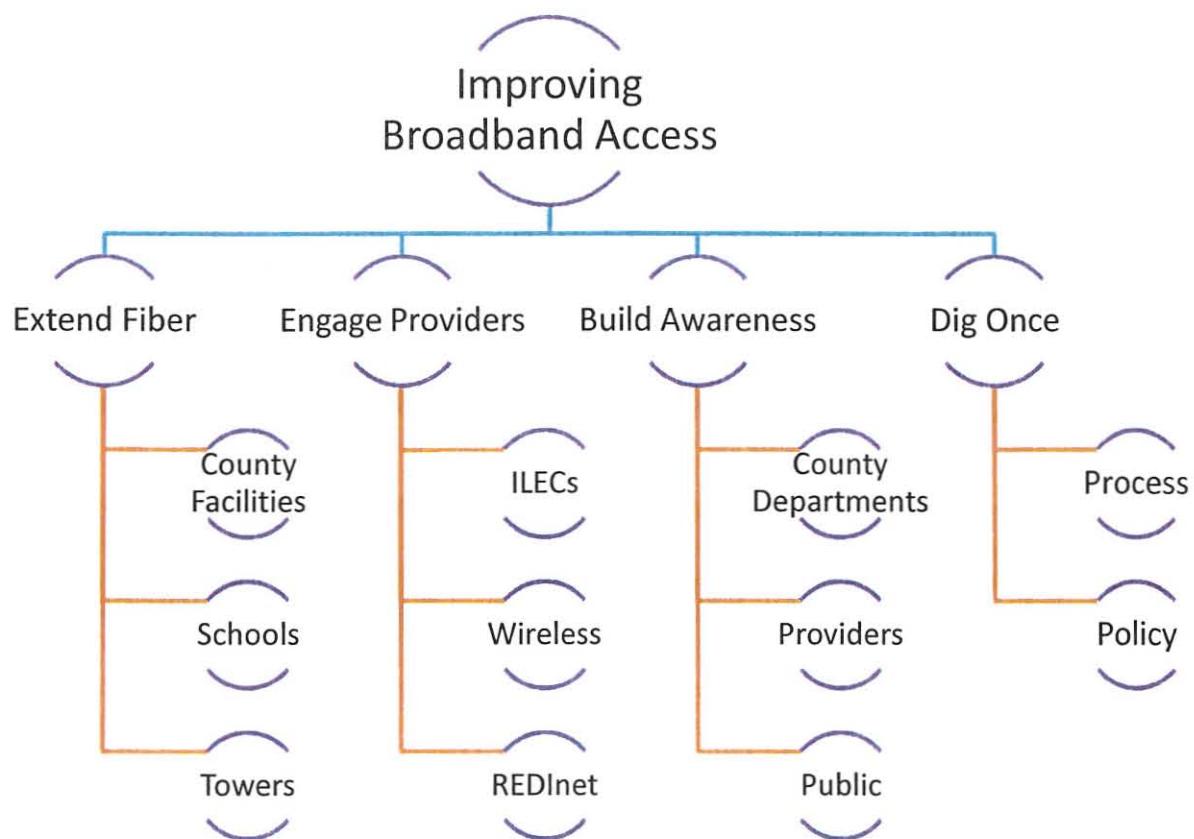


Figure 1-1. Improving Broadband Access

Section 2. Extend Fiber

Improving broadband access in the County can best be achieved by expanding the reach of fiber optic cables deeper into communities. While there are a number of communities where homes and businesses are closer to each other, much of the County is rural, with fewer buildings located farther apart. This low population density makes it cost-prohibitive to install fiber optic infrastructure all the way to homes and businesses, referred to as Fiber to the Home (FTTH), unless significant stimulus or grant funding becomes available. It is much easier and cheaper to direct County efforts and funding towards a Fiber to the Node approach, where fiber optic infrastructure runs to a node such as a DSL cabinet or a communications tower, then the remaining path to the customer is supplied with other wired or wireless technologies.

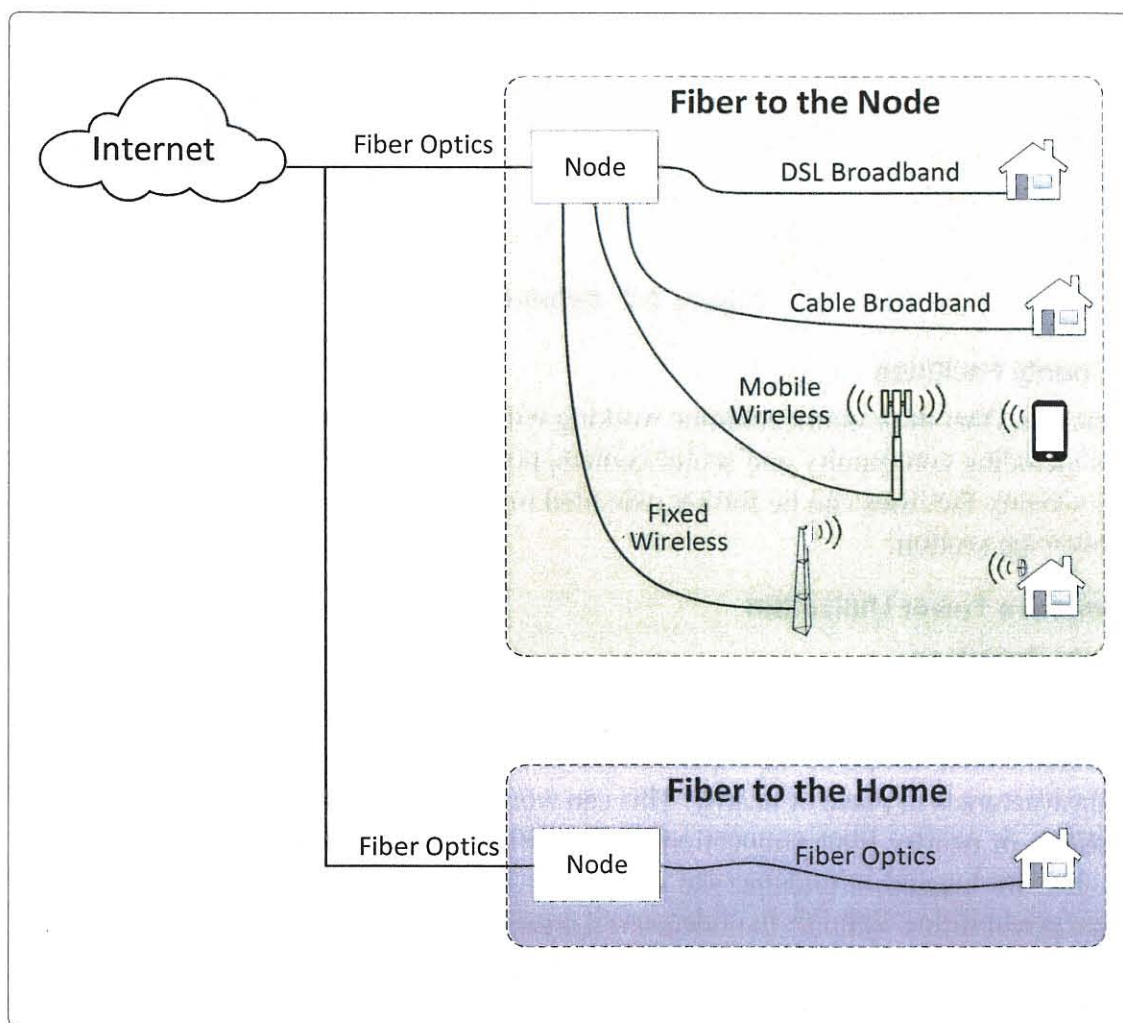


Figure 2-1. Improving Broadband Access

Continuing improvements in broadband require added fiber optic cable installation and expanded utilization of existing fiber optic cables, such as REDInet. Further fiber optic cable

installation, open access and reasonable pricing by ILEC's, MSO's and CLEC's will increase broadband development in the County by fixed wireless and cellular data providers, and lead to better service for end users.

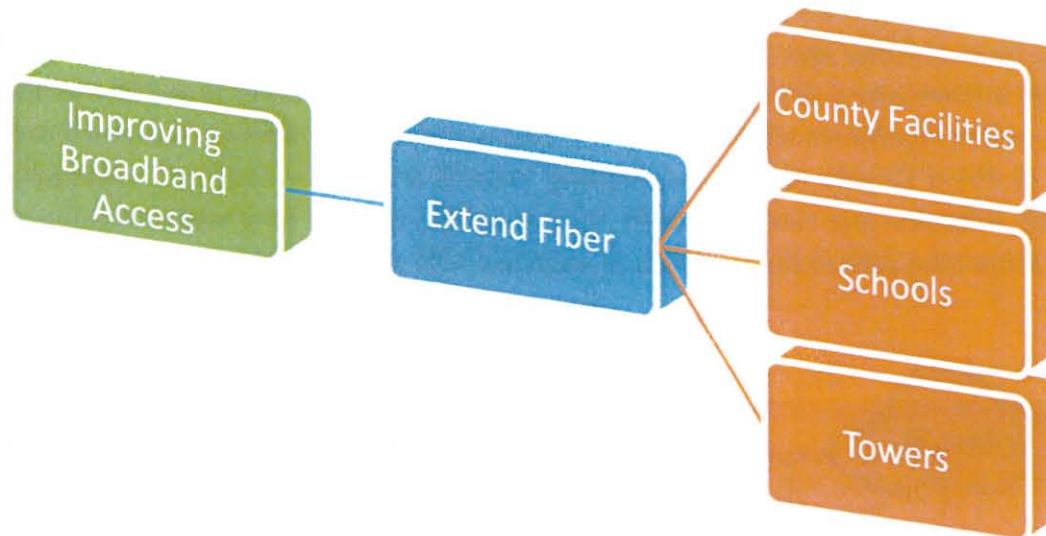


Figure 2-2. Extend Fiber

2.1.1 County Facilities

We recommend that the County continue working with providers to extending fiber to County facilities including community and senior centers, police and fire stations, and schools. Fiber access at County facilities can be further extended to the surrounding community as describe in the following section.

2.1.2 Improve Tower Utilization

On County Premises

It is recommended that the County continue on-going efforts to support the construction of new communication towers or the expanded use of existing towers at County premises where fiber infrastructure is in place or nearby. This can work especially well at County facilities that have existing or nearby fiber connections and existing communication equipment rooms or shelters, and are located in underserved areas. Fire stations, County offices, and schools are among the possibilities. Schools in underserved areas are a priority, as it can allow fiber optics and broadband services installed under the E-rate program to be extended to the neighboring homes. Offering favorable lease arrangements can encourage the development of new services to the surrounding area, such as fixed wireless or cellular. The term “towers” is used loosely here, as it applies to antennas mounted directly to buildings, not just large communication towers that can be 100 feet tall or more.

County Tower Leasing — Where space is available on existing county-owned towers, make that space available to wireless providers. In rural areas where there are no towers, consider constructing new towers for fixed wireless broadband use. Increased Wood Utility Pole Use — In rural areas of the county, given the difficult terrain (heavy tree cover, uneven topography), many rural residents may need a properly sited wood utility pole to “see” a broadband tower with wireless service. Provide incentives for increased use of these utility poles.

Private land

Increased wireless access is an intermediate strategy that could produce improved access in a year or less, placing new towers in underserved and unserved areas of the County and leasing space to wireless providers. This would be most effective when coupled with ordinance changes that would give rural residents and businesses “by right” ability to place wood utility poles on their property.

Expand REDInet Service

REDInet is a middle-mile fiber optic broadband network in rural Northern New Mexico that serves dozens of community anchor institutions including rural healthcare providers, schools, public safety institutions, and higher education institutions. We recommend that the County continue ongoing efforts to expand REDInet’s services to providers and County IT. Recent pursuits of fixed and mobile wireless transport are steps in the right direction to growing the number of County residents who benefit from fiber optics.



Figure 2-3. REDInet Opportunities

Section 3. Engage Providers

To make real progress towards extending fiber further in Santa Fe, the County must collaborate with providers to improve broadband access while accommodating market-driven constraints. The County has begun a process of engaging with providers to develop feasible approaches for improving broadband access. Providers who demonstrate their willingness to work with the County by sharing their development plans and business requirements can become partners with the County to jointly identify and broadband access improvement projects, funding opportunities, and potential incentives to achieve shared objectives. Figure 3-1 shows the three types of providers that are positioned to increase fiber optic services in the County.

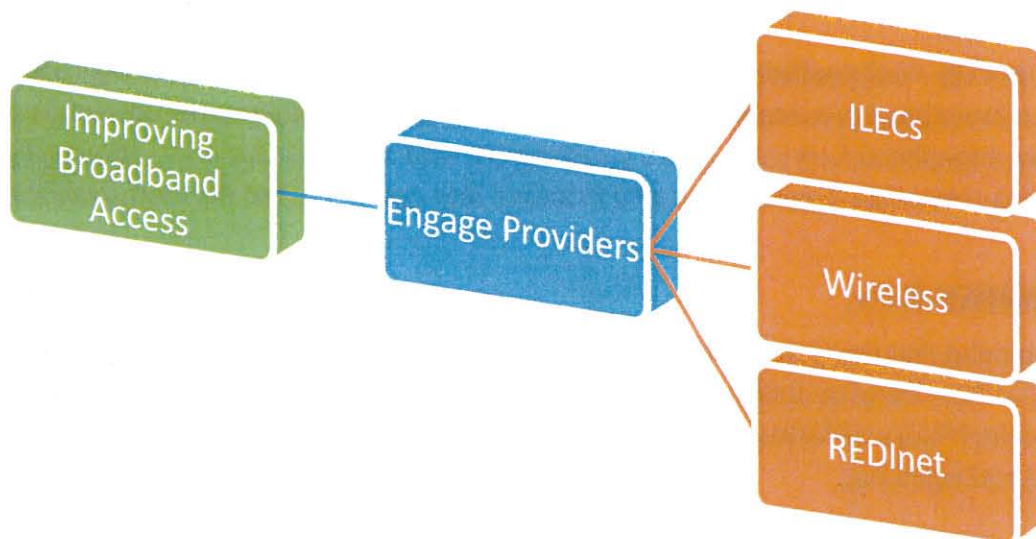


Figure 3-1. Stakeholders

3.1.1 ILECs

The County is served by three Incumbent Local Exchange Carriers (ILECs): CenturyLink through most areas, a small portion in the southeast by ENMR Plateau, and Windstream north of Pojoaque. These ILEC's use a network of fiber optic cables bringing high speed bandwidth to distribution locations, then use copper cable infrastructure to provide DSL services to a home or business.

We recommend that the County continue to engage with these ILECs to build relationships that can identify opportunities for extending fiber optics to more communities. The County should coordinate with the ILECs to continually identify and prioritize opportunities to extend fiber optic infrastructure to County facilities, schools, and towers. For example, an ILEC may have fiber optic infrastructure near a County or private communications tower, but not have a definitive business case to support extending fiber all the way to the tower. If the County can

determine that this is a high-value opportunity that will improve broadband service in the surrounding community, then it may be a candidate for directed investments or other incentives by the County.

Another case is if the County plans to build a new facility or road then the County would use the relationships with the providers to ensure that the fiber optic infrastructure needs and opportunities are evaluated as an integral part the planning process, not as an afterthought.

3.1.2 Wireless

Fixed wireless is an important technology to provide connectivity to remote areas of the county where wired connections are unavailable or low speed. Providing a fiber optic connection to a fixed wireless site can increase the available speeds to customers served by that site. On-going dialogue between the County, fixed wireless providers and REDInet have made progress towards extending REDInet fiber at anchor institutions to support fixed wireless services.

3.1.3 REDInet

REDInet is very well positioned to expand its role for the County, to build up its transport services to broadband providers, provide access to additional anchor institutions and continue to improve broadband service. Santa Fe County is well suited to assist in developing these partnerships that make greater use of REDInet's fiber optics for the northern reaches of the county.

RECOMMENDATION

We recommend that the County continue engaging the providers to find feasible opportunities to extend fiber infrastructure. Developing durable relationships with the providers can overcome the history of distrust and ensure that opportunities to increase broadband access are identified and acted on.

Section 4. Build Awareness

The third option for improving broadband access is to build awareness within and between County departments, providers, and the public, as illustrated in Figure 4-1.

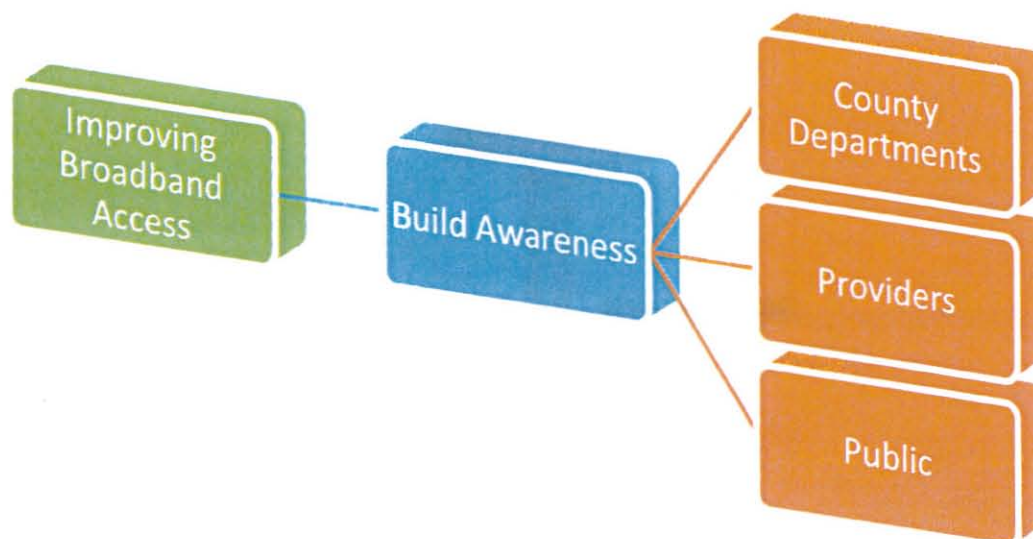


Figure 4-1. Build Awareness

We recommend that the County establish closer communication between County departments that are stakeholders in improving broadband access. The departments of Economic Development, Planning, Public Works, Public Safety, Growth Management and Public Utilities should consider opportunities for inter-department collaboration to achieve improved broadband access. A County Broadband Champion should be identified to implement this collaborative process and take responsibility for its success.

The County Broadband Champion will also be responsible for establishing and maintaining relationships with the providers and performing a bi-directional transfer of planning information, allowing the County to be fully aware of provider development plans and vice-versa.

We recommend that the County implement a marketing program to raise public awareness of improvements in broadband access in the County. The *Current Status Report* identified that residents may not realize when new internet services become available in their area. We recommend that the County work with providers to identify when they have new services available, and seek low-cost approaches for informing potential customers. The marketing program will also direct County residents to a Web-based survey that collects the locations of residents and businesses who want improved broadband access. The County can consolidate

this data to identify areas where a number of people are demanding better service, in a process referred to as “demand aggregation”. Using the relationships developed from *Section 3. Engage Providers* the County can work with providers to direct fiber infrastructure investments. This partnership between the County and the providers can improve broadband access by demonstrating a demand for better service and identifying where it exists. Some County funding would be needed for staff time and public awareness efforts to support the data collection and provider collaboration. Figure 4-2 shows the information transfer facilitated by the County Broadband Champion.

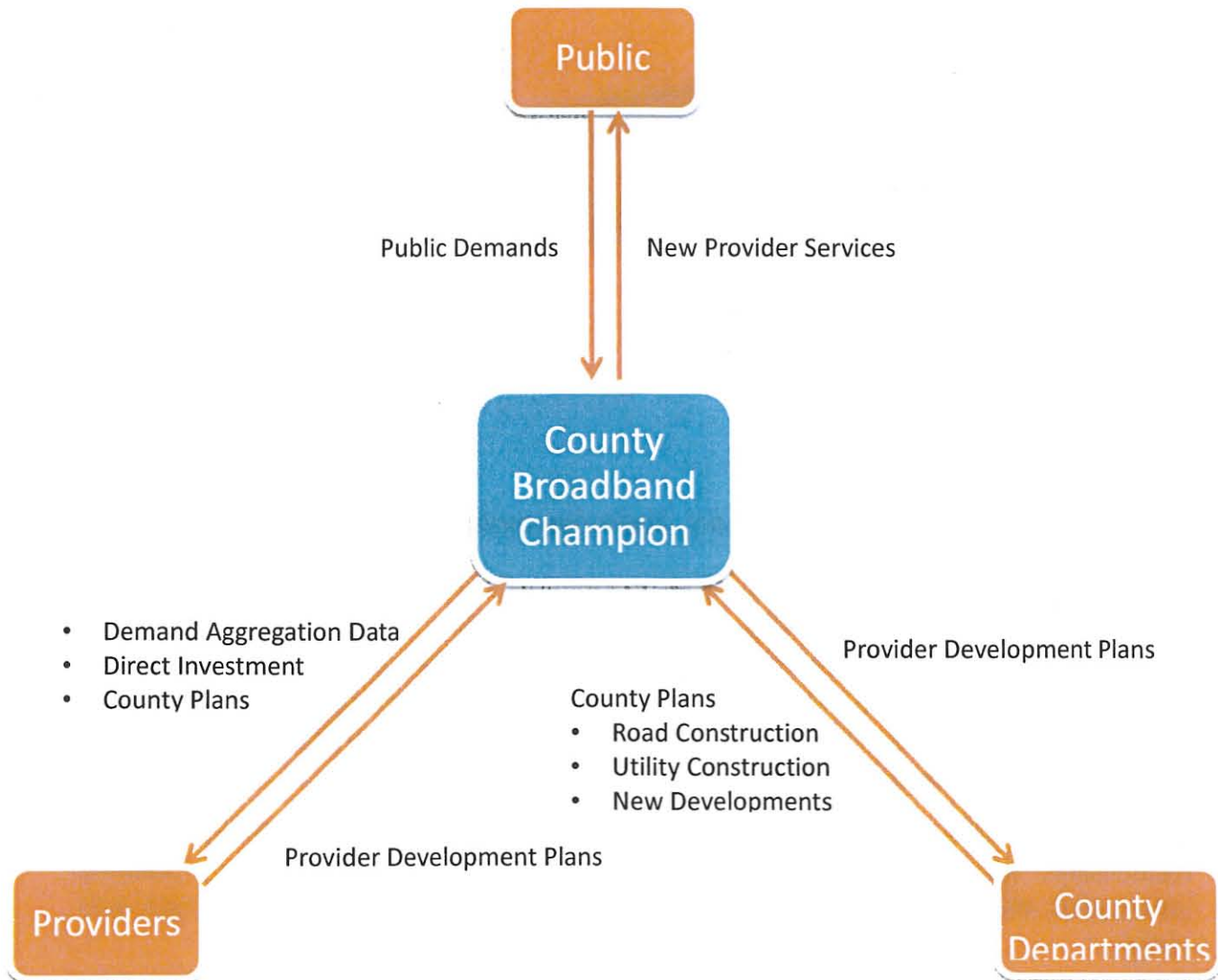


Figure 4-2. Information Transfer

Section 5. Dig Once

Buried construction is always expensive due to construction and labor costs and can be an overwhelming barrier to installing new fiber optic cables. The cost of trenching or horizontal directional drilling is the largest cost in underground broadband construction, and the incremental cost for added fiber optic cables or conduit is small. This construction cost barrier can be overcome by considering the installation of fiber optic infrastructure whenever ground will be broken in the public right-of-way, a practice commonly referred to as a “dig once” policy.

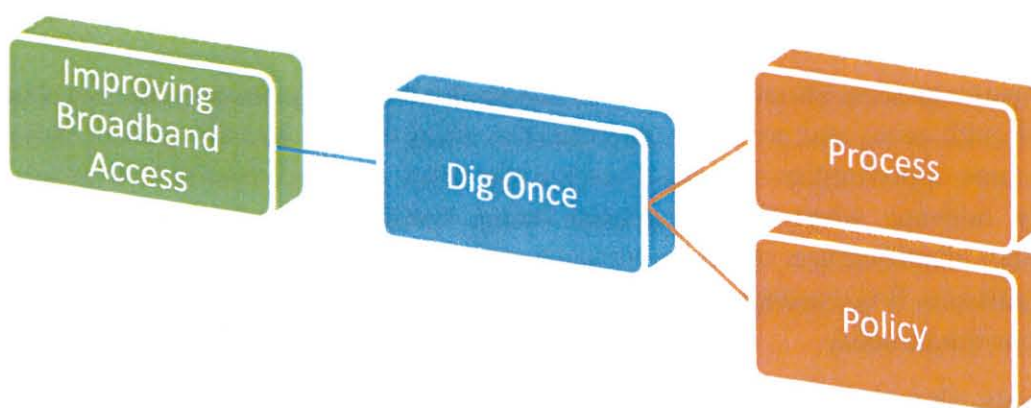


Figure 5-1. Extend Fiber

The concept is to build upon planned underground construction work, such as trenching for the installation of a water line, by requiring public and private contractors to coordinate with the County on the simultaneous installation of co-located conduit and/or fiber optic cable. This offers the following benefits:

1. Minimizes conduit installation cost by leveraging planned underground construction
2. Extends the lifetime and performance of roads and sidewalks by eliminating the additional cutting that would occur if the conduit were installed at a later time
3. Eliminates the risk of damage to existing buried systems that would occur if the conduit were installed at a later time

It is recommended that the County develop a “dig once” process to ensure that opportunities are identified and assessed. To have an effective dig once policy, it is essential that the County develops a process for identifying dig once opportunities and supporting timely communication and coordination between County departments, contractors, and other

stakeholders. The process must identify practices and specifications that bring certainty, reliability and equitability to the process. Some considerations are:

- How to identify and quantitatively evaluate opportunities
- How to communicate between County departments, providers, and other stakeholders
- How to estimate and fund the conduit or fiber installation
- Specifications for conduit or fiber installation and colocation with other utilities
- Ownership of conduit and fiber
- Maintenance and repair responsibilities

Opportunities may be identified suddenly, through a permit application for example, or well in advance, during planning for future road or County facility construction. The process should employ multiple approaches for identifying opportunities so that they are not missed. Road construction, sidewalk, lighting and trail projects are some candidates.

The evaluation process should assess opportunities for feasibility and priority. The evaluation process should assess and prioritize opportunities using criteria including costs, benefits and risks, as some opportunities may be of such a low value that they should be avoided. This is especially relevant when the installation being considered is empty conduit with no immediately identified use, or where adjacent utility poles are available for aerial fiber optic cable installation. It is reasonable that some opportunities will be passed on when they don't meet a current or future need.

The County should identify applicable specifications for the installation of co-located communications conduit. For installation in trenches, the required construction specifications may include:

- Separation distance between the conduit and other lines
- Safety, maintenance and repair considerations for both the utility and communications lines
- Conduit material, color, diameter, wall thickness
- Conduit sweep radius and maximum total bend angle between vaults
- Pull/splice vault material type, size, traffic rating and placement

Two standardized approaches are shown below for the placement of added communications conduit in coordination with a trenched utility line. Figure 5-2 shows the conceptual trenched installation of added communications conduit in a utility trench where the added conduit can share the same trench and is placed at a shallower depth above the primary utility line, with no other modifications to the trench. Placing the added conduit over the primary utility line with no additional trenching adds the lowest incremental cost.

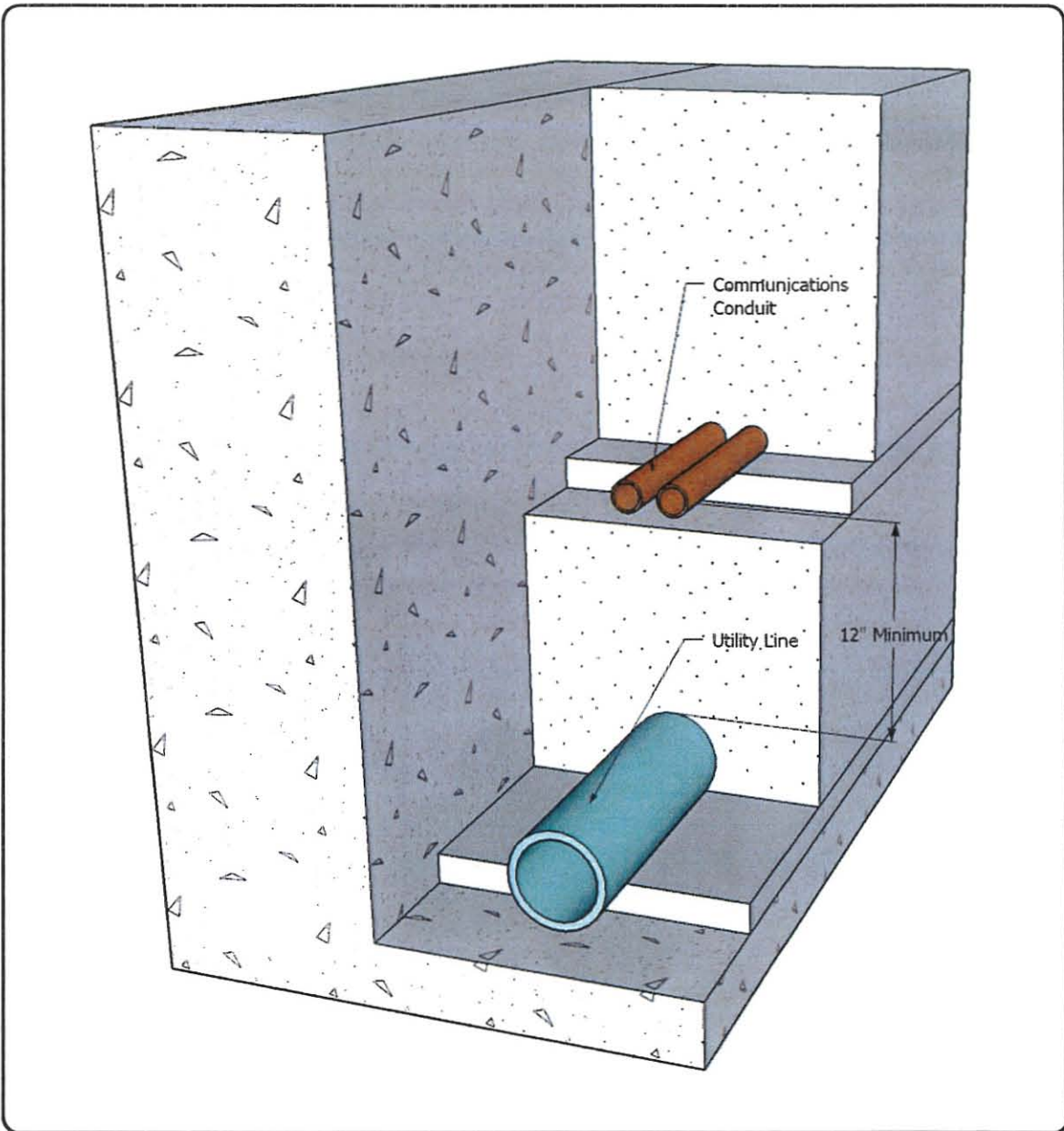


Figure 5-2. DSL Broadband

Figure 5-3 shows a conceptual trenched installation of added communications conduit that is offset horizontally from the primary utility line due to potential interference between the communications conduit and the primary utility line, requiring a wider trench. This installation approach is more costly, but as an example it may be selected for a water line to reduce the risk of damaging the communications path during maintenance or repair of the water line.

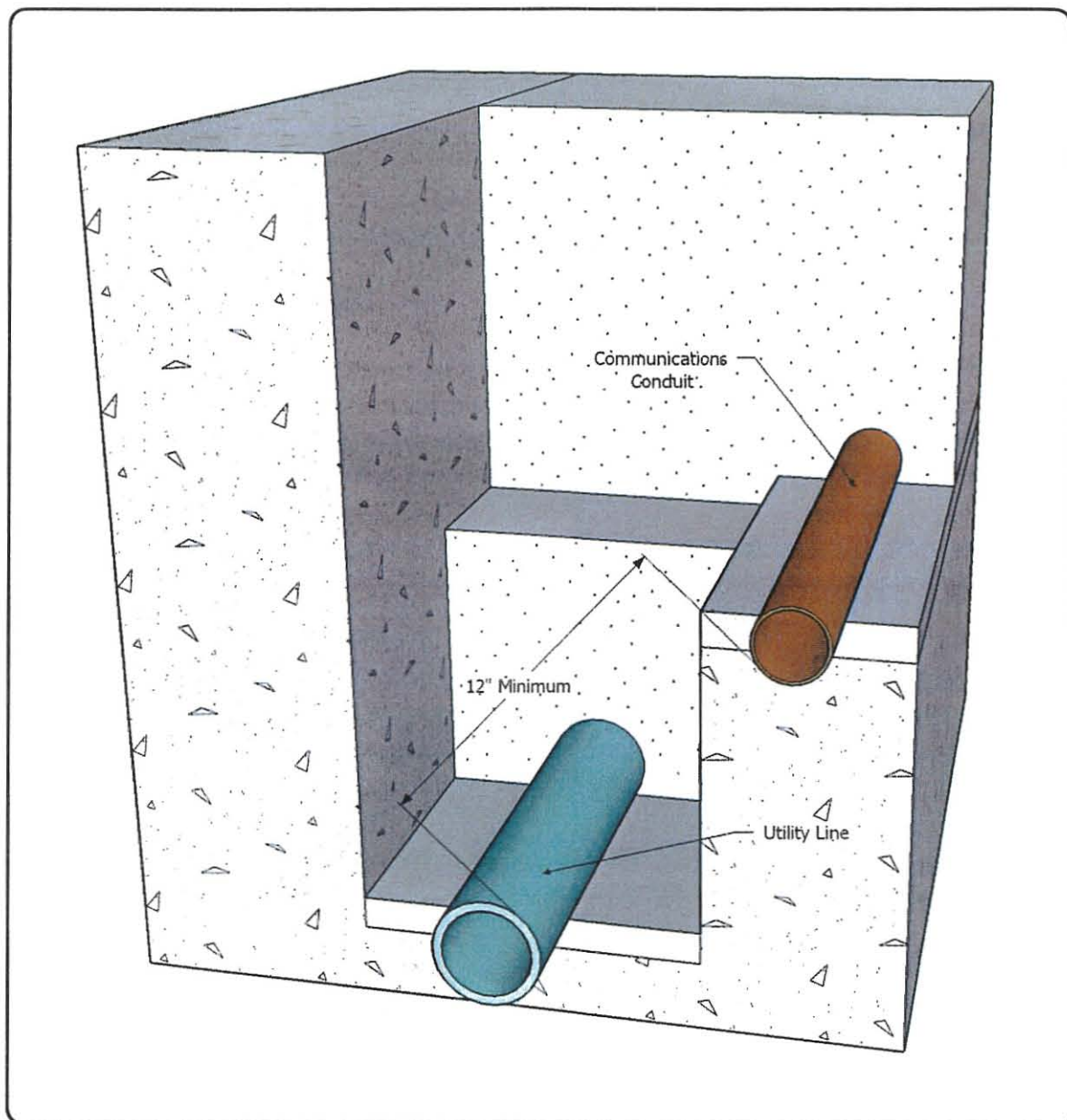


Figure 5-3. DSL Broadband

Section 6. Design and Implementation Alternatives

The findings from the Current Status Report and the current business and County government climate lead to four recommendations for achievable actions to improve broadband access in Santa Fe County.

6.1 Extend Fiber Through Directed Investments

Extend REDI-net reach

Extend the fiber optic cable into the Santa Fe County network through the location at 949 W. Alameda. In the northern part of the County, extend fiber optic cable for use by providers, such as cellular, fixed wireless and other LEC's. These installations will provide higher speed connections to the facility, resulting in better overall service to cellular and fixed wireless customers that connect through these towers.

Detailed engineering, right-of-way paths and cost estimates will be required to finalize actual costs. The following are preliminary cost estimates for deploying fiber infrastructure:

Install fiber from REDI-net meet point to Santa Fe County facility (949 W. Alameda), approximately 0.5 miles.



Figure 6-1. Santa Fe County Facility

Table 6-1. Santa Fe County Facility Cost Estimate

	Item	Qty	Unit Price	Extended
Materials	Fiber Optic pedestal	2	220.00	\$440
Labor	Pedestal Installation	2	200.00	\$400
Materials	Pull Vault	2	300.00	\$600
Labor	Vault Installation	2	400.00	\$800
Materials	Fiber Optic Cable 24 fibers	2,640	0.29	\$766
Materials	Duct	2,640	0.60	\$1,584
Labor	Install Fiber Optic Cable	2,640	1.00	\$2,640
Labor	Horizontal Directional Drilling and Duct Installation	2,640	18.00	\$47,520
			Total	\$54,750

Install fiber from meet point to towers near Santa Fe Opera (0.4 miles)

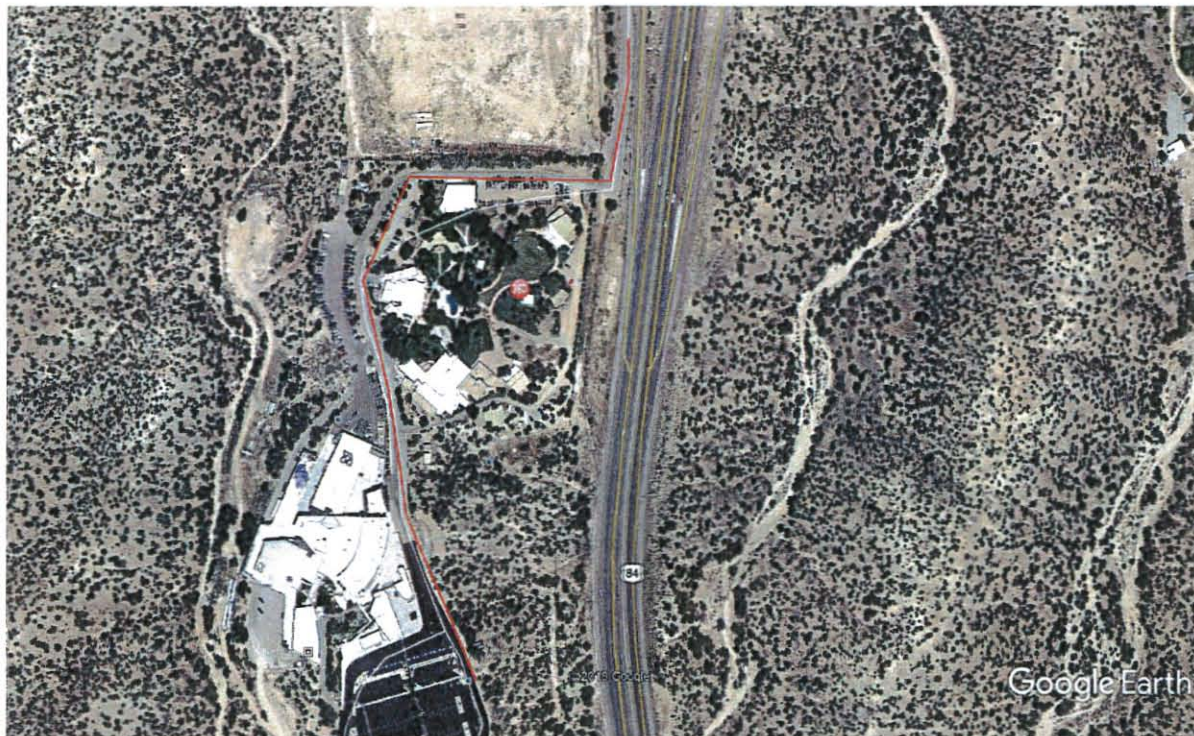


Figure 6-2. Santa Fe Opera Towers

Table 6-2. Santa Fe Opera Towers Cost Estimate

	Item	Qty	Unit Price	Extended
Materials	Fiber Optic pedestal	2	220.00	\$440
Labor	Pedestal Installation	2	200.00	\$400
Materials	Pull Vault	2	300.00	\$600
Labor	Vault Installation	2	400.00	\$800
Materials	Fiber Optic Cable 24 fibers	2,112	0.29	\$612
Materials	Duct	2,112	0.60	\$1,267
Labor	Install Fiber Optic Cable	2,112	1.00	\$2,112
Labor	Horizontal Directional Drilling and Duct Installation	2,112	18.00	\$38,016
			Total	\$44,248

Install fiber from meet point to towers at Cuyamungue (.75 miles)



Figure 6-3. Cuyamungue Towers

Table 6-3. Cuyamungue Towers Cost Estimate

	Item	Qty	Unit Price	Extended
Materials	Fiber Optic pedestal	2	220.00	\$440
Labor	Pedestal Installation	2	200.00	\$400
Materials	Pull Vault	2	300.00	\$600
Labor	Vault Installation	2	400.00	\$800
Materials	Fiber Optic Cable 24 fibers	3,960	0.29	\$1,148
Materials	Duct	3,960	0.60	\$2,376
Labor	InstallFiber Optic Cable	3,960	1.00	\$3,960
Labor	Horizontal Directional Drilling and Duct Installation	3,960	18.00	\$71,280
			Total	\$81,004

Install fiber to tower at Arroyo Seco (1 mile)



Figure 6-4. Arroyo Seco Tower

Table 6-4. Arroyo Seco Tower Cost Estimate

	Item	Qty	Unit Price	Extended
Materials	Fiber Optic pedestal	2	220.00	\$440
Labor	Pedestal Installation	2	200.00	\$400
Materials	Pull Vault	2	300.00	\$600
Labor	Vault Installation	2	400.00	\$800
Materials	Fiber Optic Cable 24 fibers	5,280	0.29	\$1,531
Materials	Duct	5,280	0.60	\$3,168
Labor	Install Fiber Optic Cable	5,280	1.00	\$5,280
Labor	Horizontal Directional Drilling and Duct Installation	5,280	18.00	\$95,040
			Total	\$107,259

Install fiber from meet point to tower at Española (0.25 miles)

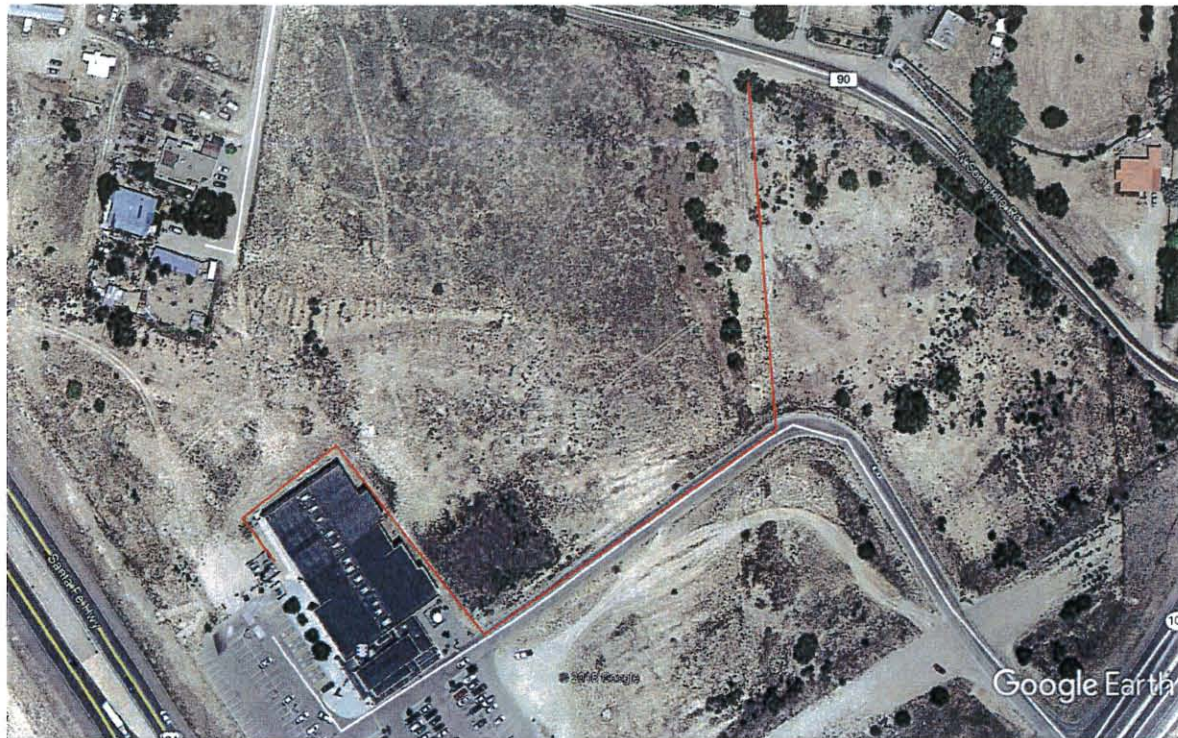


Figure 6-5. Española Tower

Table 6-5. Española Tower Cost Estimate

	Item	Qty	Unit Price	Extended
Materials	Fiber Optic pedestal	2	220.00	\$440
Labor	Pedestal Installation	2	200.00	\$400
Materials	Pull Vault	2	300.00	\$600
Labor	Vault Installation	2	400.00	\$800
Materials	Fiber Optic Cable 24 fibers	1,320	0.29	\$383
Materials	Duct	1,320	0.60	\$792
Labor	Install Fiber Optic Cable	1,320	1.00	\$1,320
Labor	Horizontal Directional Drilling and Duct Installation	1,320	18.00	\$23,760
			Total	\$28,495

6.2 Engage Providers and Develop Public-Private Partnerships

The County should creatively leverage its assets to build infrastructure with assistance from private investment. The County can provide facilities and towers, ease regulatory burden, in order to enhance partnerships that extend reach of the fiber optic network through fixed wireless.

The County should continue dialogue with CLEC's, such as CenturyLink, to push for further fiber optic investment, through economic development, infrastructure grants, CAF II funding etc. CenturyLink is willing to share information through an NDA. This process can help the County determine where directed investment on fiber optic

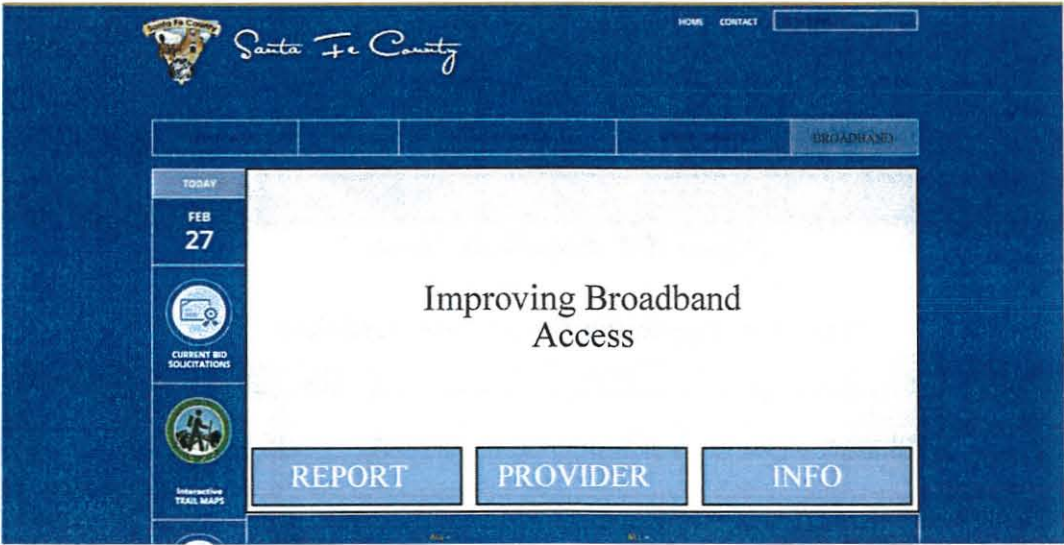
construction can work best for County facilities, such as Public Safety and Senior Centers.

6.3 Build Awareness

Create a marketing and demand aggregation portal web site and database to assist in gathering and providing information to businesses and residences for input/output on improving broadband access.

BROADBAND home page:

The Broadband home page would look similar to this page, with clicks to various areas for Reports page, Providers page and Information page.



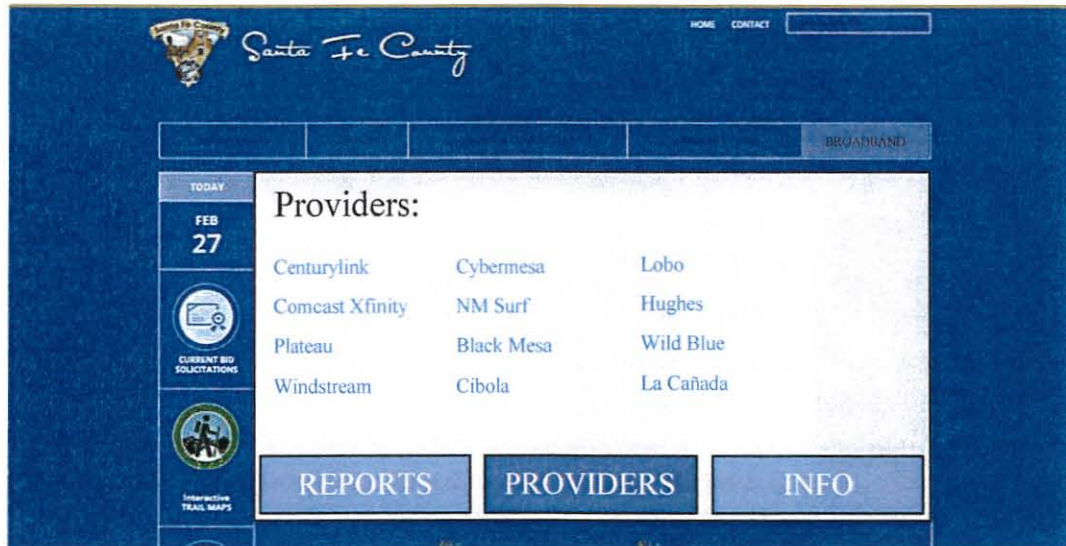
REPORTS page:

Provide information for research into plans for National, State and County government, and the relevant information to pursue grants at the various levels.



PROVIDERS page:

Provide information obtaining information on various providers that serve the County, and the methods of accessing their web pages to get useful information.



INFORMATION page:

General information and reports that are valid for County businesses and residences may determine the broadband activities that may exist within the State and local areas.



Figure 6-6. County Broadband Web Portal

Identify a County Broadband Champion to lead a coalition of County businesses and residents to continue the push and keep the momentum for improving broadband within the County, to coordinate with state, regional, local, and private entities to improve broadband access, and to monitor federal and state level funding sources.

6.4 Develop Approach for Implementing Dig Once

Establish a Dig Once policy for constructing broadband infrastructure at an incremental cost. Establish a team of County personnel from Growth Management, Public Works and Public Safety, as well as frequent County contractors and Internet Service Providers to formulate a Working Group to establish policies and rules for Dig Once.

The Working Group will focus on the Long Term benefits to establish rules for:

- Engineering Specifications,
- Appropriateness of Project (Size, Location),
- Documentation and CAD services
- Cost Allocation

Conclusion

Santa Fe County has a tremendous opportunity to extend broadband access throughout the County. In the four areas discussed, the need to work with the ILEC's and increasingly the CLEC's to continue fiber implementation provides the best opportunity to extend fiber optics to fiber and wireless nodes.

Also, by providing a campaign to raise broadband awareness through concerted marketing and implemented through a County web page.

The Dig Once policy as well, can provide an important push to Improve Broadband Access. The County can work with contractors and service providers as a community to further push fiber optics to businesses and residences.

Santa Fe County



Improving Broadband Access

March 12, 2018



CRESTINO
Telecommunications Solutions



Overall Objective

- This *Improving Broadband Access* report is taking direct aim at the goal to provide policy and implementation options to improve broadband access in the County.



Improving Broadband Access

- Extend Fiber
- Engage Providers
- Build Awareness
- Dig Once Policy
- Design and Implementation Alternatives

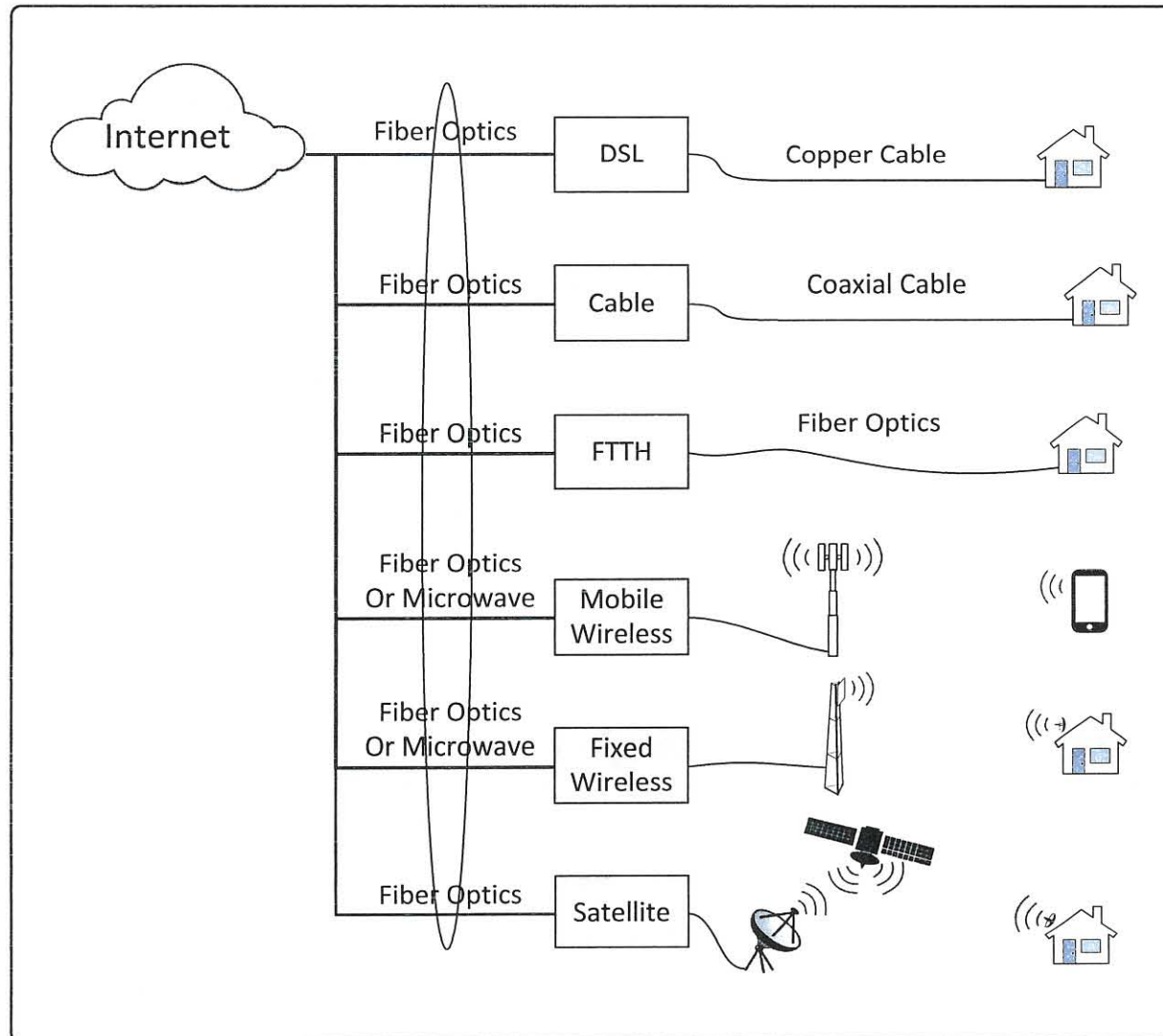


Extend Fiber

- Fiber to the Node
- Implement new sites
- Public safety
- Work with CLEC's, REDInet



Broadband Technologies





Engage Providers

- Continue discussions with ILEC's,
- FCC CAF (Connect America Fund) can assist
- Work closely CLEC's and other providers



Build Awareness

- County Broadband Champion
- Marketing through Web site



Dig Once Policy

- Minimize installation costs
- County works closely with contractors
- Develop processes

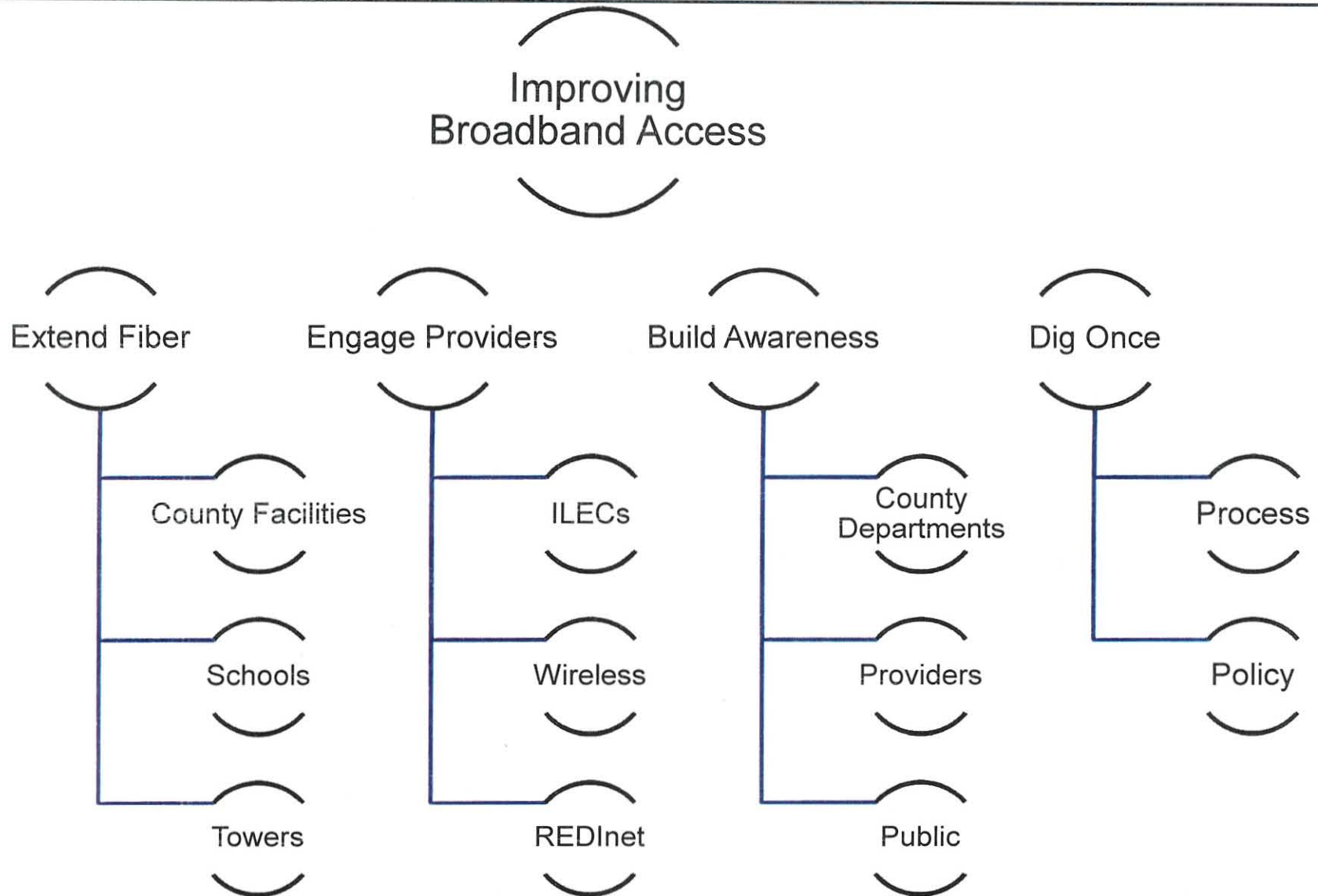


Design and Implementation

- Minimize installation costs
- County works closely with contractors
- Develop processes



Current Status





Summary

- All broadband technologies serve a role in current landscape
- Pursue opportunities to expand fiber optic cable accessibility, such as REDInet, for service to all County entities, including government, businesses and especially other Internet service providers
- County will lead with Dig Once Policy