

Application to DHCD Submitted through CAMS

County of Franklin

Franklin County Shentel Project

Application ID: 86509102021094402
Application Status: Pending
Program Name: Virginia Telecommunications Initiative 2022
Organization Name: County of Franklin
Organization Address: 1255 Franklin Street, Suite 103
Rocky Mount, VA 24151
Profile Manager Name: Lisa Cooper
Profile Manager Phone: (540) 483-3027
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Project Name: Franklin County Shentel Project
Project Contact Name: Steven Sandy
Project Contact Phone: (540) 483-3030
Project Contact Email: steve.sandy@franklincountyva.gov
Project Location: 1255 Franklin Street
Rocky Mount, VA 24151-1289

Project Service Area: Franklin County, Roanoke County, Boones Mill Town, Rocky Mount Town

Total Requested Amount: \$9,832,456.00

Required Annual Audit Status: Accepted

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Budget Information:

Cost/Activity Category	DHCD Request	Other Funding	Total
Telecommunications	\$9,832,456.00	\$14,722,315.00	\$24,554,771.00
Construction	\$9,832,456.00	\$14,567,315.00	\$24,399,771.00
Construction Related Soft Costs	\$0.00	\$155,000.00	\$155,000.00
Total:	\$9,832,456.00	\$14,722,315.00	\$24,554,771.00

Budget Narrative:

Franklin County is seeking VATI funding in the amount of \$9,832,456 (40%) to be leveraged against funding provided from Shentel, Franklin County, Roanoke County and individual citizens to provide broadband services to 3508 passings in Franklin County. This project along with a concurrent application by the WPPDC (Provider: Riverstreet) and previously funded projects is expected to provide universal coverage to Franklin County.

Questions and Responses:

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1. Project Description and Need

Describe why and how the project area(s) was selected. Describe the proposed geographic area including specific boundaries of the project area (e.g. street names, local and regional boundaries, etc.). Attach a copy of the map of your project area(s). Label map: Attachment 1 – Project Area Map.

Answer:

This project is designed to accomplish universal coverage in Franklin County. The project area therefore, is anywhere where there are unserved homes which are not part of another VATI grant and which have no federally funded coverage commitment. The County has prepared another application for funding for the awarded RDOF areas in the southwestern and eastern portions of the County with River Street Networks to complete the universal coverage. The area was determined through a collaborative, multi-stage approach drawing on many different sources of data to identify all existing unserved homes without a state or federally funded coverage commitment. Local knowledge, historical service requests, surveys, 477 data, and engineering estimates were all used to estimate remaining unserved addresses, irrespective of drop length.

Because part of this project area is in and around Shentel's existing footprint, there is extremely detailed information on the locations of many unserved homes based off of existing service data and historic service requests. County staff have also routinely interacted with residents and has kept meticulous records of existing and planned services. This local knowledge was paired with 477 data and internal engineering estimates. Due to the nature of the 477 data which counts a census block as served if there is even one home in that block with service, thoughtful analysis allows more granular coverage estimates to be developed from the 477 data. Census blocks with no broadband coverage reported and no federal funding commitment were considered to be truly unserved. For census blocks that were reported as served, especially those on the edge between served and unserved areas, were analyzed for home density and distance from the roadway. Homes that were far enough away from the roadway to require special construction costs were considered unserved. Additionally, for cable providers with franchise agreements that stipulate coverage at certain density levels, anything below those density levels was also considered unserved. Together, Shentel and the County local knowledge, along with 477-based density analysis, yielded an estimate of all unserved locations lacking a federal or state funding commitment. Both parties felt it was in the community's best interest to take a conservative estimate so that no unserved homes are left out. The unserved locations then determined the project area.

In summary, the project area will reach many parts of the County including Boones Mill, Westlake, Hardy, Windy Gap, Callaway, Ferrum, Burnt Chimney, Union Hall that the County has identified as lacking any broadband coverage, and that Shentel confirmed through engineering and customers surveys. See Attachment 1 – Project Area Map for greater detail.

Franklin County adopted a Broadband Plan that built upon the broadband assessment completed by the VA Center for Innovative Technology (CIT) in 2017 and survey of citizens and created a hybrid, phased approach to broadband deployment in the County. The Plan was prepared by Design Nine, Inc. in consultation with the Franklin County Broadband Authority, broadband working group and citizens and funding assistance from the VA Department of Housing & Community Development (DHCD). This Plan was adopted by the Broadband Authority in August 2019 and incorporated into the County's Comprehensive Plan by the Board of Supervisors in October 2019. This plan outlined a desire to extend fiber in the County's designated growth areas and villages as well as extending existing fiber networks where practical. The plan also realized the need for fixed wireless services in some of the more difficult areas to access with fiber. Therefore, this project aligns with those goals by extending fiber in areas that are near existing fiber infrastructure and providing fixed wireless service to those remaining areas.

Residents in the project area for this grant are areas where the residents have reached out to us on numerous occasions to obtain broadband services. This engagement with citizens aided in the project area selection by giving us a high level of confidence that these homes currently lack adequate broadband and establishing clear unmet demand. See Attachment 11 for support letters, petitions and emails from residents in the various project areas. Several residents have also included speed tests to show their lack of service at their home. In addition, several neighborhoods have expressed an interest and desire to provide funding to help get the needed broadband to their subdivisions.

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List existing providers in the proposed project area and the speeds offered. Please do not include satellite. Describe your outreach efforts to identify existing providers and how this information was compiled with source(s).

Answer:

Franklin County and Shentel has worked closely together by reviewing all available data to ensure there is minimal overlap with other providers that offer reliable broadband speeds of 25/3 or greater in the project area. The County has helped to coordinate communication with existing providers and other VATI grant applicants as well as providing GIS mapping information to achieve the most efficient path to universal coverage with respect to existing service areas as well as other federal, state, and local grant projects. For most wireless internet service providers, Shentel was unable to determine actual service areas, and so they are largely unaccounted for in the unserved analysis. As noted in question 1 this approach was taken to ensure true universal coverage in Franklin County rather than ignoring potentially unserved homes in general areas where wireless service providers advertise service. When possible, Shentel utilized its wireless expertise to create a conservative estimate for areas where wireless service providers likely provide 25/3 service and removed those homes from its application. In order to further achieve universal coverage, this application has not included satellite coverage areas nor has it included the areas of RDOF for which the County is working with Riverstreet Networks through a separate application prepared and submitted by West Piedmont Planning District Commission (WPPDC).

Table 1 shows a sampling of providers, speeds, and technologies that are listed in the FCC's 477 data for portions of the proposed project area. As such, this information is widely recognized to overstate the coverage areas. Therefore, some of the areas reported as served are unserved. The advertised speeds are also maximum speeds which are only available under ideal conditions, and do not represent actual customer experience. As noted, the proposed project areas were selected in collaboration with the County and the citizens living in these project areas. Routine interactions with the County officials and citizens indicate that these areas are indeed un/underserved despite some of them having advertised speeds of 25/3 or greater.

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The technologies currently available to residents in this sample of the proposed project areas are fixed wireless, DSL or satellite. Existing fixed wireless networks in the County, while an effective broadband technology in some cases, has had significant service risk/issues and degradation due to interference from foliage, terrain, and weather. In addition, much of the technology has not been updated/upgraded to keep up with increased demands. These factors have broadly precluded residents in the proposed project areas from receiving internet service that qualifies for the FCC minimum definition of broadband: 25/3.

Similarly, service from DSL degrades quickly over distance. Though CenturyLink claims to have speeds in excess of 25/3 in portions of the proposed project areas, these speeds are at best only available to a select few residents living extremely close to the CenturyLink's Central Office. Citizens continually complain about the poor service or lack of quality service they receive from Century Link. Century Link has not shown a willingness to upgrade their network or partner with the County.

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These challenges are all reflected in the County's interactions with the residents of the proposed project areas. In addition, Shentel has received sustained service requests from citizens who have cited inadequate speeds from current providers. We have been given strong feedback from door to door surveys indicating no access to reliable broadband. We have also confirmed this need with county officials. Several residents even noted that they are currently relying on hotspots for internet access or have no internet at all. See attached emails and speeds tests (Attachment 11) from residents using Century Link who are experiencing less than 10/1 mbps. Notably, even in areas like Longhorne Road, where 477 data reports available speeds well above 25/3, every single resident in our door-to-door survey noted that they only have access to less than 25/3 speeds. The persistent feedback from multiple interactions with residents and county officials convincingly demonstrates that, while Verizon, CenturyLink, and B2X may be present in portions of the proposed project areas, the reported speeds are overstated, and these areas all remain unserved.

3. Describe if any areas near the project have received funding from federal grant programs, including but not limited to Connect America Funds II (CAF II), ACAM, ReConnect, Community Connect, and Rural Digital Opportunity Funds (RDOF). If there have been federal funds awarded near the project area(s), provide a map showing these areas, verifying the proposed project area does not conflict with these areas. Do not include areas awarded to satellite broadband providers. Label Map: Attachment 2 – Documentation on Federal Funding Area.

Answer:

Given the universal nature of this project, there are some areas of the County with federal grant program awards. As noted in question 1, the goal of this project is provide functional universal coverage in coordination with previously funded projects and other pending applications. No portions of this project area has received funding from federal grant relief programs, including but not limited to Connect America Funds II (CAF II), ACAM, ReConnect and Community Connect or RDOF. There are RDOF funded areas with service by satellite providers in the project area but these areas are not considered served under VATI definitions/guidelines.

Citizens Telephone was awarded CAFII funding for Floyd County and there is some overlap of that funding area into Franklin County. This area includes approximately sixty (60) passings and they have been excluded from the Franklin County projects (both Shentel and Riverstreet projects) as service is expected to be provided by Citizens by the end of 2021.

See Attachment #2 for map details.

4. Describe if any blocks awarded in Rural Digital Opportunity Fund (RDOF), excluding those awarded to satellite internet service providers, are included in the VATI application area. If RDOF areas awarded to terrestrial internet service providers are included in the VATI application, provide a map of these areas and include information on number of passings in RDOF awarded areas within the VATI application area, and Census Block Group ID number for each block group in the project area. Label Attachment: Attachment 3 – RDOF Awarded Areas Form in VATI Area

Answer:

Franklin County has two RDOF award areas identified in the County, Wilkes (Riverstreet Networks) and Space X. Since Space X is a satellite provider these areas were considered unserved and included in this application and project area. The RDOF areas awarded to Wilkes (Riverstreet Networks) have been identified and removed them from the analysis for this project. There are no RDOF funded blocks awarded to terrestrial internet service providers that have been included in this VATI application project area.

Franklin County has developed a concurrent VATI funding application with River Street Networks and the WPPDC to serve those RDOF areas as they were the RDOF winner in those areas.

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5. Overlap: To be eligible for VATI, applicants must demonstrate that the proposed project area(s) is unserved. An unserved area is defined as an area with speeds below 25/3 mbps and with less than 25% service overlap within the project area for wireless projects and 10% for wireline projects. Describe any anticipated service overlap with current providers within the project area. Provide a detailed explanation as to how you determined the percentage overlap. Label Attachment: Attachment 4 – Documentation Unserved Area VATI Criteria.

Answer:

The anticipated service overlap within this project area will be below the allowable 10% for wireline and 25% for wireless. As noted in question 1, Shentel has gone through a lengthy process for identifying unserved locations and has designed its network to cover those unserved homes, which form the project area for this project. Since the unserved areas are estimates in some cases, and due to the nature of wireless technology, Shentel estimates a 5-10% margin of overlap, and remains committed to keeping overlap below the allowable thresholds. If any additional incidental overlap emerges, Shentel has many different options to ameliorate it. As detailed engineering design and site acquisition in existing search rings is carried out, Shentel has flexibility in the placement of wireless sites so as to minimize overlap. Shentel may also utilize directional antennas to target unserved homes and eliminate overlap. Furthermore, there may be opportunities to substitute wireless for wireline service, as new efficiencies emerge through the unique partnerships Shentel is exploring with local power companies and co-ops.

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Please see Attachment 4- Documentation Unserved Area VATI Criteria.

6.

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Total Passings: Provide the number of total serviceable units in the project area. Applicants are encouraged to prioritize areas lacking 10 Megabits per second download and 1 Megabits per second upload speeds, as they will receive priority in application scoring. For projects with more than one service area, each service area must have delineated passing information. Label Attachment: Attachment 5 – Passings Form.

a. Of the total number of VATI passings, provide the number of residential, business, non-residential, and community anchors in the proposed project area. (Up to 10 points for businesses and community anchor institutions)

b. If applicable, of the total number of RDOF passings, provide the number of residential, business, non-residential, and community anchors in the proposed project area.

c. If applicable, provide the number of passings that will require special construction costs, defined as a one-time fee above normal service connection fees required to provide broadband access to a premise. Describe the methodology used for these projections.

d. If applicable, provide the number of passings included in the application that will receive broadband access because special construction costs have been budgeted in the VATI application. Describe the methodology used for determining which passings with special construction costs were budgeted in the application.

e. Provide the number of passings in the project area that have 10/1 mbps or less. Describe the methodology used for these projections. (up to 15 points)

Answer:

a. Of the total number of VATI passings, provide the number of residential, business, non-residential, and community anchors in the proposed project area. (Up to 10 points for businesses and community anchor institutions)

This application has generated a total number of passings in the project area of 3508. Of these passings, 121 have been identified as Business passings. Forty-two (42) have been identified as Community Anchor locations such as medical and health care providers, community support organizations, public safety entities, etc. Eleven (11) have been identified as Non-Residential passings such as churches.

The project area represents some of the more sparsely populated areas of the County, hardest to reach and most lacking for broadband services. See letters of support under Attachment 11 from business, community anchor such as Chaos Mountain Brewing, Healing Strides, Ferrum College, Tri-Area Community Health, Carilion Clinic, Franklin County Public Safety, The Franklin Center just to name a few.

b. If applicable, of the total number of RDOF passings, provide the number of residential, business, non-residential, and community anchors in the proposed project area.

NOT Applicable. As noted in question 4, Shentel did not win any RDOF blocks in Franklin nor does the project area intersect with any terrestrial RDOF award areas that were won by Wilkes Telephone (Riverstreet Networks). These areas are provided for in a separate but concurrent application being filed by the WPPDC to achieve universal coverage in the County.

c. If applicable, provide the number of passings that will require special construction costs, defined as a one-time fee above normal service connection fees required to provide broadband access to a premise. Describe the methodology used for these projections

There are 849 homes included with fiber drops in excess of 300 feet. Based on historical FTTH builds in unserved and underserved areas, Shentel assumed that 65% of homes requiring long-drops will take service. The costs for that 65% of the fiber long drops is reflected in the overall cost of the project and captured in the cost breakout in Attachment 13. In order to create as comprehensive a project as possible, Shentel included unserved homes within 2,000 feet of their fiber route as part of this project and included the necessary cost to serve these homes with long drops above standard installation rates. Of those long drop costs, an estimated 215 of them are estimated to be low to moderate income households.

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d. If applicable, provide the number of passings included in the application that will receive broadband access because special construction costs have been budgeted in the VATI application. Describe the methodology used for determining which passings with special construction costs were budgeted in the application. e. Provide the number of passings in the project area that have 10/1 mbps or less. Describe the methodology used for these projections. (up to 15 points)

There are estimated to be at least 1,299 homes in the project area with an estimated speed of 10/1 or less. As discussed previously, this estimate was derived from direct consumer feedback collected by the County and Shentel.

Residents in the project area for this grant are areas where the residents have reached out to us on numerous occasions to obtain broadband services. This engagement with citizens aided in the project area selection by giving us a high level of confidence that these homes currently lack adequate broadband and establishing clear unmet demand. See Attachment 11 for support letters, petitions and emails from residents in the various project areas. Several residents have also included speed tests to show their lack of service at their home. In addition, several neighborhoods have expressed an interest and desire to provide funding to help get the needed broadband to their subdivisions.

These challenges are all reflected in the County's interactions with the residents of the proposed project areas. In addition, Shentel has received sustained service requests from citizens who have cited inadequate speeds from current providers. We have been given strong feedback from door to door surveys indicating no access to reliable broadband. We have also confirmed this need with county officials. Several residents even noted that they are currently relying on hotspots for internet access or have no internet at all. See attached emails and speeds tests (Attachment 11) from residents using Century Link who are experiencing less than 10/1 mbps. Notably, even in areas like Longhorne Road, where 477 data reports available speeds well above 25/3, every single resident in our door-to-door survey noted that they only have access to less than 25/3 speeds. The persistent feedback from multiple interactions with residents and county officials convincingly demonstrates that, while Verizon, CenturyLink, and B2X may be present in portions of the proposed project areas, the reported speeds are overstated, and these areas all remain unserved.

7. **For wireless projects only:** Please explain the ownership of the proposed wireless infrastructure. Please describe if the private co-applicant will own or lease the radio mast, tower, or other vertical structure onto which the wireless infrastructure will be installed.

Answer:

The fixed wireless portion of this application will utilize a carrier-grade, standards-based wireless network utilizing up to 60 MHz of both licensed and Generally Authorized Access 3.5 GHz spectrum in a dense, fiber-fed, small cell network. Rather than a macro site architecture, this project utilizes a wireless drop methodology where fixed wireless is only relied upon for connections of a mile or less from a fiber-fed small cell where FTTH is cost-prohibitive. These small cells will be placed on wooden utility poles between 50 and 120 feet tall, depending on the geography and topography, utilizing existing infrastructure (utility poles, water towers, tall buildings, etc) wherever practicable. Shentel conservatively estimates however, that for the majority of the small cells it will need to build new wood poles. In these instances, Shentel would own the pole, but whenever it is able to attach to existing infrastructure, it will enter into a lease agreement with the asset owner. The County is prepared to provide space on County owned assets to encourage this deployment of broadband. The Western Virginia Water Authority and Ferrum Water Authority are also willing partners in co-location on existing assets such as water tanks. The wireless equipment placed on the new poles or existing infrastructure will be owned by Shentel.

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8. Speeds: Describe the internet service offerings, including download and upload speeds, to be provided after completion of the proposed project. Detail whether that speed is based on dedicated or shared bandwidth, and detail the technology that will be used. This description can be illustrated by a map or schematic diagram, as appropriate. List the private co-applicant's tiered price structure for all speed offerings in the proposed project area, including the lowest tiered speed offering at or above 25/3 mbps. (up to 10 points)

Answer:

As already noted, this project will adopt a hybrid fiber/fixed wireless approach to maximize cost-efficiency and speed to market, while maintaining a clear upgrade path to full FTTH. Shentel estimates that approximately 55% of the proposed locations will be served by FTTH and the remaining 45% will be served by wireless drops. The below table lays out the speeds and prices for both service offerings. These prices represent a current status and may change over time.

The fiber to the home and wireless network will use shared bandwidth. In the FTTH architecture, customers will share a 10Gbps port amongst 64 customers. The network is scalable and will be able to upgrade to 32 customers per 10Gbps port in the near future. The wireless drop customers will also receive shared bandwidth from each small cell. Total capacity will vary, but through the final design process every site will be designed with more than enough bandwidth to cover all targeted homes.

9. Network Design: Provide a description of the network system design used to deliver broadband service from the network's primary internet point(s) of presence to end users, including the network components that already exist and the ones that would be added by the proposed project. Provide a detailed explanation of how this information was determined with sources. Provide information on how capacity for scalability, or expansion, of how the network can adapt to future needs. If using a technology with shared bandwidth, describe how the equipment will handle capacity during peak intervals. For wireless projects, provide a propagation map for the proposed project area with a clearly defined legend for scale of map. Label Map: Attachment 6 – Propagation Map Wireless Project.

Answer:

Overview

Shentel is proposing a hybrid solution that will deploy a fiber network that expands to within a mile of the unserved homes in Franklin County. The homes not passed by fiber, typically either those with long-drops well in excess of 2,000 ft or in scenarios or where density falls below 5 homes per mile, will be reached via a wireless drop. This approach creates a scalable, cost-effective solution with superior speed to market. The wireless drop methodology allows Shentel to realistically deploy its service within a 24 month window to get critical broadband service to residents that cannot wait another 3 or more years to receive service. Furthermore, relying on a wireless drop where it is most practical reduces costs and allows Franklin to achieve universal broadband coverage within existing budget constraints. Taken together, this hybrid approach is a fast and efficient way to deliver high-quality broadband to the entire county. Additionally, this project is scalable. As fiber is pushed further and further into the unserved areas, Shentel and Franklin will be in an excellent position to continue expanding that fiber to additional homes through both natural growth and future federal, state, and local subsidy opportunities. The technology used for both the FTTH network and the wireless drop are described below.

Fiber To The Home Network Description

Shentel intends to develop a new fiber network in Franklin County in support of its residential Fiber to the Premise (FTTP) service. Just like its existing cable network, this FTTH network will be connected to Shentel's expansive multi-state fiber network with redundant Tier 1 peering points located in Ashburn, VA and Atlanta, GA. Shentel deploys XGS-PON for its FTTP product. XGS-PON is an advanced standard for Passive Optical Networks (PON). This network can provide multi-gig speeds today and is scalable to support 10Gbps symmetrical data. As such it provides more than enough bandwidth to meet current needs and is able to scale up to stay ahead of demand for many years to come. By contrast, earlier PON networks are extremely limited in the amount of downstream and upstream capacity available to the end user. Although XGS-PON requires significant investment, the growing demand for symmetrical broadband makes the investment in XGS-PON the best choice. XGS-PON deployments are built around centralized fiber split topology and designed to allow a single fiber the ability to maintain an efficient point-to-multipoint broadband connection for multiple end users.

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Shentel typically utilizes a dedicated fiber split from the Local Convergence Point (LCP) out to the Customer Premise. Each LCP is fed with feeder fiber from a Central Office (CO) or Point of Presence (POP). Shentel will leverage their existing PoP in Bedford. This robust fiber infrastructure allows us to accommodate commercial sales opportunities and provide improved service to businesses and community anchor institutions within the project area. A centralized fiber split also provides a more dedicated and direct approach to ensuring that fiber capacity, technology, and plant records can be easily managed.

Wireless Drop Network Description

Scalability- Building for the Future

The Shentel Fixed Wireless network focuses on these components when it contemplates capacity and scalability: Evolved Packet Cores, Spectrum, Cell Site Backhaul, and Radio Access Network (RAN). Shentel uses currently measurable performance (not theoretical performance) of these components for capacity planning. This highly conservative approach helps ensure that network capacity will exceed demand.

Evolved Packet Cores

Shentel's two geo-redundant Evolved Packet Cores (EPC's) were built to exclusively support our Beam Fixed Wireless cell sites. One EPC is located in Waynesboro, VA and the other EPC is located in Edinburg, VA. These two EPC's support 4G LTE via the 3GPP standard, and these EPC's gracefully scale to support 5G with a simple software upgrade when capacity or functionality require. Please see a depiction of Shentel's EPC topology as follows:

Spectrum

Shentel recently acquired valuable 3.5 GHz licensed wireless spectrum commonly referred to as Citizens Band Radio Service or CBRS (specifically, 3550-3700 MHz). Shentel acquired this 3.5 GHz mid-band spectrum to support its Beam Fixed Wireless Broadband network. Total purchase price of this spectrum was approximately \$16 million. This acquired spectrum covers Franklin County, VA, as well as 73 other counties across rural parts of Virginia, West Virginia, Maryland and Pennsylvania. Shentel has priority access to use 30 MHz of this licensed spectrum in Franklin County. Coupled with 30 MHz of Generally Authorized Access channels, Shentel can dedicate a full 60 MHz of 3.5 GHz CBRS spectrum to cell sites. Shentel firmly believes that its priority right to use this vast amount of robust spectrum is a key differentiator from other Fixed Wireless providers.

Radio Access Network (RAN)

Shentel's cell site deployment plan includes the following for small cell sites:

- 4G LTE Small Cell (Nokia FW2QQF) – this self-contained unit is carrier-grade and standards based.
- Omni High-Gain Antennas (Alpha Wireless AW3825)
- Cell Site Router (Nokia 7705 Service Aggregation Router) - this ground-based equipment is carrier-grade and standards based. The router can support up to 10G of throughput traffic connecting each cell site to Shentel's EPC's.

Backhaul

The Fixed Wireless small cells will connect directly back to the EPC's via Shentel Fiber. Each cell site will initially enjoy over 1G of backhaul capacity, and can easily scale to 10G with simple back-office provisioning changes.

See full description and diagrams in Attachment #18.

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10. Explain how the proposed project achieves universal broadband coverage for the locality or fits into a larger plan to achieve universal broadband coverage for the locality. If applicable, explain the remaining areas of need in the locality and a brief description of the plan to achieve universal broadband coverage. (up to 50 points)

Answer:

This project achieves universal broadband coverage by designing a network to reach the unserved locations that lack existing service or federal, state, or locally funded coverage commitments. Broadband development is a top policy priority of the Board of Supervisors (Broadband Authority) and they view this as absolutely essential infrastructure for our citizenry and business community. Franklin County has been an area leader in documenting existing broadband availability and taking steps to close service gaps. The County has developed a broadband plan and continued to find ways to extend broadband to growth areas and economic development needs while also reaching as many residential households as feasible.

In conjunction with Franklin County's previous VATI applications with Shentel and Blue Ridge Towers/Brisnet, this project will leverage partnerships with Riverstreet Networks and Shentel to bring the County to universal coverage. Leveraging the joint unserved analysis outlined in question 1, the Shentel and Riverstreet projects are designed to achieve functional universal coverage. There is also a CAFII awarded project along the county's border with Floyd County that will serve approximately sixty (60) homes. That project is supposed to be completed in 2021-2022. These two remaining VATI projects will bring Franklin County to universal coverage. These build on existing Shentel coverage as well as the County's previous VATI grants with Shentel and Blue Ridge Towers/Brisnet, as well as Cares Act projects with Shentel that extended necessary fiber. Throughout these iterations of private and public funding broadband expansion, Franklin County, in conjunction with its private-sector partners, has continued to develop a more robust understanding of its broadband needs and has collaboratively developed this set of VATI projects to fill the remaining broadband gaps.

Specifically, Shentel's project, rather than being tied to a specific geographic area, is designed to reach the remaining identified unserved homes. While a small number of homes will likely remain unreached, these homes are the extreme outliers where density falls below 5 homes per mile, long drops are required well in excess of 2,000 ft, and/or terrain makes even a wireless drop untenable. That being said, Franklin County's goal in continuing collaboration with its private-sector partners is to continue to drive fiber further into remote areas to reach even these remaining homes or adding fixed wireless solutions through community poles where necessary. This effort will build off existing expansion projects in the County as well as refined broadband maps being developed at the federal and state level. The Shentel and Riverstreet projects will address Franklin's known broadband needs, and as more information is obtained in the future, the County will be excellently positioned with an extensive and competitive set of fiber networks that will be able to address any further broadband holes that emerge. The County has developed multiple partnerships with broadband providers, both private and public, as well as regional partnerships with partners such as Mid-Atlantic Broadband, Roanoke Valley Broadband Authority and American Electric Power and will continue to foster these relationships to achieve 100% coverage.

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11. Project Readiness

Describe the current state of project development, including but not limited to: planning, preliminary engineering, identifying easements/permits, status of MOU or MOA, and final design. Prepare a detailed project timeline or construction schedule, identifying specific tasks, staff, contractor(s) responsible, collection of data, etc., and estimated start and completion dates. Applicants must include Memorandums of Understanding (MOUs) or Memorandums of Agreement (MOAs) between applicants (drafts are allowable). Label Attachments: Attachment 7 – Timeline/Project Management Plan; Attachment 8 – MOU/MOA between Applicant/Co-Applicant; (up to 20 points)

Answer:

Based on Shentel's existing assets and relationships, this project is in a very favorable state of development. A high-level network design is in place with planned fiber routes estimated to exceed 300 miles of fiber and small cell search rings for more than 90 small cells. This network design is bolstered by Shentel's existing infrastructure, which will facilitate both project construction and management. A significant portion of the fiber that Shentel plans to deploy will be overlashed to existing infrastructure. This overlash opportunity reduces construction costs and risk in the overall build timeline for these portions since make-ready work and permitting is not required, as it merely requires a modification to what is already in place. Shentel's typical permitting and easement process is as follows:

- Shentel will complete a full detailed review of the planned fiber route to validate and refine the route to include determining feasibility, costs, and challenges for construction. Review will consist of Shentel personnel visually inspecting the entire planned fiber route. Shentel typically follows utility routes such as power or telephone, and permits with those utilities for new pole attachments when there is not existing Shentel attachments to allow for overlash.
- Shentel will adhere to the existing attachment guidelines and permit all utility pole owners for any overlash when required and for new pole attachments. For any utility pole that is located on private property and requires a new permit, Shentel would follow the Virginia and Federal codes that would allow Shentel to use existing like-kind utility easements. Shentel may engage the appropriate County staff for any questions that arise around such easements.
- VDOT permits would be submitted in those locations where Shentel plans to place fiber in the VDOT ROW. All other permits such as city, town, railroad, or VMRC would be permitted as required.
- Shentel will provide contact information to any agency that will be permitted for the project.

Furthermore, Shentel's long-term presence in Franklin County and strong partnership with County staff, VDOT, and utility pole owners means that the needed easements and permitting processes are all well understood and can be processed in a timely manner. Shentel is already positioned with required attachment agreements with the existing pole owners and bond securities established with VDOT. See letter of support from VDOT in Attachment 11. Shentel's longstanding relationships with qualified contractors coupled with the large volume of both aerial and underground work Shentel has proposed across Campbell, Bedford, and Franklin counties places Shentel in an ideal position to bid for these contracting resources. The County is poised to review and approve necessary permits in a timely manner.

Across its cable, fiber, and fixed wireless services, Shentel has expanded broadband service to over 58,000 homes in the last 12 months, and that number is constantly growing. This robust proven growth, along with Shentel's long history in Franklin County clearly demonstrates Shentel's ability to design and deploy a wide array of broadband networks.

This project was designed with an innovative hybrid FTTH/wireless drop architecture to provide robust universal broadband connectivity in a quick, efficient, and affordable manner. This architecture allows Shentel to deploy broadband service across significant areas quickly. As such, Shentel estimates, in conjunction with its proposals in Campbell and Bedford Counties, that the project will be completed within 24 months from contract execution, and requests to be allowed. A detailed project timeline can be found in attachment 7.

An MOU between Franklin County and Shentel has been executed and can be found in attachment 8 - MOU/MOA between Applicant/Co-Applicant. Shentel and Franklin County also have an existing PPEA contract for previously awarded projects that reduces contract negotiation and procurement times and solidifies the working relationship/partnership between Shentel and Franklin County.

12. Has the applicant or co-applicant received any VATI grants? If so, provide a list of these grants, with a detailed summary of the status of each.

Answer:

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Franklin County Shentel Project

Previous Applicant VATI Grants – Franklin County

Franklin County has applied for VATI funding in 2019, 2020 and 2021. The County was unsuccessful in the 2019 application but was awarded \$2.3 million of funding in 2020 with Blue Ridge Towers and Briscnet as the private partners. A portion of this award also include a project with Shentel (Old Salem School Road- see below). The Shentel portion of the project is fully completed. The bulk of the project was the build out of a fixed wireless system. Eighty (80) percent of the tower construction is completed and thirty (30) percent of the fixed wireless deployment is in place and active. The County requested and received an extension of the grant deadline until April 15, 2021 due to COVID factors and difficulty obtaining Federal approval for the proposed Westlake tower site. The County was also successful in receiving an award of \$1.1 million of VATI funding in 2021 to continue the build out of the fixed wireless system started with 2020 funding. This contract has not been finalized yet. The County has requested until October 15, 2021 to finalize the agreement details.

Franklin County also received funding from the VA Tobacco Revitalization Commission in 2019 to extend fiber within the County's new business park, Summit View, and extend the Shentel network to multiple areas in the County. See Table below for descriptions. Much of this work is completed and customers are connected.

Previous Applicant VATI Grants – Shentel

Shentel has applied for grants through both VATI and TRCC. In 2020, Shentel applied to VATI for three grants in Bedford, Campbell, and Franklin Counties. Shentel's application was not approved by VATI. Shentel used this experience to develop a better understanding of VATI's goals, and to develop a universal broadband plan for these counties for the 2021 VATI submission. Shentel is a trusted partner in the communities that we serve based on our history of delivering on our commitments, while always continuing to invest in our network, customer service, and community partnerships.

The following is a summary of Shentel's grant awards at the state level. All of the projects listed below deliver Internet, video, and phone through either a coax or fiber extension. The Internet speed packages offered in these extensions include a Gigabit option in addition to lower speed options.

In addition, Shentel has been awarded several grant awards directly with a locality (Campbell County and Albemarle County through CARES funding). All grants, both at the state, and local levels have been successfully closed out, and are delivering broadband to unserved locations.

Project

County

Funding Source

Award Date

Status

Walnut Run

Franklin

TRRC

6/6/2019

Completed

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County of Franklin

Franklin County Shentel Project

Old Salem School Road

Franklin

VATI

7/21/2020

Completed

Windy Gap

Franklin

TRRC

6/6/2019

Active

Burnt Chimney

Franklin

TRRC

6/6/2019

Active

Waitsboro

Franklin

TRRC

6/6/2019

Completed

Fiber Extensions for Towers & Public Wi-Fi

Franklin

CARES

10/25/20

Completed

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The Retreat

Franklin

CARES

10/25/20

Completed

Parkway Ave

Franklin

CARES

10/25/20

Completed

Cedar Bay Road

Franklin

CARES

10/25/20

Completed

New Chapel

Campbell

CARES

12/25/20

In Process

These projects have seen incredible early success. In the projects that have been completed, Shentel has seen take rates from 30-70% less than year after project completion.

13.

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Matching funds: Complete the funding sources table indicating the cash match and in-kind resources from the applicant, co-applicant, and any other partners investing in the proposed project (VATI funding cannot exceed 80 percent of total project cost). In-kind resources include, but are not limited to: grant management, acquisition of rights of way or easements, waiving permit fees, force account labor, etc. Please note that a minimum 20% match is required to be eligible for VATI, the private sector provider must provide 10% of the required match. If the private co-applicant cash match is below 10% of total project cost, applicants must provide financial details demonstrating appropriate private investment. Label Attachments: Attachment 9 - Funding Sources Table; Attachment 10 – Documentation of Match Funding

Answer:

Franklin County is committed to providing matching capital funds for the 2021 VATI Broadband project through

several methods as follows:

Private Provider Funds - Shentel will be providing \$8,594,170 in matching funding for engineering and construction

Local funds – The County currently has allocated up to \$6,000,000 of local American Rescue Plan Act (ARPA) funds for this project. The County is also allocated an additional \$1,700,000 of local ARPA funds to the River Street Networks project in the southern portions of the County to develop a FTTH buildout in the RDOF award areas. In addition, the County continues to maintain a capital spending account dedicated to broadband. Furthermore, the County is currently projecting \$1,000,000 of additional funding for broadband deployment over the next ten (10) years in the Capital Improvement Plan.

A portion of this project will also serve approximately twenty (20) unserved homes in Roanoke County. Roanoke County is committing \$40,000 of local funding to this project to help their citizens gain access to this broadband project.

Several neighborhoods have expressed their support of the project and offered funding to help assist the project. While this funding has not been secured, the County anticipates approximately \$40,000 could be generated from these interested subdivisions.

In-kind Contribution/Services - Franklin County will be managing the aspects of the project over the next 24 months. Franklin County has dedicated staff resources to the preparation of the grant application and to grant and project management. This includes the Assistant County Administrator, Finance Director, GIS Coordinator, IT Director, County Attorney, Capital Projects Manager and others to ensure that the project is successful and completed on time and on budget. It was estimated that County staff would work 15-20 hours per week on this project over the entire 24 month life of the project.

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Franklin County will be utilizing Steven Sandy, Assistant County Administrator, as lead grant facilitator/project manager. Steven has extensive experience in managing a variety of professional level Federal and state funded grant projects on behalf of the County. Steven will devote many hours of in-kind work in coordinating with Shentel on project delivery, reporting to the Broadband Authority, and preparing status reports to VATI and the public at large. The County Finance staff will also serve as the financial review and oversight team of the VATI grants. Brian Carter, Finance Director, has extensive experience in grant administration as well as Mr. Sandy to help provide the financial and auditing review and oversight needed for the project.

The County GIS staff were also invaluable to the VATI application development but also will be used to maintain and update the mapping of the fiber and wireless builds as data is received to accurately portray the County and VATI investment in achieving universal coverage. These maps can also be used publicly on the County's broadband page and accompanying storybook to explain to citizens and businesses what ISPs are operating in their general vicinity.

In addition, the County has access to the services of Andrew Cohill of Design Nine, Inc., Thompson & Litton and Blue Ridge Advisory Group to provide the County additional broadband and project management assistance as needed. The County will also require the services of the County Attorney to review, draft, and approve documents related to the partnership between Franklin County and Shentel to implement the project.

Estimated Costs

Rate	Hours	Cost
Franklin County Staff	\$75/hr	1560 \$117,000
County Attorney	\$150/hr	120 \$18,000
Consultant	\$200/hr	75 <u>\$15,000</u>
		\$150,000

The County permitting office will fast-track all ISP permitting submissions and will create a protocol to facilitate this process to ensure success with not only the County procedures but also any required coordination with VDOT. The goal will be to avoid lengthy processing delays understanding there may be a large volume of mapping and permitting data submitted. The County will also waive any permitting fees that may be required from the County to facilitate this project. These fees are estimated are \$5,000.

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See Attachments 9 and 10 for more info on Matching Funds and sources of funding.

14. Leverage: Describe any leverage being provided by the applicant, co-applicant, and partner(s) in support of the proposed project. (up to 10 points)

Answer:

Applicant-Provided Leverage - Franklin County

Franklin County is providing significant leveraging of resources to the project. The County has committed to use up to \$6 million in American Rescue Plan Act (ARPA) funding the County is expected to receive as leverage for this project. This commitment represents over 50% of the County's ARPA funding dedicated for this project alone. The County has committed another 15% of this ARPA funding to the County's concurrent application with Riverstreet to further leverage RDOF, VATI, Riverstreet and AEP funding. These funds are in addition to the capital account for broadband activities that the County has continued to fund each year through its Capital Improvement Program (CIP). The County has also committed significant staff resources as leverage to this project as described in questions 13 and 16. These resources will also facilitate permit review and approval as well as waiving of local permitting fees. The County continues to work with existing partnerships with VDOT, MBC, RVBA and AEP to leverage expedited reviews and approvals and the use of middle mile fiber where possible.

Franklin County also leverages support from the Franklin County Public Schools, Ferrum College, The Franklin Center for tele-learning opportunities and other remote learning options. Also, the County leverages relationships with Carilion Franklin Memorial Hospital, Carilion Clinics and Tri-Area Community Health to develop and facilitate tele-health opportunities for Franklin County citizens.

Co-Applicant-Proposed Leverage - Shentel

Shentel will provide leverage in several different forms to support this project. Shentel has local office locations in Rocky Mount and Rustburg and customer support center in Rustburg, VA. This office will provide convenience to customers who prefer to do business in-person and excellent local customer support to all customers across the Bedford, Campbell and Franklin County areas. This existing resource will allow Shentel to effectively manage the network and serve the customers in the project area. Shentel's existing local support and management capabilities also reduce fixed costs, as these important business elements do not need to be newly developed.

Another significant benefit to Shentel's existing local presence is the significant amount of infrastructure already in place. As noted in question 9, Shentel will be able to leverage its existing pole attachments to attach via overlash, rather than having to go through the entire permit and make ready process for the whole project. This will both reduce costs and increase deployment speed. Shentel will also be able to leverage its existing PoP in Redwood, further decreasing costs and increasing deployment speed. This PoP connection will also ensure high quality services by linking this network to Shentel's existing fiber network with redundant Tier 1 peering points located in Ashburn, VA and Atlanta, GA.

Shentel also leverages the FCC Emergency Broadband Benefit Program by providing connection opportunities for low income families.

15. Marketing: Describe the broadband adoption plan.

a. Explain how you plan to promote customer take rate, including marketing activities, outreach plan, and other actions to reach the identified serviceable units within the project area. Provide the anticipated take rate and describe the basis for the estimate. (up to 10 points)

b. Describe any digital literacy efforts to ensure residents and businesses in the proposed project area sufficiently utilize broadband. Please list any partnering organizations for digital literacy, such as the local library or cooperative extension office.

Answer:

a.

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Shentel has a strong and constantly improving marketing strategy, driven by its expansive growth in recent years. Their marketing plan utilizes public relations, mass media, social media, digital advertising, direct mail, email, printed collateral and merchandising pieces. All of these are reinforced by a robust website, a dedicated customer service team and Sales & Marketing representatives on the ground, in market.

Shentel's existing Fiber to the Home business involves many customer touchpoints both before and after construction. Before construction begins, Shentel uses staged digital and direct mail announcements to alert customers of the upcoming service. This advance notice serves to both alert residents to the service that will be available to them and to give them advance warning of impending construction.

Construction alerts and coming soon ads help to continue to keep residents aware of the reason for the construction work that may involve work in the rights of way or easements near their home. Throughout this process, door to door sales will be employed to maintain clear communication with residents.

Installations will begin after construction is complete and service is available, which will continue to drive increased awareness of available services. Shentel believes 50% to 70% of the homes passed will subscribe to internet service within 5 years of availability. They have seen similar take rates in underserved areas with their current offerings.

- 30 - 60 days prior to launch: PR outreach to local media outlets & social media posts on local pages announcing coverage areas that will soon be launched.
 - 30 days prior to launch: Digital ad campaign geo-fenced to focus on the coverage area, utilizing a "Coming Soon" theme. Social Media also shifts in its messaging to reinforce the digital ad messaging. We target mobile phones, tablets, laptops & traditional desktop computers within the coverage area. All ads link to the Beam website, where address serviceability may be checked and pre-registration can take place.
 - At launch: Direct mail letters are sent, targeting serviceable households in the new coverage area. Digital ads, social media, online search terms, billboards, updated press release and local marketing representatives place flyers and signs in public areas and local businesses. Where possible 30 second ads are run on small local radio stations that have tight broadcast coverage to the new Beam coverage area.
 - Post launch: In the weeks and months that follow, a second direct mail campaign is launched targeting the new coverage area, digital ads and social media ads and posts continue, as does the placement of posters, flyers and yard stake signs and marketing materials in local businesses and other public gathering places. Local events are also researched to evaluate if they may provide a good venue to further drive awareness and interest in Beam.
- Also see Attachment 17.

b.

The Franklin County Public Library (FCPL) is currently working on an initiative that utilizes a two-pronged approach:

- 1) Provide an interim broadband access service while "last-mile" fiber is installed in areas that are not internet connected
- 2) Expand the provision of digital literacy training among residents without home internet

The program would establish a free mobile service unit, tentatively called Know on the Go delivering digital access and digital literacy programs directly into the heart of unserved and underserved neighborhoods. It could operate before, during, and after the process of expanding broadband infrastructure. The program provides an array of services tailored to community needs. Services could facilitate the public's access to telework, telehealth, and distance education—all areas where access and usage needs have skyrocketed as a result of the COVID-19. Program would deliver internet access, computing devices, and digital literacy training for the public to obtain accurate and timely information, conduct business online (for example, apply for jobs, pay bills, or use Virginia's 2-1-1 referral service, etc.), and develop skills in using technology even before their households are connected.

The FCPL will also provide digital literacy training that would be tailored to the public's needs. For example, it is expected that health educators, social service providers, and career readiness counselors could accompany library personnel to provide specialized, expert information. In addition, health educators could demonstrate how to use telemedicine services and protect personal privacy. Social service providers could also provide enrollment information for Medicaid, WIC, CHIP, etc. AARP Tax-Aide volunteers could assist with online tax filing.

The FCPL has already identified and delivered mobile services to sites throughout the county with hotspot connectivity, safe parking, proximity to unserved/underserved populations, and where the property owners know us and support us. The FCPL has experience in helping the public develop digital literacy skills. For example, our librarians have provided

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one-on-one “What the Tech?!” educational sessions to assist individuals in learning how to use their phones and tablets and to access the library’s digital offerings. We have helped the public learn how to use Universal Class, which offers 500-plus online classes, often with CEUs; access learn-a-new-language resources; obtain legal forms; and use Gale’s Career Transitions career development tools.

The program would also support young adults or adults who need digital access and skills development and students who need appropriate technology resources to complete school assignments and to connect with their teachers, guidance counselors, and peers. Many individuals who are newly unemployed or working from home for the first time have had urgent needs for broadband access and for digital know-how, such as how to use virtual meeting technology. The COVID-19 pandemic has exacerbated how Franklin County’s poor broadband infrastructure affects communities that are not internet connected.

See support letters from many partner organizations in Attachment 11.

16. Project Management: Identify key individuals who will be responsible for the management of the project and provide a brief description of their role and responsibilities for the project. Present this information in table format. Provide a brief description of the applicant and co applicant’s history and experience with managing grants and constructing broadband communication facilities. Please attach any letters of support from stakeholders. If the applicant is not a locality(s) in which the project will occur, please provide a letter of support from that locality. Attachment 11 – Letters of Support.

Answer:

Applicant grant management team:

Franklin County will be utilizing Steven Sandy, Assistant County Administrator, as lead grant facilitator/project manager. Steven has extensive experience in managing a variety of professional level Federal and state funded grant projects on behalf of the County. Steven will devote many hours of in-kind work in coordinating with Shentel on project delivery, reporting to the Broadband Authority, and preparing status reports to VATI and the public at large. The County Finance staff will also serve as the financial review and oversight team of the VATI grants. Brian Carter, Finance Director, has extensive experience in grant administration as well as Mr. Sandy to help provide the financial and auditing review and oversight needed for the project.

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In addition, the County has access to the services of Andrew Cohill of Design Nine, Inc., Thompson & Litton and Blue Ridge Advisory Group to provide the County additional broadband and project management assistance as needed. The County will also require the services of the County Attorney to review, draft, and approve documents related to the partnership between Franklin County and Shentel to implement the project.

Name

Title

Project Role

Franklin County

Steven Sandy

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County of Franklin

Franklin County Shentel Project

Project Manager/ Assistant County Administrator

County's overall point of contact and contract administrator

Mike Lockaby

County Attorney

Internal legal assistance

John Harrison

IT Director

Information technology specialist for Franklin County

Christopher Whitlow

County Administrator

Project Oversight

Brian Carter

Finance Director

Project funding, reporting

Leland Mitchell

Broadband Authority Chairman

Regulatory Oversight

Eric Schmidt

GIS Coordinator

Mapping/Data Assistance

Bill Hunter

Roanoke County IT Director

Information technology specialist for Roanoke County

Co-Applicant management team and experience

Shentel is one of the largest regional internet service providers in the Mid-Atlantic. They have a 119-year operating history and an extensive fiber network that spans more than 7,000 miles and supports its rapidly growing and multi-

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faceted broadband services in Virginia, West Virginia, Maryland, Kentucky, and Pennsylvania. With broadband service delivered to more than 58,000 homes in the past 12 months and nearly 600 miles of fiber laid so far in 2021, Shentel has the clear and tangible financial and operational experience to not only construct, but also operate and manage the project proposed in this grant application.

Shentel is currently operating and expanding its legacy cable markets, while also managing two highly successful broadband initiatives in its GloFiber FTTH service and its Beam fixed wireless service. Launched in 2019, GloFiber is an XGS-PON FTTH network that is currently live and serving customers with symmetrical multi-gigabit speeds in Harrisonburg, Winchester, Front Royal, Staunton, Lynchburg, Roanoke, and Salem, with engineering and construction underway in several more markets in Virginia, West Virginia, Maryland, and Pennsylvania.

Meanwhile, Shentel launched its Beam fixed wireless service in 2020 and now has service live in Albemarle, Augusta, Buckingham, Clarke, Frederick, Goochland, Greene, Louisa, Orange, Nelson, Page, Rockingham, Shenandoah Counties in VA and Barbour and Randolph Counties in WV. This service is targeted to bring broadband service to unserved homes in rural, hard to reach portions of these states and currently provides that service to thousands of previously unserved homes.

The Shentel team that will manage this project is as follows:

17. Project Budget and Cost Appropriateness

Budget: Applicants must provide a detailed budget that outlines how the grant funds will be utilized, including an itemization of equipment, construction costs, and a justification of proposed expenses. If designating more than one service area in a single application, each service area must have delineated budget information. For wireless projects, please include delineated budget information by each tower. Expenses should be substantiated by clear cost estimates. Include copies of vendor quotes or documented cost estimates supporting the proposed budget. Label Attachments: Attachment 12 – Derivation of Costs; Attachment 13 - Documentation of Supporting Cost Estimates. (up to 10 points)

Answer:

As noted in questions 11 and 16, Shentel is a 119-year old telecommunications company that has served Franklin, Campbell, and Bedford, and Counties for many years. Shentel is currently laying hundreds of miles of fiber per year to support its expanding Cable, FTTH, and Fixed Wireless services. As shown in attachments 12 and 13, all cost estimates are based off of a long and active history in both the wireless and wireline industry. While attachment 12 shows a high level roll up of costs in alignment with DHCD guidance, attachment 13 provides detailed cost breakouts and supporting documentation from various vendor relationships for both wireline and wireless services.

18. The cost benefit index is comprised of state cost per unit passed. Individual cost benefit scores are calculated and averaged together to create a point scale for a composite score. Provide the following:
- Total VATI funding request

- Number of serviceable units
(up to 125 points)

Answer:

- Total VATI funding request

The total VATI funding request is \$9,832,456.

- Number of serviceable units

The total number of serviceable unites covered is 3508.

19.

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Commonwealth Priorities (Up to 40 points)

Additional points will be awarded to proposed projects that reflect Commonwealth priorities. If applicable, describe the following:

- a. Businesses, community anchors, or other passings in the proposed project area that will have a significant impact on the locality or region because of access to broadband.
- b. Unique partnerships involved in the proposed project. Examples include electric utilities, universities, and federal/state agencies.
- c. Digital equity efforts to ensure low to moderate income households in the proposed project area will have affordable access to speeds at or above 25/3 mbps.

Answer:

a. The availability of broadband for residential customers is a major factor for people moving to the County and/or accepting employment. The County recognizes the need for increased residential broadband access and its impact on local businesses. The County is taking part in a housing study which has identified broadband as a major factor in future development projects. Within the Commonwealth Connect report, Franklin County Broadband Authority is listed as a regional authority, having prepared the universal broadband plan. Upon funding, the project is ready for implementation. The project expands upon previous funding efforts that served the Summit View Business Park, estimated by the Chumura economic impact report to employ 1,562 by businesses within the park and a total of 2,221 direct, indirect, and induced jobs due to the park and spur additional private investment. Two businesses have already located in the Park and a 3rd has committed to construction in 2021. Expansion of broadband services will attract more companies and further economic development and housing initiatives in the County. New fiber will advance economic and community development, as prescribed in the County's Comprehensive Plan and Broadband Plan.

Access to quality broadband internet services is particularly important in the rural areas of Franklin County as it is a significant economic development tool for small businesses, farmers and ranchers, and community anchors, driving innovation, cost reductions, and market expansion. Broadband also fosters economic development and community services by enabling telecommuting, e-education, and telemedicine in these areas, an even more pronounced reality during the pandemic. Community anchors like Healing Strides of VA (HSVA) that is a non-profit that has several professional staff, certified instructors, trained volunteers, and a herd of 20+ horses to provide mental health counseling and therapy. HSVA is the only Premier Accredited Center (PAC) with the Professional Association of Therapeutic Riding Int'l (PATH) in the Roanoke Valley. They are an Equine Assisted Activities and Therapy Program (EAAT) which includes Therapeutic Riding, Equine Assisted Learning (EAL), Equine Assisted Psychotherapy (EAP), Hippotherapy, and several other programs related to equine therapies. Carol Young, CEO expressed her need for broadband, the business of 24 employees and work with tutoring some of our students, who all need internet services. They also offer several Professional Development Leadership Courses and ask that all the attendees of these courses use internet to access their test data. Currently, everyone using the facility must use their own data as their current broadband is inadequate. She also expressed that all of the training and development opportunities will only be enhanced by having better broadband.

Business startups, small rural businesses need quality broadband to flourish in today's economy. Chaos Mountain Brewing is an example that started in 2013 and have been open for business for the last seven years. This business has quickly grown into a popular craft brewery. Joseph Hallock, Owner, points out that sixteen years later and there is still no internet service available other than satellite, not even DSL. Satellite internet is slow and unreliable, and we have had to spend time and money to make up for its shortcomings. As a small business in the County they recognize the importance of broadband. Such improvements will increase educational opportunities and economic growth in the area.

The VA Cooperative Extension Office in the County points out that the farming community needs to be able to access a lot of data through the internet. The Broadband infrastructure in the County at its current time is poor. A lot of farming community has in previous years relied upon the local libraries to use the free internet service, but with COVID those resources have not been readily available to our community. The ability to have on-farm reliable internet will prevent farmers in Franklin County from being left behind in the advances in technology used on the farm. A lot of the equipment used on farms needs internet access to work correctly and send data from one location to another, take part in

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educational programming that continues to be virtual. The use of on-farm real-time monitoring systems for animal health, reproduction and milking data is slowed because the lack of internet available in the areas in Franklin County where these farms are located. The use of home/farm security needs is a need on farms to monitor all aspects of the farming business and can help prevent accidents or save a life, but when internet is not available farmers cannot effectively use these types of systems.

b. Franklin County has developed partnerships throughout the past several years of increased broadband development with Mid-Atlantic Broadband, VDOT, Roanoke Valley Broadband Authority, Western VA Water Authority and also American Electric Power to help facilitate the development and advancement of broadband in Franklin County. This has been evident in the development of the Summit View Business Park but also in the previously funded broadband projects with both Shentel and Briscnet. In addition, the County has worked with the school system, Ferrum College, The Franklin Center, libraries to help fund more technology dependent programming for students, workforce development and patrons. In addition, partnerships have been created with Carilion Clinics and Tri-Area Community Health to facilitate the use of tele-health and tele-medicine initiatives in the Franklin County.

c. In addition to the digital literacy efforts discussed above, Shentel and the FCBA have made efforts to make broadband available to low to moderate income households. Shentel has done this through low rate plans designed to provide service to these households at an affordable rate and their participation in the FCC Broadband Benefit Program. The County has also worked with the FC Public Schools to assist low to moderate income families with installation/setup costs to connect to broadband. The County, FCPS and Ferrum College also continue to expand on previous efforts to create public wi-fi hotspots in school parking lots and other public areas for households that may not be able to receive or afford broadband services at their home.

20. Additional Information

Provide the two most recent Form 477 submitted to the FCC, or equivalent, as well as point, polygon, and, for wireless providers, RSSI shapefiles for the project area **in .zip file form**. With attachments 17 through 20, attach any other information that the applicant desires to include. Applicants are limited to four additional attachments.

Label Additional Attachments as:

a. Attachment 14 – Two most recent Form 477 submitted to the FCC or equivalent

b. Attachment 15 - Point and Polygon shapefiles, in.zip file form, showing proposed passings and project area

c. Attachment 16 - For wireless applicants: shapefiles, in .zip file form, indicating RSSI projections in the application area

d. Attachment 17 – XXXXXXXX

e. Attachment 18 – XXXXXXXX

f. Attachment 19 – XXXXXXXX

g. Attachment 20 – XXXXXXXX

Answer:

Additional attachments have been added to the attachments tab.

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Attachments:

Map(s) of project area, including proposed infrastructure

Attachment1914202152803.pdf

Documentation of Federal Funding (CAF/ACAM/USDA/RDOF, etc...) in and/or near proposed project area.

Attachment2913202125540.pdf

RDOF Awarded Areas included in VATI Application (Use template provided)

Attachment3913202125309.pdf

Documentation that proposed project area is unserved based on VATI criteria

Attachment4913202161249.pdf

Passings Form (Use template provided)

Attachment5914202123903.pdf

Propagation Map if Wireless Project

Attachment6913202135558.pdf

Timeline/Project Management Plan

Attachment7913202143819.pdf

MOU/MOA between applicant/co-applicant (can be in draft form)

Attachment8913202143604.pdf

Funding Sources Table (Use template provided)

Attachment9914202150315.pdf

Documentation of Match Funding

Attachment10910202153922.pdf

Letters of Support

Attachment11914202143423.pdf

Application to DHCD Submitted through CAMS

County of Franklin

Franklin County Shentel Project

Derivation of Cost/Project Budget (Use template provided)

Attachment12914202152449.pdf

Documentation of Supporting Cost Estimates

Attachment13914202124529.pdf

Two most recent Form 477 submitted to the FCC or equivalent

Attachment14913202124846.pdf

Point and Polygon shapefiles, in.zip file form, showing proposed passings and project area

FOIA914202124756.pdf

For wireless applicants: shapefiles, in .zip file form, indicating RSSI projections in the application area

FOIA914202124801.pdf

Optional

Attachment159102021110842.pdf

Optional

Attachment169102021102254.pdf

Optional

Attachment17910202145206.pdf

Optional

Attachment18914202145945.pdf

Franklin County

VATI 2022 Application

Shentel

Attachment 1

Map(s) of Project Area, Including
Proposed Infrastructure



Franklin County
A Natural Setting for Opportunity

Franklin County Broadband Expansion

Shentel VATI 2022



Legend

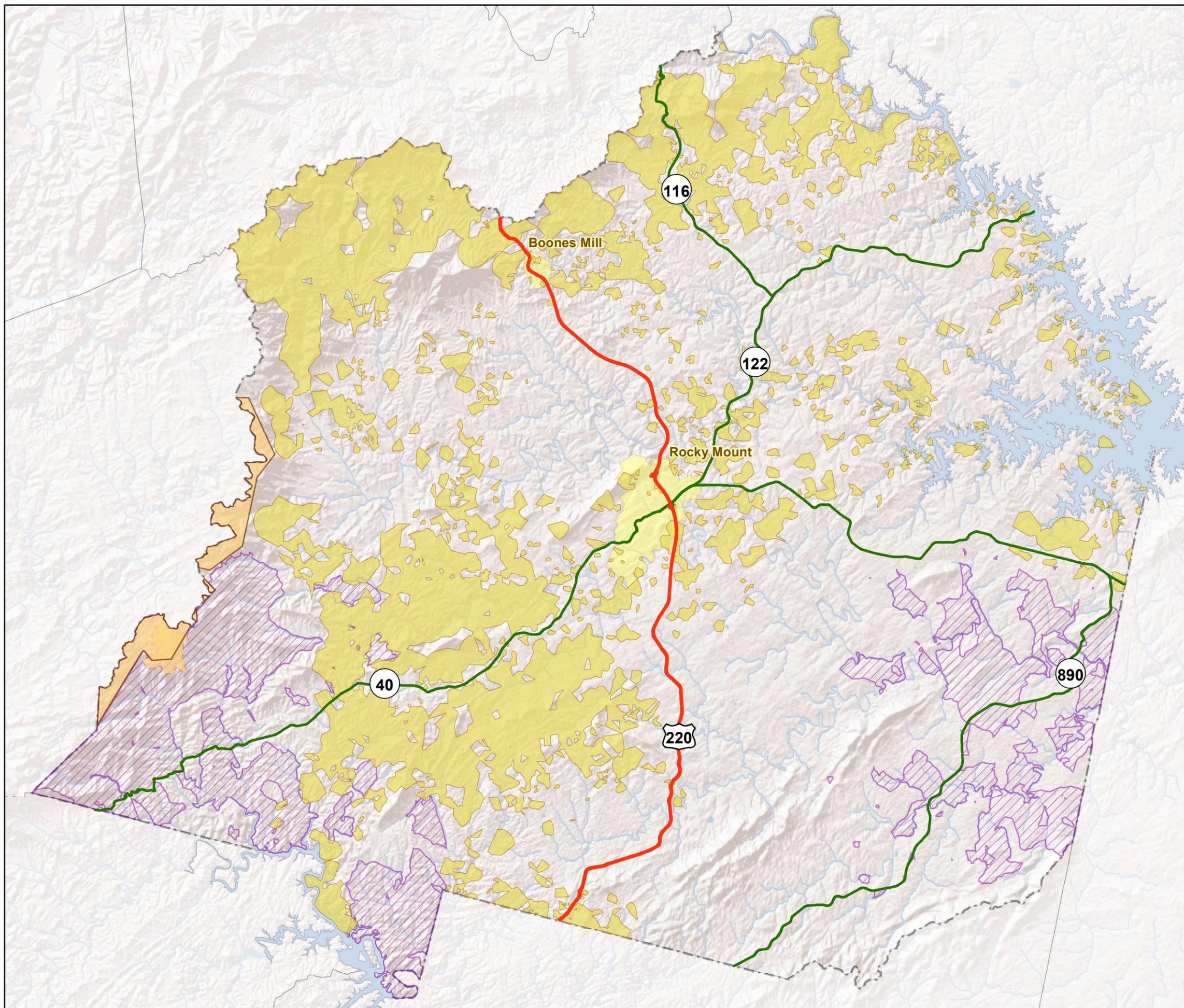
- Shentel Project Boundary
- Riverstreet (Wilkes TMC) RDOF Award Areas
- Citizens Telephone - CAF2 Award
- Additional Citizens Telephone Coverage
- Franklin County
- Towns
- Water Features
- US Hwy
- State Hwy

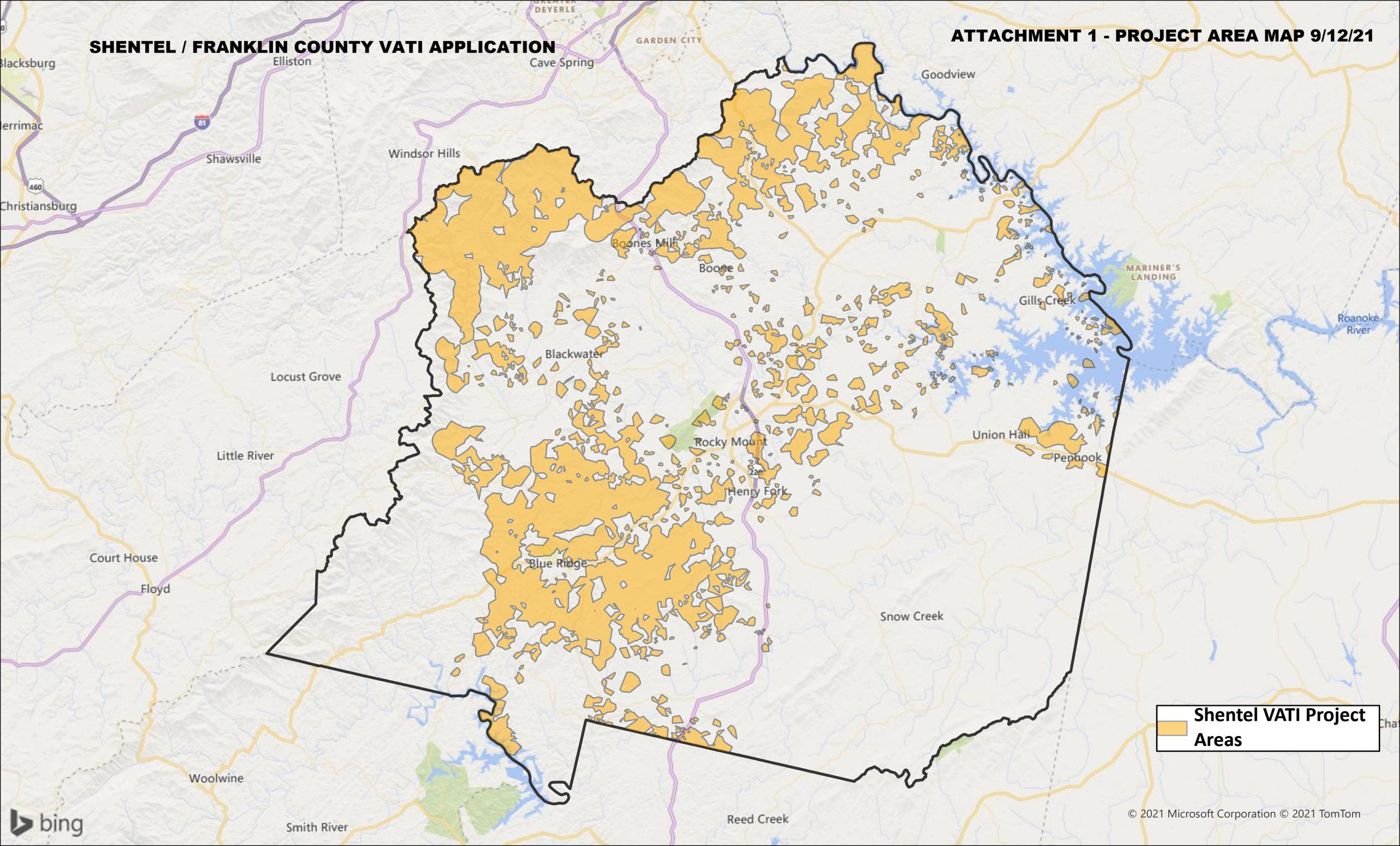
0 5 10 Mi



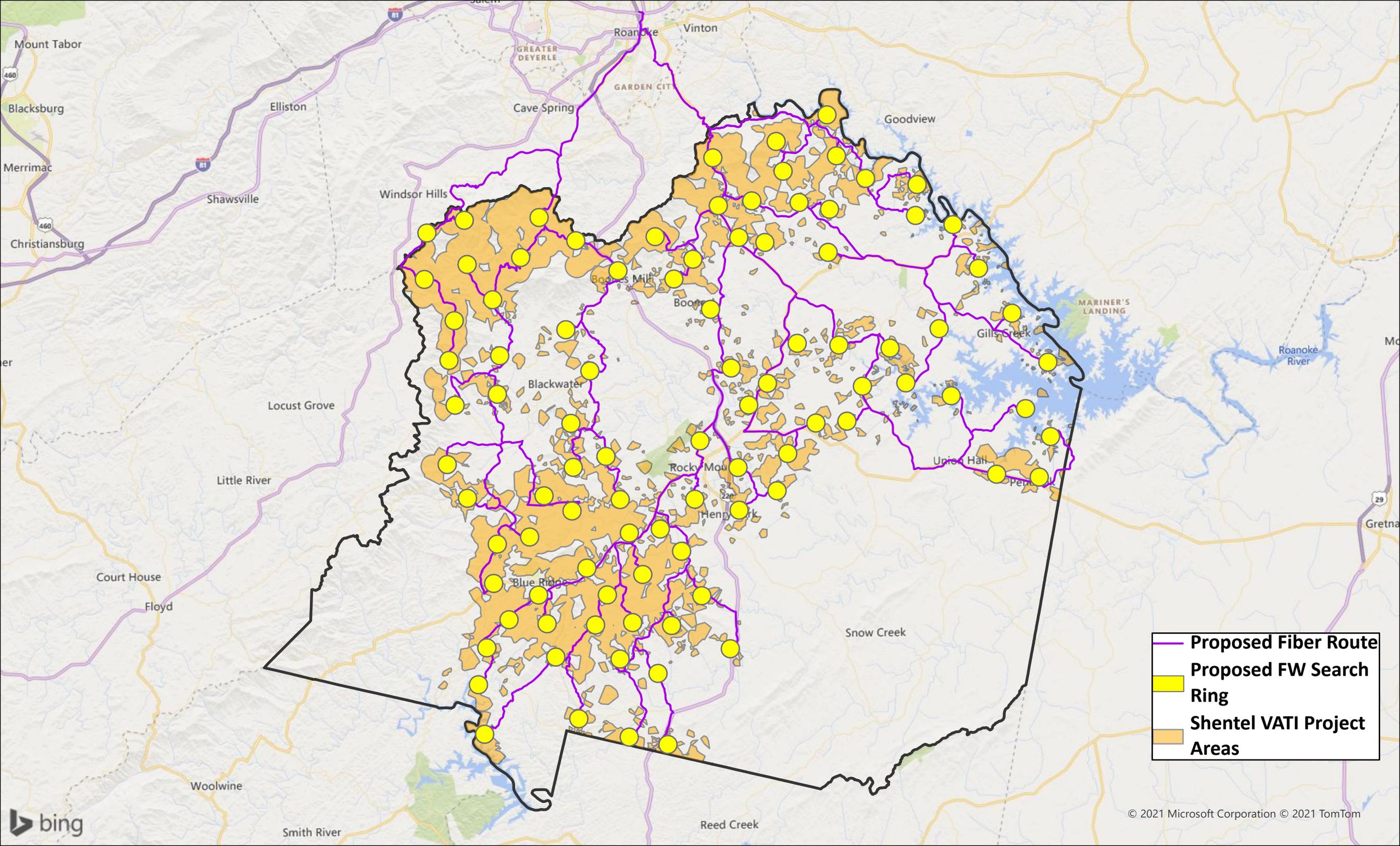
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Date: 9/13/2021





Shentel VATI Project Areas



Proposed Fiber Route
Proposed FW Search Ring
Shentel VATI Project Areas

Franklin County

VATI 2022 Application

Shentel

Attachment 2

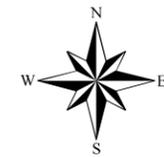
Documentation of Federal Funding
(CAF/ACAM/USDA/RDOF. etc....) in
and/or near proposed project area



Franklin County
A Natural Setting for Opportunity

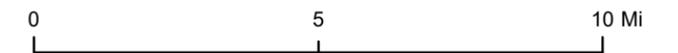
Franklin County Broadband Expansion

Federal Funding Awards for Broadband



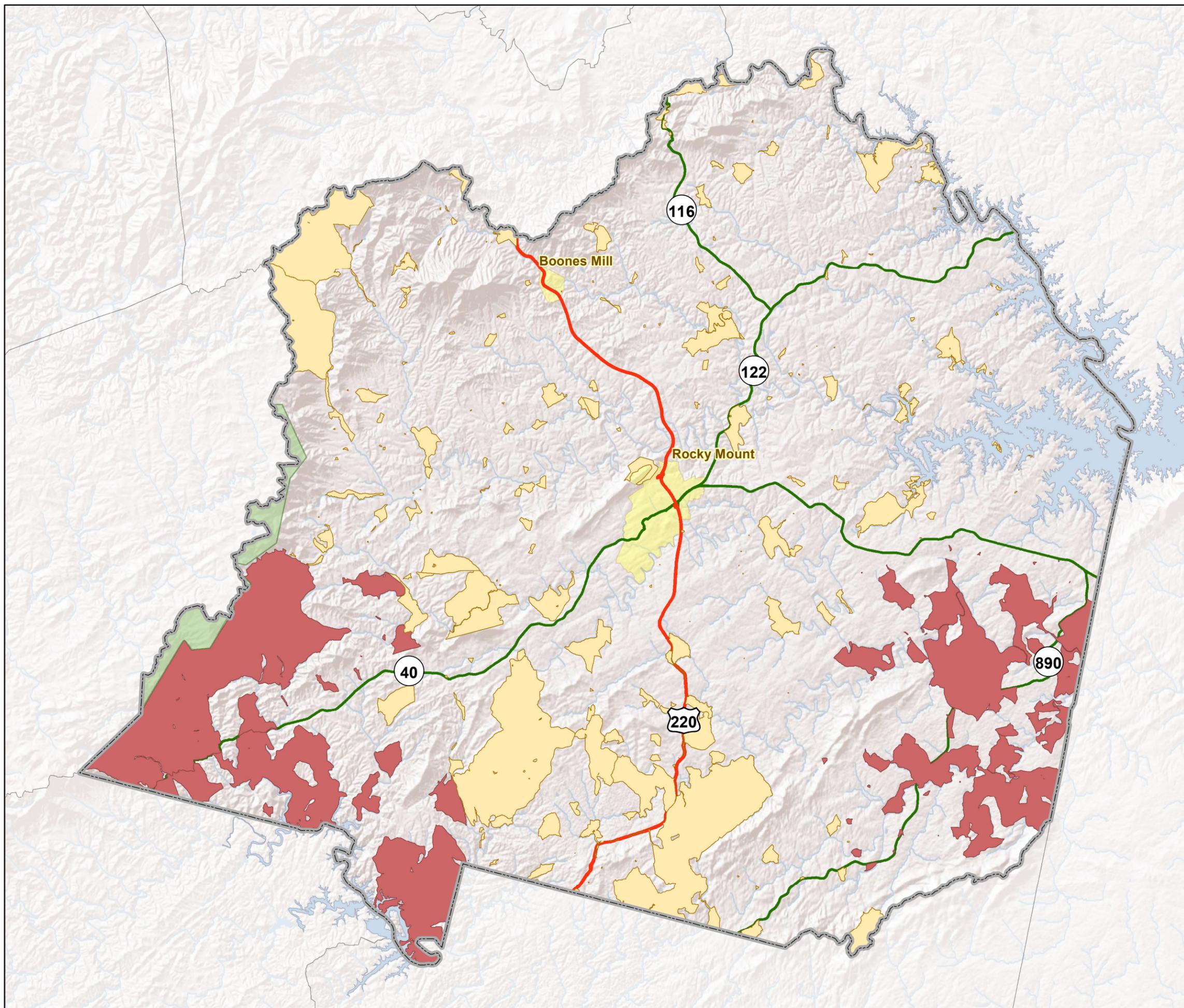
Legend

- RDOF-904: Wilkes Telephone Membership Corp.
- RDOF-904: Space Exploration Technologies Corp.
- CAF2 Award - Citizens Telephone Cooperative
- Franklin County
- Towns
- Water Features
- US Hwy
- State Hwy

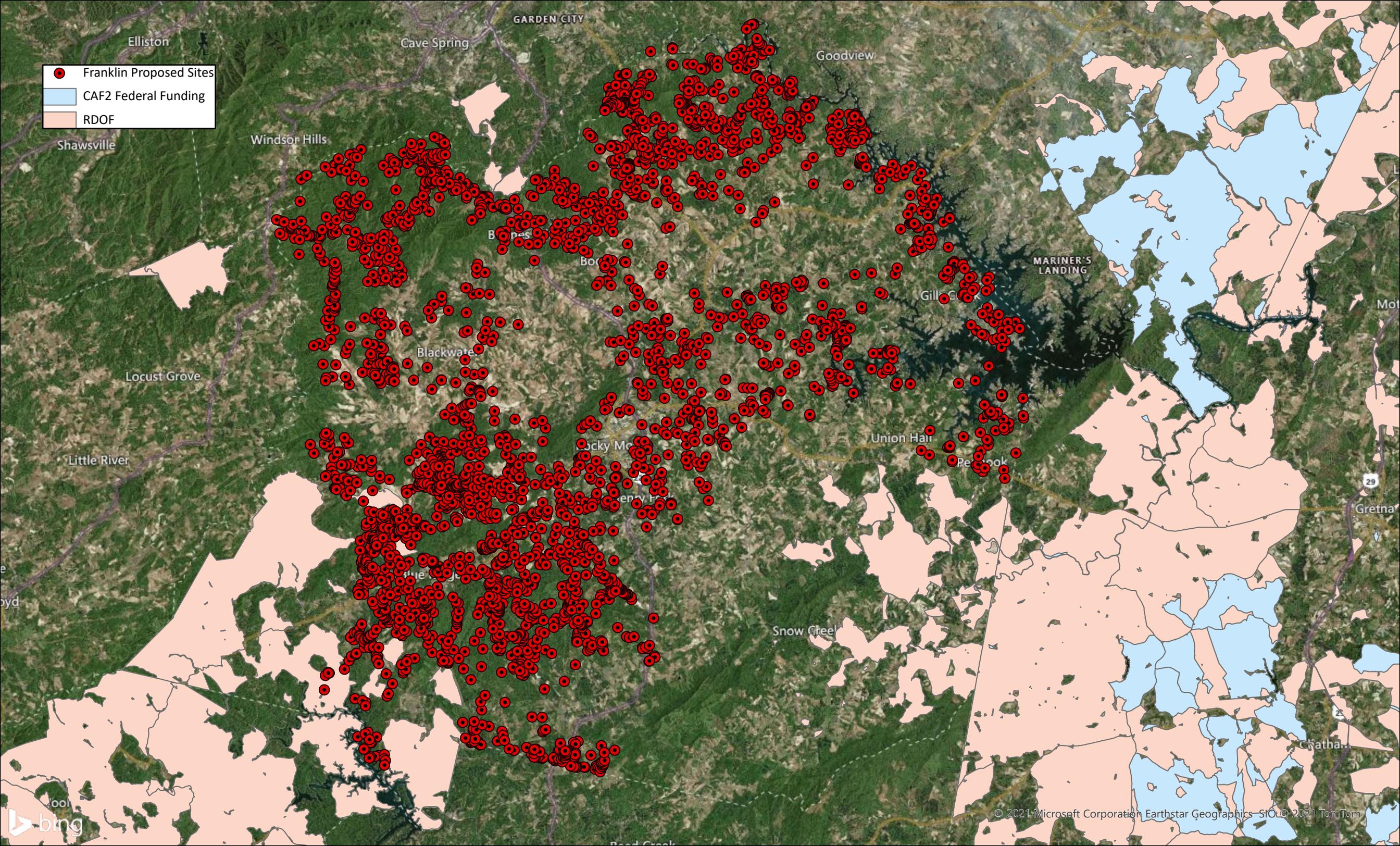


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Date: 9/10/2021



● Franklin Proposed Sites
CAF2 Federal Funding
RDOF



Franklin County

VATI 2022 Application

Shentel

Attachment 3

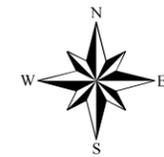
Documentation RDOF Awarded Area
in VATI Project Area, if needed



Franklin County
A Natural Setting for Opportunity

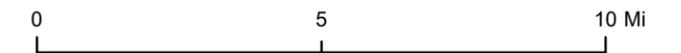
Franklin County Broadband Expansion

Federal Funding Awards for Broadband



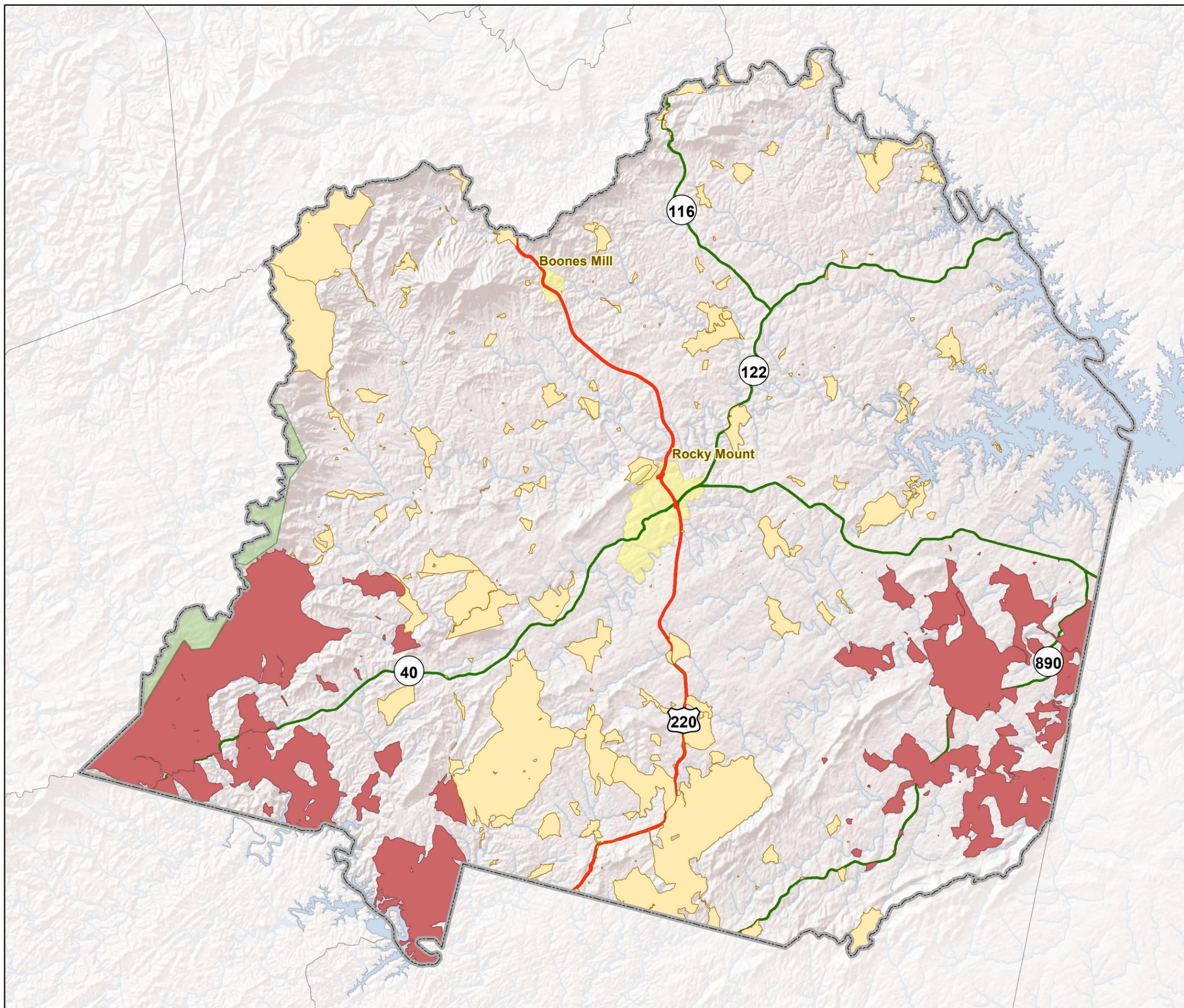
Legend

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- RDOF-904: Space Exploration Technologies Corp.
- CAF2 Award - Citizens Telephone Cooperative
- Franklin County
- Towns
- Water Features
- US Hwy
- State Hwy



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Date: 9/10/2021



**ATTACHMENT 3 – DOCUMENTATION OF RDOF AWARDED AREA INCLUDED IN
VATI APPLICATION**

Not applicable to this project.

Franklin County

VATI 2022 Application

Shentel

Attachment 4

Documentation that Proposed
Project Area is Unserved based on
VATI Criteria



ATTACHMENT – 4 Documentation of Unserved Area VATI Criteria

Shentel has defined its project area through an iterative and collaborative process of identifying unserved homes. The only homes included in Shentel's VATI application are believed to be unserved. As such, Shentel anticipates no overlap other than possible incidental overlap for two reasons. First, the process for identifying unserved is complicated and involves several different data sources as well as local knowledge and citizen feedback. As such, there are possible holes in the estimate that may lead to a small amount of overlap. Second, the nature of the wireless drop portion of Shentel's proposed project naturally leaves room for incidental overlap. Wireless technology is not as precise and controllable as wireline technology. Cell site location can be constrained by available infrastructure, such as utility poles, fiber connectivity, and utility power, as well as geography, terrain, and topology considerations. Because of these constraints, there may be situations where the only way to reach unserved locations is to place a site that has some incidental service overlap. Due to these considerations, Shentel has estimated a 5-10% overlap percentage.

Furthermore, Shentel is committed to continuing to minimize overlap throughout the life of this project. As the high-level design is refined and planned out in detail, there will be many opportunities to improve the accuracy of Shentel's wireless drop service. Specific cell sites will be determined based on existing search rings, and there is flexibility in this process to determine sites that will minimize overlap. Shentel may also use directional antennas to further target only unserved locations and avoid overlap. Finally, there may be opportunities to substitute wireless connections with wireline connections, eliminating overlap concerns. Shentel has gone through an extensive process to identify unserved addresses and worked with County partners to minimize overlap in keeping with VATI guidance. Shentel is furthermore committed to reasonably closing any gaps where previously unidentified overlap comes to light, and remaining below the allowable VATI overlap threshold.

Franklin County 2022VATI Grant National Broadband Availability (NTIA) County Overview

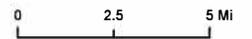


Legend

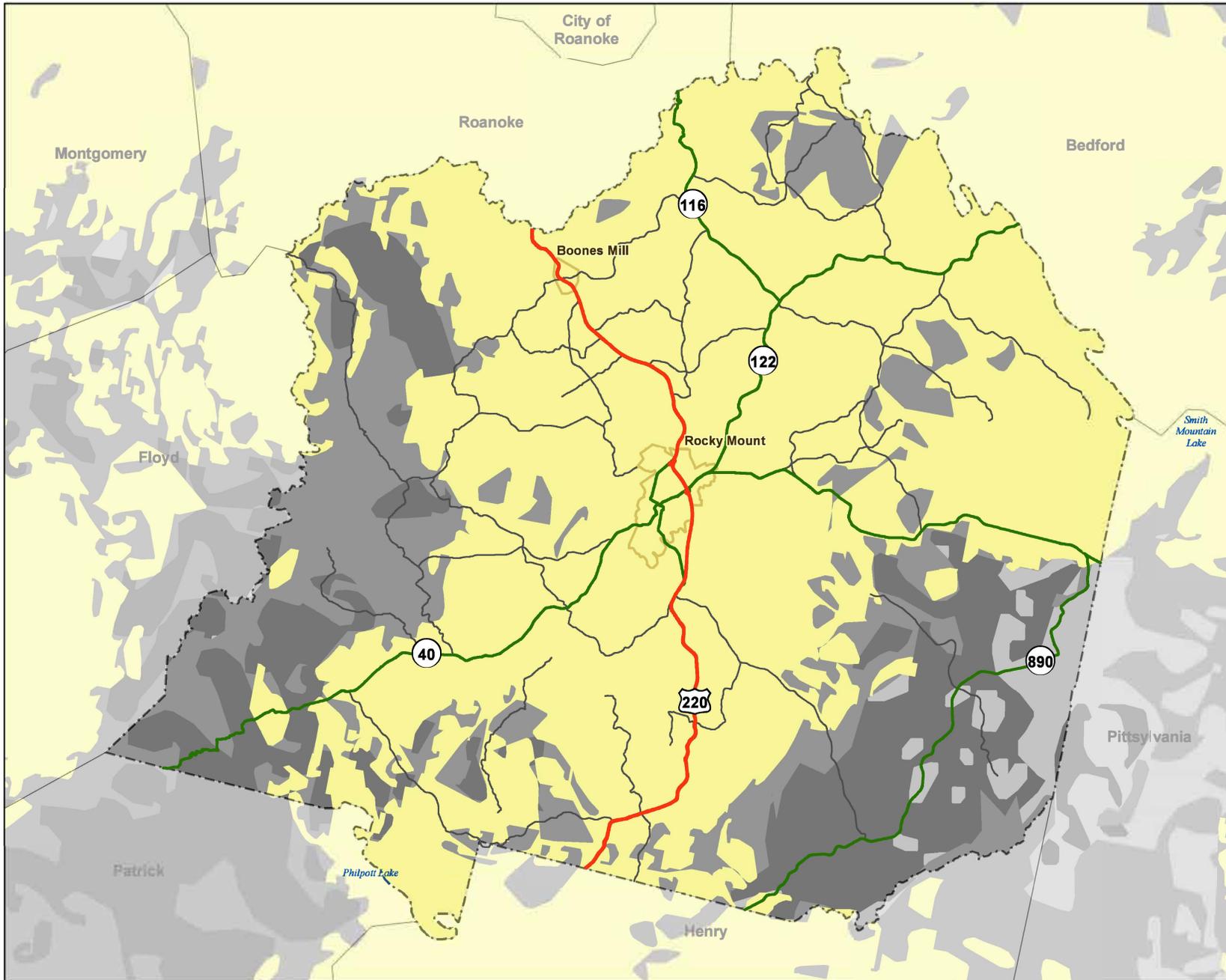
Typical Download Speed

- 0.2 - 1.5 Mbps
- 1.51 - 6 Mbps
- 6.1 - 10 Mbps
- 10.1 - 50 Mbps
- 50.1 - 1,000 Mbps
- No DL Speed Available

- Franklin County
- Surrounding Counties
- Water Features
- US Hwy
- State Hwy
- Primary Collector



The data layers provided herein were compiled from various sources within a geographic information system (GIS) for the primary use of Franklin County. The data provided herein are believed to be accurate but are provided for reference purposes only. These GIS data are in no way meant as a replacement for a legal survey, legal description, or standard due diligence. No guarantee, expressed or implied, is made regarding their accuracy, currency, adequacy, usefulness, or reliability. These data are provided 'as is' and neither Franklin County nor its employees shall be held responsible for their inappropriate use.

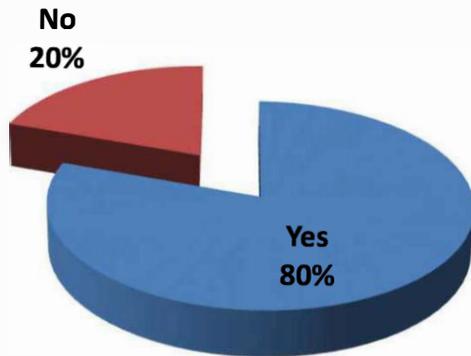


Franklin County Citizen's Survey

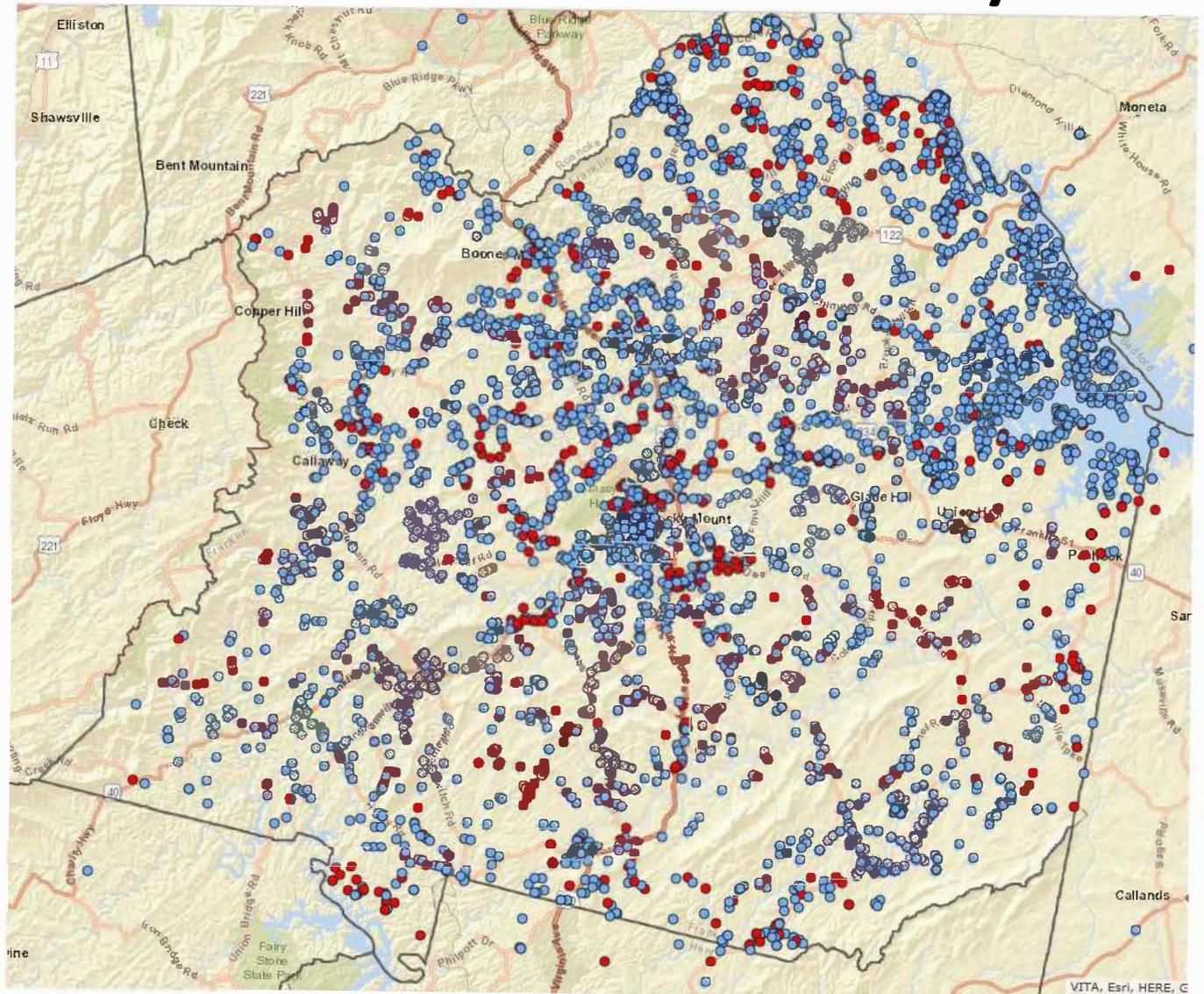
6258 Responses

99% +/- 1.39
based on occupied
housing units (23,248)

Do you have Internet
service at home?

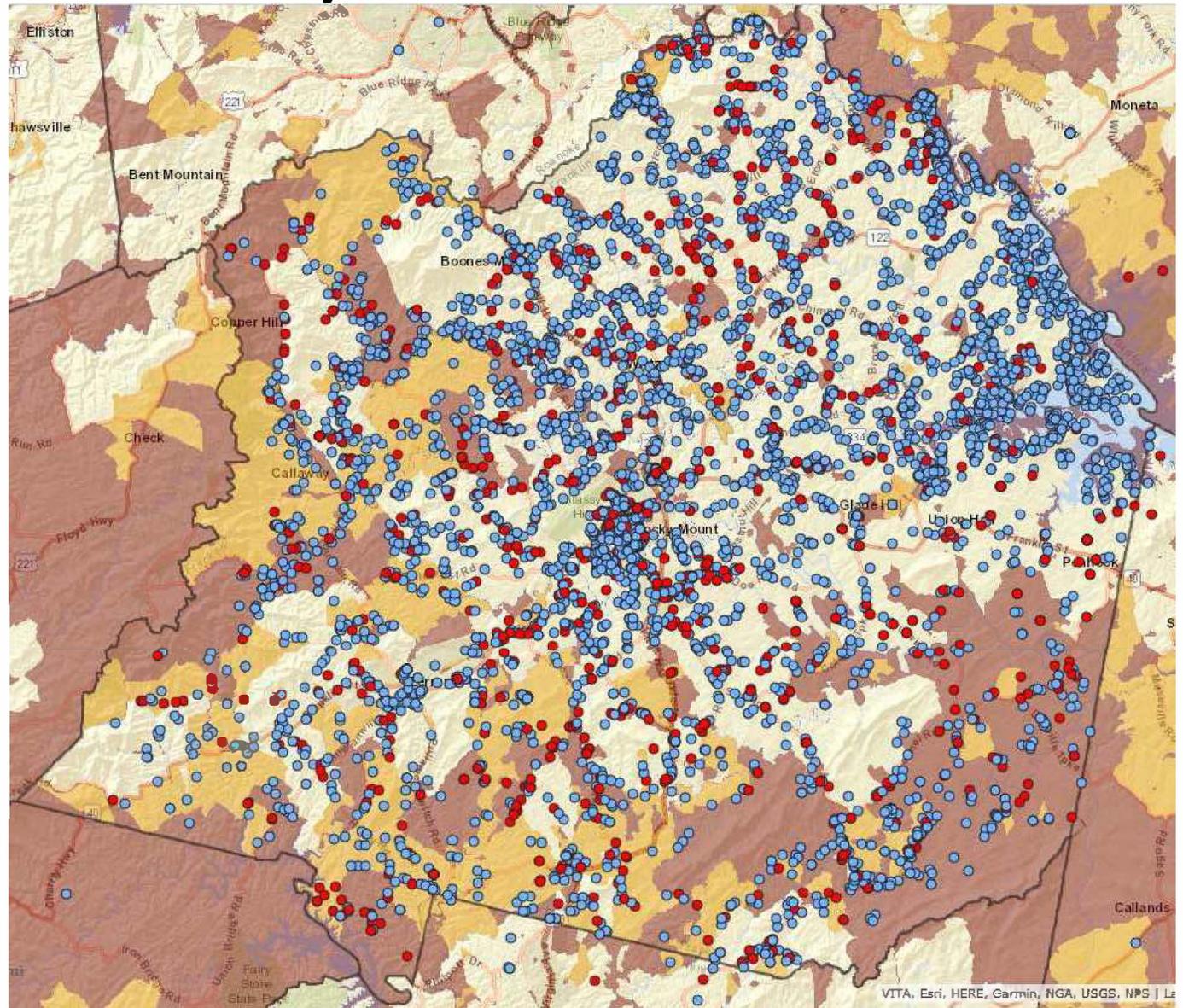


Over 90% of respondents feel
the Internet is important.



Franklin County Un/Underserved

- Unserved = Broadband speed below 10 Mbps Download speed
- Underserved = Broadband speed between 10 Mbps Download speed and 25 Mbps Upload speed



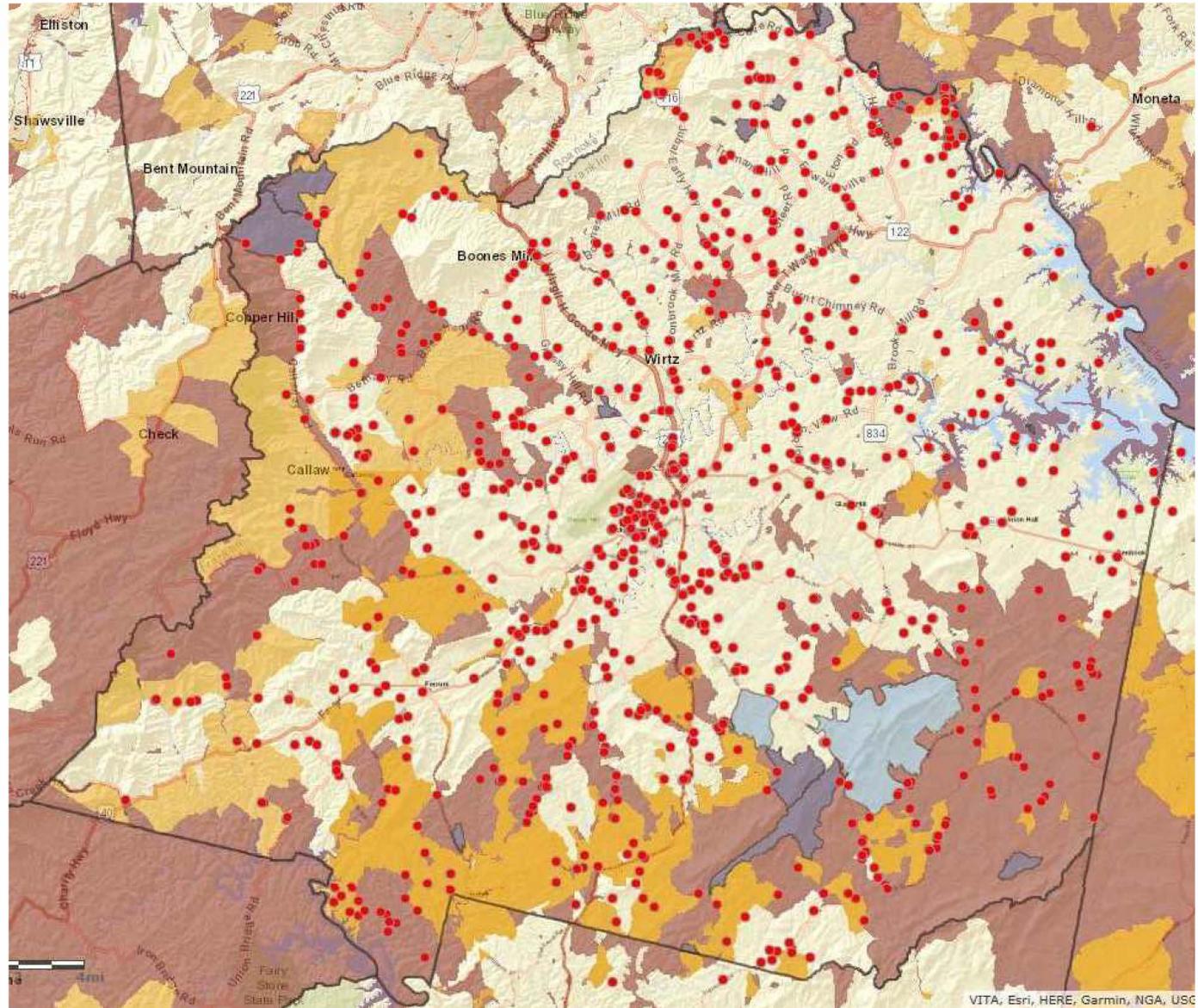
Franklin County Un/Underserved

Do you have Internet Service at Home?

● No.

● Unserved = Broadband speed below 10 Mbps Download speed

● Underserved = Broadband speed between 10 Mbps Download speed and 25 Mbps Upload speed



Franklin County

VATI 2022 Application

Shentel

Attachment 5

Passing's Form (Please use the
Template provided)



Franklin County
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2022 Virginia Telecommunication Initiative (VATI) Passing Form

Type of Passings	Total Number of Passings in the Project Area ¹	Passings in the Project Area, without Special Construction Costs Required ²	Passings with Special Construction Costs budgeted in the Application ³	Number of Passings with Speeds at 10/1 or below in Project Area ⁴
Residential	3,334	2,028	1,306	1,299
Businesses (non-home based)	121	121	0	0
Businesses (home-based)	0	0	0	0
Community Anchors	42	42	0	0
Non-residential	11	11	0	0
Total	3,508	2,202	1,306	1,299

Note: The Total Number of Passings **MUST** be equal to the Residential, Business (non-home based), Non-residential and Community Anchors sum.

Note: Do not include passings in RDOF awarded areas that were awarded to the co-applicant; these passings should be included in the RDOF Passings Form. Passings included in this application in RDOF awarded areas that were not awarded to the co-applicant, unless successfully challenged, are considered unserved and should be counted as passings in this form.

¹ The total number of structures in the project area that can receive service. See definition of passing below for more detail.

² The number of structures in the project area that will not require special construction costs to provide service to. These passings fall within the broadband provider's standard service connection drop length and do not require nonstandard equipment or any additional fees above normal service connection fees required to provide broadband access to a premise.

³ The number of structures in the project area with all construction costs budgeted in the application. These passings will not require any additional special construction costs beyond those budgeted for in the VATI application.

⁴ The number of structures in the project area that do not have access to internet at speeds of at least 10 mbps download and 1mbps upload.

Definitions

Passing – any structure that can receive service. Multi-unit structures may be counted as more than 1 passing, provided individual connections and account are planned at that structure.

Business – An organization or entity that provides goods or services in order to generate profit. Businesses based in residential homes can count if they are a registered business (BPOL, LLC, etc.).

Community Anchor - schools, libraries, medical and health care providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and agencies that provide outreach, access, equipment, and support services to facilitate greater use of broadband service by vulnerable populations, including low-income, unemployed, and the aged.

Non-Residential Passing – places of worship, federal, state, or local facilities or other potential customers that are neither a residence, business or a community anchor as defined above.

Franklin County

VATI 2022 Application

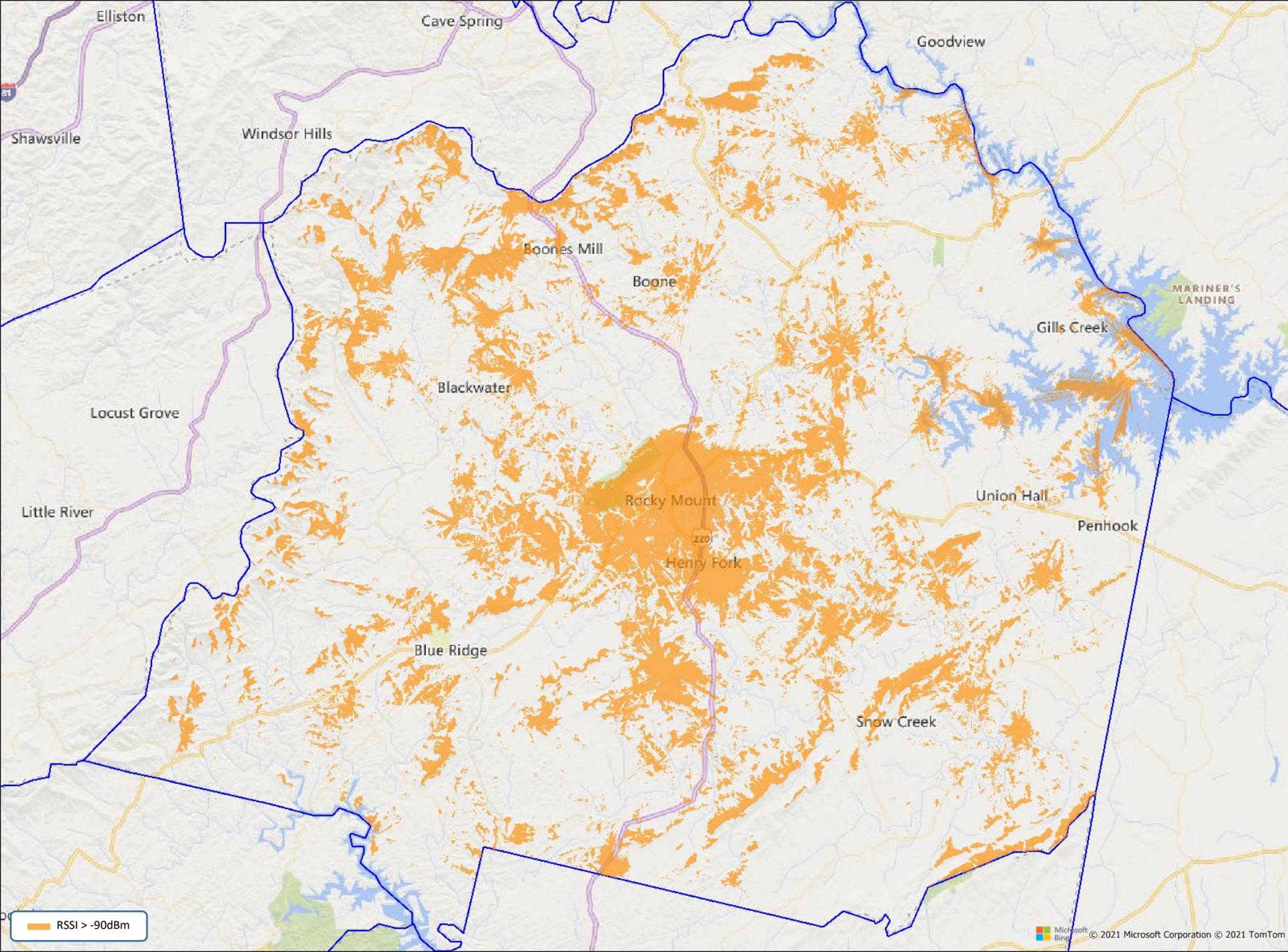
Shentel

Attachment 6

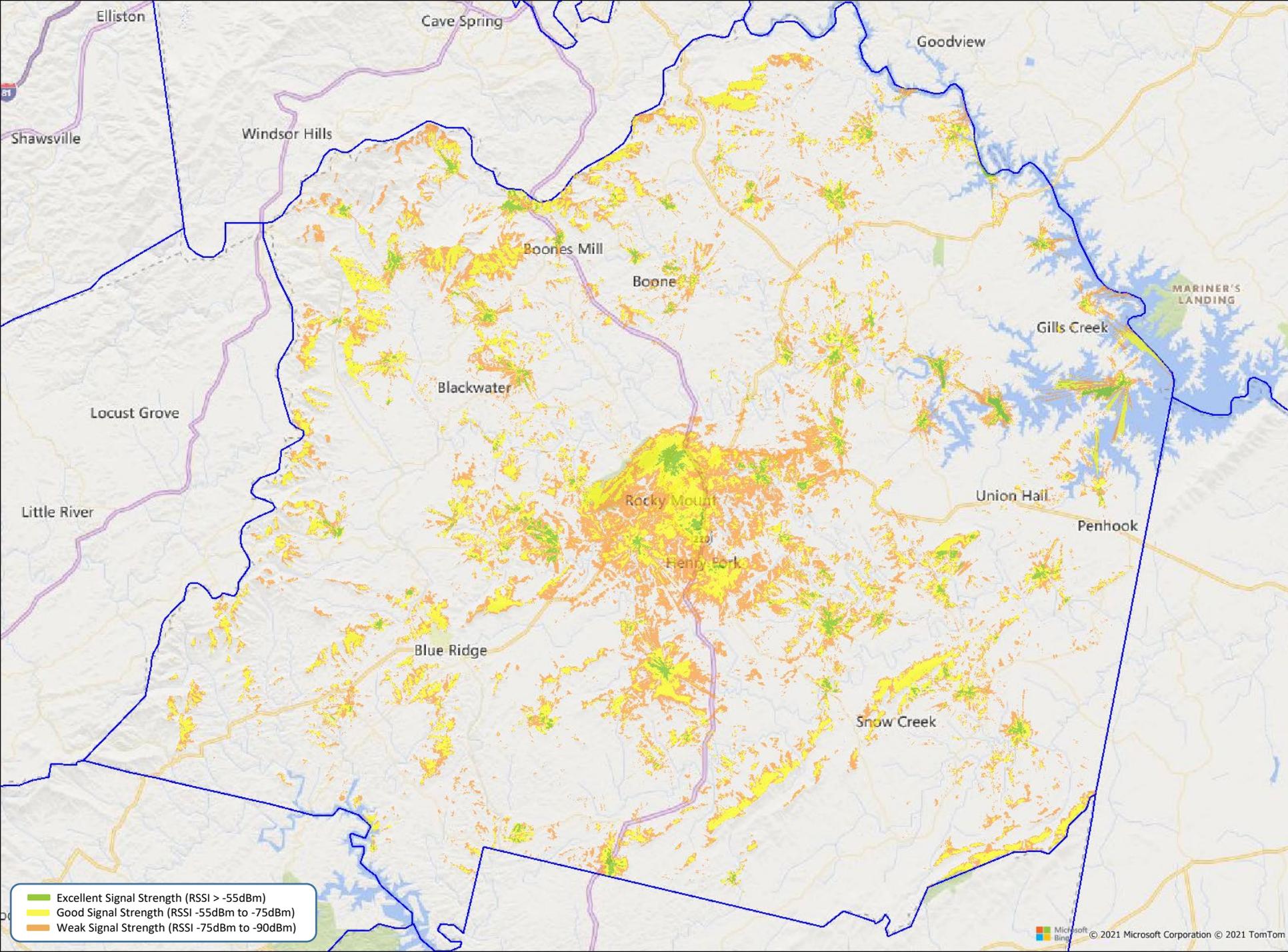
Propagation Map and Heat Map if
Wireless Project



Franklin County
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RSSI > -90dBm



Elliston
Cave Spring
Goodview
Shawsville
Windsor Hills
Boones Mill
Boone
Gills Creek
MARINER'S LANDING
Blackwater
Locust Grove
Rocky Mount
Union Hall
Penhook
Little River
Henry Fork
Blue Ridge
Snow Creek

- Excellent Signal Strength (RSSI > -55dBm)
- Good Signal Strength (RSSI -55dBm to -75dBm)
- Weak Signal Strength (RSSI -75dBm to -90dBm)

Franklin County

VATI 2022 Application

Shentel

Attachment 7

Timeline/Project Management Plan



Shentel Attachment 7 – Project Timeline

ATTACHMENT 7 (Question 11 Project Readiness)

Project Timeline																								
Month 1 = Contract Award Notification and Contract Fully Executed																								
Project Deadline = December, 2024 (24 months)																								
Hybrid Broadband (includes FTTH and Fixed Wireless)																								
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24
Performance Milestones	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
Field Engineering - Phased	█	█	█	█	█																			
Design Engineering - Phased			█	█	█	█	█																	
Search Ring Release - Phased				█	█	█	█	█	█															
Site Acquisition - Phased					█	█	█	█	█	█	█	█	█	█	█	█	█	█	█					
Permitting - Phased						█	█	█	█	█	█	█	█	█	█	█	█	█	█	█				
Final Project Review - Phased							█	█	█	█	█	█	█	█	█	█	█	█	█	█				
Construction - Phased								█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
Customer Installation Commencement - Phased																█	█	█	█	█	█	█	█	
Project Close-out - Phased																	█	█	█	█	█	█	█	█
																		Target Completion						Project Deadline

Detailed description of each of the aforementioned Performance Milestones for both Fiber to the Home and Fixed Wireless technologies are as follows:

Performance Milestones – Fiber to the Home

Field Engineering – Phased

- Outside Plant:
 - Shentel shall complete a full review of the planned fiber route to determine feasibility, costs, and challenges for construction. This review shall consist of Shentel personnel visually inspecting the entire planned fiber route. Shentel typically follows utility routes

Shentel Attachment 7 – Project Timeline

such as power or telephone, with those utilities for new pole attachments when there is not existing Shentel attachment to allow overlash.

- Shentel shall make a determination to go underground if the utility routes are deemed unfavorable or contain challenges that would result in high costs to construct.
- Shentel shall collect all pole information and route information and prepare the proper permits to pole owners and VDOT.

Design Engineering – Phased

- Outside Plant:
 - Shentel shall complete a detailed Engineering Package that includes the entire defined fiber build route, as well as a complete list of all required materials to complete the fiber build.
 - Engineering Package shall consist of geospatial drawings of the physical route (aerial versus buried), list all physical structures and other possible obstructions, provide required materials and their physical placement, and note key requirements that construction is required to follow to complete the project.
- Inside Plant:
 - Shentel shall complete a full design and procure all required equipment and ancillary hardware to support all planned services.

Permitting – Phased

- Outside Plant:
 - Shentel shall permit all utility pole owners for any overlash or new pole attachments.
 - For any new permitted utility pole that is located on private property, Shentel shall follow the Virginia and Federal code that would allow Shentel to utilize existing like-kind utility easements. Shentel shall engage the County to aid in any dispute that would arise from a landowner denying Shentel access to utility easements.
 - Shentel shall submit all other permits such as city, town, railroad, or VMRC permits as required.

Construction – Phased

- Outside Plant:
 - Shentel shall complete all construction requirements as outlined and defined in the Engineering Package once all permits have been approved.
 - Required changes during construction shall be communicated and approved before construction can be completed.

Shentel Attachment 7 – Project Timeline

- Shentel shall complete end-to-end fiber characterization and testing of fiber to determine if fiber passes all defined criteria. Any noted problems are corrected at the time of testing.
- Inside Plant:
 - Shentel shall configure, deploy, and install all equipment and ancillary hardware.
 - Shentel shall complete end-to-end testing and certification to validate the service.

Customer Installation Commencement – Phased

- Operations:
 - Release of addresses to sales database
 - Shentel shall complete the installation, test, and turn-up of all customer CPE (Customer Premise Equipment) at the home/business to support the service.

Project Close-Out – Phased

- Shentel shall complete a full review of the completed construction against the Engineering Package to verify that all requirements have been completed.
- Shentel shall complete a full review of all received equipment and ancillary hardware to complete verify that all materials have been received and placed into service.
- Shentel shall complete a full review of all vendor invoices against their completed work and materials to verify billing accuracy.
- Shentel shall complete all financial true-ups and closeouts to complete the project.

Performance Milestones – Fixed Wireless

Field Engineering – Phased

- Reconfirm previous analysis of unserved or underserved homes
- Competitive analysis of other providers

Design Engineering – Phased

- Prediction modelling using InfoVista Planet platform
- Targeted coverage review/analysis

Shentel Attachment 7 – Project Timeline

- Site configuration – macro vs. small cell
- Prediction and analysis of home counts

Search Ring Release – Phased

- Creation of designated search ring area

Site Acquisition – Phased

- Property Acquisition
- Prediction modelling using InfoVisto Planet platform of specific site candidates
- Regulatory Review/Title Review
- Lease/Easement acquired
- Construction Drawings
- Structural Analysis Review
- Environmental Review

Permitting – Phased

- Zoning/Permitting with jurisdiction
- Land Use Permit filing with VDOT

Final Project Review – Phased

- Notice to proceed issued
- Materials and equipment order finalized

Construction – Phased

- Civil construction (includes backhaul, power and BTS set)
- Tower construction
- Integration of equipment/activation of site

Customer Installation Commencement – Phased

- Release of addresses to sales database

Shentel Attachment 7 – Project Timeline

- CPE (Customer Premise Equipment) installation at home/business

Project Close-out – Phased

- Shentel shall complete a full review of the completed construction against the Engineering Package to verify that all requirements have been completed.
- Shentel shall complete a full review of all received equipment and ancillary hardware to complete verify that all materials have been received and placed into service.
- Shentel shall complete a full review of all vendor invoices against their completed work and materials to verify billing accuracy.
- Shentel shall complete all financial true-ups and closeouts to complete the project.

Franklin County

VATI 2022 Application

Shentel

Attachment 8

MOU/MOA between Applicant/Co-Applicant (can be in draft form)



Franklin County
A Natural Setting for Opportunity

**MEMORANDUM OF UNDERSTANDING
BETWEEN FRANKLIN COUNTY
BROADBAND AUTHORITY AND
SHENTEL FOR APPLYING FOR VIRGINIA
TELECOMMUNICATIONS INITIATIVE
FUNDING FOR PROVIDING BROADBAND
SERVICES**

I. PARTIES AND PURPOSE

This Memorandum of Understanding (MOU) is made and entered into this 13 day of September, 2021 by and between the Franklin County Broadband Authority (FCBA), a political subdivision of the Commonwealth of Virginia under the Wireless Service Authorities Act, hereinafter referred to as the "FCBA," and Shenandoah Telecommunications Company, hereinafter referred to as "Shentel," for the purpose of creating a partnership to prepare and submit an application for grant funding through the 2022 Virginia Telecommunications Initiative (VATI) the Virginia Department of Housing and Community Development in an effort to expand and improve broadband services to the citizens of Franklin County, Virginia.

The FCBA recognizes that in order to attain and maintain a high-quality level of broadband service to the citizens of Franklin County, a close working relationship with the private internet providers is desirable and will be made possible in large part through state and federal grant funding opportunities.

II. SCOPE OF WORK

The FCBA and Shentel desire to cooperatively work together to prepare and apply for grant funding through the 2022 VATI Funding Program managed by the Virginia DHCD to provide fiber and "small-cell" fixed wireless broadband service across the unserved areas of the County by extending their existing fiber network. The application for funding anticipates coverage to be made available to approximately 3,334 serviceable units (homes, lots and businesses) in the County that are currently unserved/underserved. Service is envisioned to be provided through the following infrastructure improvements:

Miles of fiber: 310

Small Cell Structures and Antennae: 120

FCBA and Shentel agree to provide the necessary funding to construct the projects above to deliver internet service to the homes/businesses/anchor institutions in these areas by providing minimum average internet speeds ranging from 50 Mbps/10 Mbps to 1 Gbps and meeting the requirements of American Rescue Plan Act (ARPA). The total cost of this project is estimated at \$24,555,000.

To obtain necessary project funding, the FCBA agrees to complete a grant funding application, with assistance from the FCBA consultant and Shentel through the DHCD 2022 VATI Funding Program requesting \$10,067,000 to be allocated to the above projects on or before September 14, 2021. The Franklin County Broadband Authority agrees to commit up to \$6,000,000 in local funding, primarily through use of ARPA funding. Shentel agrees to provide the remaining project funding to complete the above projects.

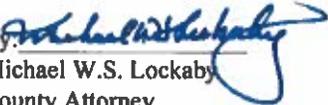
Both parties confirm that a detailed agreement shall be executed if funding is approved to outline all the obligations of the FCBA and Shentel and provide performance guarantees for service delivery and maintenance. If funding is approved from DHCD, both parties confirm and understand that Shentel will be responsible for providing the remaining of the funding necessary to complete the project for which DHCD funding was received. In addition, as part of the funding agreement, Shentel agrees to provide one buffer tube (12 strands) of fiber with each project and a thirty (30) year IRU (Indefeasible Right to Use) agreement for the FCBA subject to no up-front fees. However, a market rate annual maintenance fee may be required.

IN WITNESS WHEREOF, the parties have executed this Memorandum of Understanding on the day, month, and year indicated:

FOR FRANKLIN COUNTY BROADBAND AUTHORITY:

Approved as to Form:

FRANKLIN COUNTY
BROADBAND AUTHORITY,
VIRGINIA

By: 
Michael W.S. Lockaby
County Attorney

By: 
Christopher Whitlow
County Administrator

FOR SHENTEL:

By: 
Christopher S. Kyle
Vice President Industry Affairs
and Regulatory

Franklin County

VATI 2022 Application

Shentel

Attachment 9

Funding Sources Table



VATI FUNDING SOURCES TABLE

Please fill in the chart below with a description of the project funding source (local, federal, state, private, other), the amount from that source, the percentage of total project funding that source represents, and a description of the current status of the funds (pending, secured, etc.).

Source	Amount	%	Status
REQUESTED VATI	\$9,832,456	40%	Pending
SHENTEL	\$8,594,170	35%	SECURED
FCBA – LOCAL FUNDS	\$ 5,893,145	24%	SECURED
FCBA – IN-KIND	\$ 155,000	0.66%	SECURED
ROANOKE CO – LOCAL FUNDS	\$ 40,000	0.17%	SECURED
HOMEOWNER CONTRIBUTIONS	\$ 40,000	0.17%	PENDING
	\$		
TOTAL	\$ 24,554,771	100 %	

Franklin County

VATI 2022 Application

Shentel

Attachment 10

Documentation for Match Funding





September 10, 2021

VA Department of Housing &
Community Development
600 E. Main Street, Suite 300
Richmond, VA 23210

RE: VATI 2022 Shentel Application - Attachment 10 Documentation of Matching Funding

DHCD Staff:

The Franklin County Broadband Authority (the "Authority") has approved the full local match in an amount of up to \$6,000,000 for our Shentel VATI 2022 Application. The funds will be made available as required to pay for the construction of the fiber to the home (FTTH) with small-cell fixed wireless project. These funds will be considered appropriated by the Board of Supervisors once the grant is approved and awarded.

We are very pleased to be associated with this application and feel that it will help us reach our goal of ubiquitous broadband service in our County.

Thank you for your consideration and potential partnership with Franklin County and Shentel.

Regards,

Christopher L. Whitlow
County Administrator



Shentel is prepared to provide all necessary match funding in alignment with this grant application. All VATI grant projects will be accounted for in the annual budget and funded to the necessary level. Furthermore, Shentel is committed to the proposed projects and has more than adequate financial backing to support their completion.

A handwritten signature in blue ink that reads "Chris Kyle". The signature is fluid and cursive, with the first letters of "Chris" and "Kyle" being capitalized and prominent.

Chris Kyle
Vice President, Industry Affairs & Regulatory

ITEM 6. SELECTED FINANCIAL DATA

The following table sets forth selected consolidated financial data for the years presented and at the dates indicated below. Our historical results are not necessarily indicative of our results in any future periods. The summary of our consolidated financial data set forth below should be read together with our consolidated financial statements and related notes, as well as the sections entitled "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations," included elsewhere in this Annual Report on Form 10-K. All periods reflect the operating results, cash flows, and financial position, related to our Wireless operations as discontinued operations. Additionally, those assets and liabilities which are expected to transfer in the sale of our discontinued Wireless operations are presented as held for sale in our Consolidated Balance Sheets.

	Years Ended December 31,		
	2020	2019	2018
<i>(in thousands, except share and per share amounts)</i>			
Revenue	\$ 220,775	\$ 206,862	\$ 192,683
Operating expenses	221,922	207,581	195,652
Operating loss	(1,147)	(719)	(2,969)
Income tax (benefit) expense	(586)	173	(1,343)
Income from continuing operations	2,626	2,388	2,077
Income from discontinued operations, net of tax	124,097	53,568	44,518
Net income	\$ 126,723	\$ 55,956	\$ 46,595
Shareholder Information:			
Shares outstanding	49,867,676	49,670,603	49,630,119
Net income per share, basic and diluted:			
Basic - Income from continuing operations	\$ 0.05	\$ 0.05	\$ 0.04
Basic - Income from discontinued operations, net of tax	\$ 2.49	\$ 1.07	\$ 0.90
Basic net income per share	<u>\$ 2.54</u>	<u>\$ 1.12</u>	<u>\$ 0.94</u>
Diluted - Income from continuing operations	\$ 0.05	\$ 0.05	\$ 0.04
Diluted - Income from discontinued operations, net of tax	\$ 2.48	\$ 1.07	\$ 0.89
Diluted net income per share	<u>\$ 2.53</u>	<u>\$ 1.12</u>	<u>\$ 0.93</u>
Cash dividends per share	\$ 0.34	\$ 0.29	\$ 0.27
Years Ended December 31,			
	2020	2019	2018
Cash and cash equivalents	\$ 195,397	\$ 101,651	\$ 85,086
Assets held for sale	\$ 1,133,294	\$ 1,196,575	\$ 910,596
Total assets	\$ 2,031,707	\$ 1,898,902	\$ 1,487,488
Liabilities held for sale	\$ 452,202	\$ 422,335	\$ 46,487
Total liabilities	\$ 1,449,313	\$ 1,426,474	\$ 1,043,254
Capital expenditures	\$ 120,450	\$ 67,048	\$ 56,631

Franklin County

VATI 2022 Application

Shentel

Attachment 1 1

Letters of Support



United States Senate

WASHINGTON, DC 20510-4606

September 14, 2021

COMMITTEES:
FINANCE

BANKING, HOUSING, AND
URBAN AFFAIRS

BUDGET

INTELLIGENCE

RULES AND ADMINISTRATION

Ms. Tamarah Holmes
Director
Office of Broadband
Virginia Department of Housing and Community Development
600 East Main Street, Suite 300
Richmond, VA 23219-2430

Dear Ms. Holmes,

I write today in support of Franklin County's grant proposal to the Virginia Department of Housing & Community Development's (DHCD) Virginia Telecommunications Initiative (VATI) program. If approved, Franklin County and Shenandoah Telecommunications (Shentel) plan to improve internet services in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of their rural areas, especially students that needed internet services in order to attend school virtually. The expansion of broadband internet access throughout the rural areas of Shenandoah County will be of great benefit to county residents and businesses alike. Shenandoah County is known for its outdoor recreation and agritourism attractions. These businesses are often located in rural areas that currently lack the high-speed internet necessary for many essential business functions. With VATI funding, Franklin County's proposed improvements will increase educational opportunities and economic growth in the area.

I ask that you give this proposal every appropriate consideration. Should you or your staff have any questions, please contact Bianca Casper at 804-775-2314 or bianca_casper@warner.senate.gov.

Thank you for your service on behalf of my constituents.

Sincerely,



MARK R. WARNER
United States Senator

MRW/bc

☐ 180 WEST MAIN STREET
ABINGDON, VA 24210
PHONE: (276) 628-8158

☐ 101 WEST MAIN STREET
SUITE 7771
NORFOLK, VA 23510
PHONE: (757) 441-3079

☐ 919 EAST MAIN STREET
SUITE 630
RICHMOND, VA 23219
PHONE: (804) 775-2314

☐ 110 KIRK AVENUE, SW
ROANOKE, VA 24011
PHONE: (540) 857-2676

☐ 8000 TOWERS CRESCENT DRIVE
SUITE 200
VIENNA, VA 22182
PHONE: (703) 442-0670

SENATE OF VIRGINIA

DAVID R. SUETTERLEIN
19TH SENATORIAL DISTRICT
ALL OF FLOYD COUNTY, ALL OF THE CITY
OF SALEM, AND PART OF BEDFORD,
CARROLL, FRANKLIN, MONTGOMERY,
ROANOKE, AND WYTHE COUNTIES

POST OFFICE BOX 20237
ROANOKE, VIRGINIA 24018



COMMITTEE ASSIGNMENTS:
AGRICULTURE, CONSERVATION AND
NATURAL RESOURCES
EDUCATION AND HEALTH
TRANSPORTATION

September 14, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes,

Please find this letter in support of Franklin County's VATI application with Shenandoah Telecommunications for building improved internet infrastructure. Franklin County is a large county with several beautiful rural communities that currently lack broadband access.

Many rural Franklin County citizens would significantly benefit from the additional education and economic opportunities that would be realized if this proposed VATI Grant were approved and increased broadband internet infrastructure was created.

Thank you for consideration of this application.

Sincerely,

A handwritten signature in black ink that reads "David Suetterlein".

David Suetterlein
Senate of Virginia

SENATE OF VIRGINIA

WILLIAM M. STANLEY
20TH SENATORIAL DISTRICT
ALL OF HENRY AND PATRICK COUNTIES; ALL OF
THE CITIES OF GALAX AND MARTINSVILLE; PART
OF CARROLL, FRANKLIN, HALIFAX, AND
PITTSYLVANIA COUNTIES; AND PART OF THE
CITY OF DANVILLE
P. O. Box 96
GLADE HILL, VA 24092



COMMITTEE ASSIGNMENTS:
AGRICULTURE, CONSERVATION AND
NATURAL RESOURCES
JUDICIARY
LOCAL GOVERNMENT

September 13, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

I am writing to express my support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) to increase broadband access for rural and underserved locations within Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom. Many students were required to travel to areas with broadband access in order to complete their assignments during the pandemic.

Throughout the Commonwealth of Virginia, areas such as Franklin County do not have the same access to broadband as other localities in Virginia. This grant would allow Franklin County the opportunity to This much needed utility can help to improve the quality of life, increase medical care through telemedicine, and provides numerous business opportunities for those with proper access. A VATI grant would be highly beneficial for those within Franklin County and would serve as a gateway for the success of future generations.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know I will stand in support of these much-needed efforts in Franklin County.

If I can be of further assistance, please do not hesitate to contact me at the telephone number or mailing address listed above.

Until then, I remain;

Very truly yours,

A handwritten signature in blue ink, appearing to read "Will", with a stylized flourish at the end.

William M. Stanley, Senator



COMMONWEALTH OF VIRGINIA
HOUSE OF DELEGATES
RICHMOND

KATHY J. BYRON
MINORITY CAUCUS CHAIR

POST OFFICE BOX 900
FOREST, VIRGINIA 24551

TWENTY-SECOND DISTRICT

COMMITTEE ASSIGNMENTS:
FINANCE
LABOR AND COMMERCE
COMMUNICATIONS, TECHNOLOGY
AND INNOVATION

September 14, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
600 E Main St Ste 300
Richmond VA 23219-2430

RE: Franklin County VATI grant Request

Dear Dr. Holmes:

I am writing to encourage the approval of the VATI grant application, filed jointly by Franklin County and Shentel Telecommunications Company, to expand broadband service in Franklin County's rural areas.

Having sponsored the successful legislation that accelerated the expansion of broadband to unserved and underserved portions of the Commonwealth, I know the cost per household of these expansions is much greater due to the topographical challenges. Having spearheaded a solution that involved those most qualified and experienced at meeting such challenges, private communications firms, I also know that a public-private approach produces the best results at the lowest cost with no deficiencies.

These grants requests are also a regional project because County Governments are working together to deliver universal coverage in the counties through multiple providers. Regional projects will make use of its existing network and leveraging unique partnerships like MBC will help to do these projects more cost effectively, similar to the successful projects that have been done through the Tobacco Commission delivering connections to thousands of households and businesses.

Now, with the unprecedented levels of funding these projects are receiving from the federal government, I would hope applications are being approved promptly. Expediently approving these grants will quickly ameliorate the "digital divide" long afflicting rural areas of the commonwealth.

Those living in the rural areas of Bedford, Campbell and Franklin County have long experienced the effects of this inequity. That situation has become more pronounced during the

COVID pandemic, with many businesses requiring employees work from home and most schools requiring remote learning. In rural regions, the disruption occurring throughout America because of the pandemic was exacerbated by the lack of access to reliable broadband service. Ultimately, this deficiency affected every aspect of life in unserved regions, making a difficult situation nearly impossible to address.

I have enjoyed working with you to build on the VATI program success and I am excited that the federal funding opportunities will help to move these projects forward.

The prompt approval of the Franklin/Shentel joint VATI grant application will be of tremendous benefit to the people of Franklin County and Smith Mountain Lake. I ask that you give it your serious consideration for approval.

Sincerely,



Kathy J. Byron, Member
Virginia House of Delegates
22nd District



COMMONWEALTH OF VIRGINIA
HOUSE OF DELEGATES
RICHMOND

CHARLES D. POINDEXTER
POST OFFICE BOX 117
GLADE HILL, VIRGINIA 24092

NINTH DISTRICT

COMMITTEE ASSIGNMENTS:
FINANCE
COUNTIES, CITIES AND TOWNS
AGRICULTURE, CHESAPEAKE AND
NATURAL RESOURCES

September 14, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, VA 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes,

I am writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for expanding broadband to unserved areas and improved internet in underserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom. The topology is difficult here, so we are behind many areas of Virginia in deployment.

I recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Franklin County's proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century, and also equally with citizens in larger cities and more populated areas.

Please consider their application and know I stand in support of Franklin County's efforts.

Sincerely,

A handwritten signature in cursive script that reads "Charles D. Poindexter".

Charles D. Poindexter
9th District, Virginia House of Delegates



ROANOKE COUNTY

OFFICE OF THE COUNTY ADMINISTRATOR
5204 Bernard Drive, P.O. Box 29800
Roanoke, Virginia 24018-0798

Daniel R. O'Donnell
County Administrator

TEL: (540) 772-2004
FAX: (540) 561-2884

September 14, 2021

Mr. Steve Sandy
Assistant County Administrator, Franklin County
1255 Franklin Street
Rocky Mount, Virginia 24151

Dear Steve,

Thank you for the opportunity to work together to extend broadband service to the unserved residence of Roanoke County. Beldon Woods Estates in Roanoke County and Windy Gap Village in Franklin County present the perfect opportunity for our municipalities. This project meets both the spirit and intent of the Virginia Telecommunication Initiative (VATI).

With anticipated cost running between \$1800 - \$2000 per passing the County of Roanoke is pleased to pledge up to \$40,000.00 towards this important project. I believe these investments have a significant impact on economic development by increasing options for residents to engage in virtual learning, access to telehealth, and telework. These projects also allow opportunities for more home-based businesses to thrive.

With the demand for broadband connectivity higher than ever, partnering to reach the unserved is of utmost importance. I am optimistic that VATI submissions like these will be ranked in the top of submissions by the Department of Housing and Community Development.

Sincerely,

Daniel R. O'Donnell
County Administrator



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

731 Harrison Ave.
Salem, VA 24153-0560

STEPHEN C. BRICH, P.E.
COMMISSIONER

September 10, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 NTIA Grant for Franklin County

Dear Dr. Holmes:

I am writing in support of the Franklin County VATI application and their joint grant application with RiverStreet Networks and the West Piedmont PDC for building improved internet in rural areas of southwestern and eastern Franklin County, Virginia.

Expanded broadband service in Franklin County will:

1. Provide alternatives for shopping and work trips, reducing traffic on our roads;
2. Enhance economic opportunity; and
3. Provide connectivity that supports the provision of transportation services.

The Virginia Department of Transportation (VDOT) looks forward to partnering with Franklin County to expand broadband service. By effectively coordinating with VDOT's Salem District while planning service expansion, Franklin County will maximize benefits to its residents and minimize disruptions during construction.

Please consider their application and know we will stand in support of their efforts.

Sincerely,


Kenneth H. King Jr, PE
Salem District Engineer

C: Christopher Whitlow, Franklin County Administrator, via email & US Mail
Steven Sandy, Assistant Franklin County Administrator, via email & US Mail

www.VirginiaDOT.org
WE KEEP VIRGINIA MOVING

September 1, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

I am writing on behalf of Ferrum College in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

As we look to the future, remote learning and remote work will likely become a defining feature of the Ferrum College experience. Broadband access enables us to attract and retain students and employees who are drawn to the area but rely on stable and reliable internet access for their work and education.

At Ferrum College, we believe improving broadband access will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know Ferrum College will stand in support of their efforts.

Sincerely,



Wilson T. Paine
Vice President for Institutional Advancement
and External Relations



Virginia Cooperative Extension
Franklin County
90 East Court Street
Rocky Mount, Virginia 24151
540-483-5161 Fax: 540-483-0807
email: cmartel@vt.edu
www.vt.edu

VATI 2022 Letter of Support

September 13, 2021

Dr. Tamarah Holmes

Director, Office of Broadband

Virginia Department of Housing & Community Development

VATI Program

600 East Main Street, Suite 300

Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes

I am writing this letter of support for the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

As a resident of Wirtz, Virginia and employee with Virginia Cooperative Extension (VCE) in Franklin County, I have seen first hand the challenge with keeping up with technology advancements with the lack of high speed and quality internet. We went almost 10 years dealing with hotspots from cellular carriers to internet speeds of less than 0.5 Mbps. It was so bad at time when you run an internet test speed that it would fail to reach its destination. Working from home the last year and children being virtual has created an even bigger hardship to the Franklin County community. With more and more families taking to homeschooling this presents even bigger issues with the lack of reliable internet. Working for VCE, I also see the challenges the farming community experiences with the lack of reliable high-speed internet through the county. The farming community needs to be able to access a lot of data through the internet. The infrastructure in the County at its current time is poor to say it nicely. A lot of our

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Extension is a joint program of Virginia Tech, Virginia State University, the U.S. Department of Agriculture, and state and local governments.

Virginia Cooperative Extension programs and employment are open to all, regardless of age, color, disability, gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, genetic information, veteran status, or any other basis protected by law. An equal opportunity/affirmative action employer.



farming community has in previous years relied upon the local libraries to use the free internet service, but with COVID those resources have not been readily available to our community. The ability to have on-farm reliable internet will prevent farmers in Franklin County are being left behind in the advances in technology used on the farm. A lot of the equipment used on farms needs internet access to work correctly and send data from one location to another, take part in educational programming that continues to be virtual. The use of on-farm real-time monitoring systems for animal health, reproduction and milking data is slowed because the lack of internet available in the areas in Franklin County where these farms are located. The use of home/farm security needs is a need on farms to monitor all aspects of the farming business and can help prevent accidents or save a life, but when internet is not available farmers can not effectively use these types of systems.

Please consider the application put forth by Franklin County in bringing more access to high-speed broadband internet throughout the County. Access would greatly support the farming community.

Sincerely,



Cynthia Martel
VCE, ANR, Dairy Agent
Franklin County



September 13, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

We purchased our building in 2005 and originally operated Sleep Safe Beds out of this location. We started Chaos Mountain Brewing in 2013 and have been open for business for the last seven years. Sixteen years later and there is still no internet service available other than satellite, not even DSL. Satellite internet is slow and unreliable, and we have had to spend time and money to make up for its shortcomings.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

Joseph Hallock, Owner

Chaos Mountain Brewing, LLC

3135 Dillons Mill Rd.

Callaway, Va. 24067



DEPARTMENT OF PUBLIC SAFETY

1488 FRANKLIN STREET • ROCKY MOUNT, VA 24151

BUSINESS: (540) 483-3091 • FAX: (540) 483-3086 • EMERGENCY: 9-1-1

William B. Ferguson
Director

J. E. Mason
Chief Support Services/Fire Marshal

9/13/2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

As the Director of Public Safety, the benefits of reliable broadband for first responders include being able to use mobile data terminals in apparatus to provide real-time call data and reporting, as well as allowing for mapping functions. It also allows members in vehicles to perform license and record checks and complete reports. EMS agencies may transmit and submit their reports and heart tracings (Electrocardiograms) from the scene, directly to the hospital. Fire apparatus would have the ability to view diagrams and building plans while in route to scenes of emergencies, thereby, making dangerous environs much safer for the first responder.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

William Ferguson, Director of Public Safety



August 27, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main St., Suite 300
Richmond, VA 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

On behalf of the Franklin County Public Library, I am pleased to provide this letter of support for Franklin County's joint VATI application with Shenandoah Telecommunications (Shentel) for building improved internet service in unserved and underserved areas of Franklin County, Virginia.

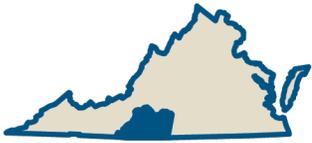
Citizens living or working in many of Franklin County's rural areas have long experienced little to no internet service. The COVID-19 pandemic has further exposed those gaps and impaired the day-to-day workings of households and businesses. Children and youth have been especially impacted when required to continue their schooling virtually rather than in-person.

Even in a pre-pandemic environment, members of the public living or working in our rural communities have had to forego use of the digital resources provided by the Franklin County Public Library and other County agencies unless they visited our physical buildings to use our WiFi networks. Without internet service in their own neighborhoods and communities, citizens cannot take full advantage of such taxpayer-funded digital resources as online CEU-conferring courses, learn-a-language classes, career readiness and job networking tools, genealogy databases, e-books, and online literacy groups. It is worth noting too that the library and other public settings are generally not conducive to conducting personal or private business such as telehealth appointments. In addition, the lack of connectivity hinders the public's participation in critical civic activities, such as downloading voter registration forms, streaming public hearings and town hall meetings, applying for jobs, accessing GIS data, and staying abreast of up-to-the-minute public health and public safety information.

As more services and resources migrate online, the digital divide widens for individuals, families and businesses without internet connectivity. Internet service has become an essential service. The proposed investment in broadband infrastructure using a VATI grant would bring our unserved and underserved rural communities into the 21st century and ease the digital inequality imposed on them.

Sincerely,

Alison Barry
Alison Barry
Director



West Piedmont Planning District Commission

P.O. Box 5268
Martinsville, VA 24115-5268
Phone: (276) 638-3987
Fax: (276) 638-8137
e-mail: staff@wppdc.org

Serving Franklin, Henry, Patrick, and Pittsylvania Counties - Cities of Danville and Martinsville - Town of Rocky Mount - Since 1970

September 10, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

RE: Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

On behalf of West Piedmont Planning District Commission (WPPDC), I am writing in strong support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

We know broadband is an essential utility, and this project will ensure residents, businesses, and community facilities across Franklin County will have access to high-speed, affordable service. This project is critical for continued economic and residential development success in the county, and WPPDC is partnering with Franklin County and others to achieve universal broadband coverage.

On a personal note, as a resident of Franklin County, I only recently received broadband access at my residence through Shentel. Prior to that, I was unable to work from home, because I could not participate in virtual meetings or work with online grant portals. That made working during the pandemic quarantine extremely difficult. Franklin County's successful partnership with Shentel has had a significant impact in my local community.

Again, WPPDC fully supports Franklin County and the county's application for VATI grant funds to develop broadband access in unserved and underserved areas of the county. WPPDC stands ready to assist the county with this and other broadband projects.

With Appreciation,

Michael R. Armbrister
Executive Director



 111 Franklin Plaza, Suite 333
Roanoke, VA 24011

 540-343-1550

 roanoke.org

August 31, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, VA 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

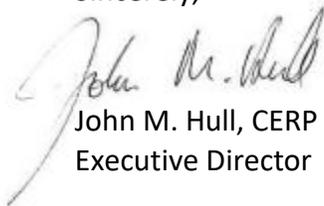
We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of their rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

We recognize the importance of broadband to citizens in Franklin County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,


John M. Hull, CERP
Executive Director

September 13, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

Visit Virginia's Blue Ridge is writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long endured the disadvantage suffered with little to no internet service in rural areas. This especially came to light during the recent COVID-19 pandemic when students and remote workers attempted to work virtually.

We recognize the importance of broadband to visitors and citizens in Franklin County. Such improvements will increase educational opportunities and economic growth in the area. The proposed investment in broadband infrastructure utilizing a VATI Grant would bring the County into the 21st century and level the playing field for equal broadband access.

Thank you for your consideration of this application.

Sincerely,

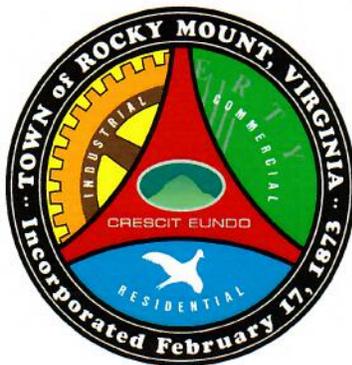


Landon C. Howard
President

TOWN OF ROCKY MOUNT
345 DONALD AVE.
ROCKY MOUNT, VIRGINIA 24151

540.483.7660
FAX: 540.483.8830

E-MAIL: RWOOD@ROCKYMOUNTVA.ORG
WWW.ROCKYMOUNTVA.ORG



TOWN COUNCIL
STEVEN C. ANGLE, MAYOR
JON W. SNEAD, VICE MAYOR

A. RALPH CASEY
J. TYLER LEE
BOBBY L. MOYER
MARK H. NEWBILL
BILLIE W. STOCKTON

ROBERT J. WOOD, *Town Manager*
Rebecca H. Dillon, *Executive
Administrative Assistant*

September 14, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

Robert J. Wood
Town Manager

Town Council

The Honorable Victor E. Conner, Mayor
The Honorable Dale Fisher, Vice Mayor
The Honorable Sarah Eames
The Honorable Mike Smith
The Honorable Keith Chrisman
The Honorable Peggy Steele
The Honorable Jason Masching



Appointed Officials

B. T. Fitzpatrick III, Town Manager
Jean Rucker, Town Clerk/Treasurer
Amie Kirby, Deputy Clerk
Dennis Deacon, Police Chief

August 26, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

RE: Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dr. Holmes,

The Town of Boones Mill is writing in support of the Franklin County VATI application and their joint grant application with Shenandoah Telecommunications (Shentel) for building improved internet in rural areas of southwestern and eastern Franklin County, Virginia.

The citizens of Boones Mill, in Franklin County, have long suffered from little to no internet service. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than in a classroom.

The Town recognizes the importance of broadband to its citizens. Such improvements will increase educational opportunities and economic growth in the area. The County's proposed investment in broadband infrastructure using a VATI Grant would bring our community into the 21st century. The citizens of Boones Mill and Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider Franklin County's application and know Boones Mill stands in support of their efforts.

Sincerely Yours,

A handwritten signature in black ink that reads 'B.T. Fitzpatrick III' with a stylized flourish at the end.

B.T. Fitzpatrick III
Town Manager

Cc: Steve Sandy, Assistant Administrator, Franklin County, Virginia
Madeline Sefcik, Clerk, Franklin County, Virginia



Roanoke Valley-Alleghany

REGIONAL
commission

rvarc.org

313 Luck Avenue, SW | Roanoke, Virginia 24016 | P: 540.343.4417 | F: 540.343.4416 | rvarc@rvarc.org

August 26, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

RE: Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Holmes', is written over a white background.

Jeremy Holmes, Executive Director
Roanoke Valley-Alleghany Regional Commission



FRANKLIN COUNTY PUBLIC SCHOOLS

Office of Superintendent

25 Bernard Road • Rocky Mount, VA 24151-6614
(540) 483-5138 • FAX (540) 483-5806

September 9, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

Franklin County Public Schools can attest to multiple stories of K-12 students found at schools during evenings and weekends to utilize school WiFi in order to complete school assignments. The inadequate and/or sometimes non-existent internet service in Franklin County neighborhoods places our K-12 students at a significant disadvantage when competing in the global marketplace.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

Dr. Bernice Cobbs
Division Superintendent



Horses Inspiring Hope

September 14, 2021

To whom it may concern:

We are in great support of having Broadband on Naff Rd and the Boones Mill area, as we are a business of 24 employees and work with tutoring some of our students, who all need internet services.

We, also, offer several Professional Development Leadership Courses and ask that all the attendees of these courses use internet to access their test data, at this time we rely on each person to use their own data as our service will not carry the load.

All of our training and development opportunities here will only be enhanced by having broad band here.

Sincerely,

Carol Young, CEO

Healing Strides of VA

672 Naff Rd., PO Box 456, Boones Mill, VA 24065

540-334-5825



August 20, 2021

To Whom It May Concern,

Healing Strides of 672 Naff Road, Boones Mill, VA strongly supports the upgrade of the Naff Rd and 220 North and South bound intersection.

We are also in strong support of the continued development of the broadband in our part of the county as well as throughout the rest of Franklin County.

Please feel free to contact us should the need arise.

Sincerely,

Carol Young, CEO
carol@healingstridesofva.org



August 26, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

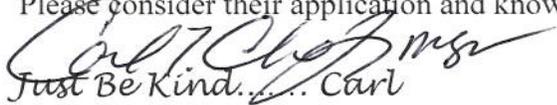
We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

As an administrator of the hospital, I allowed several of my employee's school aged children access to my computer lab and parking lot so that they could gain access to Wi-Fi network in order to complete their homework. Imagine using a car as their schoolwork area.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.



Carl T. Cline, Jr.
Just Be Kind... Carl

Carl T. Cline, Jr. MSN, RN, CMTE
Vice President, Carilion Clinic
Administrator, Carilion Franklin Memorial Hospital
Office: 540-489-6344
email: ctcline@carilionclinic.org



Tri-Area Community Health

CORPORATE OFFICE
PO Box 9
14168 Danville Pike
Laurel Fork VA 24352
276/398-2292
276/398-3331FAX

September 11, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

I am writing in support of Franklin County's VATI application and their joint grant application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County, which is in Tri-Area Community Health's Service area.

The citizens of Franklin County have long suffered with little to no internet service, especially in rural areas. This lack of service was highlighted during the COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

In addition, as a healthcare organization that attempted to meet people's needs during the pandemic, we are acutely aware of the broadband limitations in our service area. We have had to collect data for the government on the use of video and telephone services. From the start of the pandemic, we noticed that approximately half of our out-of-clinic visits each week have been by telephone instead of video because people do not have access to broadband and/or their speeds are not fast enough to support video visits. We had to purchase tablets and install extra wireless points so that people without broadband could come to our parking lots and connect to our wireless network in order to have video visits.

We recognize the importance of broadband to citizens in our service area, including Franklin County. Such improvements will increase educational and healthcare opportunities and spur economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our communities into the 21st century. The residents in the covered areas of Franklin County will have access to broadband equivalent to citizens in larger cities and more populated areas.

Please consider this application and know we will stand in support of their efforts.

Sincerely,

James Werth, Jr.

James Werth, Jr., PhD, ABPP
Chief Executive Officer



Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

We here at the Smith Mountain Lake Regional Chamber of Commerce have seen firsthand how high-speed internet can positively impact our region. Whenever broadband is added to one of our areas anywhere near the lake, we see increases in both visitors and full-time residents following closely behind.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Bruns". The signature is fluid and cursive, with a long horizontal line extending to the right.

Andy Bruns
Executive Director



ROANOKE REGIONAL
CHAMBER

August 31, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

The pandemic has demonstrated a stark reality for those of our friends, family, and neighbors who don't have reliable internet access. Simply put, those without internet access are being left behind in their careers and in the classroom. We have all heard the stories of the families who take their children to internet cafes to do their homework, and the proliferation of remote learning/remote work mean that these situations will remain until broadband access is universal.

The expansion of broadband is also a great recruiting tool to bring businesses and talent to regions where remote working may have never been possible – until now. As more companies convert their workplaces to the virtual space, opportunities will arise for less populous communities to attract and retain talent. This would not be likely for those regions lacking in broadband access.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Thank you for your consideration of their application. Please know we will stand in support of their efforts. Should you have any questions, I can be reached at 540.682.2101 or JWaugh@RoanokeChamber.org.

Sincerely,

Joyce Waugh
President & CEO



Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom. This was further hindered by the need for adults to work from home. Small businesses need high speed internet to operate their businesses successfully. Jobseekers must rely on the internet since most employers have job applications online now.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

A handwritten signature in black ink that reads "Kathy E. Hodges".

Kathy E. Hodges, Executive Director of Workforce Development

KATHY E. HODGES
EXECUTIVE DIRECTOR
50 CLAIBORNE AVENUE
ROCKY MOUNT, VA 24151
540-483-0179
FAX 540-483-1297
www.thefranklincenter.org

September 13, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

The lack of any reliable high-speed in our development has hurt those that live here and those that want to live here. In today's society, reliable high-speed is a must. Anyone that is work based from home, has a job that requires reliable internet or has children at home that are in school realize it's importance. I own several small businesses and it take me hours what should take me minutes to complete. More often than not, I leave my house and go somewhere to get reliable service like the library or another business location that has high-speed. It is frustrating every day, in the 21st Century, that we lack these types of basic services.

It is so bad that in our development – Lake Watch - commercial lots are not sold and people do not move here if that is a basic requirement for them to live, which it is for almost all.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

Timothy Reith
24 Watch Tower Drive – Lake Watch
Moneta, VA 24121

September 13, 2021

Dr. Tamarah Holmes

Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Grant for Franklin County

Dear Dr. Holmes:

I am Gary Robertson, President of the Carriage Homes in Lakewatch Plantation POA. We are writing in support of the Franklin County VATI application with Shenandoah Telecommunications (Shentel) for building improved internet in underserved and unserved areas of Franklin County.

The citizens of Franklin County have long suffered with little to no internet service in many of our rural areas. This especially came to light during the recent COVID-19 pandemic when students were trying to continue their classwork virtually rather than be in a classroom.

Lakewatch Plantation is no different. Our lack of high speed internet service has made it difficult on homeowners that have students or try to conduct business from their homes.

We recognize the importance of broadband to citizens in our County. Such improvements will increase educational opportunities and economic growth in the area. Their proposed investment in broadband infrastructure utilizing a VATI Grant would bring our community into the 21st century. The citizens of Franklin County in the covered region will have access to broadband equal to citizens in larger cities and more populated areas.

Please consider their application and know we will stand in support of their efforts.

Sincerely,

Gary Robertson
President, Carriage Homes of Lakewatch Plantation POA

John S. Stroebel

86 LAKEWATCH CIRCLE MONETA, VIRGINIA 24121

Telephone
484-238-7385

Email
jstroebel1951@gmail.com

September 13, 2021

Dr. Tamarah Holmes
Director, Office of Broadband
Virginia Department of Housing & Community Development
VATI Program
600 East Main Street, Suite 300
Richmond, Virginia 23219

Letter of Support for 2022 VA Telecommunications Gant for Franklin County

Dear Dr. Holmes:

My name is John Stroebel. I moved to Franklin County, Virginia in 2009 when I purchased a waterfront home in the development known as Lakewatch Plantation. At that time, I was the only waterfront resident in Lakewatch. For a number of years I have served in an uncompensated capacity as the President of the Lakewatch Plantation Homeowners Association, the Association that represents the 64 waterfront lots in Lakewatch Plantation.

Lakewatch Plantation was a signature development for Franklin County. As initially envisioned, Lakewatch Plantation would have been comprised of 64 waterfront homes, 35 carriage homes (smaller off-water homes on 1/2 acre or less lots), 25 estate homes (larger off-water homes on greater than 1/2 acre lots), commercial developments (including restaurants, an exercise facility) and eventually a hotel and conference center. Unfortunately, the financial crisis intervened, land sales faltered and the developer filed for bankruptcy in August 2009.

During the ensuing decade, little development has taken place. While some commercial development has occurred, no hotel or conference center was ever built. At the present time, only 10 of the 64 waterfront lots have houses constructed on them and only two houses have been built on the 25 estate lots. The carriage home development has fared a little better with 14 homes constructed on the 35 lots. Current residential occupancy stands at a little over 20%. Thus, a decade after the financial crisis, Lakewatch remains mostly untapped economic potential for Franklin County. Assuming an average lakefront home cost of \$650,000, an average carriage home cost of \$300,000 and an average estate home cost of \$450,000, full development of the planned residential segment of Lakewatch would mean an additional investment of over \$50MM in rural Franklin County and additional tax revenues of over \$300,000.

To this point, most people wishing to construct homes and settle in Lakewatch have been retirees, seeking the peace and quiet and natural beauty of the area around Smith Mountain Lake. The onslaught of the pandemic saw this demographic change—many working couples were offered the opportunity to work remotely and sought to move out of the large metropolitan areas into rural communities offering some insulation from the infection that was spreading in the large cities. However, a high speed internet connection was essential to facilitate remote work—and for the most part, particularly for the waterfront and estate lot homes, a high speed internet connection was not available in Lakewatch.

During my more than a decade of living in Lakewatch, the best internet connection that I could obtain was DSL from CenturyLink (and old-line telephone company) offering maximum download speeds of 10 Megabytes per second and upload speeds measured in the kilobytes. (For a brief period I tried satellite internet from HughesNet which promised higher download speeds of 25 Megabytes per second—but satellite internet involves a lot of “jitter” and “packet loss”, so I saw little improvement in experienced performance and this came with unrealistically low data caps.) I have tried on several occasions to encourage local telecommunication providers (Verizon, Shentel and SML Wireless) to bring cable-based or high speed wireless internet capability into Lakewatch, but without success. Due to the low current population density, topography (hills and heavily wooded areas) and long cable runs, they all have declined. So, Lakewatch remains largely without high speed internet. Per a just run speed test, my current download speed is 9.2 MBPS; upload speed is .8 MBPS. While the download speed will support some video streaming to a single device, the slow upload speeds make running significant operations “off the Cloud” impossible—backing up a hard disk to the Cloud can take hours. I know for a fact of several recent lot purchases that fell through when the prospective buyer learned that high speed internet was not available in Lakewatch.

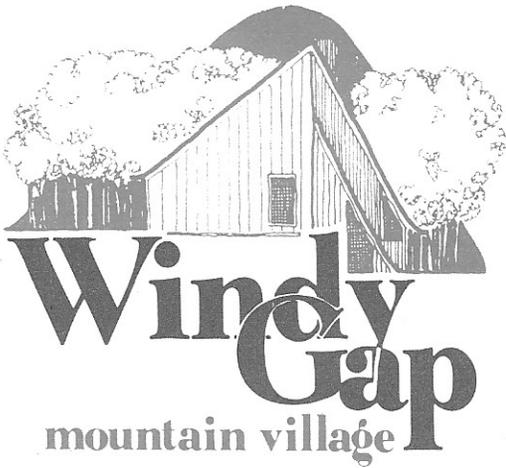
In today’s environment, if Lakewatch is to attract residents who are currently working, high speed internet access is a must, not a luxury. Even for non-working people, so much of our current entertainment is dependent on high speed internet access that people will not consider purchasing an expensive residence that does not offer a high speed internet connection as an amenity. I am convinced that if Lakewatch is ever to realize its potential as an economic development driver for Franklin County, the lack of high speed internet availability for residents must be addressed.

For these reasons I enthusiastically support the pending application of Franklin County with Shentel under the VATI program to provide improved internet availability in underserved and unserved areas of Franklin County, including Lakewatch Plantation.

Sincerely yours,

A handwritten signature in blue ink that reads "John S. Stroebel". The signature is written in a cursive style with a large initial "J" and "S".

John S. Stroebel



To: Franklin County Broadband Authority, Mr. Steve Sandy

From: Board of Directors, Windy Gap Property Owners Association

Date: September 11, 2021

Subject: Interest and support from Windy Gap Mountain Village for the FCBBA/Shentel broadband project.

The Board of Directors of Windy Gap Property Owners Association (WGPOA) notifies you of our enthusiastic support for the broadband project proposed by the Franklin County Broadband Authority for our community. The homeowners provided overwhelming support of the installation of a high speed broadband network in the neighborhood. We understand that the project will be implemented by Shentel Telecommunications Company to provide fiber optic based, high speed broadband internet, cable TV and telephone to every household in the neighborhood that wants it. We believe that this will satisfy an urgent need of so many of our neighbors who are now working from home as a result of the pandemic. Also, it will greatly enhance the educational options of our community's children who started distance learning during the pandemic. Overall, it will immeasurably improve our neighbors' ability to interact with our web-based world.

We truly appreciate Franklin County's ongoing efforts and your leadership in providing broadband to the county residents. We look forward to working with Franklin County and Shentel to facilitate the project and make it a success.

A handwritten signature in black ink, appearing to read "Casey Criswell".

Casey Criswell, Treasurer

For the Board of Directors
Windy Gap Property Owners Association

Sandy, Steve

From: Samantha Breeden <samantha.breeden@jeswork.com>
Sent: Tuesday, August 3, 2021 11:44 AM
To: Sandy, Steve
Subject: Windy Gap - Internet Service

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Hello Steve,

I was referred to you by the HOA President of Windy Gap Mountain Village, Becky Carneal. We recently purchased the property across the street from Windy Gap Mountain Village (7638 Jubal Early Hwy) and have been unsuccessful securing internet service. Becky suggested I reach out to you and inquire as to whether or not our property could be included in the coordinated effort to bring fiber optic service to this area. We have two other homes located behind us down Kalena Drive (this road cuts through our property) who would also benefit from being included.

If there is anything we can do to be included in the proposed service for Windy Gap Mountain Village, please advise. Or if you have any suggestions for our obtaining service on our side of 116, it would be greatly appreciated.

My personal email is: breeden.sam@gmail.com ; cell: 757-286-2563

Kindly,

Samantha Breeden
Office Manager
JES Foundation Repair – Roanoke
Phone: 540-318-7163



House number: 383

How many members in home: 4

School use or work: BOTH

Internet use: CENTURY LINK

How much you would be willing to help pay: ? 200-300.00

Name: Rob Yanok Rob Yanok

Signatures: _____

House number: 243

How many members in home: 2

School use or work: NA

Internet use: Century link

How much you would be willing to help pay: ?

Name: Calvin Hawley

Signatures: C.J. Hawley

House number: 267

How many members in home: 4

School use or work: work

Internet use: Century link

How much you would be willing to help pay: ?

Name: Guy Nutz, Elizabeth Nunez

Signatures: [Signature], [Signature]

House number: 264 Valley Rd.

How many members in home: 3

School use or work: 2x WORK

Internet use: TV streaming, work from home (currently use Century Link \$ get only 3-5Mbps - ^{too slow} for work)

How much you would be willing to help pay: \$ up to 1k

Name: Thomas & Elaine Thurman

Signatures: Elaine B Thurman Tom Thurman

House number: 156 Valley Road

How many members in home: 3

School use or work: School, college, work from home

Internet use: TV Streaming, work, uploading documents & Photos

How much you would be willing to help pay: up to \$1000.00

Name: Lorie Ranson

Signatures: Lorie Ranson

House number: 350 VALLEY Rd

How many members in home: 6

School use or work: both

Internet use: tv, streaming, work, gaming

How much you would be willing to help pay: few hundred

Name: DAVID PALMER

Signatures: David Palmer

House number: 90

How many members in home: 4

School use or work: work

Internet

use: streaming, work

How much you would be willing to help pay: ?

Name: Jay Zane

Signatures: Jay Zane

House number: 219 valley rd

How many members in home: 2

School use or work: work

Internet

use: streaming work

How much you would be willing to help pay: 100

Name: Brandon Ciseh

Signatures: Brandon Ciseh

House number: _____

How many members in home: _____

School use or work: _____

Internet use: _____

How much you would be willing to help pay: _____

Name: _____

Signatures: _____

Sandy, Steve

From: Vicki Thompson <howvic24121@gmail.com>
Sent: Tuesday, July 14, 2020 7:32 PM
To: Sandy, Steve
Subject: Broadband in Sunset Pointe, Moneta 24121

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

I support our subdivision (Sunset Pointe) being on the list for funding from the state to help Shentel extend fiber to our neighborhood. Century Link is the only internet provider available and their service is insufficient – please see my current speed test attached.

Sandy, Steve

From: Donnelle Arrington <Darrington@southernheritagehomes.com>
Sent: Saturday, July 18, 2020 4:58 PM
To: Carter, Mike; Sandy, Steve
Subject: Fwd: The Woods Edge subdivision
Attachments: Petition pg 1.jpg; Petition pg 2.jpg

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Mr. Sandy & Mr. Carter,

On behalf of the property owners within The Woods Edge subdivision, I am writing to bring to your attention the lack of ISP availability to our residents and ask for your assistance in providing reliable internet service from Shentel. We ask for and would greatly appreciate your efforts to secure grant money for broadband expansion during the Broadband Authority meeting on July 21 in order to provide Shentel internet services to all residents of The Woods Edge. While I am sure this is a common request within the county, ours is a unique situation for several reasons, which I have explained below.

Our neighborhood is a heavily wooded location, preventing any satellite or line-of-sight tower ISP options. The leaves on the trees during the spring & summer months even leave us without reliable cell service, eliminating the option for cellular hotspot internet. Due to our terrain, wired internet is the only service available to us.

Although we are an established neighborhood of 20+ years, we only just received an ISP (CenturyLink) around 2016. CenturyLink DSL remains the only service available to us at speeds of 6-8mg. Unfortunately, the quality of service from CenturyLink continues to go from bad to worse. We have *multiple* outages on a *daily basis* in addition to speeds that regularly drop to 1-2mg. These are well documented problems that go back for at least 2 years. We have tried relentlessly to get the service we are paying for, to no avail – even from local CenturyLink management personnel. (Ex. dozens of phone calls & emails, requests for meetings, cannot get return phone calls or follow-up, etc.) At times, my internet speed is so slow that an online speed test is unable to detect it. After years of trying to resolve this, **CenturyLink's final solution is to reduce our speed to 3 mg of service and they refuse to provide service to any new accounts within our subdivision, as a recent new homeowner discovered after closing on her home.** This is detrimental to our subdivision – with families working from home and being required to homeschool their children, this isn't even enough to service one device in each home. Furthermore, The Woods Edge will become a stagnant neighborhood with existing landowners planning to build and/or residents planning to sell finding it nearly impossible to do so due to a lack of internet.

Currently, Shentel's service is just 6/10 mile to the furthest point in our subdivision. For a comparable monthly price (or less, in some cases), Shentel can provide reliable, wired service to The Woods Edge at a minimum of 16x the speed that CenturyLink plans to reduce us to. We have had the build engineered and priced with the following results: The total build is \$72,360 with Shentel picking up \$41,400 of that bill. The remaining amount, left to the residents of The Woods Edge to cover, totals \$30,960, which is a very large sum of money for our neighborhood to absorb. I am asking that you allocate funding from the grants available to you to provide The Woods Edge with the necessary resources to proceed. **As detailed above, this is the only option for reliable internet to The Woods Edge.**

We want to help! I've attached images of a signed petition of our homeowners requesting your assistance in securing grant money. **Our residents also have committed \$2,750 to help reduce the amount of grant money needed to complete the Shentel build.**

Our neighborhood is located on Angle Plantation Rd., just minutes from town and 220. It is a highly desired area, usually seeing quick home sales and high interest in land sales for building. Continuing to foster growth in this neighborhood is beneficial both to our residents, as well as the County.

I'm more than happy to discuss this in person or over the phone (540.493.7242) and can provide contact information for many more of our homeowners as well. With the new school year starting next month and the need for students and parents to have reliable internet access in order to homeschool, we are in need of this service as soon as it can be installed. Your prompt attention is greatly appreciated and I look forward to hearing from you soon.

Thank you for your assistance,

Donnelle Arrington

Cell: 540.493.7242



www.SouthernHeritageHomes.com

Sandy, Steve

From: Lyndsay Tarus <Imtarus@gmail.com>
Sent: Tuesday, July 14, 2020 4:26 PM
To: Sandy, Steve
Subject: Broadband access for Sunset Pointe, Moneta 24121
Attachments: speed test_20 Sunview Circle.PNG

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Hi Steve, I hope you are doing well. I'm writing to ask for your support in helping our subdivision (Sunset Pointe) get on the list for funding from the state to get broadband access. Century Link is the only internet provider available and their services are insufficient. Please see the current speed test attached.

Living in a rural area is a challenge for finding jobs, but being able to work from home with reliable internet service greatly expands the number of accessible opportunities. As a work-from-home employee and a small business owner, broadband access is really important to me and my family.

Thanks for your consideration,
Lyndsay and Kyle Deitrick

Sandy, Steve

From: Donnelle Arrington <Darrington@southernheritagehomes.com>
Sent: Thursday, June 11, 2020 11:52 AM
To: Sandy, Steve
Subject: The Woods Edge subdivision

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Mr. Sandy,

On behalf of the property owners within The Woods Edge subdivision, I am writing to bring to your attention the lack of ISP availability to our residents and ask for your assistance in providing reliable internet service from Shentel. While I am sure this is a common request within the county, ours is a unique situation for several reasons, which I have explained below.

Our neighborhood is a heavily wooded location, preventing any satellite or line-of-sight tower ISP options. The leaves on the trees during the spring & summer months even leave us without reliable cell service, eliminating the option for cellular hotspot internet. Due to our terrain, wired internet is the only service available to us.

Although we are an established neighborhood of 20+ years, (23 residents with additional landowners waiting to build), we only just received an ISP (CenturyLink) around 2016. CenturyLink DSL remains the only service available to us at speeds of 6-8mg. Unfortunately, the quality of service from CenturyLink continues to go from bad to worse. We have *multiple* outages on a *daily basis* in addition to speeds that regularly drop to 1-2mg. These are well documented problems that go back for at least 2 years. We have tried relentlessly to get the service we are paying for, to no avail – even from local CenturyLink management personnel. (Ex. dozens of phone calls & emails, requests for meetings, cannot get return phone calls or follow-up, etc.) After years of trying to resolve this, **CenturyLink's final solution is to reduce our speed to 3 mg of service and they refuse to provide service to any new accounts within our subdivision, as a recent new homeowner discovered after closing on her home.** This is detrimental to our subdivision – with families working from home and being required to homeschool their children, this isn't even enough to service one device in each home. Furthermore, The Woods Edge will become a stagnant neighborhood with existing landowners planning to build and/or residents planning to sell finding it nearly impossible to do so due to a lack of internet.

Currently, Shentel's service is just 6/10 mile to the furthest point in our subdivision. For a comparable monthly price (or less, in some cases), Shentel can provide reliable, wired service to The Woods Edge at a minimum of 16x the speed that CenturyLink plans to reduce us to. We have had the build engineered and priced with the following results: The total build is \$72,360 with Shentel picking up \$41,400 of that bill. The remaining amount, left to the residents of The Woods Edge to cover, totals \$30,960, which is a very large sum of money for our neighborhood to absorb. I am asking that you allocate funding from the grants available to you to provide The Woods Edge with the necessary resources to proceed. **As detailed above, this is the only option for reliable internet to The Woods Edge.**

Our neighborhood is located on Angle Plantation Rd., just minutes from town and 220. It is a highly desired area, usually seeing quick home sales and high interest in land sales for building. Continuing to foster growth in this neighborhood is beneficial both to our residents, as well as the County.

I'm more than happy to discuss this in person or over the phone (540.493.7242) and can provide contact information for many more of our homeowners as well. As you know, our pricing from Shentel is valid for 60 days and expires on July 29, 2020. Specific questions regarding pricing can be addressed with the Engineer, Nick Lambert (304.923.3870). Your prompt attention is greatly appreciated and I look forward to hearing from you soon.

Thank you for your assistance,

Donnelle Arrington

Cell: 540.493.7242



www.SouthernHeritageHomes.com

Sandy, Steve

From: Kimberly Najduch <knajduch@ferrum.edu>
Sent: Tuesday, July 14, 2020 9:48 AM
To: Sandy, Steve
Subject: K. Najduch: Woods Edge Sub Division - Shentel Expansion

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Good Morning Steve,

My name is Kimberly Najduch and I am a homeowner in Woods Edge Development. I have lived at 190 Woods Edge, Rocky Mount VA for the past 5 years.

The poor quality of Internet service has been the one downside of living in this neighborhood. I currently pay for a business level account through CenturyLink in an attempt to get more reliable service, but the added expense has not proven to result in any serious gains in my connectivity, speed or reliability.

In my position as Registrar of Ferrum College, especially during this time of Quarantine, I often am working from home, not only during business hours, but after hours as well. I am often responding and troubleshooting issues for faculty and students because they need a timely response. I also have three children. My oldest son is a college student pursuing a degree in Computer Engineering. The majority of his coursework is now online. My daughter is starting 8th grade on August 10, and according to the School Board meeting last night, I expect both her and my youngest son, who will be in 5th grade, will be receiving their instruction primarily through online instruction for at least the first few months of school if not the entire upcoming school year. That means without anything recreational (streaming media, social media, online games, etc) my household will have four active connections that will require stability and reliability on a daily basis.

I have had consistent issues with my Internet through CenturyLink. We have been without the internet for days at a time and our connection speed is often so slow that I will connect to a cellular hotspot to conduct business. This is NOT an acceptable solution.

In talking with various customer service personnel, as well as technicians, the bottom line is that CenturyLink has told us that what we have now is as good as it gets. And their solution to questions of reliability is to further reduce the connections that we are getting and allowing no new customers in the area. This is what makes me upset. CenturyLink is not invested in fixing or improving the service they provide to us and they are the only choice we have.

Please consider our application for Woods Edge to be included on the application for grant money to assist with the cost of expanding Shentel service to areas of Franklin County. If you have any questions, or would like to discuss this in person, please feel free to contact me.

Kimberly J. Najduch
190 Woods Edge Drive
Rocky Mount, VA 24151
C: 540-420-5800

Thank you and I hope you have a great day.

Kimberly

"Very often out of adversity that's when the best work comes." - Tom Cochrane

★ Create an Amazing Day ★

Kimberly J. Najdich

Registrar

SEVIS PDSO

11 John Wesley Hall

Office: [540.365.4275](tel:540.365.4275) • Cell: [540.420.5800](tel:540.420.5800)

Email: knajdich@ferrum.edu • Online: www.ferrum.edu

Sandy, Steve

From: smootcm <smootcm@yahoo.com>
Sent: Thursday, July 9, 2020 8:19 AM
To: Sandy, Steve
Subject: Re: Woods Edge Subdivision Shentel Request
Attachments: 7811.jpeg

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Good morning Steve,

Thanks for the quick response attach is a speed test that we did this morning. Our speeds are very very inconsistent, And they are all based on according to century link the amount of people in our subdivision that are online at the same time. Hopefully this helps our situation.

Chris Smoot

Sent from my Verizon, Samsung Galaxy smartphone

----- Original message -----

From: "Sandy, Steve" <Steve.Sandy@franklincountyva.gov>
Date: 7/8/20 8:52 PM (GMT-05:00)
To: Chris Smoot <smootcm@yahoo.com>
Subject: Re: Woods Edge Subdivision Shentel Request

Chris,

Thanks for your email. I will share your concerns with the Broadband Authority. Your subdivision is one of the locations that is under consideration for grant funding through the state. The application is due August 17th.

Could you please perform a speed test on your current internet service and send me a screenshot of the results? If you are not familiar, there are several free sites on the internet like speedtest and TestIT.

Thanks!

Steve

Sent from my iPhone

On Jul 8, 2020, at 7:04 PM, Chris Smoot <smootcm@yahoo.com> wrote:

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Steve,

I am writing you in regards to the to internet concerns that we are having in Woods Edge. Donnelle Arrington has already contacted you in regards to the issues we are having with Centurylink and the current speeds they can offer us. They are now not accepting new customers in our subdivision because of the lack of speed and issues. We have no other reliable option, cell service from all providers in good but not great and satellite options have failed to. Shentel is literally right down the road from us and seems to be going in all around us. So I am writing you in request and hopes that we can be put on your list of subdivisions that can get selected to for broadband service. With the current upcoming school year in regards to the pandemic this is going to be tough for everyone but much harder for those that don't have good and reliable internet.

It may be difficult for all the neighbors to email you by the July 21 (scheduled meeting), but trust me, we have had this concern for a long time.

I speak for most in this subdivision and we need something.

Sincerely,

Chris Smoot

Petition to install Shentel

Petition summary and background	Currently, CenturyLink DSL is the only ISP available to the following addresses. We continue to deal with daily disruptions in internet connection and service outages that take days to resolve. This is an ongoing problem that has lasted for several years with no improvement.
Action petitioned for	We, the undersigned, are requesting that Shentel extend service from its current termination at the intersection of Kin Vale & Angle Plantation Rd (Rocky Mount, VA), to and throughout the Woods Edge Subdivision. This is an approximate ¼ mile extension of service that would provide much needed service to 26 potential customers of Shentel.
Primary Contact for Undersigned	Donnelle Arrington (540) 493.7242 donnellearrington@gmail.com 495 Woods Edge Drive Rocky Mount, VA 24151

Printed Name	Street Address (located in Rocky Mount, VA 24151)	Email Address	Phone Number	Date
Holly McKnight	469 Woods Edge Dr	hirmcknight6@yahoo.com	540 580 6925	5/8/20
William Hodges	389 Woods Edge Dr	wfhodges@curriculum.ink.org	540-493-3677	5/8/20
Chris Smart	211 Woods Edge Dr	smartcun@yahoo.com	540-484-3013	5/8/20
Bob Girault	425 Woods Edge Dr	rpgirault1995@gmail.com	540-588-9037	5/8/20
Penelope Glauco	425 Woods Edge Dr	spglauco1995@gmail.com	443 880 4706	5/8/20
CHAS SWEED	71 Woods Edge Dr	CSWEED82@yahoo.com	540-761-2271	5-7-20
EDDIE ANGLE	WOODS EDGE DR	---	540-243-1600	5-9-20
Don Marsh	74 Cheyenne Ln	---	---	5/12/20
James & Pam Stachison	30 Cheyenne Ln.	plutch6454@hotmail.com	(540) 483-8469	5/12/20
Karin and Regina Boman	Woods Edge Dr	---	(540) 484-3017	5.13.20

Sandy, Steve

From: Lynne Siemon <lsiemon235@gmail.com>
Sent: Wednesday, August 12, 2020 10:10 AM
To: Sandy, Steve
Subject: Re: Broadband Internet Service
Attachments: iPhone Hotspot Internet Speed Test 8 12 20.png; US Cellular Hotspot Internet Speed Test 8 12 20.png

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Steve:

Thank you so much for reaching out to us regarding the new application. Below are screenshots of my internet speed test - both with a US Cellular Hotspot and using my iPhone as a hotspot.

Please let me know if you need any additional information or tests. I just ran these tests this morning I suspect if I ran it again later in the day, they might be quite different. I will try that and let you know accordingly.

Once again, we appreciate your assistance with this. Jennifer Faulkner and I have asked our neighbors to send you their speed test results - and we are attempting to reach out to residents on other streets (off of Wysong Mill Road).

Lynne Siemon



Virus-free. www.avg.com

On Tue, Aug 11, 2020 at 5:11 PM Sandy, Steve <Steve.Sandy@franklincountyva.gov> wrote:

We are preparing our application for state funding for broadband and your area is part of the proposed Shentel expansion project. Can you provide a current speed test of your current internet service for me? Does your neighborhood have a signed petition or can you get some or all of your neighbors to sign something saying they want better broadband?

Please encourage others to provide current speed tests as well.

Thanks!

Steve

Sandy, Steve

From: john christman <idjohnc@yahoo.com>
Sent: Thursday, August 13, 2020 1:58 PM
To: Sandy, Steve
Subject: INTERNET SERVICE

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Steve,
Spoke to John Dabareiner about interest in internet service in my area. My address is 120 Thorn Dr Hardy. We current have to use Verizon wifi and it stinks..Hi speed internet would be a big plus for us and the value of our home.If you have any questions feel free to call me at 540 -353-3966.

Thanks

John Christman

Sandy, Steve

From: Wes Dennison <wdennison73@yahoo.com>
Sent: Wednesday, August 12, 2020 12:43 PM
To: Sandy, Steve
Subject: broadband internet service

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Hello Mr. Sandy,

My Neighbor Lynne Seimon reached out to me about potential internet service. I am very interested as I do not have any service at this time due to lack of decent options. Hughes net was so slow it was unusable so I canceled.

Please add us to the list.

My address is:
Wesley Dennison
233 Maggie Lane
Hardy VA 24101

540-471-5097

Thank you very much!

If you need any other info please feel free to contact me.

[Sent from Yahoo Mail on Android](#)

Sandy, Steve

From: Jon <jldabar@aol.com>
Sent: Wednesday, August 12, 2020 7:33 PM
To: Sandy, Steve
Subject: Internet service

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Steve,

Spoke to Wes about interest in internet service in my area. My address is 1068 Juniper Rd Hardy. We current have to use Verizon mifi and a land line for our fire alarms in the home.

We have 7 homes in this area in would subscribe for service for each home

Having this service would Allie use to up grade alarm and security system(s) which is a win for use and emergency services if needed. Ur could also lead to additional increase in property values again a win for county and us. People moving to the lake insist on high speed internet.

Let me know if the is additional questions Thank for your interest.

Jon

Sent from my iPhone

Sandy, Steve

From: nautiquefamily <nautiquefamily@cox.net>
Sent: Thursday, August 13, 2020 11:22 AM
To: Sandy, Steve
Subject: Shentel internet

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Mr. Sandy,

We understand you are gauging interest in broadband availability for our area. We have no reliable internet. We tried Hughesnet and have cancelled it for slow and spotty connection. Our cell service is also spotty at best. We would love to enjoy the benefits our friends around Franklin County do with Shentel. Let's get a line down Maggie Lane!

Steve and Val Karras
143 Maggie Lane Hardy VA
540.312.1220

Sandy, Steve

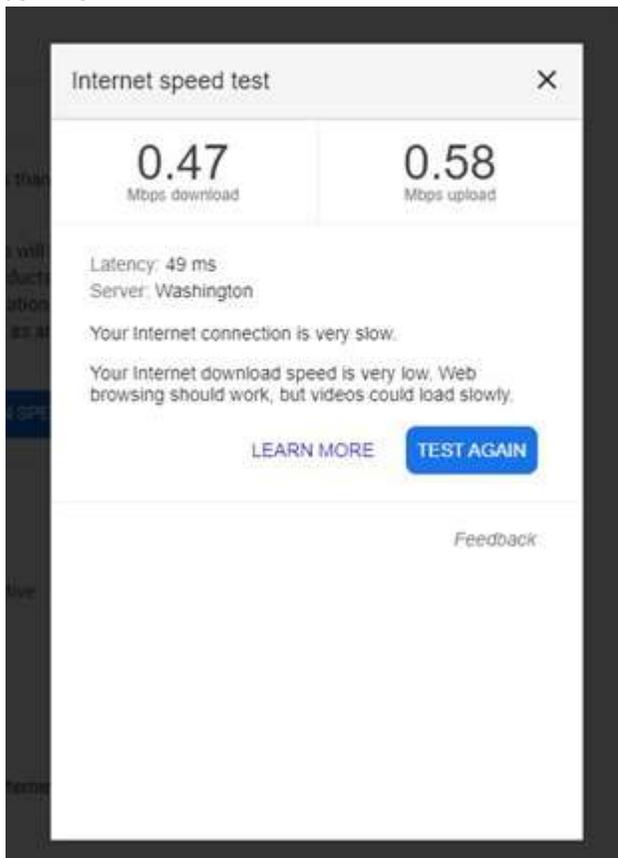
From: Jennifer Faulkner <jennifer.faulkner11@gmail.com>
Sent: Wednesday, August 12, 2020 8:41 AM
To: Sandy, Steve
Subject: Re: Broadband Internet Service

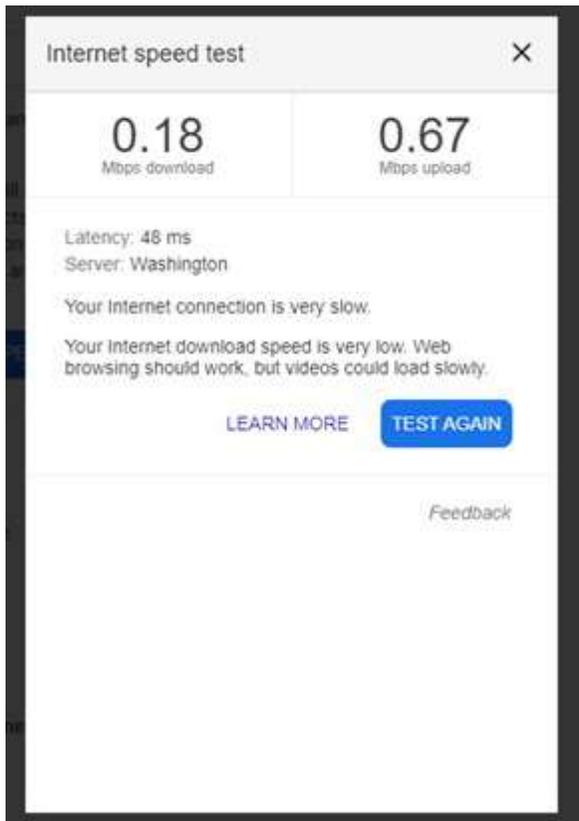
==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Good morning Steve -

I did two speed tests - one with my Verizon hotspot and one with the hotspot from my work cell phone - - below are the results. I'm not sure how these are submitted through the website that runs them but it shows a Washington server - - so hopefully my IP registers as Summerfield Rd. If there is some other way you'd like me to submit these results - just let me know.

Thank you,
Jennifer





On Tue, Aug 11, 2020 at 5:10 PM Sandy, Steve <Steve.Sandy@franklincountyva.gov> wrote:

We are preparing our application for state funding for broadband and your area is part of the proposed Shentel expansion project. Can you provide a current speed test of your current internet service for me? Does your neighborhood have a signed petition or can you get some or all of your neighbors to sign something saying they want better broadband?

Please encourage others to provide current speed tests as well.

Thanks!

Steve

From: Jennifer Faulkner <jennifer.faulkner11@gmail.com>
Sent: Tuesday, July 21, 2020 11:08 PM
To: Sandy, Steve <Steve.Sandy@franklincountyva.gov>
Subject: Broadband Internet Service

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Good evening Mr Sandy -

I live on Summerfield Rd and have been working the last several months from home using a cellular hotspot. As you can imagine, zoom meetings, file sharing and a constant stream of information is not easy using just a cell signal. I am hopeful that the new wire runs I am seeing go in on Wysong Mill Rd are a good sign of things to come. Tonight, I saw mention of the new contracts signed for the construction phase of broadband expansion. Please advise if either of these new options will be available for my neighborhood. Ours is one of many homes in this area that have a need of reliable and fast internet service for work and school.

I have lived in Franklin County for 25 years and used Shentel services for all but the last 7 (when I moved to this location). They offer a great service and it would seem that a neighborhood with so many permanent lake residents would be a prime location to expand into. I am hopeful that the great service Shentel offers in other areas can be extended to our road and that you will do what you can to make that happen.

Please let me know what I can do to help this become a reality.

Thank you,

Jennifer & Jeff Faulkner

60 Summerfield Rd

Hardy VA 24101



Result ID 9756219805

RESULTS



PING ms

37



DOWNLOAD Mbps

8.62



UPLOAD Mbps

0.76



Connections

Multi



CenturyLink

Charlottesville, VA

[Change Server](#)



CenturyLink

184.2.73.210

RATE YOUR PROVIDER

CenturyLink



Sandy, Steve

From: Ben Chapman <ben.chapman6@gmail.com>
Sent: Thursday, July 16, 2020 11:58 AM
To: Sandy, Steve
Cc: Smith, Lorie
Subject: Re: Internet Access

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

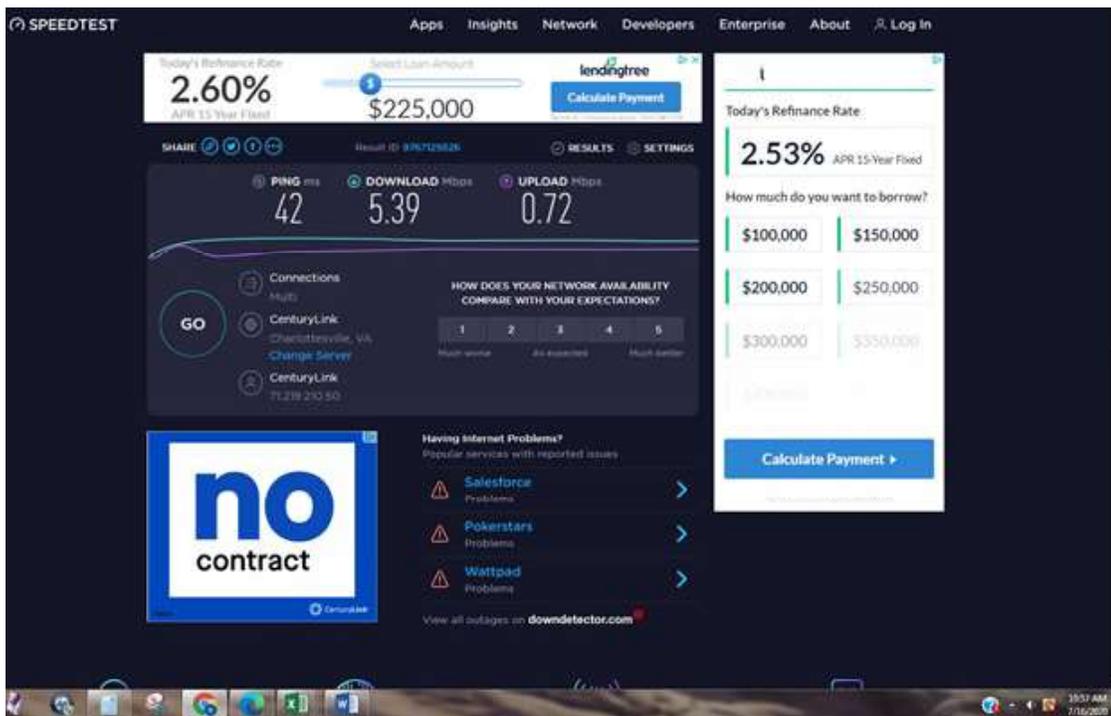
Dear Mr Sandy,

Since my email to you on June 8, I have had further communication with CenturyLink, and I am now subscribing to their 10 Mpbs plan (which ended up being \$5 less than the 5 Mpbs plan or half the cost since my conversation with them last fall), but I am still unable to get consistent and decent Internet performance. I am attaching a copy of my most recent Internet speed test showing 5.39 Mpbs upload and .72 Mpbs download (if only this was as bad as it ever got) I am continuing to work with CenturyLink on getting them to provide the service 10 Mpbs delivery speed which they are selling, but even if I get there, it's still far below the broadband offerings in communities throughout the country.

As I understand your responsibilities include developing and implementing broadband services for Franklin County and as requested in my earlier email, I would like to understand the plans for providing a viable alternative for legitimate broadband service to our subdivision and if working with Shentel is a viable alternative since they provide service up and down Scruggs road past our subdivision. If you are no longer involved in this effort, please let me know where I should be directing my questions.

Thank you.

Ben Chapman



On Mon, Jun 8, 2020 at 3:42 PM Ben Chapman <ben.chapman6@gmail.com> wrote:
Via email

Mr. Steve Sandy
Director of Planning
Franklin County,
1255 Franklin Street, #103
Rocky Mount, VA 24151

Dear Mr. Sandy:

Since purchasing a home in the Sunset Pointe subdivision, accessed near the end of Scruggs Road, 12 years ago, we have had less than quality Internet service purchased from Century-Link. As the Internet demand has continued to grow, the service continues to degrade. In exploring options of increasing the bandwidth through Century-Link or other viable options such as Shentel or satellite, I have not found a clear direction. Century-Link does not come close to providing the reported bandwidth of their advertised rate, so I am hesitant to double the cost for poor service. Satellite service, while better than it used to be, is not as strong as cable, fiber, etc., with latency and storm issues; and Shentel, while very close to our property, does not provide service in our sub-division.

For the last year I have been reading about the excitement on the Bedford side of the lake with the implementation of fiber projects and hearing that Franklin County was also working on a broadband solution. To that extent, I have read the *August 2019 Broadband Assessment Plan* for the County, but I have a difficult time understanding how that impacts my property and the potential timing. I am somewhat concerned as it appears our subdivision may be in a "bubble" as their coverage map makes it look like we are in the Shentel service area when in fact we are not. If you call them, their initial reaction is that we are in their coverage area, but after checking, find out we are not. As for Century-Link, I have not seen anything indicating they plan

to increase their ability to provide better service which currently stands at 10 Mbps (advertised, but not deliverable) which even by today's standards is not very robust.

Can you advise what the plans are to provide property owners in Sunset Pointe with a viable alternative for better Internet service? Is there some way the County might work with Shentel to get them to add our sub-division (small sub-division with 17 homes with approximately ~10 lots) to their service area?

Sincerely,

Ben Chapman

170 Sunset Pointe Drive
Moneta, VA 24121

Internet speed test

Mbps download

8.14

Mbps upload

6.50

Latency: 43 ms

Server: Chicago

Your Internet speed is fine.

Your Internet connection should be able to handle streaming an HD video. If multiple devices are

streaming video at the same time, you may run into

some slowdowns.

[LEARN MORE](#)

[TEST AGAIN](#)

[Feedback](#)

Internet speed test

Mbps download

7.68

Mbps upload

3.29

Latency: 74 ms

Server: Chicago

Your Internet speed is fine.

Your Internet connection should be able to handle

streaming an HD video. If multiple devices are

streaming video at the same time, you may run into

some slowdowns.

[LEARN MORE](#)

[TEST AGAIN](#)

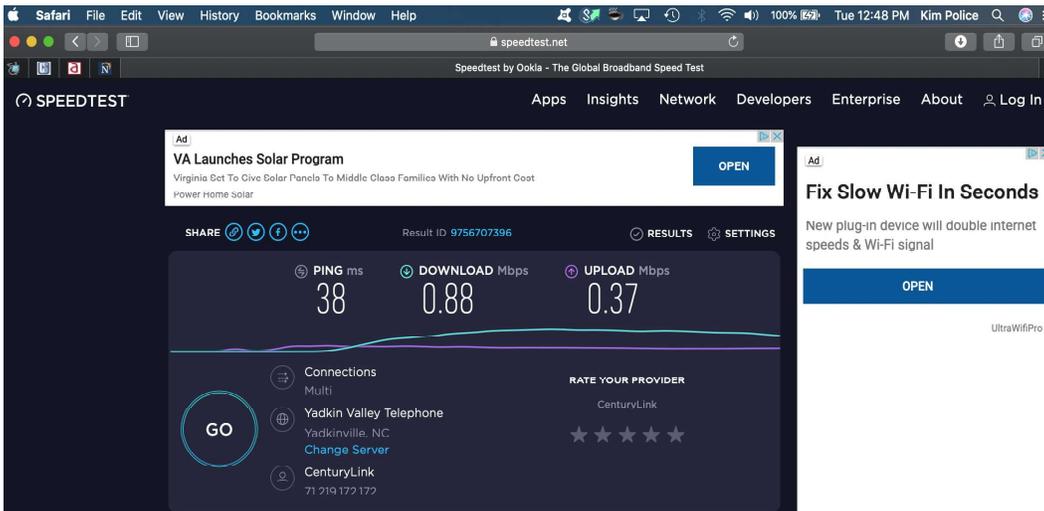
Sandy, Steve

From: Kimberly Najduch <knajduch@ferrum.edu>
Sent: Tuesday, July 14, 2020 12:58 PM
To: Sandy, Steve
Subject: Re: K. Najduch: Woods Edge Sub Division - Shentel Expansion

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Steve -
Just got home and about to be on a zoom call (hopefully)
Here is a speed test - I am paying for 10Mb service.

If you would like me to run another at different times of the day - just let me know. I am happy to help!
I know the whole neighborhood appreciates the consideration of being included.
Kimberly



"Very often out of adversity that's when the best work comes." - Tom Cochrane
★ Create an Amazing Day ★

Kimberly J. Najduch
Registrar
SEVIS PDSO
11 John Wesley Hall
Office: [540.365.4275](tel:540.365.4275) • Cell: [540.420.5800](tel:540.420.5800)
Email: knajduch@ferrum.edu • Online: www.ferrum.edu

On Tue, Jul 14, 2020 at 10:24 AM Sandy, Steve <Steve.Sandy@franklincountyva.gov> wrote:

Ok great. Thanks!!

Steve



Result ID 9757516149

RESULTS

PING ms

34

DOWNLOAD Mbps

3.42

UPLOAD Mbps

0.67



Connections

Multi



CenturyLink

Charlottesville, VA

[Change Server](#)



CenturyLink

184.6.12.15

HOW LIKELY IS IT THAT YOU
RECOMMEND CENTURYLINK TO A
COLLEAGUE?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Not at all likely

E

Internet speed test



4.50
Mbps download

0.58
Mbps upload

Latency: 107 ms

Server: Washington

Your Internet connection is slow.

Your Internet connection should be able to handle one device at a time streaming a video. If multiple devices are using this connection at the same time, you may run into some slowdowns.

[LEARN MORE](#)

[TEST AGAIN](#)



[Feedback](#)

Sandy, Steve

From: Gail Bolt <gailbolt99@gmail.com>
Sent: Wednesday, July 15, 2020 7:03 PM
To: Sandy, Steve
Subject: Broadband in Sunset Pointe, Moneta 24121

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Mr. Sandy,

We support our subdivision (Sunset Pointe) being on the list for funding from the state to help Shentel extend fiber to our neighborhood. Century Link is the only internet provider available and their service is insufficient.

We own 4 properties in Sunset Pointe, and having reliable and fast internet would be a great asset for us or anyone we might sell to in the future.

Thank you.

Gail and Alton Bolt

Sandy, Steve

From: Ben Chapman <ben.chapman6@gmail.com>
Sent: Monday, June 8, 2020 3:42 PM
To: Sandy, Steve
Subject: Internet Access

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Via email

Mr. Steve Sandy
Director of Planning
Franklin County,
1255 Franklin Street, #103
Rocky Mount, VA 24151

Dear Mr. Sandy:

Since purchasing a home in the Sunset Pointe subdivision, accessed near the end of Scruggs Road, 12 years ago, we have had less than quality Internet service purchased from Century-Link. As the Internet demand has continued to grow, the service continues to degrade. In exploring options of increasing the bandwidth through Century-Link or other viable options such as Shentel or satellite, I have not found a clear direction. Century-Link does not come close to providing the reported bandwidth of their advertised rate, so I am hesitant to double the cost for poor service. Satellite service, while better than it used to be, is not as strong as cable, fiber, etc., with latency and storm issues; and Shentel, while very close to our property, does not provide service in our sub-division.

For the last year I have been reading about the excitement on the Bedford side of the lake with the implementation of fiber projects and hearing that Franklin County was also working on a broadband solution. To that extent, I have read the *August 2019 Broadband Assessment Plan* for the County, but I have a difficult time understanding how that impacts my property and the potential timing. I am somewhat concerned as it appears our subdivision may be in a "bubble" as their coverage map makes it look like we are in the Shentel service area when in fact we are not. If you call them, their initial reaction is that we are in their coverage area, but after checking, find out we are not. As for Century-Link, I have not seen anything indicating they plan to increase their ability to provide better service which currently stands at 10 Mbps (advertised, but not deliverable) which even by today's standards is not very robust.

Can you advise what the plans are to provide property owners in Sunset Pointe with a viable alternative for better Internet service? Is there some way the County might work with Shentel to get them to add our sub-division (small sub-division with 17 homes with approximately ~10 lots) to their service area?

Sincerely,

Ben Chapman

170 Sunset Pointe Drive
Moneta, VA 24121

Sandy, Steve

From: Luke <lubobh2@gmail.com>
Sent: Friday, September 10, 2021 10:22 AM
To: Brian Byrd (Shentel); Jason Durrance (Shentel)
Cc: Sandy, Steve
Subject: Broadband buildout for Windy Gap and Belden Woods

==== CAUTION: This email is from outside Franklin County Government. Total security is not guaranteed. Remember to use safe practices when using email and other technologies. ====

Gentlemen:

I'm Luke Huybrechts, with the Windy Gap property Owners Association. We've "met" on a conference call with Steve Sandy of the Franklin County Broadband Authority in February of this year, and discussed the "Windridge" project to get broadband into the Windy Gap and Belden Woods neighborhoods.

We understand that there is a new funding opportunity for broadband build-out in Franklin County, on a more comprehensive approach than previously. Apparently applications are due Tuesday, 9-14. We are very much interested in having you include our neighborhoods in your application, as we think it would be very much mutually beneficial to Shentel and our neighborhoods.

As you may recall, our neighborhoods have nearly 100 households, mostly concentrated near Windridge Parkway. We are very marginally served by a poorly maintained, intermittent DSL service over 50 year old copper, for which Verizon accepts no new subscribers. Video is mostly by expensive Direct TV, which is difficult because of the forest environment, and cell service is marginal. So, if Shentel were to bring broadband service into the neighborhoods, it would have a high probability of signing up the better part of 100 new long term household customers.

We will be happy to do anything we can in your application efforts. If a letter of interest from the neighborhoods could be helpful, we'll be happy to get that out ASAP. If so, we'd appreciate any guidance on content, and how to address it, and to whom.

We wish you success in your application, and look forward to working with Shentel to bring broadband services into our neighborhoods.

Luke Huybrechts, 540-798-5299,

For the Windy Gap Property Owners Association

Franklin County

VATI 2022 Application

Shentel

Attachment 12

Derivation of Cost (Project Budget)



ATTACHMENT 12 - Derivation of Costs

Product	Total 100%	VATI 40%	Non-VATI 60%	Source of Estimate	Date
Fiber Plant Build	\$ 15,310,020	\$ 6,130,585	\$ 9,179,435	Shentel - please see Attachment 13 for supporting documentation	9/12/2021
Fixed Wireless Small Cells	\$ 6,650,000	\$ 2,662,857	\$ 3,987,143	Shentel - please see Attachment 13 for supporting documentation	9/12/2021
Long Drops at Customer Premise	\$ 2,044,751	\$ 818,779	\$ 1,225,972	Shentel - please see Attachment 13 for supporting documentation	9/12/2021
Core Network Capacity Additions	\$ 550,000	\$ 220,236	\$ 329,764	Shentel - please see Attachment 13 for supporting documentation	9/12/2021
	\$ -	\$ -	\$ -		
PROJECT TOTAL	\$ 24,554,771	\$ 9,832,456	\$ 14,722,315		
	100%	40%	60%		

Franklin County

VATI 2022 Application

Shentel

Attachment 13

Documentation Supporting Project
Costs



Franklin County
A Natural Setting for Opportunity

This attachment has been emailed to VATI as per notification below for FOIA exemption.

Good morning VATI Applicant:

You are receiving this email as a requestor of FOIA exemption for Virginia Telecommunication Initiative (VATI) application materials, or if you have been approved for FOIA exemption for materials you plan to submit as a part of your VATI application.

This email serves as a reminder that all materials that have been approved for FOIA exemption should not be submitted through CAMS. Instead, these documents must be submitted to DHCD at vati@dhcd.virginia.gov, with a subject line denoting FOIA exempt materials.

Please do not hesitate to ask questions for clarification,

DHCD Team

Franklin County

VATI 2022 Application

Shentel

Attachment 14

Two most recent Form 477
Submitted to FCC



Franklin County
A Natural Setting for Opportunity

(RETAIN FOR YOUR RECORDS)
Form 477 Filing Summary

FRN: 0002064145 | Data as of: Dec 31, 2020 | Operations: Non-ILEC | Submission Status: Original - Submitted | Last Updated: Mar 12, 2021 14:44:20

Filer Identification

Section	Question	Response
Filer Information	Company Name	Shentel
	Holding Company Name	Shenandoah Telecommunications Company
	SAC ID	
	499 ID	
Data Contact Information	Data Contact Name	Christina Price
	Data Contact Phone Number	(540) 984-5350
	Data Contact E-mail	christina.price@emp.shentel.com
Emergency Operations Contact Information	Emergency Operations Name	Shentel NOC
	Emergency Operations Phone Number	(540) 984-5531
	Emergency Operations E-mail	shentel-noc@shentel.net
Certifying Official Contact Information	Certifying Official Name	Ed McKay
	Certifying Official Phone Number	(540) 984-5303
	Certifying Official E-mail	ed.mckay@emp.shentel.com

Data Submitted

Form Section	File Name	Date & Time	Number of Rows
Fixed Broadband Deployment	CLEC_Broadband_Coverage.csv	Mar 12, 2021 08:39:53	40195
Fixed Broadband Subscription	CLEC_Broadband_Subscription.csv	Mar 10, 2021 19:01:30	2625
Fixed Voice Subscription	CLEC_Voice_Subscription.csv	Mar 10, 2021 18:57:27	321

Fixed Broadband Deployment

Census Block Counts by State, DBA Name and Technology

State	DBA Name	Technology	Blocks
Kentucky	Shentel	Cable Modem – DOCSIS 3.1	369
		Optical Carrier/Fiber to the End User	238
Maryland	Shentel	Cable Modem – DOCSIS 3.1	578
		Optical Carrier/Fiber to the End User	784
Pennsylvania	Shentel	Optical Carrier/Fiber to the End User	1375

State	DBA Name	Technology	Blocks
Virginia	Beam	Terrestrial Fixed Wireless	4530
	Glo Fiber	Optical Carrier/Fiber to the End User	1690
	Shentel	Cable Modem – DOCSIS 3.1	9320
		Optical Carrier/Fiber to the End User	8520
West Virginia	Canaan Cable TV	Cable Modem – DOCSIS 3.0	141
	Shentel	Cable Modem – DOCSIS 3.0	298
		Cable Modem – DOCSIS 3.1	6099
		Optical Carrier/Fiber to the End User	6253
Total			40195

Fixed Broadband Subscription

Fixed Broadband Subscriptions by State, Technology and End-user Type

State	Technology	Census Tracts	Subscriptions		
			Consumer	Business / Govt	Total
Kentucky	Cable Modem	41	2160	88	2248
Maryland	Cable Modem	45	2205	228	2433
	Optical Carrier/Fiber to the End User	19	0	38	38
Pennsylvania	Optical Carrier/Fiber to the End User	15	0	29	29
Virginia	Cable Modem	1023	62554	6337	68891
	Optical Carrier/Fiber to the End User	606	6103	870	6973
	Terrestrial Fixed Wireless	28	80	0	80
West Virginia	Cable Modem	650	17824	2260	20084
	Optical Carrier/Fiber to the End User	198	3249	382	3631
Total		2625	94175	10232	104407

Fixed Broadband Subscriptions by Bandwidths and End-user Type

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
1.000	0.512	5	0	5
1.000	1.000	0	3	3
1.500	0.512	0	28	28
3.000	0.768	2813	3	2816
4.000	1.500	64	0	64
5.000	1.000	9336	639	9975
5.000	5.000	0	9	9
6.000	1.000	4	0	4

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
8.000	1.500	115	0	115
10.000	2.000	7369	1910	9279
10.000	5.000	36	0	36
10.000	10.000	1608	1554	3162
15.000	3.000	0	107	107
15.000	10.000	2	1138	1140
15.000	15.000	383	10	393
20.000	20.000	0	57	57
22.000	5.000	244	0	244
25.000	3.000	28	0	28
25.000	5.000	3909	903	4812
25.000	10.000	0	1360	1360
25.000	25.000	418	65	483
30.000	30.000	0	28	28
40.000	40.000	0	7	7
50.000	5.000	229	0	229
50.000	10.000	36131	1164	37295
50.000	50.000	343	216	559
60.000	60.000	0	2	2
70.000	70.000	0	3	3
75.000	75.000	0	6	6
80.000	80.000	0	2	2
95.000	95.000	0	1	1
100.000	10.000	2	0	2
100.000	100.000	133	243	376
101.000	10.000	277	382	659
150.000	10.000	22473	93	22566
150.000	150.000	0	44	44
200.000	200.000	47	76	123
250.000	250.000	0	22	22
300.000	10.000	3652	0	3652
300.000	300.000	2480	13	2493
350.000	350.000	0	2	2

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
400.000	400.000	0	3	3
500.000	500.000	0	20	20
700.000	700.000	0	1	1
750.000	750.000	0	4	4
1000.000	10.000	401	15	416
1000.000	1000.000	1672	58	1730
2000.000	2000.000	1	6	7
3000.000	3000.000	0	6	6
5000.000	5000.000	0	7	7
6000.000	6000.000	0	2	2
7000.000	7000.000	0	2	2
10000.000	10000.000	0	18	18
Total		94175	10232	104407

Fixed Broadband Subscriptions by Technology, Bandwidths and End-user Type

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
Cable Modem	1.000	0.512	5	0	5
	1.500	0.512	0	24	24
	3.000	0.768	2721	3	2724
	4.000	1.500	64	0	64
	5.000	1.000	8855	577	9432
	5.000	5.000	0	5	5
	6.000	1.000	4	0	4
	8.000	1.500	115	0	115
	10.000	2.000	6973	1894	8867
	10.000	5.000	36	0	36
	10.000	10.000	1608	1398	3006
	15.000	3.000	0	106	106
	15.000	10.000	1	1068	1069
	15.000	15.000	383	0	383
	22.000	5.000	244	0	244
	25.000	5.000	3637	901	4538
	25.000	10.000	0	1291	1291

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
	25.000	25.000	418	24	442
	50.000	5.000	1	0	1
	50.000	10.000	33852	1134	34986
	50.000	50.000	342	15	357
	100.000	100.000	132	14	146
	101.000	10.000	251	356	607
	150.000	10.000	21212	85	21297
	200.000	200.000	47	0	47
	250.000	250.000	0	7	7
	300.000	10.000	3462	0	3462
	1000.000	10.000	380	11	391
Optical Carrier/Fiber to the End User	1.000	1.000	0	3	3
	1.500	0.512	0	4	4
	3.000	0.768	92	0	92
	5.000	1.000	481	62	543
	5.000	5.000	0	4	4
	10.000	2.000	396	16	412
	10.000	10.000	0	156	156
	15.000	3.000	0	1	1
	15.000	10.000	1	70	71
	15.000	15.000	0	10	10
	20.000	20.000	0	57	57
	25.000	5.000	272	2	274
	25.000	10.000	0	69	69
	25.000	25.000	0	41	41
	30.000	30.000	0	28	28
	40.000	40.000	0	7	7
	50.000	5.000	178	0	178
	50.000	10.000	2279	30	2309
	50.000	50.000	1	201	202
	60.000	60.000	0	2	2
	70.000	70.000	0	3	3

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
	75.000	75.000	0	6	6
	80.000	80.000	0	2	2
	95.000	95.000	0	1	1
	100.000	100.000	1	229	230
	101.000	10.000	26	26	52
	150.000	10.000	1261	8	1269
	150.000	150.000	0	44	44
	200.000	200.000	0	76	76
	250.000	250.000	0	15	15
	300.000	10.000	190	0	190
	300.000	300.000	2480	13	2493
	350.000	350.000	0	2	2
	400.000	400.000	0	3	3
	500.000	500.000	0	20	20
	700.000	700.000	0	1	1
	750.000	750.000	0	4	4
	1000.000	10.000	21	4	25
	1000.000	1000.000	1672	58	1730
	2000.000	2000.000	1	6	7
	3000.000	3000.000	0	6	6
	5000.000	5000.000	0	7	7
	6000.000	6000.000	0	2	2
	7000.000	7000.000	0	2	2
	10000.000	10000.000	0	18	18
Terrestrial Fixed Wireless	25.000	3.000	28	0	28
	50.000	5.000	50	0	50
	100.000	10.000	2	0	2
Total			94175	10232	104407

Fixed Voice Subscription

VGE Lines and VoIP Subscriptions by State and End-user Type

State	Total VGE Lines	Consumer VGE Lines	Total VoIP Subscriptions	Consumer VoIP Subscriptions
Kentucky	0	0	800	724

State	Total VGE Lines	Consumer VGE Lines	Total VoIP Subscriptions	Consumer VoIP Subscriptions
Maryland	0	0	833	502
Pennsylvania	0	0	133	0
Virginia	0	0	18683	8122
West Virginia	0	0	11138	8339
Total	0	0	31587	17687

**Fixed Voice
Subscription
(iVoIP)**

Over-the-top VoIP Subscriptions by State and End-user Type

State	Total	Consumer	Business / Govt
Kentucky	0	0	0
Maryland	0	0	0
Pennsylvania	0	0	0
Virginia	0	0	0
West Virginia	0	0	0
Total	0	0	0

All other VoIP Subscriptions by State, End-user Type, Bundle and Last-mile Medium

State	Total	by End-user Type		by Bundle		by Last-mile Medium			
		Consumer	Business / Government	Sold w/ Internet	Sold w/o Internet	FTTP	Coax	Fixed Wireless	Copper
Kentucky	800	724	76	712	88	0	800	0	0
Maryland	833	502	331	637	196	0	833	0	0
Pennsylvania	133	0	133	133	0	0	133	0	0
Virginia	18683	8122	10561	10869	7814	238	18445	0	0
West Virginia	11138	8339	2799	9276	1862	1140	9998	0	0
Total	31587	17687	13900	21627	9960	1378	30209	0	0

Form 477 Filing Summary

FRN:
0002064145

Data as of:
Jun 30, 2021

Operations:
Non-ILEC

Submission Status:
Original - Submitted

Last Updated:
Aug 30, 2021 04:04
PM

Filer Identification

Section	Field	Response
Filer Information	Company Name	Shentel
	Holding Company Name	Shenandoah Telecommunications Company
	Filing Type	Non-ILEC
	SAC ID	N/A
	499 ID	829505
Data Contact Information	Data Contact Name	Christina Price
	Data Contact Phone Number	(540) 984-5350
	Data Contact E-mail	christina.price@emp.shentel.com
Emergency Operations Contact Information	Emergency Operations Name	Shentel NOC
	Emergency Operations Phone Number	(540) 094-5531
	Emergency Operations E-mail	shentel-noc@shentel.net
Certifying Official Contact Information	Certifying Official Name	Rick Mason
	Certifying Official Phone Number	(540) 984-5164
	Certifying Official E-mail	rick.mason@emp.shentel.com

Data Submitted

Form Section	File Name	Date & Time	Number of Rows
Fixed Broadband Deployment	CLEC Broadband Coverage.csv	Aug 30, 2021 09:02 AM	45,616
Fixed Broadband Subscription	CLEC Broadband Subscription.csv	Aug 29, 2021 03:26 PM	2,953
Fixed Voice Subscription	CLEC Voice Subscription.csv	Aug 29, 2021 03:27 PM	330

Fixed Broadband Deployment

Census Block Counts by State, DBA Name and Technology

State	DBA Name	Technology	Blocks
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State	DBA Name	Technology	Blocks
Kentucky	Shentel	Cable Modem – DOCSIS 3.1	369
		Optical Carrier/Fiber to the End User	238
Maryland	Shentel	Cable Modem – DOCSIS 3.1	578
		Optical Carrier/Fiber to the End User	787
Pennsylvania	Shentel	Optical Carrier/Fiber to the End User	1,437
Virginia	Beam	Terrestrial Fixed Wireless	7,453
	Glo Fiber	Optical Carrier/Fiber to the End User	2,473
	Shentel	Cable Modem – DOCSIS 3.1	9,348
		Optical Carrier/Fiber to the End User	9,868
West Virginia	Beam	Terrestrial Fixed Wireless	204
	Shentel	Cable Modem – DOCSIS 3.0	439
		Cable Modem – DOCSIS 3.1	6,103
		Optical Carrier/Fiber to the End User	6,319
Total			45,616

Fixed Broadband Subscription

Fixed Broadband Subscriptions by State, Technology and End User Type

State	Technology	Census Tracts	Subscriptions		
			Consumer	Business/Govt.	Total
Kentucky	Cable Modem	46	2,172	85	2,257
Maryland	Cable Modem	46	2,294	226	2,520
	Optical Carrier/Fiber to the End User	23	0	33	33
Pennsylvania	Optical Carrier/Fiber to the End User	21	0	23	23
Virginia	Cable Modem	1,079	62,352	8,425	70,777
	Optical Carrier/Fiber to the End User	749	9,717	997	10,714
	Terrestrial Fixed Wireless	81	488	0	488
West Virginia	Cable Modem	693	18,660	2,360	21,020
	Optical Carrier/Fiber to the End User	215	3,398	415	3,813
Total		2,953	99,081	12,564	111,645

Fixed Broadband Subscriptions by Bandwidths and End User Type

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
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Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
1.000	0.512	5	0	5
1.000	1.000	0	2	2
1.500	0.512	0	28	28
3.000	0.768	2,464	3	2,467
4.000	1.500	104	0	104
5.000	1.000	8,337	568	8,905
5.000	5.000	0	5	5
6.000	1.000	3	0	3
8.000	1.500	102	0	102
10.000	2.000	6,438	3,032	9,470
10.000	10.000	0	2,240	2,240
15.000	3.000	368	96	464
15.000	10.000	3	1,075	1,078
15.000	15.000	0	9	9
20.000	20.000	0	52	52
22.000	5.000	359	0	359
25.000	5.000	4,712	1,212	5,924
25.000	10.000	0	1,344	1,344
25.000	25.000	0	21	21
30.000	30.000	0	29	29
40.000	40.000	0	6	6
50.000	5.000	197	0	197
50.000	10.000	39,242	1,373	40,615
50.000	50.000	6	217	223
60.000	60.000	0	2	2
70.000	70.000	0	8	8
75.000	75.000	0	5	5
80.000	80.000	0	2	2
95.000	95.000	0	1	1
100.000	10.000	10	142	152
100.000	20.000	156	14	170
100.000	100.000	1	248	249
101.000	10.000	198	364	562

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
150.000	10.000	24,299	86	24,385
150.000	150.000	0	63	63
200.000	20.000	0	6	6
200.000	25.000	53	0	53
200.000	200.000	0	81	81
250.000	20.000	0	43	43
250.000	250.000	0	20	20
300.000	10.000	4,355	2	4,357
300.000	300.000	3,851	16	3,867
350.000	350.000	0	1	1
400.000	400.000	0	5	5
500.000	20.000	0	10	10
500.000	500.000	0	31	31
700.000	700.000	0	1	1
750.000	750.000	0	7	7
1,000.000	10.000	526	13	539
1,000.000	1,000.000	3,289	48	3,337
2,000.000	2,000.000	3	7	10
2,500.000	2,500.000	0	1	1
3,000.000	3,000.000	0	5	5
5,000.000	5,000.000	0	5	5
6,000.000	6,000.000	0	2	2
7,000.000	7,000.000	0	3	3
10,000.000	10,000.000	0	10	10
Total		99,081	12,564	111,645

Fixed Broadband Subscriptions by Technology, Bandwidths and End User Type

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
Cable Modem	1.000	0.512	5	0	5
	1.500	0.512	0	24	24
	3.000	0.768	2,385	3	2,388
	4.000	1.500	104	0	104
	5.000	1.000	7,905	506	8,411

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
	5.000	5.000	0	4	4
	6.000	1.000	3	0	3
	8.000	1.500	102	0	102
	10.000	2.000	6,083	2,962	9,045
	10.000	10.000	0	2,097	2,097
	15.000	3.000	368	95	463
	15.000	10.000	3	1,001	1,004
	22.000	5.000	359	0	359
	25.000	5.000	4,207	1,185	5,392
	25.000	10.000	0	1,276	1,276
	50.000	10.000	36,329	1,311	37,640
	100.000	10.000	0	133	133
	100.000	20.000	155	14	169
	101.000	10.000	180	337	517
	150.000	10.000	22,638	77	22,715
	200.000	20.000	0	6	6
	200.000	25.000	53	0	53
	250.000	20.000	0	41	41
	300.000	10.000	4,102	2	4,104
	500.000	20.000	0	9	9
	1,000.000	10.000	497	13	510
Optical Carrier/Fiber to the End User	1.000	1.000	0	2	2
	1.500	0.512	0	4	4
	3.000	0.768	79	0	79
	5.000	1.000	432	62	494
	5.000	5.000	0	1	1
	10.000	2.000	355	70	425
	10.000	10.000	0	143	143
	15.000	3.000	0	1	1
	15.000	10.000	0	74	74
	15.000	15.000	0	9	9
	20.000	20.000	0	52	52

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
	25.000	5.000	353	27	380
	25.000	10.000	0	68	68
	25.000	25.000	0	21	21
	30.000	30.000	0	29	29
	40.000	40.000	0	6	6
	50.000	5.000	197	0	197
	50.000	10.000	2,596	62	2,658
	50.000	50.000	5	217	222
	60.000	60.000	0	2	2
	70.000	70.000	0	8	8
	75.000	75.000	0	5	5
	80.000	80.000	0	2	2
	95.000	95.000	0	1	1
	100.000	10.000	0	9	9
	100.000	100.000	1	248	249
	101.000	10.000	18	27	45
	150.000	10.000	1,655	9	1,664
	150.000	150.000	0	63	63
	200.000	200.000	0	81	81
	250.000	20.000	0	2	2
	250.000	250.000	0	20	20
	300.000	10.000	252	0	252
	300.000	300.000	3,851	16	3,867
	350.000	350.000	0	1	1
	400.000	400.000	0	5	5
	500.000	20.000	0	1	1
	500.000	500.000	0	31	31
	700.000	700.000	0	1	1
	750.000	750.000	0	7	7
	1,000.000	10.000	29	0	29
	1,000.000	1,000.000	3,289	48	3,337
	2,000.000	2,000.000	3	7	10

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
	2,500.000	2,500.000	0	1	1
	3,000.000	3,000.000	0	5	5
	5,000.000	5,000.000	0	5	5
	6,000.000	6,000.000	0	2	2
	7,000.000	7,000.000	0	3	3
	10,000.000	10,000.000	0	10	10
Terrestrial Fixed Wireless	25.000	5.000	152	0	152
	50.000	10.000	317	0	317
	50.000	50.000	1	0	1
	100.000	10.000	10	0	10
	100.000	20.000	1	0	1
	150.000	10.000	6	0	6
	300.000	10.000	1	0	1
Total			99,081	12,564	111,645

Fixed Voice Subscription

VGE Lines and VoIP Subscriptions by State and End User Type

State	Total VGE Lines	Consumer VGE Lines	Total VoIP Subscriptions	Consumer VoIP Subscriptions
Kentucky	0	0	783	700
Maryland	0	0	842	503
Pennsylvania	0	0	169	0
Virginia	0	0	20,339	8,200
West Virginia	0	0	11,162	8,339
Total	0	0	33,295	17,742

Fixed Voice Subscription (iVoIP)

Over-the-Top VoIP Subscriptions by State and End User Type

State	Total	Consumer	Business/Govt.
Kentucky	0	0	0
Maryland	0	0	0
Pennsylvania	0	0	0

State	Total	Consumer	Business/Govt.
Virginia	0	0	0
West Virginia	0	0	0
Total	0	0	0

All Other VoIP Subscriptions by State, End User Type, Bundle and Last-Mile Medium

State	Total	by End User Type		by Bundle		by Last-Mile Medium			
		Consumer	Business/Govt.	Sold w/ Internet	Sold w/o Internet	FTTP	Coax	Fixed Wireless	Copper
Kentucky	783	700	83	614	169	0	783	0	0
Maryland	842	503	339	673	169	0	842	0	0
Pennsylvania	169	0	169	169	0	169	0	0	0
Virginia	20,339	8,200	12,139	17,868	2,471	1,456	18,883	0	0
West Virginia	11,162	8,339	2,823	7,673	3,489	2,038	9,124	0	0
Total	33,295	17,742	15,553	26,997	6,298	3,663	29,632	0	0

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Form 477 Filing Summary

FRN: 0002072668 | Data as of: Dec 31, 2020 | Operations: ILEC | Submission Status: Revised - Submitted | Last Updated: Mar 8, 2021 13:49:25

Filer Identification

Section	Question	Response
Filer Information	Company Name	Shenandoah Telephone Company
	Holding Company Name	Shenandoah Telecommunications Company
	SAC ID	190250, 197251
	499 ID	802200
Data Contact Information	Data Contact Name	Danielle Brooks
	Data Contact Phone Number	(540) 984-5389
	Data Contact E-mail	danielle.brooks@emp.shentel.com
Emergency Operations Contact Information	Emergency Operations Name	Harris Duncan
	Emergency Operations Phone Number	(540) 984-5838
	Emergency Operations E-mail	Harris.Duncan@emp.shentel.com
Certifying Official Contact Information	Certifying Official Name	Ed McKay
	Certifying Official Phone Number	(540) 984-5303
	Certifying Official E-mail	ed.mckay@emp.shentel.com

Data Submitted

Form Section	File Name	Date & Time	Number of Rows
Fixed Broadband Deployment	ILEC Broadband Coverage_Deployment.csv	Mar 8, 2021 13:41:33	4997
Fixed Broadband Subscription	ILEC Broadband Subscription.csv	Mar 8, 2021 13:46:36	160
Fixed Voice Subscription	ILEC Voice Subscription.csv	Mar 8, 2021 13:41:33	16

Fixed Broadband Deployment

Census Block Counts by State, DBA Name and Technology

State	DBA Name	Technology	Blocks
Virginia	Shentel	ADSL2	2012
		Optical Carrier/Fiber to the End User	973
		Other Copper Wireline	2012
Total			4997

**Fixed
Broadband
Subscription**

Fixed Broadband Subscriptions by State, Technology and End-user Type

State	Technology	Census Tracts	Subscriptions		
			Consumer	Business / Govt	Total
Virginia	Asymmetric xDSL	94	6620	463	7083
	Optical Carrier/Fiber to the End User	65	191	118	309
	Other Copper Wireline	1	0	1	1
Total		160	6811	582	7393

Fixed Broadband Subscriptions by Bandwidths and End-user Type

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
0.384	0.128	29	3	32
0.768	0.512	58	2	60
1.500	0.512	393	18	411
1.500	1.500	0	1	1
3.000	0.768	1665	104	1769
5.000	0.768	1249	204	1453
5.000	1.000	8	0	8
10.000	1.000	1609	107	1716
10.000	10.000	0	21	21
15.000	1.000	1654	25	1679
15.000	15.000	0	11	11
20.000	20.000	0	22	22
25.000	5.000	10	0	10
25.000	25.000	0	10	10
30.000	30.000	0	1	1
50.000	10.000	111	0	111
50.000	50.000	0	28	28
70.000	70.000	0	1	1
100.000	100.000	0	13	13
101.000	10.000	18	0	18
125.000	125.000	0	1	1
150.000	10.000	6	0	6
200.000	200.000	0	5	5
300.000	300.000	0	1	1
1000.000	10.000	1	0	1

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
1000.000	1000.000	0	4	4
Total		6811	582	7393

Fixed Broadband Subscriptions by Technology, Bandwidths and End-user Type

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
Asymmetric xDSL	0.384	0.128	29	3	32
	0.768	0.512	58	2	60
	1.500	0.512	393	18	411
	3.000	0.768	1665	104	1769
	5.000	0.768	1249	204	1453
	10.000	1.000	1583	107	1690
	15.000	1.000	1643	25	1668
Optical Carrier/Fiber to the End User	5.000	1.000	8	0	8
	10.000	1.000	26	0	26
	10.000	10.000	0	21	21
	15.000	1.000	11	0	11
	15.000	15.000	0	11	11
	20.000	20.000	0	22	22
	25.000	5.000	10	0	10
	25.000	25.000	0	10	10
	30.000	30.000	0	1	1
	50.000	10.000	111	0	111
	50.000	50.000	0	28	28
	70.000	70.000	0	1	1
	100.000	100.000	0	13	13
	101.000	10.000	18	0	18
	125.000	125.000	0	1	1
	150.000	10.000	6	0	6
	200.000	200.000	0	5	5
	300.000	300.000	0	1	1
	1000.000	10.000	1	0	1
	1000.000	1000.000	0	4	4
Other Copper Wireline	1.500	1.500	0	1	1
Total			6811	582	7393

**Fixed Voice
Subscription**

VGE Lines and VoIP Subscriptions by State and End-user Type

State	Total VGE Lines	Consumer VGE Lines	Total VoIP Subscriptions	Consumer VoIP Subscriptions
Virginia	12070	8749	0	0
Total	12070	8749	0	0

**Fixed Voice
Subscription
(VGE Lines)**

VGE Lines Provided to Unaffiliated Providers by State

State	Wholesale	UNE-L
Virginia	0	0
Total	0	0

VGE Lines Provided to End Users by State, Bundle and Product Type

State	Total	by Bundle		by Product Type			
		Sold w/ Internet	Sold w/o Internet	Consumer		Bus-Govt	
				& No PIC	& PIC	& No PIC	& PIC
Virginia	12070	4473	7597	1656	7093	628	2693
Total	12070	4473	7597	1656	7093	628	2693

VGE Lines Provided to End Users by State, Ownership and Last-mile Medium

State	Total	by Ownership			by Last-mile Medium			
		Owned	UNE-L	Resale	FTTP	Coax	Fixed Wireless	Copper
Virginia	12070	12070	0	0	1753	0	0	10317
Total	12070	12070	0	0	1753	0	0	10317

Form 477 Filing Summary

FRN:
0002072668

Data as of:
Jun 30, 2021

Operations:
ILEC

Submission Status:
Revised - Submitted

Last Updated:
Aug 31, 2021 09:56
AM

Filer Identification

Section	Field	Response
Filer Information	Company Name	Shenandoah Telephone Company
	Holding Company Name	Shenandoah Telecommunications Company
	Filing Type	ILEC
	SAC ID	190250,197251
	499 ID	802200
Data Contact Information	Data Contact Name	Danielle Brooks
	Data Contact Phone Number	(540) 984-5389
	Data Contact E-mail	danielle.brooks@emp.shentel.com
Emergency Operations Contact Information	Emergency Operations Name	Shentel NOC
	Emergency Operations Phone Number	(540) 984-5531
	Emergency Operations E-mail	shentel-noc@shentel.com
Certifying Official Contact Information	Certifying Official Name	Rick Mason
	Certifying Official Phone Number	(540) 984-5164
	Certifying Official E-mail	rick.mason@emp.shentel.com

Data Submitted

Form Section	File Name	Date & Time	Number of Rows
Fixed Broadband Deployment	ILEC Broadband Coverage.csv	Aug 31, 2021 09:49 AM	5,016
Fixed Broadband Subscription	ILEC Broadband Subscription.csv	Aug 31, 2021 09:52 AM	158
Fixed Voice Subscription	ILEC Voice Subscription.csv	Aug 31, 2021 09:49 AM	16

Fixed Broadband Deployment

Census Block Counts by State, DBA Name and Technology

State	DBA Name	Technology	Blocks
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State	DBA Name	Technology	Blocks
Virginia	Shentel	ADSL2	2,012
		Optical Carrier/Fiber to the End User	992
		Other Copper Wireline	2,012
Total			5,016

Fixed Broadband Subscription

Fixed Broadband Subscriptions by State, Technology and End User Type

State	Technology	Census Tracts	Subscriptions		
			Consumer	Business/Govt.	Total
Virginia	Asymmetric xDSL	92	6,398	440	6,838
	Optical Carrier/Fiber to the End User	66	230	124	354
Total		158	6,628	564	7,192

Fixed Broadband Subscriptions by Bandwidths and End User Type

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
0.384	0.128	25	3	28
0.768	0.512	52	2	54
1.500	0.512	347	14	361
1.500	1.500	0	1	1
3.000	0.768	1,463	99	1,562
5.000	0.768	1,132	189	1,321
10.000	1.000	1,621	108	1,729
10.000	10.000	0	17	17
15.000	1.000	1,758	25	1,783
15.000	15.000	0	6	6
20.000	20.000	0	21	21
25.000	5.000	20	2	22
25.000	25.000	0	5	5
30.000	30.000	0	5	5
50.000	10.000	183	0	183
50.000	50.000	0	35	35
70.000	70.000	0	1	1

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
100.000	100.000	0	17	17
101.000	10.000	21	1	22
125.000	125.000	0	1	1
200.000	200.000	0	6	6
300.000	10.000	3	0	3
300.000	300.000	0	3	3
1,000.000	10.000	3	0	3
1,000.000	1,000.000	0	3	3
Total		6,628	564	7,192

Fixed Broadband Subscriptions by Technology, Bandwidths and End User Type

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
Asymmetric xDSL	0.384	0.128	25	3	28
	0.768	0.512	52	2	54
	1.500	0.512	347	14	361
	3.000	0.768	1,463	99	1,562
	5.000	0.768	1,132	189	1,321
	10.000	1.000	1,621	108	1,729
	15.000	1.000	1,758	25	1,783
Optical Carrier/Fiber to the End User	1.500	1.500	0	1	1
	10.000	10.000	0	17	17
	15.000	15.000	0	6	6
	20.000	20.000	0	21	21
	25.000	5.000	20	2	22
	25.000	25.000	0	5	5
	30.000	30.000	0	5	5
	50.000	10.000	183	0	183
	50.000	50.000	0	35	35
	70.000	70.000	0	1	1
	100.000	100.000	0	17	17
	101.000	10.000	21	1	22
	125.000	125.000	0	1	1
	200.000	200.000	0	6	6

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
	300.000	10.000	3	0	3
	300.000	300.000	0	3	3
	1,000.000	10.000	3	0	3
	1,000.000	1,000.000	0	3	3
Total			6,628	564	7,192

Fixed Voice Subscription

VGE Lines and VoIP Subscriptions by State and End User Type

State	Total VGE Lines	Consumer VGE Lines	Total VoIP Subscriptions	Consumer VoIP Subscriptions
Virginia	11,659	8,468	0	0
Total	11,659	8,468	0	0

Fixed Voice Subscription (VGE Lines)

VGE Lines Provided to Unaffiliated Providers by State

State	Wholesale	UNE-L
Virginia	0	0
Total	0	0

VGE Lines Provided to End Users by State, Bundle and Product Type

State	Total	by Bundle		by Product Type			
		Sold w/ Internet	Sold w/o Internet	Consumer		Business/Govt.	
				& No PIC	& PIC	& No PIC	& PIC
Virginia	11,659	4,158	7,501	1,580	6,888	596	2,595
Total	11,659	4,158	7,501	1,580	6,888	596	2,595

VGE Lines Provided to End Users by State, Ownership and Last-Mile Medium

State	Total	by Ownership			by Last-Mile Medium			
		Owned	UNE-L	Resale	FTTP	Coax	Fixed Wireless	Copper
Virginia	11,659	11,659	0	0	1,839	0	0	9,820
Total	11,659	11,659	0	0	1,839	0	0	9,820

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Franklin County

VATI 2022 Application

Shentel

Attachment 17

Shentel Marketing Examples



Franklin County
A Natural Setting for Opportunity

Marketing & Citizen Engagement Plan

Frederick County, MD



Marketing & Citizen Engagement Plan

Timeline

Franchise agreement signed: Press Release

90 Days prior to construction: post on our Glo Fiber social media pages

60 Days prior to construction: Direct Mail to LCPs announcing Glo Fiber beginning construction

60 Days prior to construction: Media efforts

30 Days prior to construction: Launch Press Release

30 Days prior to construction: Construction door tags

3-Days prior to construction: Construction imminent door tags

Construction Start Date: Coming Soon Digital Ads

Construction Start Date: Email to pre-registered leads

30 Days before LCP is Active: Direct Mail to LCPs with special offer

Construction progress: Email to pre-registered leads

Service Available: Email to pre-registered leads

Installation: Yard stake

Marketing & Citizen Engagement Plan

90 days prior to construction

Social Media

- Post on Glo Fiber Facebook and Instagram pages
- Text with post would provide more detail of availability
- Image provided to municipality to post on their social media pages



Sample

Marketing & Citizen Engagement Plan

60 days prior to construction

Direct Mail

- Sent to all households in the LCP slated for construction in the next 60 days
- Introduction to Glo Fiber
- 6x9 double-sided, folded mail piece

Front

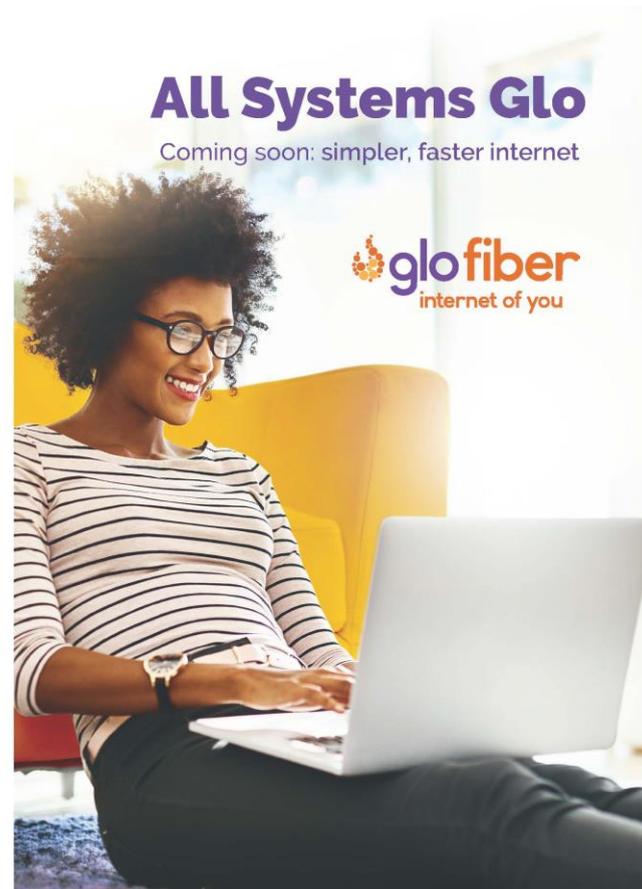
PRESORTED
STANDARD
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U.S. POSTAGE
PAID
GLOFIBER

GLO_20

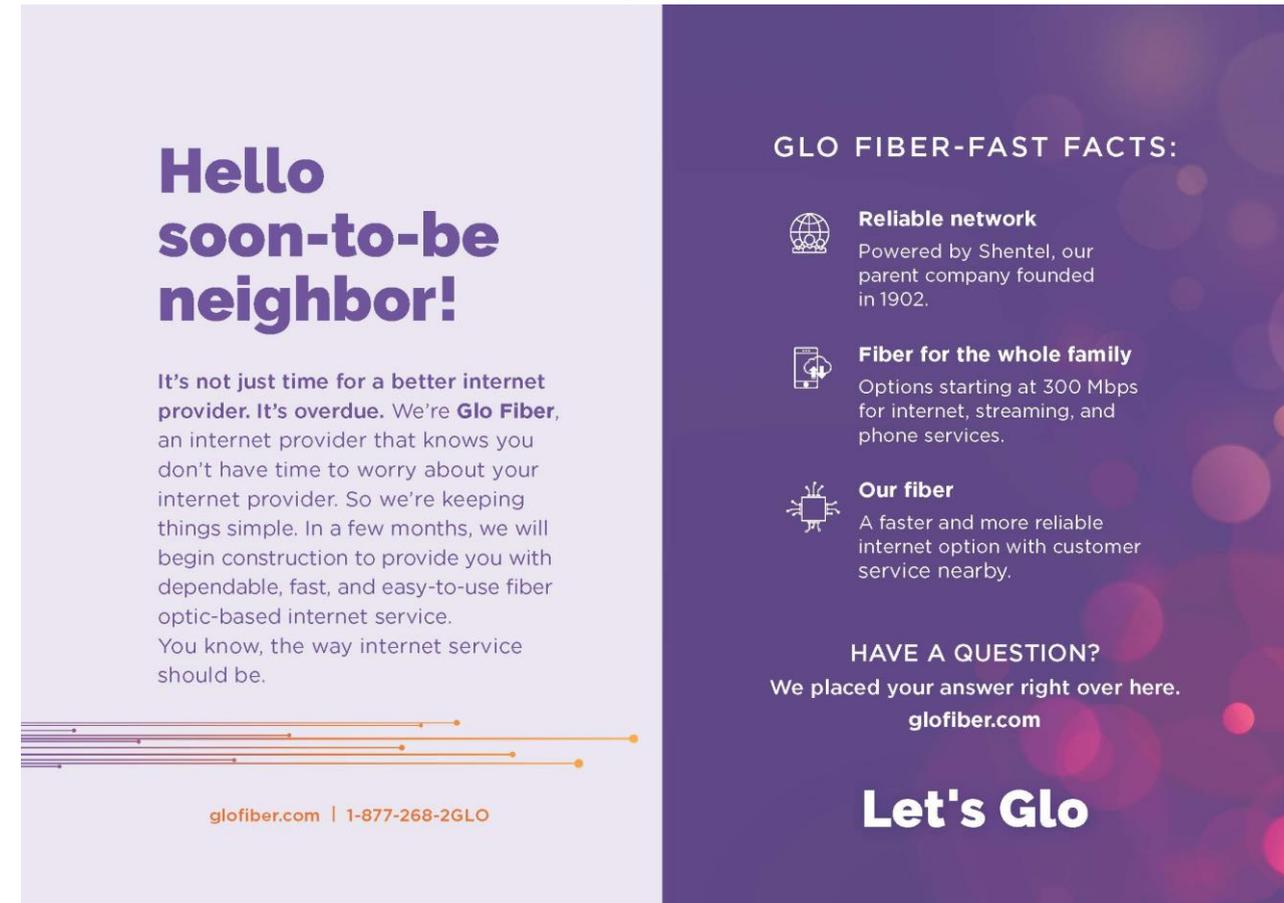
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*Service not available in all areas. Subject to eligibility guidelines and other restrictions may apply.
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glo fiber
internet of you
20 S Mason Street
Harrisonburg VA, 22801



Back



Marketing & Citizen Engagement Plan

30 days prior to construction

Door Tags

- Deployed by D2D team
- All households in the LCP slated for construction in the next 30 days are tagged
- Provides basic overview of construction process and service offerings
- Website listed on door tag will provide more detailed information



We will start upgrading your neighborhood in the next 2-3 weeks
Ready to experience fiber optic Internet at the speed of light?

Construction Steps:

- Step 1:** Glo Fiber works with your local municipality to design the fiber-optic route.
- Step 2:** Glo Fiber or a Glo Fiber Contractor will be working on or around your property to place fiber optic lines. All work performed on private property is completed within a utility easement or public right-of-way. If our equipment or lines are located in a backyard utility easement, crews may require access to that easement. Flags and paint marking the existing utilities and digging will be required.
- Step 3:** Glo Fiber returns to splice the fiber that will connect your home. Glo Fiber then tests the connection.
- Step 4:** When you request service, Glo Fiber connects the fiber to your home in preparation for your install.

To learn more, please visit:
glofiber.com/construction



Fiber Internet

- Internet speeds that fit your lifestyle, up to 2 Gbps.
- Fiber to the home connection provides a high speed, bandwidth rich network. Get upload speeds as fast as your download speeds making the sharing of content faster.
- Wall to wall WiFi blankets your home in fast, reliable WiFi.

Streaming TV

- App based TV allows you to bring your own device. Use your Apple TV, Amazon Fire TV, mobile devices or some Smart TVs without the need for an additional cable box.
- Tailored show recommendations and parental controls.
- Watch your recordings and some of your channels on the go. Set recordings from your phone.

Fiber Phone

- Keep your existing number
- Crystal clear conversations
- Premium features come standard like call waiting, unlimited long distance, 3 way calling and robocall blocker.

Marketing & Citizen Engagement Plan

3 days prior to construction

Door Tags

- Deployed by Construction team
- All households in the LCP slated for construction in the next 3 days are tagged
- Provides update construction process and what to expect during that time
- Website listed on door tag will provide more detailed information

glo fiber

Get Ready!

Construction is about to begin in your area!

In the next few days, Glo Fiber or a Glo Fiber Contractor will be working on or around your property to place fiber optic lines. All work performed on private property is completed within an easement or right-of-way. Crews may need access to a backyard if it falls within that easement.

You may notice flags and/or paint markings indicating the proposed path of the new cable and the location of the existing utilities on your property. These markings are required by law.

Please be advised that private lines are unable to be marked. If you have any private underground lines, you will need to mark those lines to avoid any damage to those facilities.

Our goal is to perform the work safely and cause as little disruption as possible. Our typical work hours are Monday through Saturday 7:30 am to 5 pm.

For more information, please visit or call
glofiber.com/construction
540-984-5510

brought to you by Shentel



Fiber Internet

- Internet speeds that fit your lifestyle, up to 2 Gbps.
- Fiber to the home connection provides a high speed, bandwidth rich network. Get upload speeds as fast as your download speeds making the sharing of content faster.
- Wall to wall WIFI blankets your home in fast, reliable WIFI.

Streaming TV

- App based TV allows you to bring your own device. Use your Apple TV, Amazon Fire TV, mobile devices or some Smart TVs without the need for an additional cable box.
- Tailored show recommendations and parental controls.
- Watch your recordings and some of your channels on the go. Set recordings from your phone.

Fiber Phone

- Keep your existing number.
- Crystal clear conversations.
- Premium features come standard like call waiting, unlimited long distance, 3 way calling and robocall blocker.

Marketing & Citizen Engagement Plan

Construction start date

Coming Soon Digital Ad

- Geotargeted to zip codes/neighborhoods that will be getting Glo Fiber
- Learn more button linked to Glo Fiber website for more information. User can check for serviceability and pre-register for updates

Digital Ad - Sample



Marketing & Citizen Engagement Plan

Various stages throughout construction process

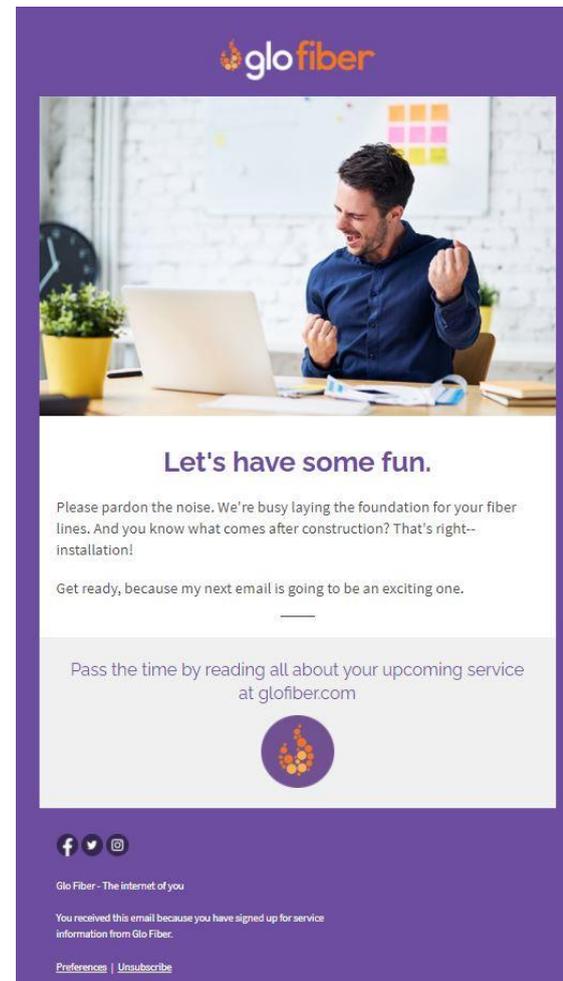
Email notifications

- Sent to those that pre-register on Glo Fiber website informing of construction progress

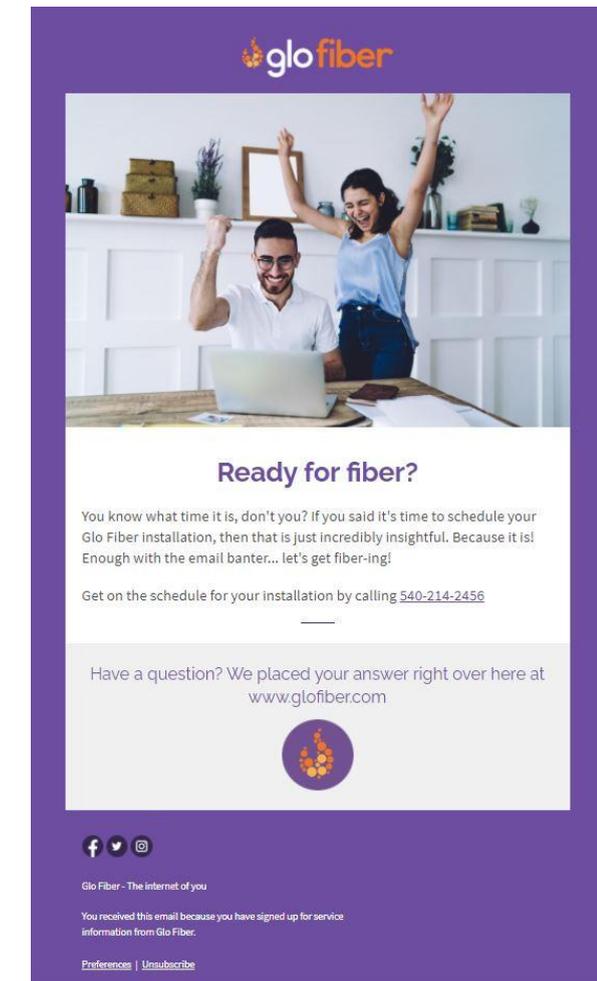
Construction start date



Construction in progress Email



Service Available



Marketing & Citizen Engagement Plan

30 days before LCP is active

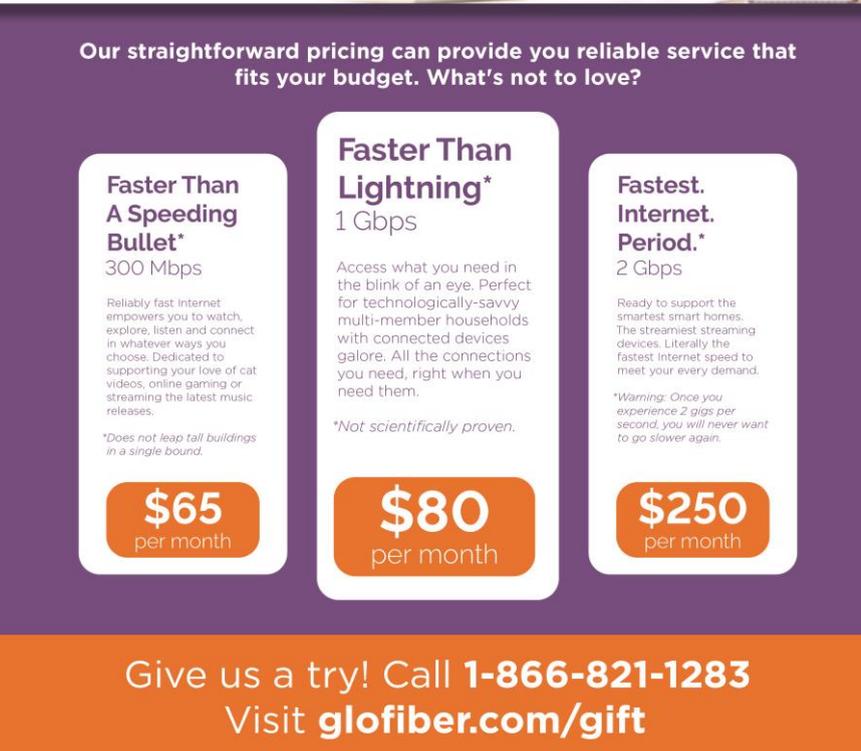
Direct Mail

- Sent to all households in the active LCP
- Special offer as incentive to try Glo Fiber
- 6x9 double-sided, folded mail piece

Front



Back



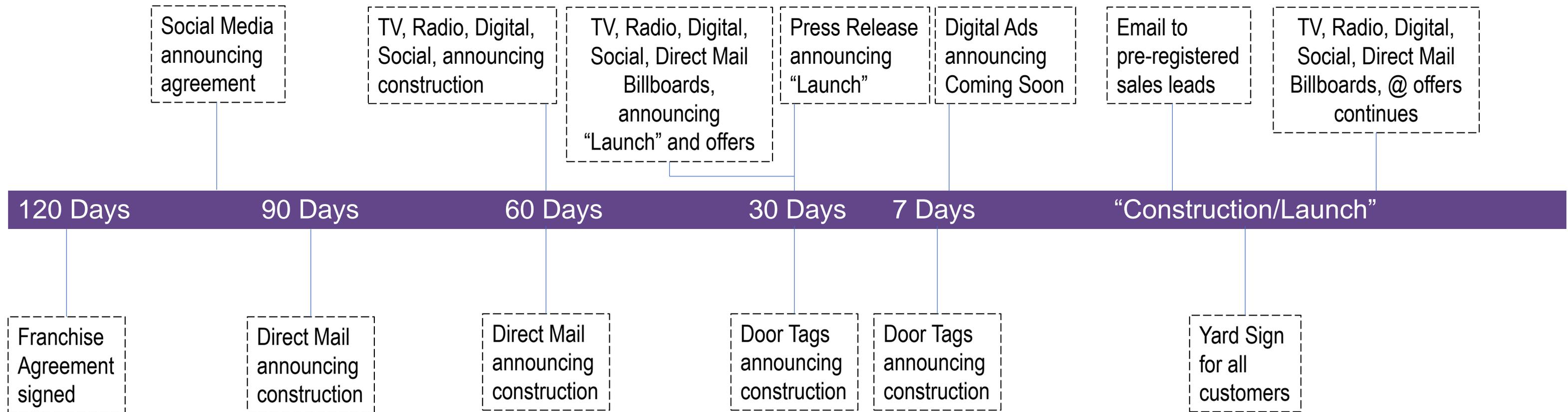
Marketing & Citizen Engagement Plan

Installation

Yard Stake

- Used after installation in homeowner's yard
- Homeowner approval required





Marketing & Citizen Engagement Plan



Marketing & Citizen Engagement Plan

Timeline

- **30 - 60 days prior to launch:** PR outreach to local media outlets & social media posts on local pages announcing coverage areas that will soon be launched.
- **30 days prior to launch:** Digital ad campaign geo fenced to focus on the coverage area, utilizing a “Coming Soon” theme. Social Media also shifts in its messaging.
- **At launch:** Direct mail letters are sent, targeting serviceable households in the new coverage area. Digital ads, social media, Online search terms, billboards, updated press release and local marketing representatives place flyers and signs in public areas and businesses.
- **Post launch:** In the weeks and months that follow, a second direct mail campaign is launched targeting the new coverage area, digital ads and social media continue, as does the placement of yard stake signs and marketing materials in local businesses and other public gathering places.

Marketing & Citizen Engagement Plan

30 - 60 Days prior to launch

- **Public Relations Local Outreach**
- PR agency reaches out to local media outlets with pre-launch information about Beam.
- PR agency also pitches providing access to key Subject Matter Experts at Shentel for follow-up questions and additional news content and articles.
- Local newspaper(s), TV, radio stations, Chamber of Commerce, etc.



Marketing & Citizen Engagement Plan

30 Days prior to launch

- **Social Media**
- Post on Beam Facebook and Instagram pages.
- Posts would provide additional details regarding benefits and availability.
- Posts can link to the Beam website, where local addresses can be checked for serviceability and pre-registration.



Pre-launch graphic example.

Marketing & Citizen Engagement Plan

30 Days prior to launch

- **Coming Soon Digital Ads**
- Geo-targeted to zip codes/neighborhoods that will be getting Beam.
- Learn more button linked to the Beam website for more information. User can check for serviceability and pre-register.



Marketing & Citizen Engagement Plan

30 Days prior to launch

- **Coming Soon Social Media Posts**
- Geotargeted to zip codes/neighborhoods that will be getting Beam
- Learn more button linked to the Beam website for more information. User can check for serviceability and pre-register



Pre-launch graphic example.

Marketing & Citizen Engagement Plan

At launch

- Direct Mail
- Traditional letter to provide thorough content and frequently asked questions & answers.
- Sent to all households in the new coverage area.
- Provides a strong call to action and follow-up contact information.

beam-
internet by shentel

Hey Neighbor,
We're bringing a new high-speed internet option to your area. Say hello to **Beam Internet, by Shentel**.

We believe everyone should have access to high quality and reliable high-speed internet, regardless of where they live. That's why Shentel is working to expand affordable high-speed internet options in the areas we serve. We'll beam a signal directly to your house, so you can have reliable connectivity without paying a fortune.

Beam offers three service options. You can get speeds up to **25 Mbps for \$60 a month**, up to **50 Mbps for \$80 a month**, or up to **100 Mbps for \$160 a month**. These prices include all of your equipment and your service, so you won't get any surprises on your bill.

Sincerely,
Angela T. Washington
Angela T. Washington
Vice President of Marketing

Wanna learn more?
Visit iwantbeam.com/hello
or call **(866) 583-1730**

How It Works

- 1. Inspection**
A technician will come measure the Beam signal strength around your home to figure out which speeds are available to you, and where equipment would need to be placed to receive the best possible signal.
- 2. Installation**
Our technician will install a receiver the size of a small pizza box on your home. We'll work with you to find the best place for it, based on your preferences and signal strength. We'll also install a WiFi router and power supply inside your home. All of this equipment is included at no additional cost to your monthly rate.
- 3. Experience**
We'll help you connect your devices to your new WiFi network, so you can begin enjoying faster internet speeds than you may have ever thought possible!

beam-
internet by shentel
500 Shentel Way
Edinburg, VA 22824

A new option for fast, reliable internet in your area!

Plans starting at **\$60/month**
Speeds up to **100 Mbps**

What is Beam?
Beam is a brand new high-speed internet service. We beam a signal to your house wirelessly from a nearby tower. This enables Beam's internet signal to reach people who haven't been eligible for other internet services in the past.

Who can get it?
To be eligible for Beam Internet, your home needs to be within range of one of our towers. Before you pay anything, we'll send out a technician to make sure your home can get a strong signal.

How is this better than DSL?
DSL usually has a maximum speed of 15 Mbps for users. Depending on your location, Beam can provide speeds from around 25 Mbps up to 100 Mbps.

I've heard about these kinds of services before. What makes Beam different?
Other providers use a shared spectrum, which can make internet access spotty and unreliable when a large number of people, businesses and electronic devices are using that spectrum at the same time. To solve this issue we have invested in our own licensed spectrum, so you won't be competing for internet access because only Beam customers are on our network. Plus, with Beam's high powered network, external interference and most weather conditions won't affect your internet access.

How reliable is the service?
Reliability is our first priority. We work hard to keep you from dealing with service interruptions, and pride ourselves in being able to offer a reliable product. However due to the technology used, sometimes things outside of our control can occasionally cause your internet speed to vary. Therefore you will likely not see the maximum speeds at all times.

Do I need a clear line of sight to a tower?
Not necessarily. The signal we use can beam through many obstacles. However, there are some things that will block service, such as rock, metal buildings and dense tree growth. We can't be 100% certain about availability until a technician tests the signal strength at your house.

What speed is best for me?
Every household is different and has different internet needs.

- Our entry-level service (up to 25 Mbps) is great for homes with a few internet users who only need basic web browsing and email.
- The mid-level package (up to 50 Mbps) is better for households that'll be streaming, gaming, learning, or working from home and have a few connected devices.
- Our fastest package (up to 100 Mbps) keeps families with a lot of streaming, gaming, and smart home devices connected without compromise.

What about other services?
We're currently focused on building a high quality, high-speed internet network for those who need it most. However, we are looking to provide phone service in the near future.

How long have you been in business?
Shentel, our parent company, has been offering telecommunications services for over 100 years. Everything we do is based on our core belief that everyone deserves access to high-quality services, regardless of where they live. Beam is the next step in this Shentel tradition, expanding options for reliable high-speed internet to places that couldn't get it before.

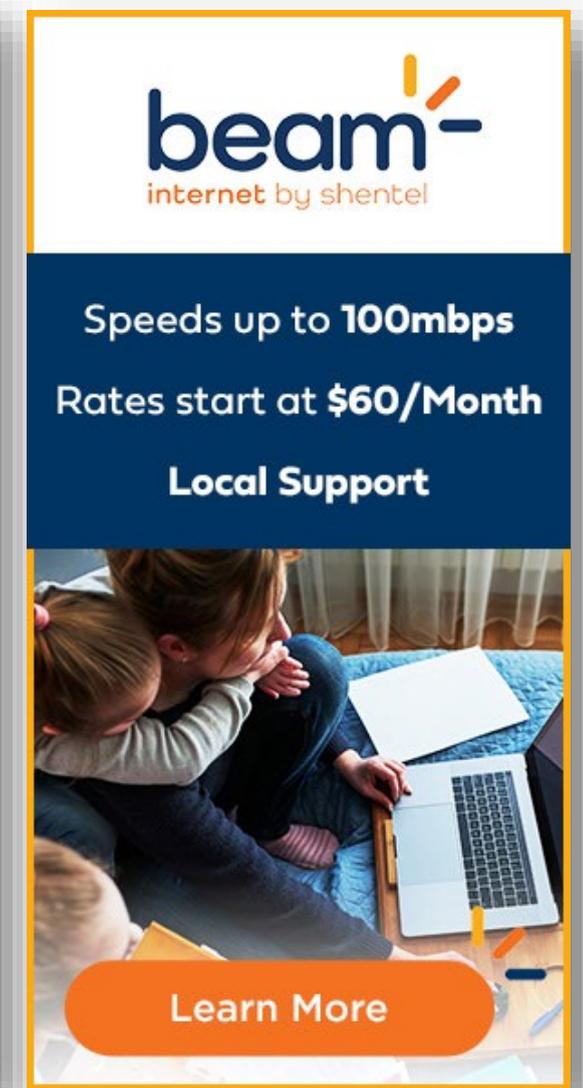
Reach Out To Us
To sign up, or for more info call **(866) 583-1730**.

23101_2021

Marketing & Citizen Engagement Plan

At launch

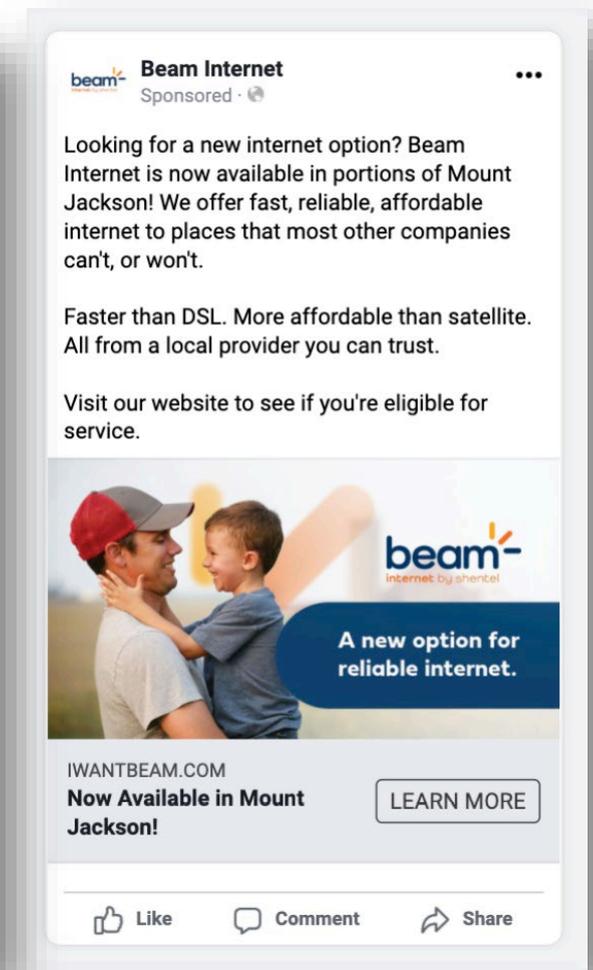
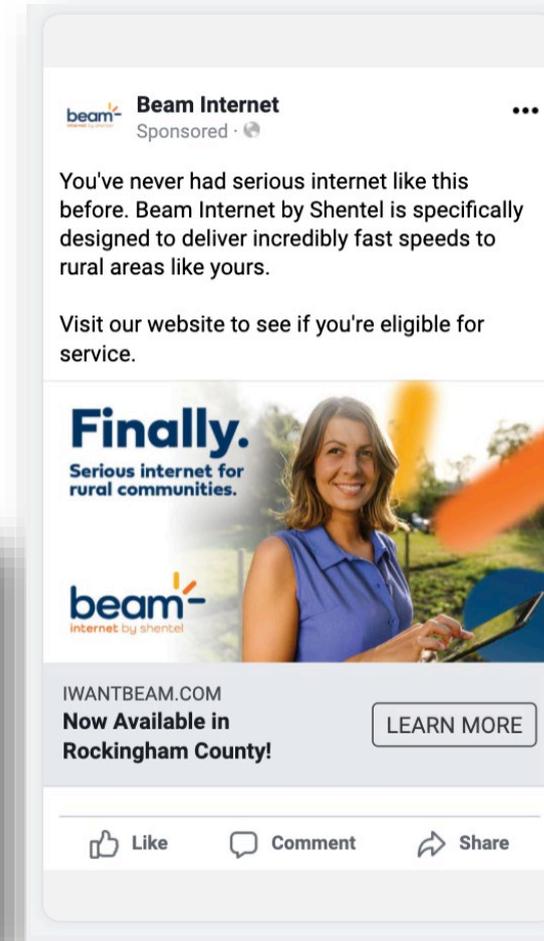
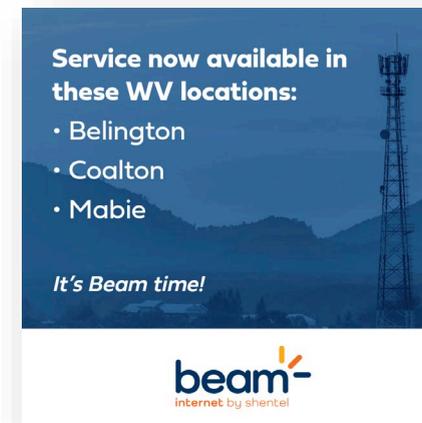
- **Digital Ads**
- Geo-targeted to zip codes/neighborhoods that will be getting Beam.
- Learn more button linked to the Beam website for more information. User can check for serviceability and pre-register.



Marketing & Citizen Engagement Plan

At launch

- **Social Media**
- Post on the Beam Facebook and Instagram pages as well as paid advertising through Facebook.
- Posts would provide more details regarding benefits and availability.
- Posts can link to the Beam website, where local addresses can be checked for serviceability and pre-registration.



Marketing & Citizen Engagement Plan

At launch

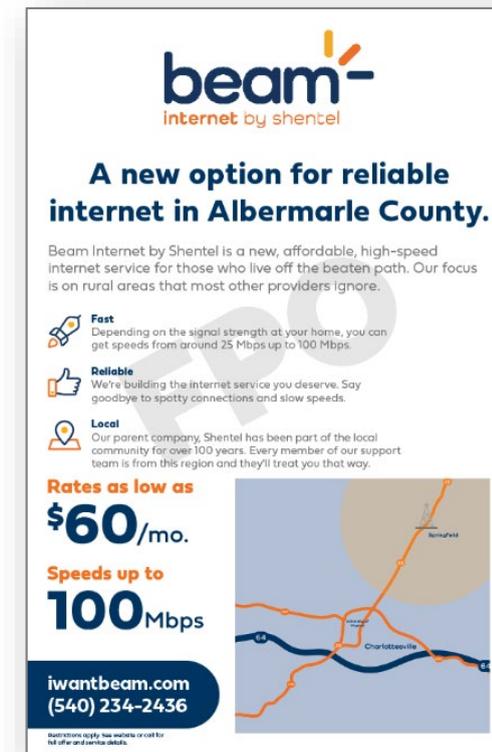
- **Local Marketing**
- Visit local businesses and common gathering places to introduce them to Beam and ask for permission to leave local marketing materials:
 - Flyers
 - Table Tents
 - Small Posters
 - Yard Signs



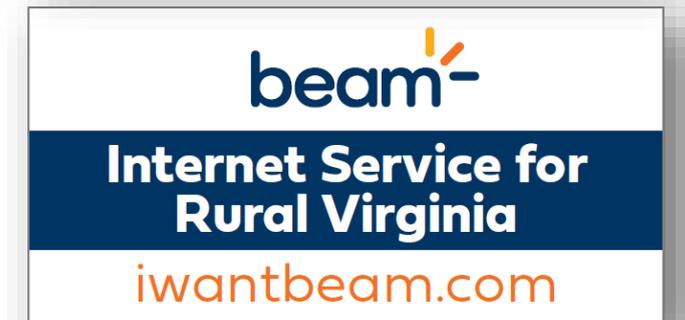
- 5"x7" Flyer, for local business countertops, pizza box toppers, etc.



- Table Tent for restaurants and local business countertops



- 11"x17" Customizable Poster

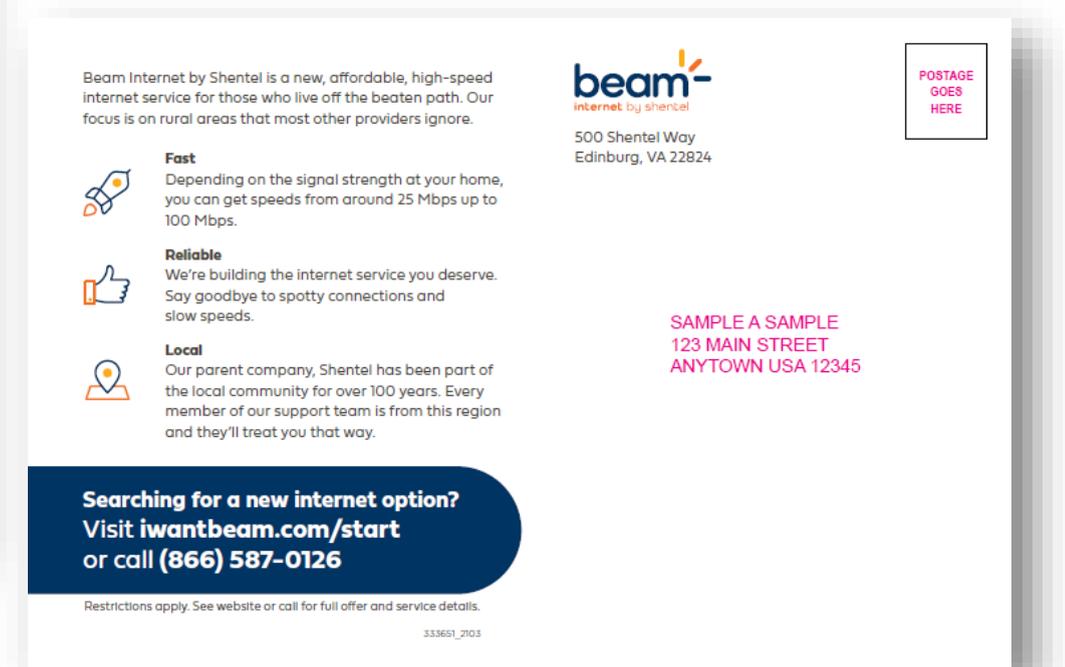


- 24"x48" Yard Stake Signs

Marketing & Citizen Engagement Plan

Two weeks after launch

- **Direct Mail**
- Sent to all households in the active coverage area as a follow-up reminder of Beam service being available
- 6x9 postcard



Marketing & Citizen Engagement Plan

90 Days prior to launch

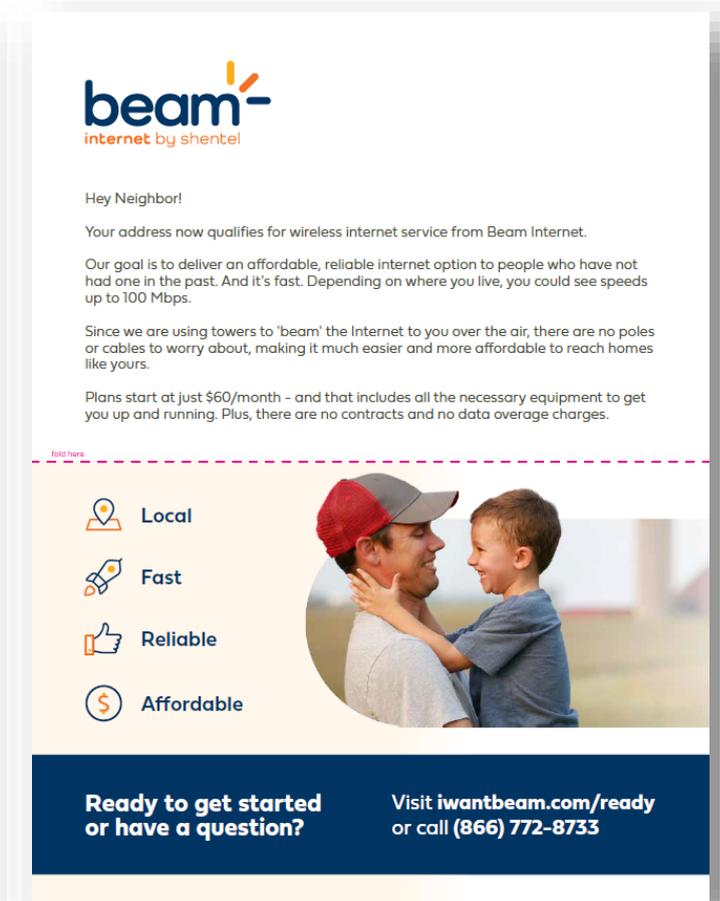
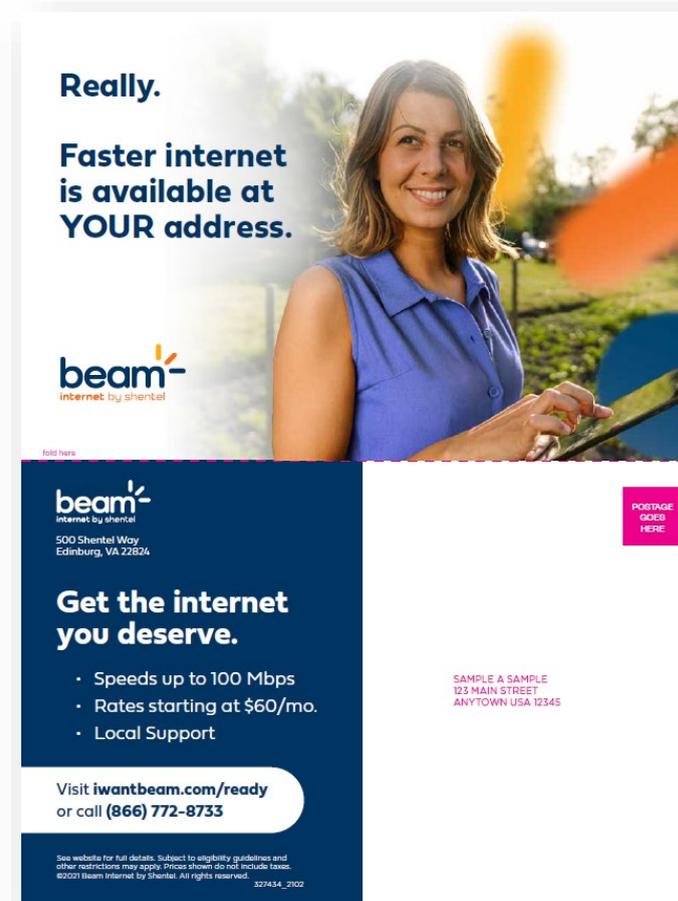
- **Yard Stake**
- Placed in the homeowner's yard after service installation is complete.
- Promotes Beam to both the neighbors & all local traffic.
- Homeowner approval required.



Marketing & Citizen Engagement Plan

Post launch

- **Direct Mail**
- Sent to all households in the new coverage area around 90 days after launch.
- Introduction to Beam, the service benefits and the next steps to take to learn more & sign up.
- Large folded postcard that merges the primary content from the traditional Beam letter and the Beam postcard.



Franklin County

VATI 2022 Application

Shentel

Attachment 18

Shentel Network Design Details



Franklin County
A Natural Setting for Opportunity

ATTACHMENT #18 – NETWORK DESIGN INFORMATION TO SUPPLEMENT NARRATIVE QUESTION #9

Overview

Shentel is proposing a hybrid solution that will deploy a fiber network that expands to within a mile of the unserved homes in Franklin County. The homes not passed by fiber, typically either those with long-drops well in excess of 2,000 ft or in scenarios or where density falls below 5 homes per mile, will be reached via a wireless drop. This approach creates a scalable, cost-effective solution with superior speed to market. The wireless drop methodology allows Shentel to realistically deploy its service within a 24 month window to get critical broadband service to residents that cannot wait another 3 or more years to receive service. Furthermore, relying on a wireless drop where it is most practical reduces costs and allows Franklin to achieve universal broadband coverage within existing budget constraints. Taken together, this hybrid approach is a fast and efficient way to deliver high-quality broadband to the entire county. Additionally, this project is scalable. As fiber is pushed further and further into the unserved areas, Shentel and Franklin will be in an excellent position to continue expanding that fiber to additional homes through both natural growth and future federal, state, and local subsidy opportunities. The technology used for both the FTTH network and the wireless drop are described below.

Fiber To The Home Network Description

Shentel intends to develop a new fiber network in Franklin County in support of its residential Fiber to the Premise (FTTP) service. Just like its existing cable network, this FTTH network will be connected to Shentel's expansive multi-state fiber network with redundant Tier 1 peering points located in Ashburn, VA and Atlanta, GA.

Shentel deploys XGS-PON for its FTTP product. XGS-PON is an advanced standard for Passive Optical Networks (PON). This network can provide multi-gig speeds today and is scalable to support 10Gbps symmetrical data. As such it provides more than enough bandwidth to meet current needs and is able to scale up to stay ahead of demand for many years to come. By contrast, earlier PON networks are extremely limited in the amount of downstream and upstream capacity available to the end user. Although XGS-PON requires significant investment, the growing demand for symmetrical broadband makes the investment in XGS-PON the best choice. XGS-PON deployments are built around centralized fiber split topology and designed to allow a single fiber the ability to maintain an efficient point-to-multipoint broadband connection for multiple end users.

Shentel typically utilizes a dedicated fiber split from the Local Convergence Point (LCP) out to the Customer Premise. Each LCP is fed with feeder fiber from a Central Office (CO) or Point of Presence (POP). Shentel will leverage their existing PoP in Bedford. This robust fiber infrastructure allows us to accommodate commercial sales opportunities and provide improved service to businesses and community anchor institutions within the project area. A centralized fiber split also provides a more dedicated and direct approach to ensuring that fiber capacity, technology, and plant records can be easily managed.

Primary Network Vendors – FTTP

1. LCP – Nokia 7360 Optical Line Terminal (OLT) - Each FTTP market is deployed with a dedicated Nokia 7360 OLT and connected back to Shentel's dedicated multiple 100Gbps core network that is powered by Cisco's NCS-55A/5501 platforms.
2. Optical Network System (ONS) - Cisco's ONS 15454 Series Multiservice Transport Platform and the Network Convergence System (NCS) 2000. The coherent ONS provides the transport layer of Shentel's backbone Network with 100Gbps and 200Gbps wavelengths.

3. Optical Fiber - Shentel will utilize G.625.D compliant optical fiber. Shentel's preferred suppliers are Commscope, Corning and OFS.

4. P-Route Core - Cisco's NCS-55A and NCS-5501 platforms. The Core network is composed of ten Core devices and two 100Gbps paths between each device. The dual 100Gbps architecture provides both physical diversity and resiliency if a network failure or fiber cut occurs. This is extended to the PE network as well. Each device interfaces with two separate P routers, which provides Shentel the best option for diversity.

5. PE-Route Distribution Network - Cisco's ASR-90xx and ASR-99xx platforms. The Distribution Network is made up of many platforms deployed throughout Shentel's service footprint. Although the Core is the primary element within Shentel's topology, it is the actual Distribution network that is the workhorse of the network.

Customer Premise Equipment – FTTP

At the Customer Premise, a Network Interface Device (NID) is placed on the outside of the residence to serve as a transition point between Outside Plant Fiber and Inside Plant Fiber. For FTTP broadband services, a Nokia XS-250X-A or Nokia XS-020X-A Optical Network Terminal (ONT) is utilized. Customers have the option of purchasing wall to wall WiFi service which utilizes a wireless mesh network to provide coverage and in home WiFi speeds nearing 1Gbps over WiFi and multi-gigabit when using cat 5.

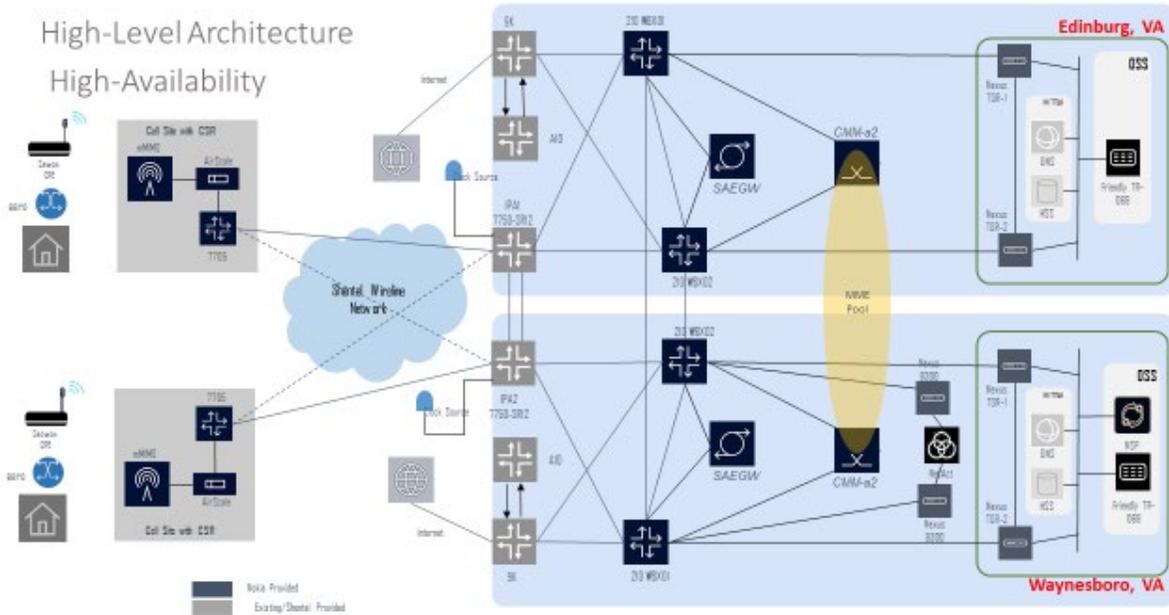
Wireless Drop Network Description

Scalability- Building for the Future

The Shentel Fixed Wireless network focuses on these components when it contemplates capacity and scalability: Evolved Packet Cores, Spectrum, Cell Site Backhaul, and Radio Access Network (RAN). Shentel uses currently measurable performance (not theoretical performance) of these components for capacity planning. This highly conservative approach helps ensure that network capacity will exceed demand.

Evolved Packet Cores

Shentel's two geo-redundant Evolved Packet Cores (EPC's) were built to exclusively support our Beam Fixed Wireless cell sites. One EPC is located in Waynesboro, VA and the other EPC is located in Edinburg, VA. These two EPS's support 4G LTE via the 3GPP standard, and these EPC's gracefully scale to support 5G with a simple software upgrade when capacity or functionality require. Please see a depiction of Shentel's EPC topology as follows:



Spectrum

Shentel recently acquired valuable 3.5 GHz licensed wireless spectrum commonly referred to as Citizens Band Radio Service or CBRS (specifically, 3550-3700 MHz). Shentel acquired this 3.5 GHz mid-band spectrum to support its Beam Fixed Wireless Broadband network. Total purchase price of this spectrum was approximately \$16 million. This acquired spectrum covers Franklin County, VA, as well as 73 other counties across rural parts of Virginia, West Virginia, Maryland and Pennsylvania. Shentel has priority access to use 30 MHz of this licensed spectrum in Franklin County. Coupled with 30 MHz of Generally Authorized Access channels, Shentel can dedicate a full 60 MHz of 3.5 GHz CBRS spectrum to cell sites. Shentel firmly believes that its priority right to use this vast amount of robust spectrum is a key differentiator from other Fixed Wireless providers.

Radio Access Network (RAN)

Shentel's cell site deployment plan includes the following for small cell sites:

- 4G LTE Small Cell (Nokia FW2QQF) – this self-contained unit is carrier-grade and standards based.
- Omni High-Gain Antennas (Alpha Wireless AW3825)
- Cell Site Router (Nokia 7705 Service Aggregation Router) - this ground-based equipment is carrier-grade and standards based. The router can support up to 10G of throughput traffic connecting each cell site to Shentel's EPC's.

Backhaul

The Fixed Wireless small cells will connect directly back to the EPC's via Shentel Fiber. Each cell site will initially enjoy over 1G of backhaul capacity, and can easily scale to 10G with simple back-office provisioning changes.

Customer Premise Equipment

At the customer premise location, Shentel will professionally install a directional exterior antenna (Outdoor Unit or “ODU”), and up to two interior WIFI units. The ODU will be approximately 12” x 12” and will be typically mounted near the eave of the customer’s roof. The ODU’s are manufactured by Seowon Intech, a South Korean company. The ODU’s comply with the 3GPP 4G LTE Advanced standard, and feature a 15 dBi high gain antenna resulting in EIRP of 39 dBm. These LTE Category 15 ODUs support the very latest in customer premise equipment advances:

Downlink

- Up to 580 Mbps
- 4x4 MIMO
- Up to 4 Carrier Aggregation (both intra and inter)
- 256 QAM
- Transmission Mode 8 (multi-user MIMO)

Uplink

- Up 30 Mbps
- Up to 2 Carrier Aggregation (intra)
- 64 QAM
- Transmission Mode 8 (multi-user MIMO)

The in-home WIFI units are produced by Eero, an Amazon company, and support unlicensed WIFI in the 2.4 GHz and 5.8 GHz spectrum bands. Specifically, Shentel’s Beam customers enjoy the Eero 6 dual-band WIFI routers. Each Eero 6 unit in the wireless mesh network covers up to 1,500 square feet inside the home. These Eero devices offer a fast and easy set-up process - the Eero app walks the customer through setup and empowers the customer to manage the home network from anywhere. The Eero 6 connects compatible devices on the customer’s home network with Alexa, so there is no need to buy a separate smart home hub for each device. The Eero 6 uses a TrueMesh technology, which optimizes connections and reduces drop-offs. Eero devices also get better over time - they have automatic updates that bring the latest Eero features while also keeping the home network safe and secure.

Advanced RF Engineering - Targeting the Underserved

Small cell tower locations are planned with highly accurate propagation models down to 10-meter accuracy. Actual locations to be served are derived from building footprints that are extracted from LiDAR or photogrammetry with rooftop-level accuracy. Leveraging our mobility wireless experience, Shentel has empirical propagation data covering more than 7 years of 4G LTE operational history.

The accurately predicted Reference Signal Receive Power (RSRP) and Signal to Interference and Noise Ratio (SINR) translate directly to 3GPP Modulation and Coding Schemes (MCS) which correlate to actual down link and uplink throughput. The Beam network is designed to support the Beam service plans with a margin of error sufficient to overcome historically observed seasonal propagation changes, weather impact, and the propagation model’s observed error margin.

Defining Homes Passed and Wireless Risk

It is important to note that Wireless Networks differ from a traditional fiber or coaxial cable networks (a/k/a “Wireline Networks”). While comparably more costly to build, Wireline Networks rarely have “serviceability risk” with respect to targeted households – if they plan to build to a household, they can usually always get service to the household. By contrast, Wireless Networks are comparably less costly to build and have much faster speed to market, but they have a higher “serviceability risk” because computer simulations of radio frequency propagation can never be 100% accurate given foliage and other last mile variables. However, to minimize “serviceability risk” in our Beam Fixed Wireless Network, Shentel uses advanced engineering technologies (e.g., Light Detection and Ranging a/k/a LiDAR, InfoVista Planet Radio Frequency modelling platform, etc.), advanced and carrier-grade 4G LTE cell site equipment (e.g., massive and multi-user MIMO, antenna beam forming, carrier aggregation, etc.) and highly trained local engineers. Shentel has taken a conservative position in designating serviceable homes in this proposal. As an example, Shentel has conservatively assumed that only 85% of the wireless long drop homes will actually be serviceable. This 15% fallout assumption is already reflected in the projected passings.

Fixed Wireless Small Cell Equipment (Nokia FW2QQF)

Outdoor Multi Band TD LTE Small Cell

Specification	First Band Details	Second Band Details
TDD LTE Access	Band Class 48: UL: 3550 – 3700 MHz DL: 3550 – 3700 MHz	Band Class 48: UL: 3550 – 3700 MHz DL: 3550 – 3700 MHz
RF Output Power	100mW to 2W per Tx Path	100mW to 2W per Tx Path
Bandwidth Support	10, 15, 20 MHz	10, 15, 20 MHz
LTE Carriers	Up to 3 Carriers (60 MHz DL / 40 MHz UL) Max 2 carriers per RF Module	
Physical Size	Volume: ~12L / Mass: ~12 Kg 220 x 380 x 153 mm	
Optional	Optional dual-band integrated Nokia Wi-Fi access 2.4GHz / 5GHz 802.11b / g / n / ac	
Synchronization	RF GPS, 1588v2 (frequency, time, phase), SyncE	
Backhaul	4 Ports, combination of copper/fiber	
Antenna	Configuration: 2 Tx / 2 Rx per band Types: Remote (Customer Provided Antennas)	
Operating Temperature	-40°C to +55°C	
Input Power	90-264VAC	
3GPP Specification	TS36.104 Rev13 Medium Area	



FW2QQF LTE Only
FW2QQWF LTE + WiFi

RAN Capacity & Performance

- The RAN equipment and CPE are both capable of 2-carrier aggregation in the downlink (40 MHz channel) and 2-carrier aggregation in the uplink (40 MHz channel). Carrier aggregation is both contiguous and non-contiguous.
- With carrier aggregation of 40 MHz of spectrum in the downlink and 40 MHz of spectrum in the uplink, the network is capable of more than 200 Mbps downlink and 40 Mbps uplink to a single user.
- Current latency is in the 30-50ms range and declining as 5G standards evolve.

Shentel uses currently measurable performance (not theoretical performance) for capacity planning. This highly conservative approach helps ensure that network capacity will exceed demand.

Franklin County

VATI 2022 Application

Shentel

Attachment 15

Franklin County Broadband
Assessment by CIT



Franklin County
A Natural Setting for Opportunity

The Path Forward

A Community Broadband Assessment for Franklin County Virginia

May 2017



Topics

- Community Profile
- Current Reported Coverage
- Broadband Demand
- Local Assets
- Review of local policies & fees
- Needs, Future Capacity
- Next Steps

Before We Begin

Positive impacts of broadband on household income:

- gaining 4 Mbps of broadband increases household income by \$2,100 per year
- re-employment 25 percent faster than traditional searches
- higher employment rates in rural counties

Positive impacts of broadband on healthcare

- enables solutions that help manage chronic diseases, like diabetes and obesity.
- connecting health and broadband sectors is a path to a more connected, healthier locality.

Reasons for positive impacts

- boosts personal productivity,
- enables more flexible work arrangements
- enables home-based businesses as a replacement, or complement to an ordinary job.
- enables people to be more informed,
- better educated and socially and culturally enriched – fueling a faster career path.
- improves access to health and care

Source: The Appalachian Regional Commission (ARC) Broadband Planning Primer Toolkit
<https://www.arc.gov/images/programs/telecom/ARCBroadbandPlanningPrimerToolkit.pdf>
Connect2HealthFCC: <https://www.fcc.gov.edgekey.net/health/maps>
Why broadband matters: http://www2.ntia.doc.gov/files/broadbandmatters_021417.pdf

The Economics of Broadband Deployment

From the provider perspective:

$$\text{Profit/Sustainability} = \text{Revenue} - \text{CapEx} + \text{OpEx}$$

How do we make the math work for sustainability & future upgrades?

How do we entice the private sector to invest?

INCREASE REVENUES 	LOWER COSTS 
Adoption and Demand	Local Assets/Infrastructure What you have that might be shared
Population Density	Policies & Fees Reduce or eliminate fees for partners Streamline permitting
Community Anchor Institutions Residents, businesses, government facilities, healthcare	Funding Options Public & Private Investments

***Red indicates variables local governments can affect**

Broadband Perspective

COMMUNITY PROFILE

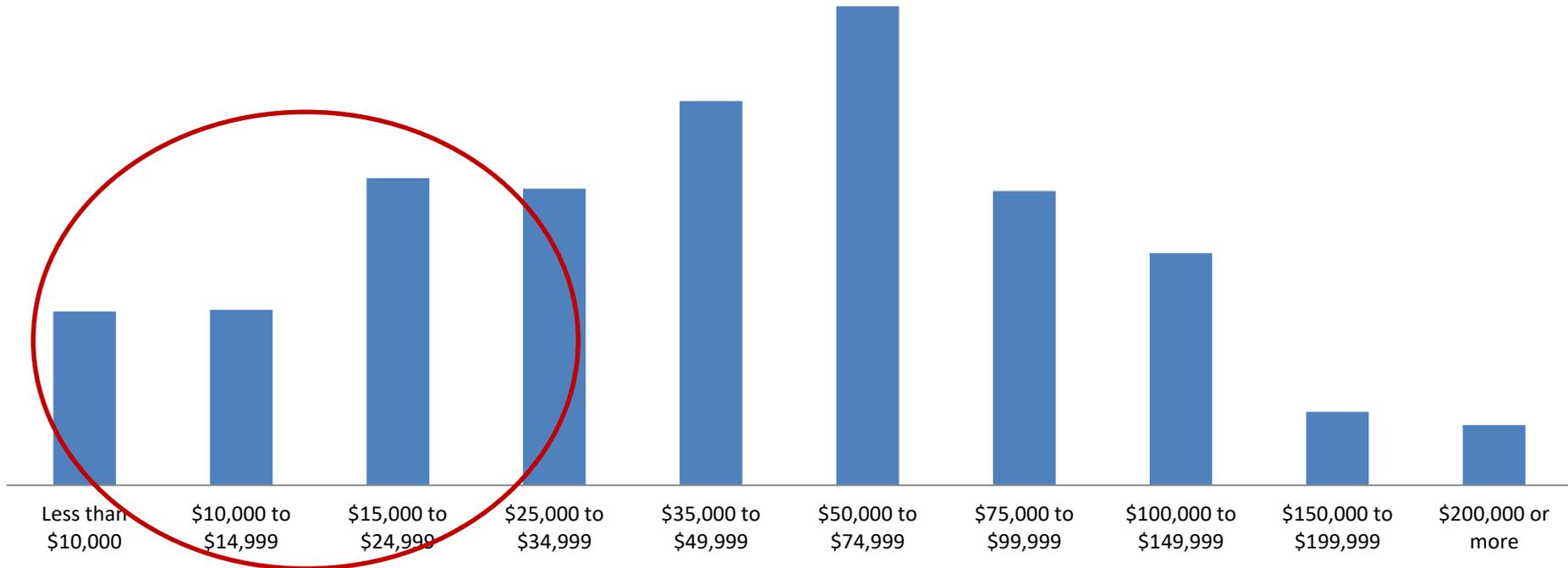
SOURCE: AMERICAN COMMUNITY SURVEY

[HTTPS://WWW.CENSUS.GOV/ACS/WWW/DATA/DATA-TABLES-AND-TOOLS/DATA-PROFILES/2014/](https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2014/)

Franklin County Household Income

Median Household Income: \$44,827

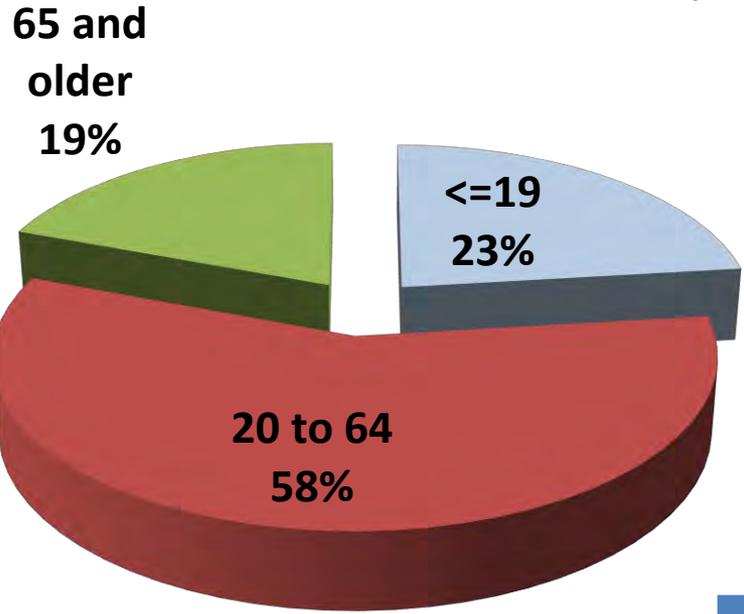
Total Occupied Housing Units: 23,248



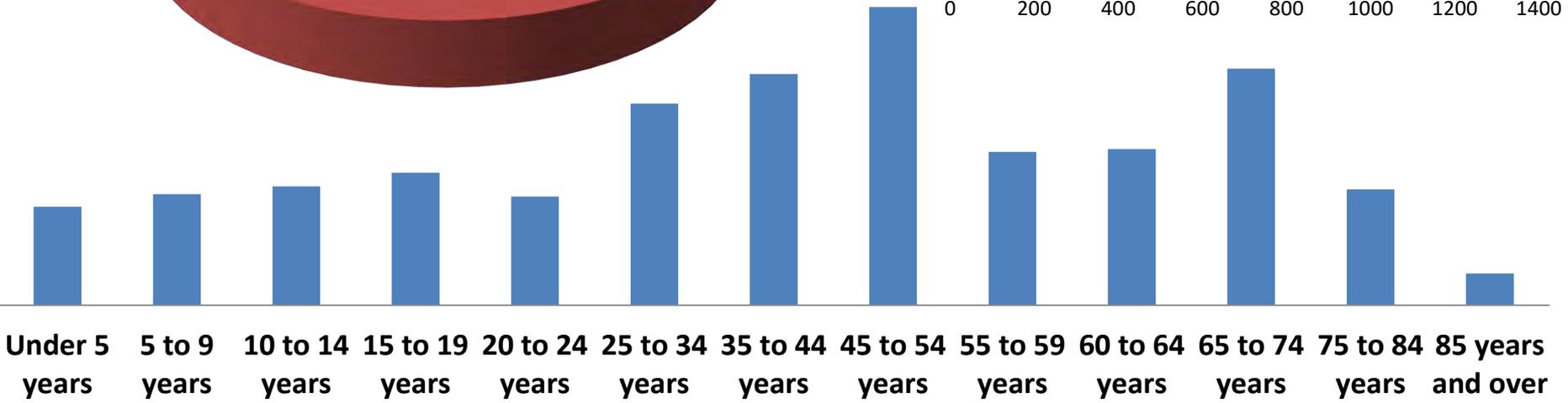
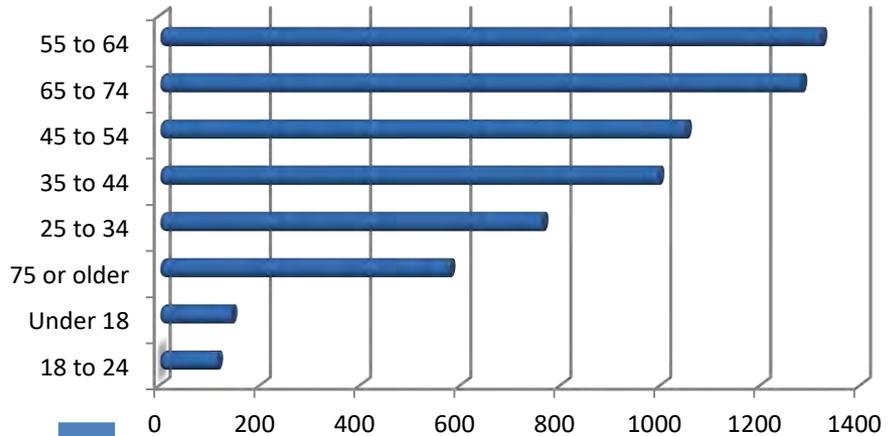
Take Away: ~30% of households may have affordability challenges.

Franklin County Age and Population Groups

Total Population: 56,360

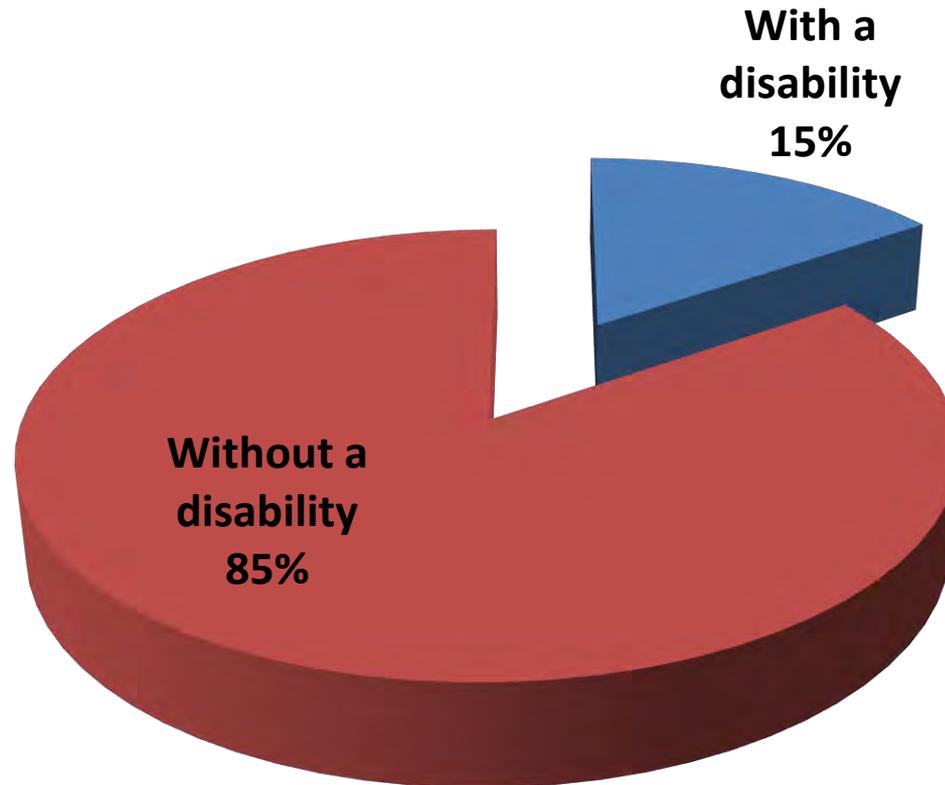


Age of County Survey Respondents



Take away: Good News: Most of the population - 81% - considered technology adopters

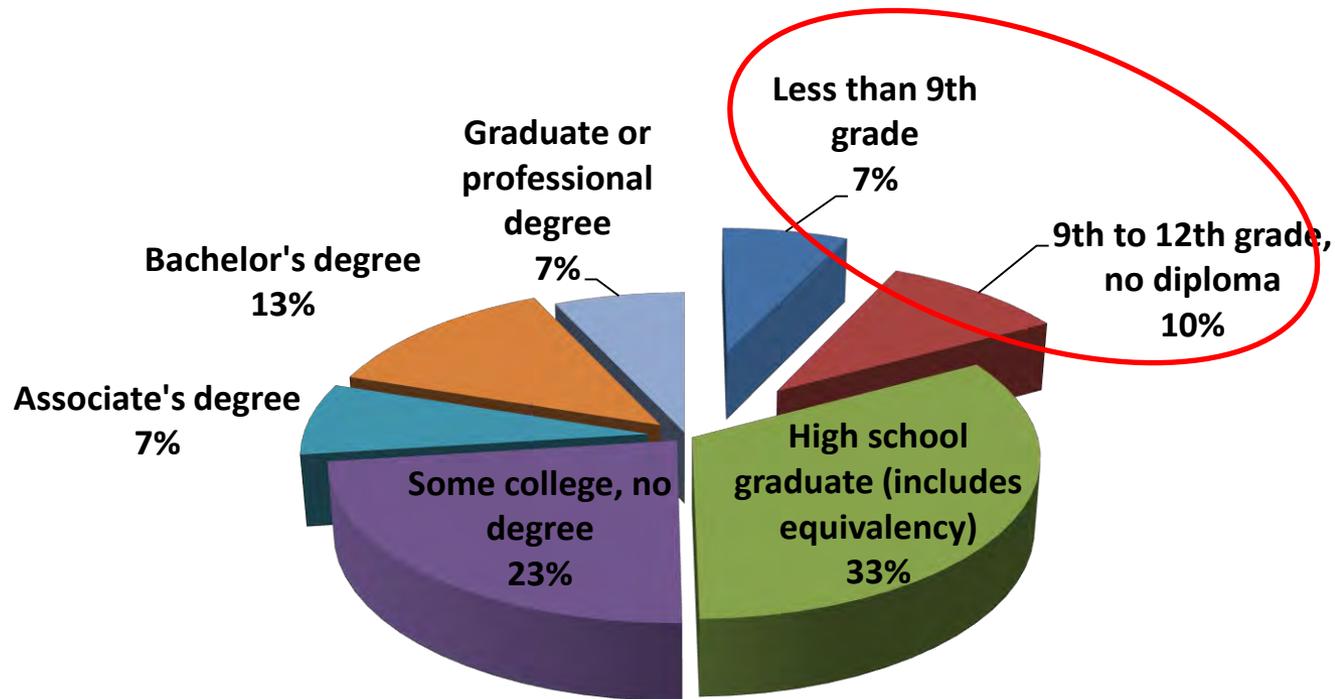
Franklin County Populations with Special Broadband Needs



Take Away: 15% may be slow to adopt technology or need special equipment

Franklin County Educational Attainment Profile

Franklin Population over 25 years: 40,264

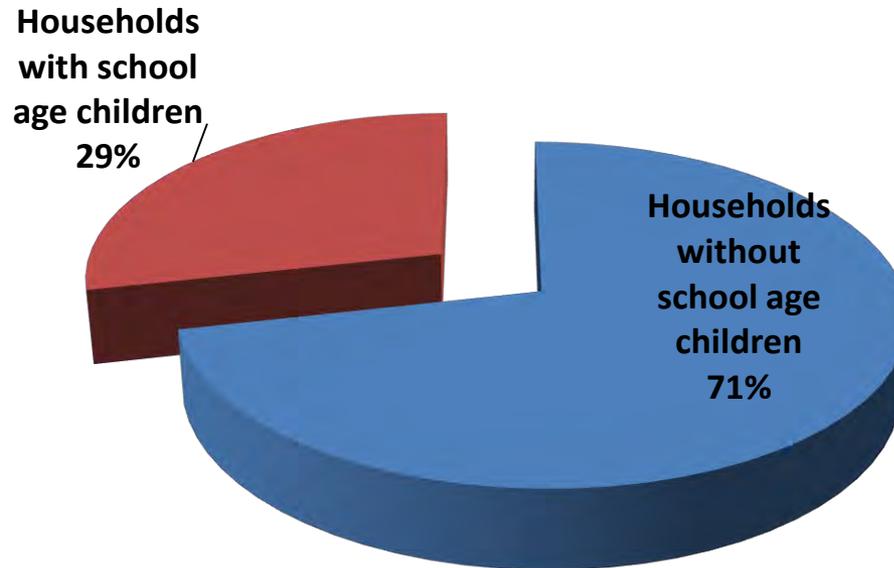


Take Away

17% of adult population may be slow to adopt and/or less likely to subscribe to new services.

Franklin County Households with K-12 Children

Total Family Households: 16,480

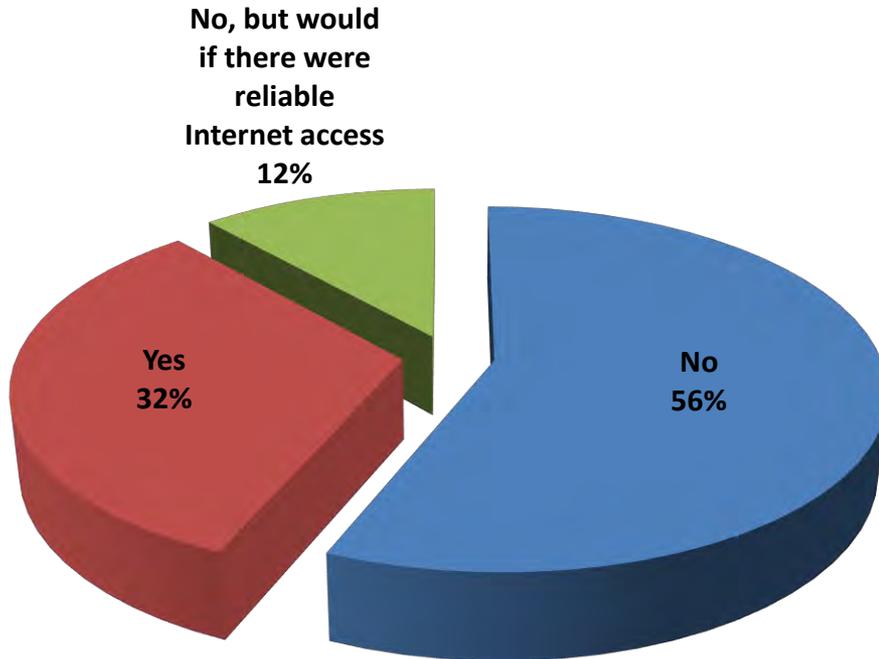


Take Away: According to census, 29% of households need broadband at home to support K-12 education

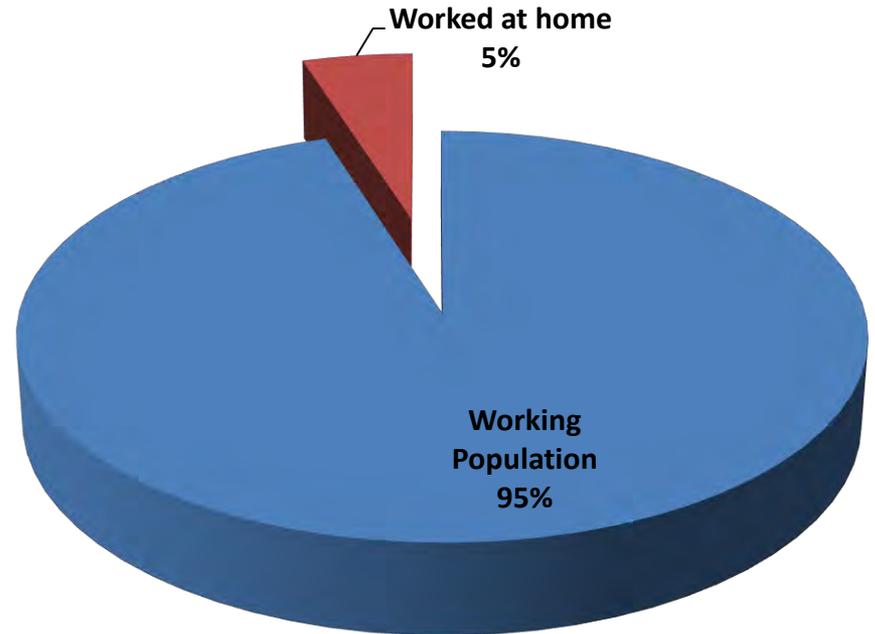
From Survey: 22% of respondents reported school aged children.
6% of those do not have Internet at home.

Franklin County Work from Home

County Survey - Telework



2014 ACS Data



Take away: 12% of respondents would work from home if they could.

Franklin County Housing

**Vacant*
housing
units
21%**

Franklin Housing Occupancy
Total housing units: 29,386

**Occupied
housing
units
79%**

Take away: ~1/5 of housing units are vacant or represent seasonal/weekend homes

**Renter-
occupied
22%**

Franklin Housing Tenure
Occupied Housing Units: 23,248

**Owner-
occupied
78%**

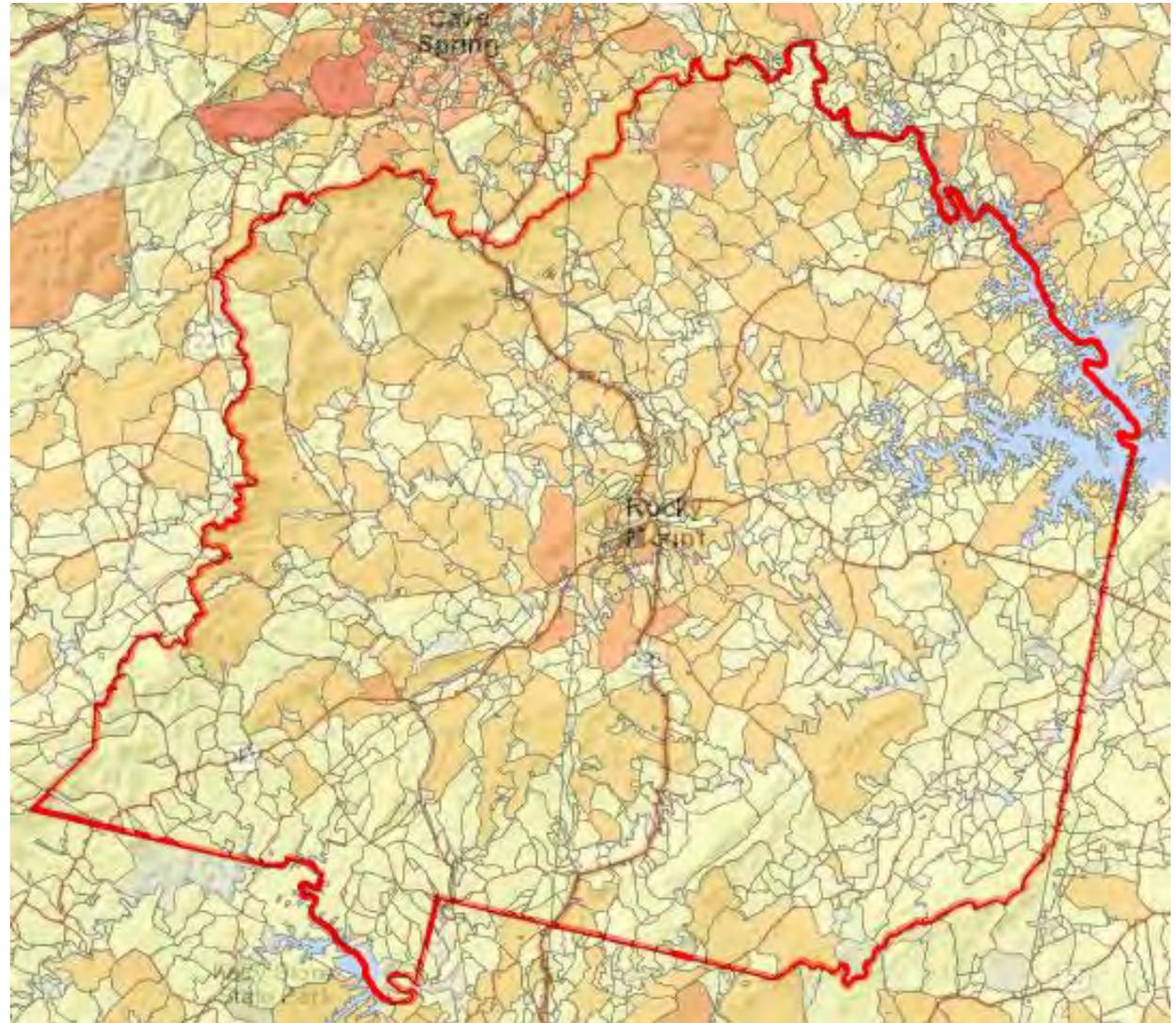
*a vacant unit may be one which is entirely occupied by persons who have a usual residence elsewhere.

Source:

<https://www.census.gov/housing/hvs/definitions.pdf>

Population Density

2015 Census Population Estimates



NOTE: denser areas in the south and west as those will correlate with unserved areas – to note there is population in those areas albeit limited areas.

FCC Provider Reported Data

REPORTED CURRENT COVERAGE

seriously Important note about FCC reported coverage

All facilities-based broadband providers* **are required** to file data with the FCC twice a year (Form 477) on where they offer Internet access service at speeds exceeding 200 kbps in at least one direction.

Fixed providers file lists of census blocks in which they can or do offer service to at least one location, ...

Mobile providers file maps of their coverage areas for each broadband technology (e.g., EV-DO, HSPA, LTE).

Block-Level Deployment and Competition

A provider that reports deployment of a particular technology and bandwidth in a particular census block may not necessarily offer that particular service everywhere in the census block.

Accordingly, a list of providers deployed in a census block does not necessarily reflect the number of choices available to any particular household or business location in that block, and the number of such providers in the census block does not purport to measure competition.

Source: Source: <https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477>

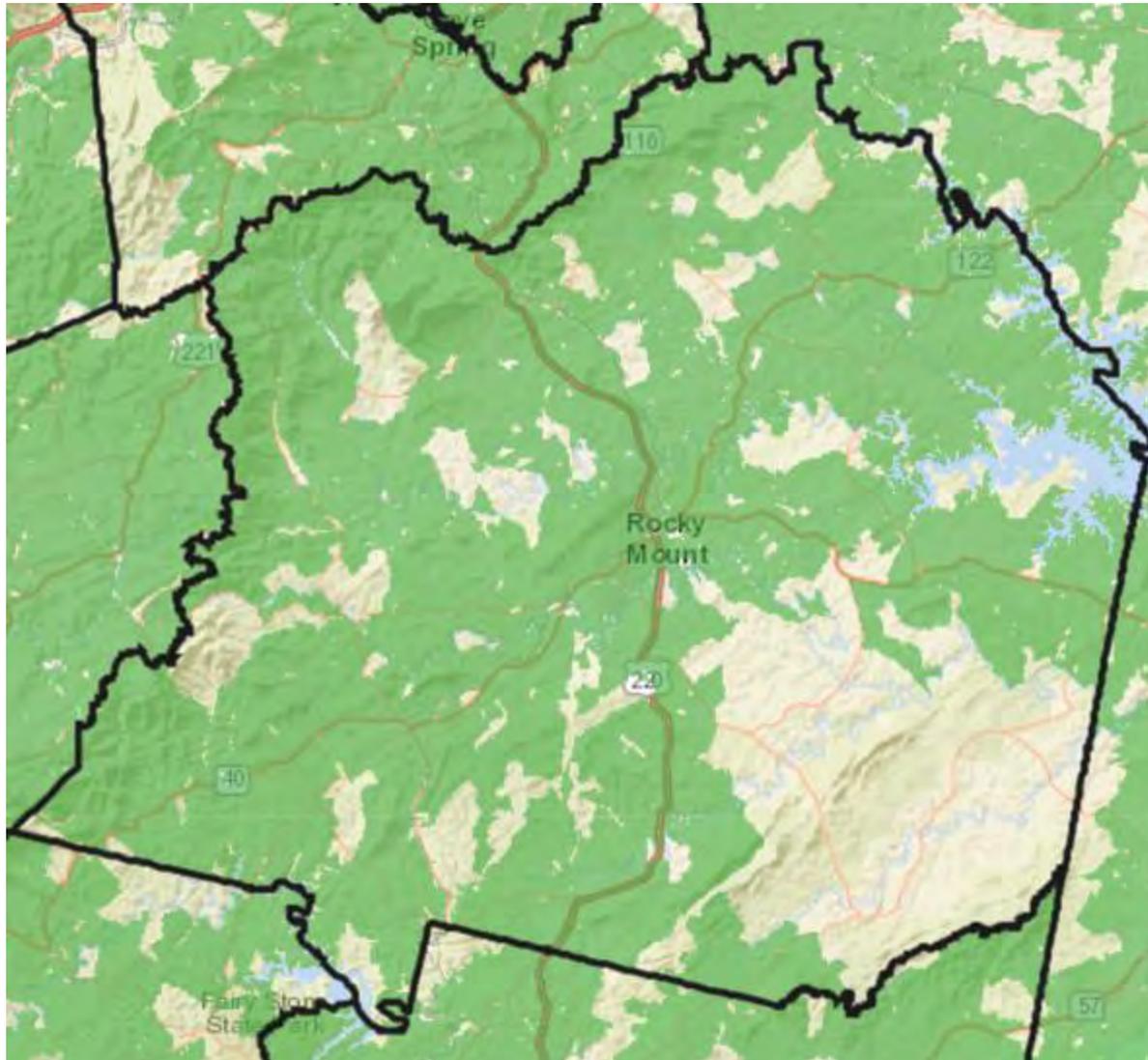
***A Facilities-based Broadband Provider** is an entity that provides broadband services over facilities it owns, provisions and/or equips.

Take away - Coverage maps are generally overstated due to federal reporting rules!

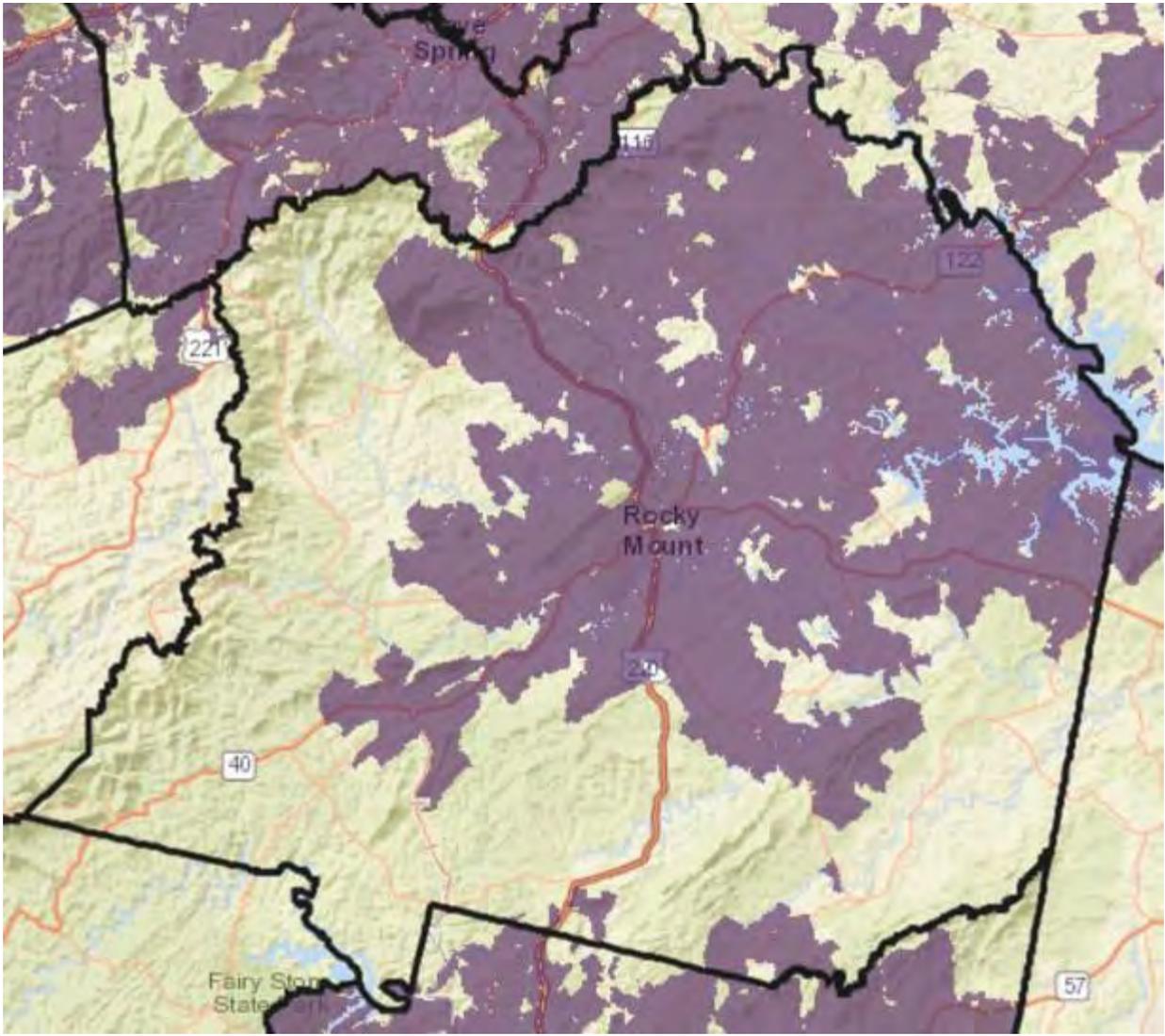
Franklin County Service Providers That Report to the FCC

Business Name	Technology	Number of Blocks	Maximum Download Speed	Maximum Upload Speed
B2X ONLINE	Fixed Wireless	136	20	20
CENTURYLINK	DSL	1,121	25	3
CENTURYLINK	DSL	232	80	40
CITIZENS TELEPHONE COOPERATIVE	DSL	5	6	0.768
COMCAST	Cable	11	150	10
FAIRPOINT COMMUNICATIONS	DSL	11	25	1.5
KINEX TELECOM, INC.	DSL	1	1000	1000
KINEX TELECOM, INC.	Fiber	1	1000	1000
LIGHTOWER	Fiber	107	1000	1000
MCI	Copper Wireline	1	6	6
SHENTEL	Cable	1,377	101	10
SHENTEL	Fiber	628	1000	1000
VERIZON VIRGINIA LLC	DSL	47	15	1

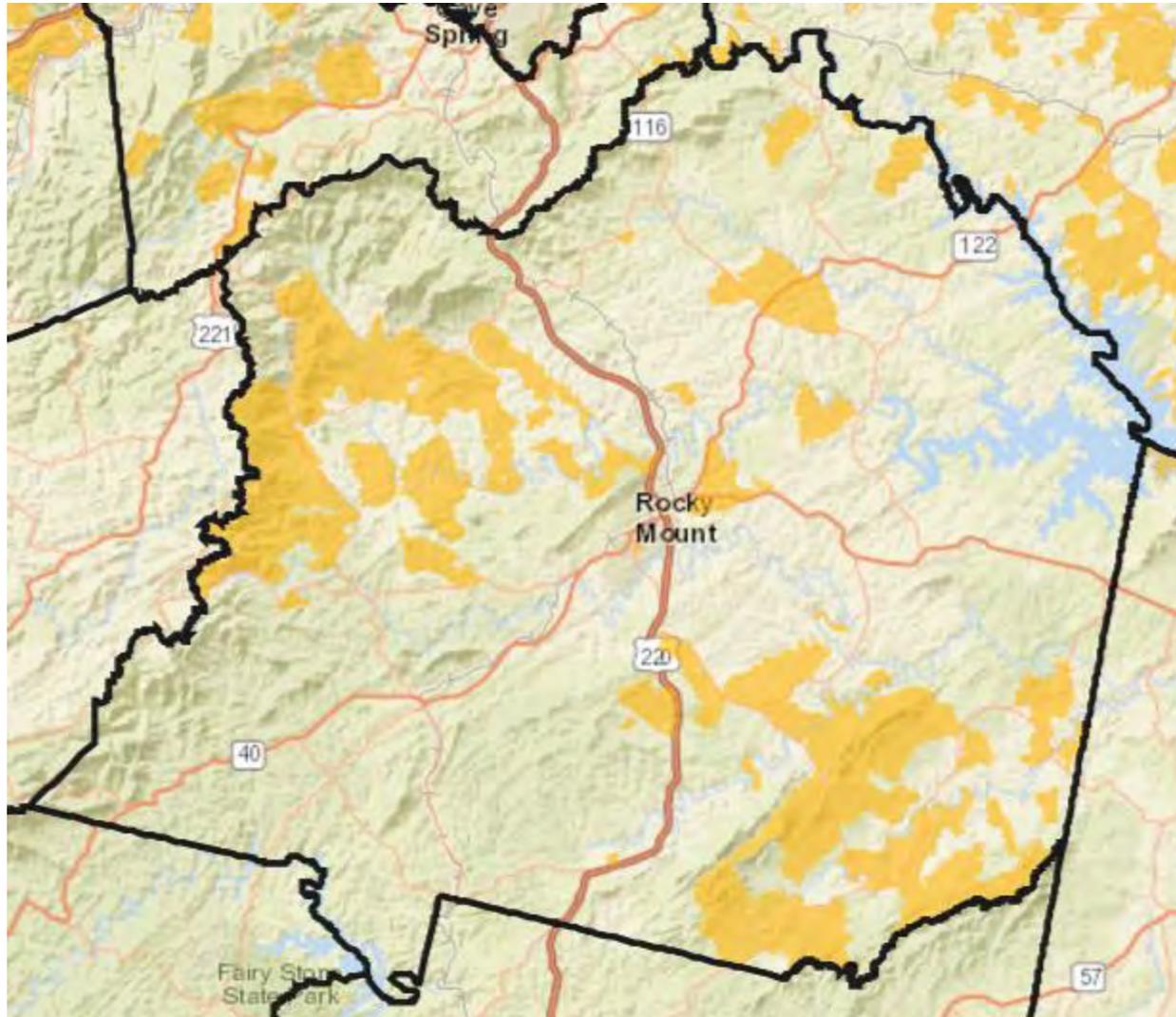
DSL Coverage (CenturyLink)



Cable Coverage (Shentel)



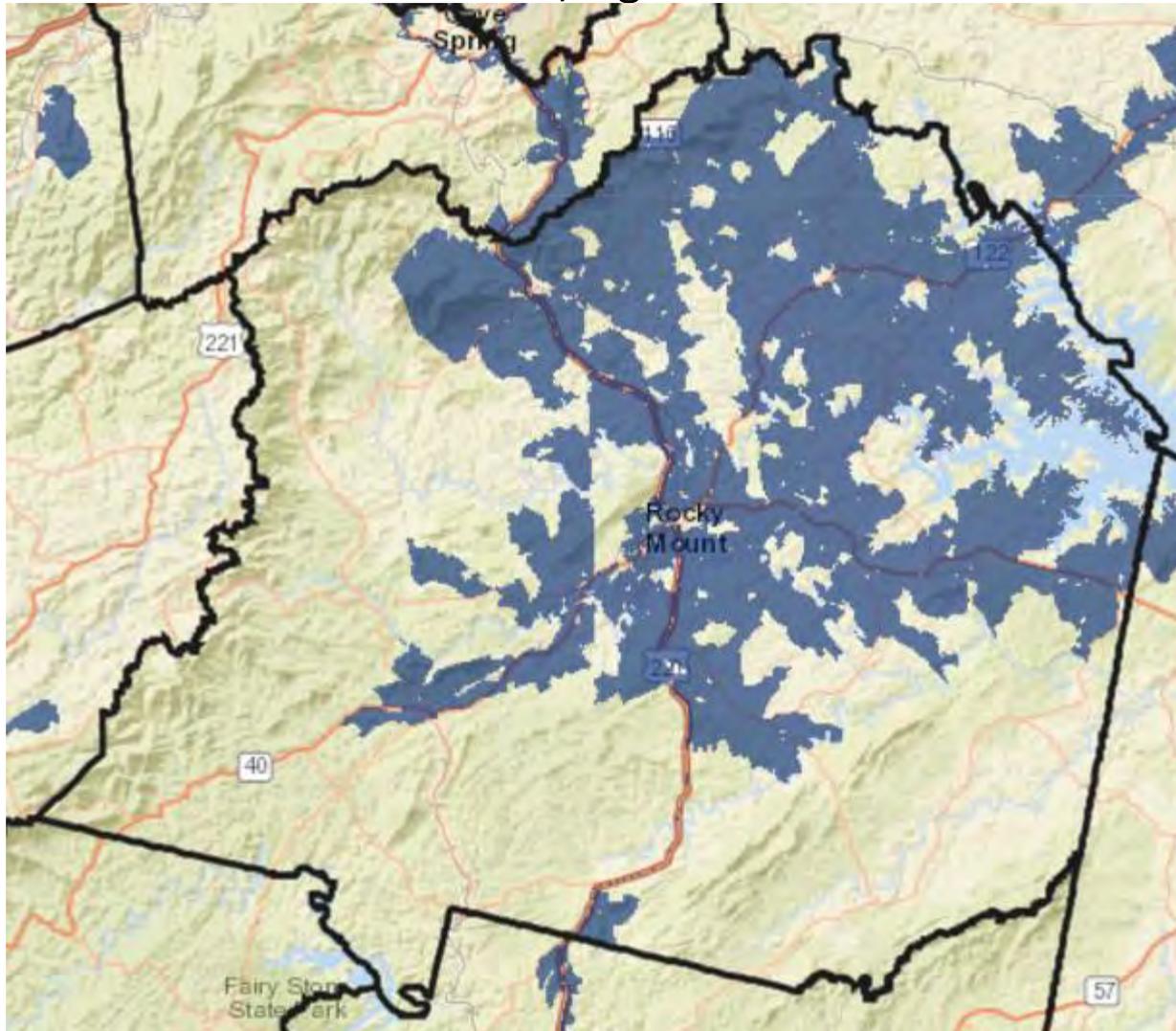
Fixed Wireless Coverage B2X

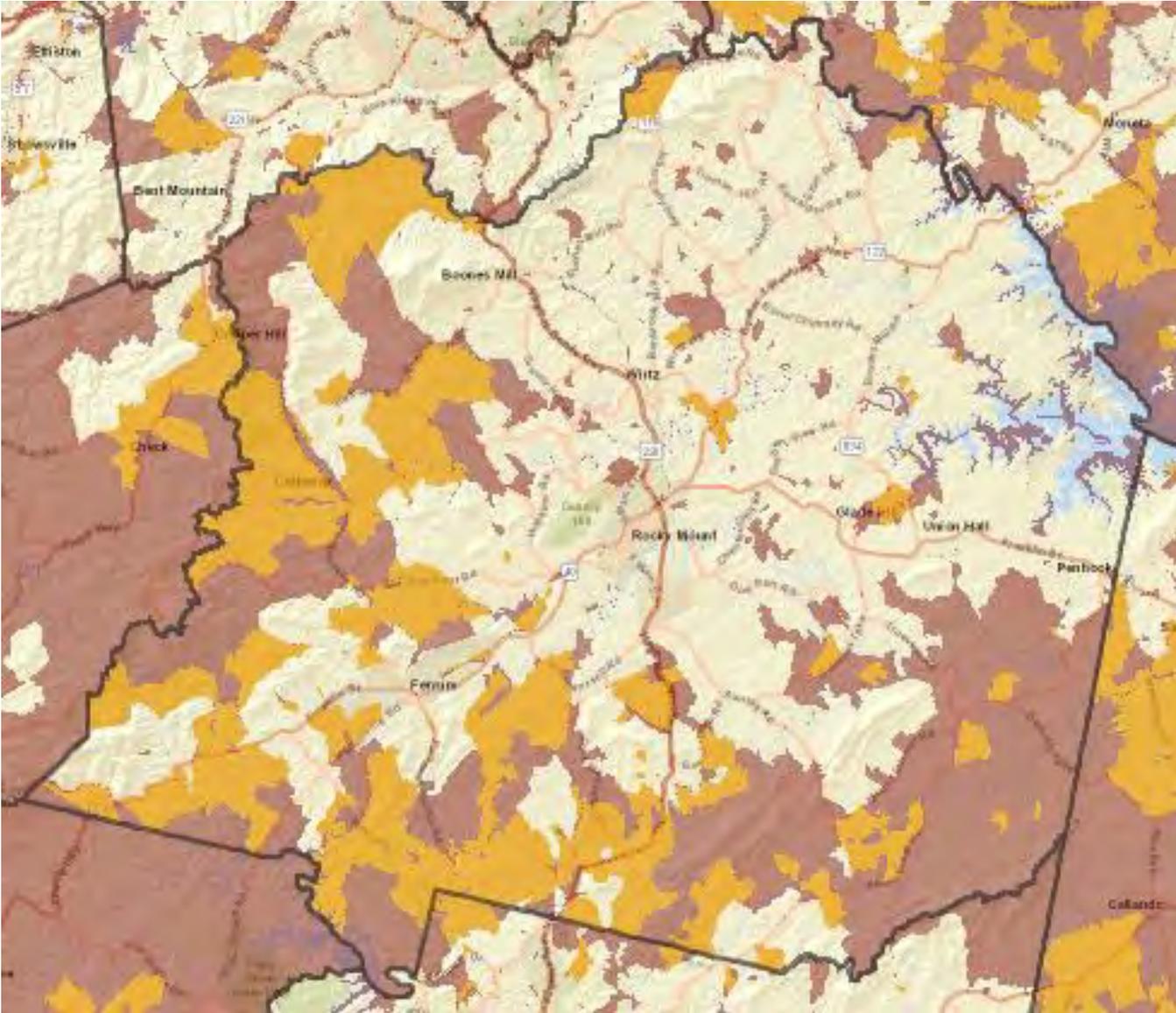


Fiber Service

(Not Commercial Fiber Routes)

Shentel, Lightower





FCC Consumer Fixed BB Download Stats

- **>= 4 Mb 93.1%***
- **>= 10 < 25 83.3%***
- **>= 25 Mb 82.4%***

Source: FCC 477 data
Spring 2016

*Percent of total households

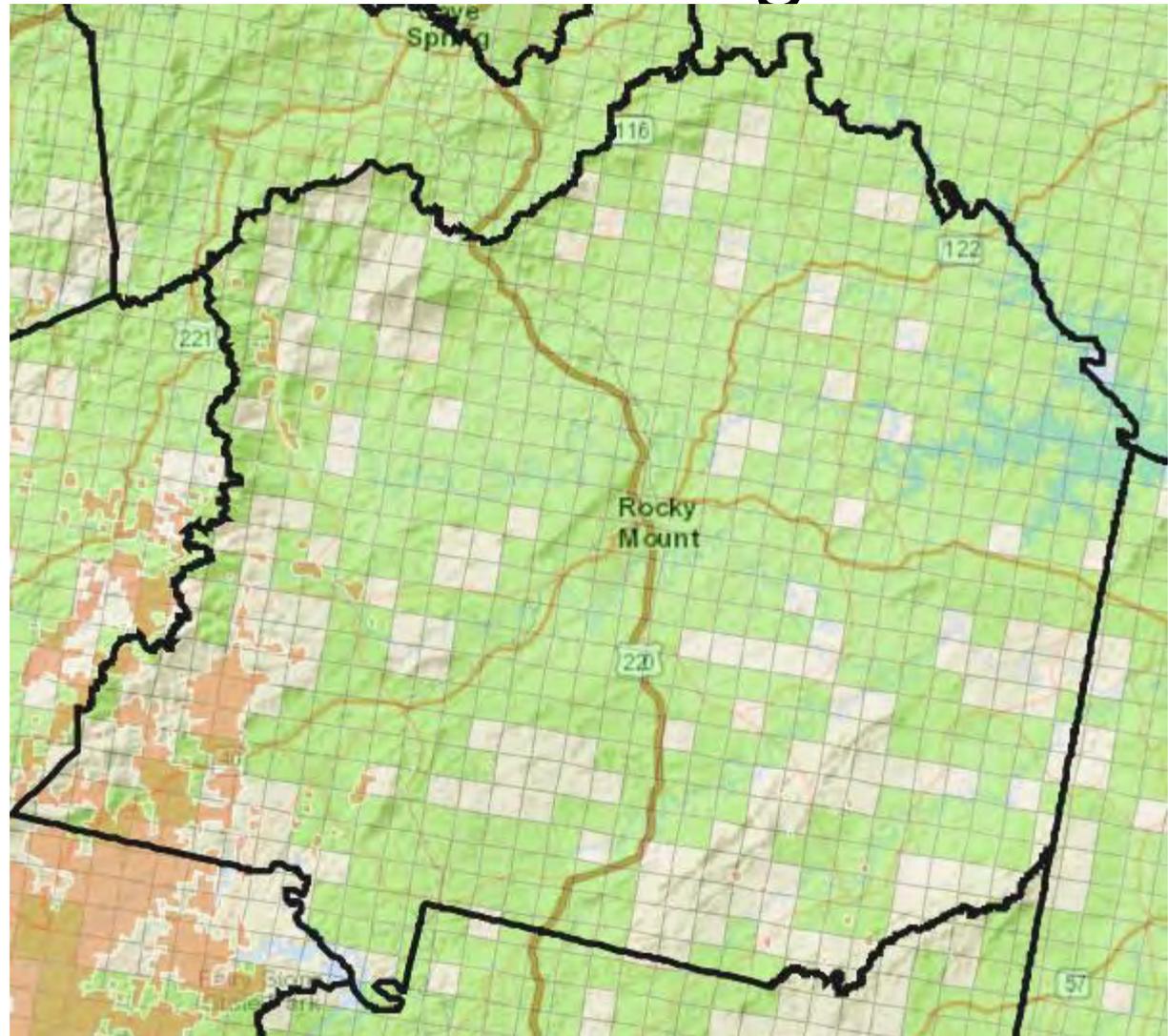
- Underserved = Broadband speed below 10 Mbps Download speed
- Underserved = Broadband speed between 10 Mbps Download speed and 25 Mbps Upload speed

Public Safety

FirstNet & No-LTE Coverage

FirstNet 1x1 mile grids.

-  Proposed terrestrial coverage
-  Proposed non-terrestrial coverage
-  No LTE Coverage



Now and Into the Future

BROADBAND DEMAND

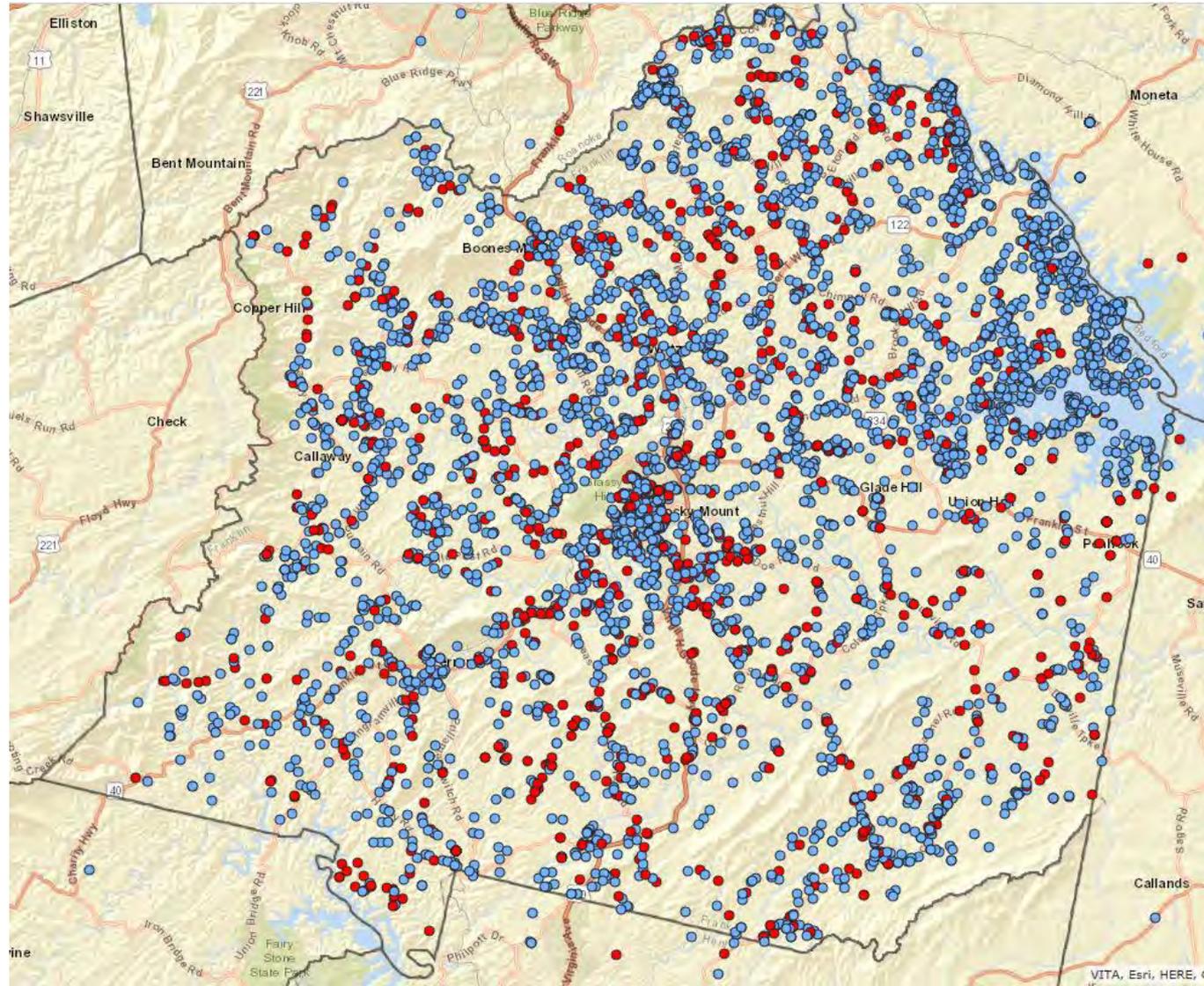
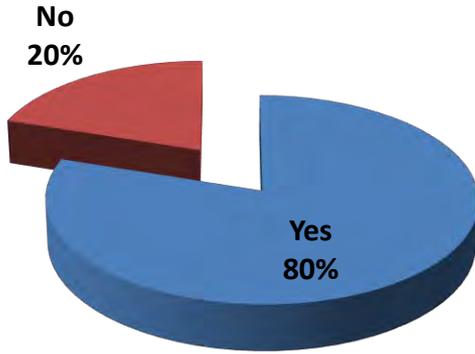
FRANKLIN COUNTY'S BROADBAND SURVEY RESULTS

Franklin County Citizen's Survey

6258 Responses

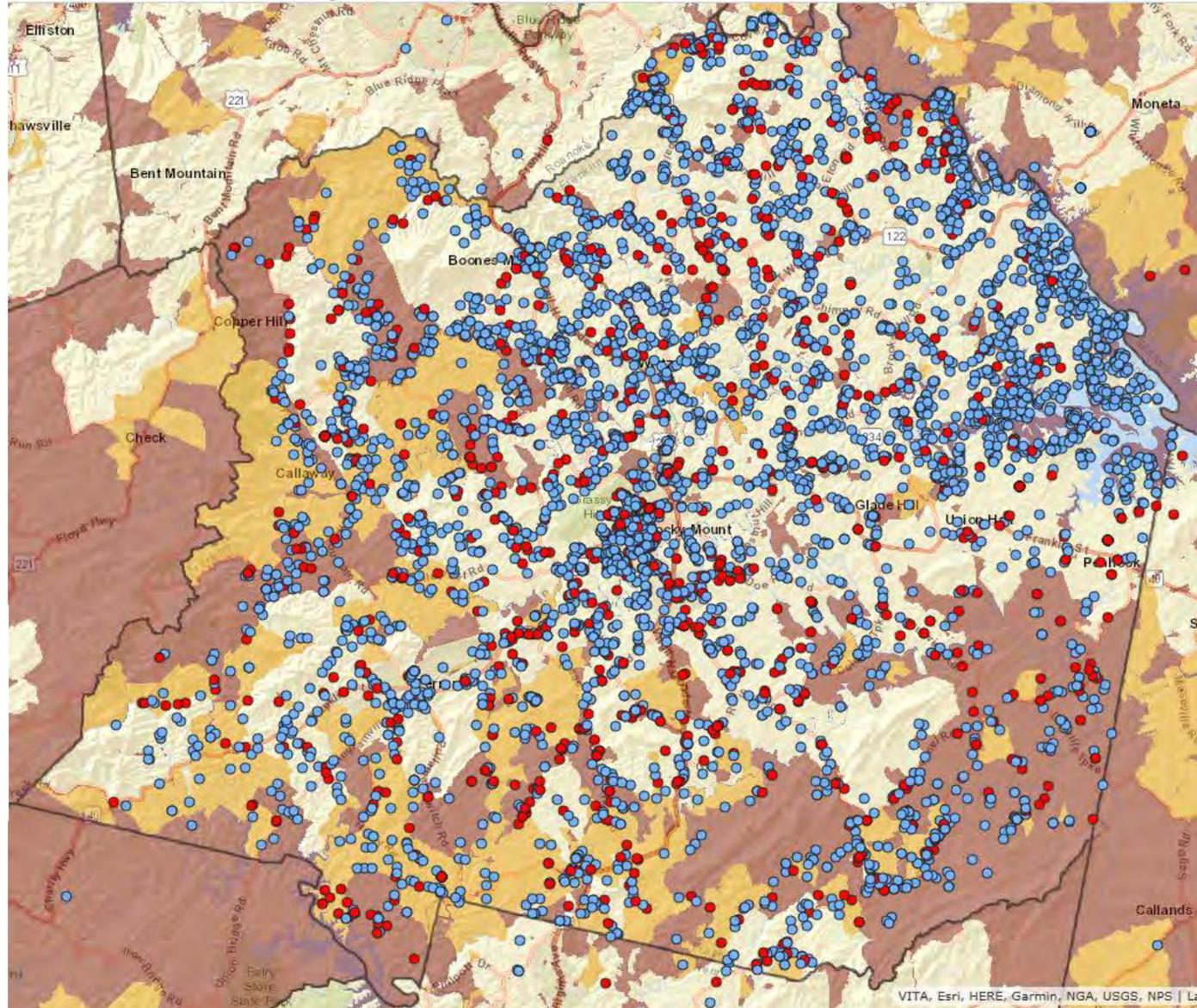
99% +/- 1.39
based on occupied
housing units (23,248)

Do you have Internet
service at home?



Over 90% of respondents feel
the Internet is important.

Franklin County Un/Underserved



- Unserved = Broadband speed below 10 Mbps Download speed
- Underserved = Broadband speed between 10 Mbps Download speed and 25 Mbps Upload speed

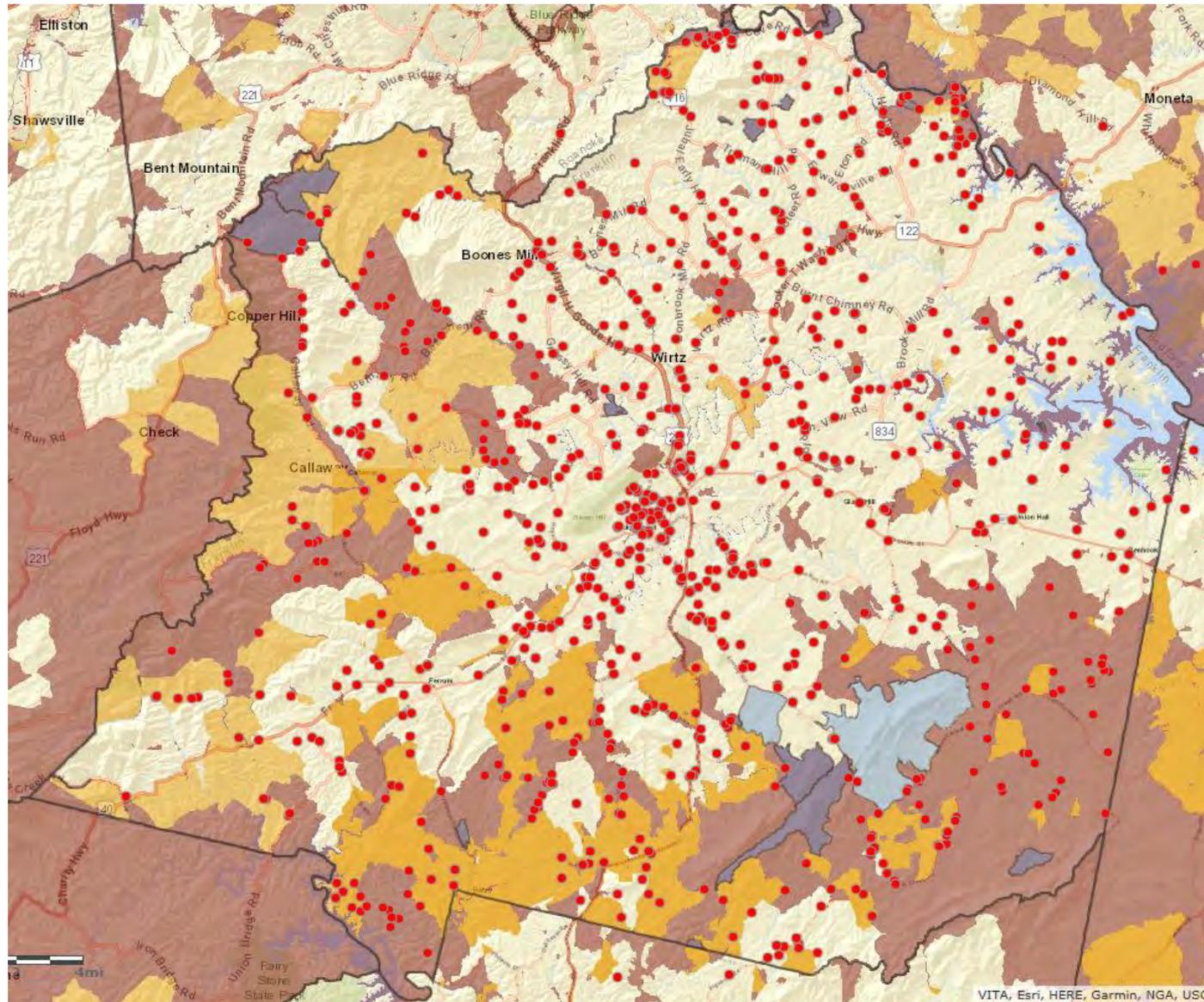
Franklin County Un/Underserved

Do you have Internet Service at Home?

● No.

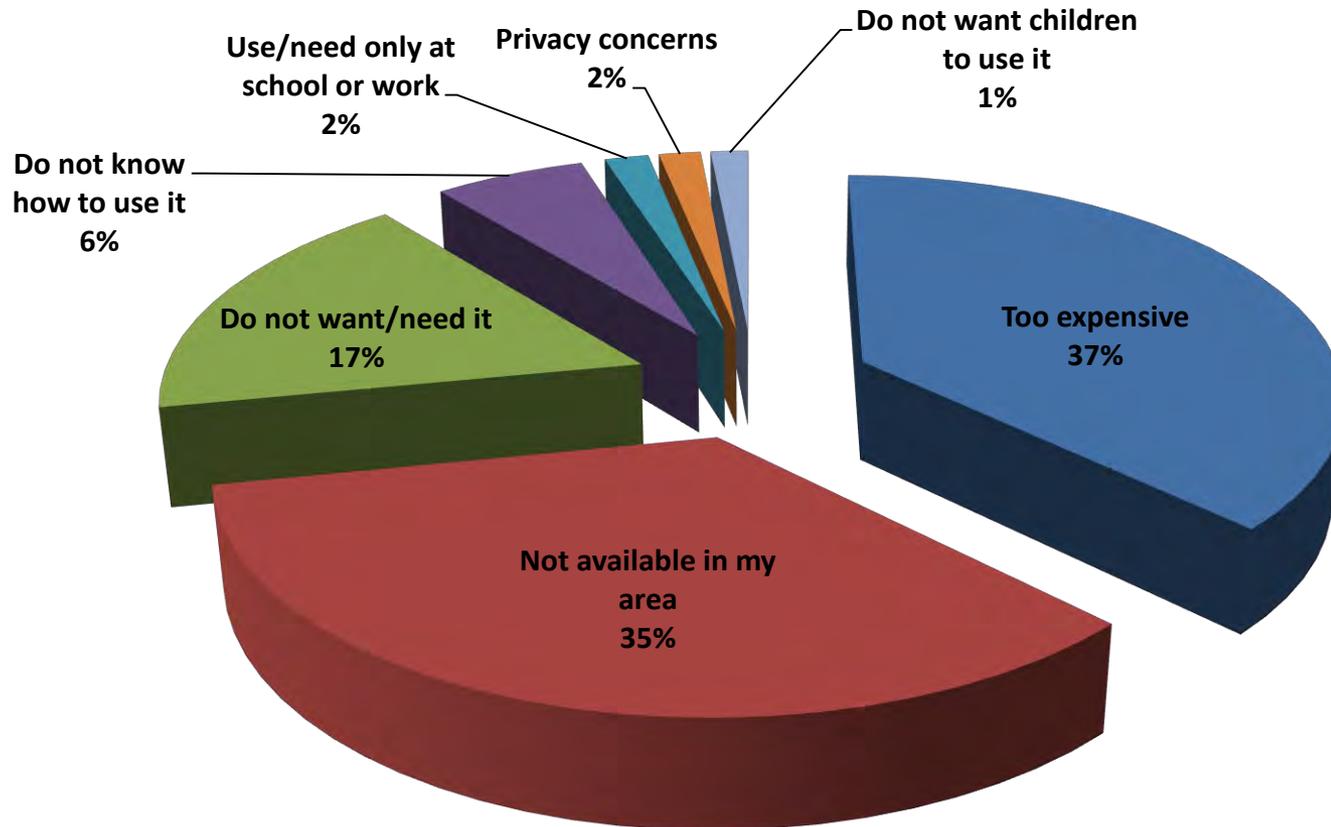
● Unserved = Broadband speed below 10 Mbps Download speed

● Underserved = Broadband speed between 10 Mbps Download speed and 25 Mbps Upload speed



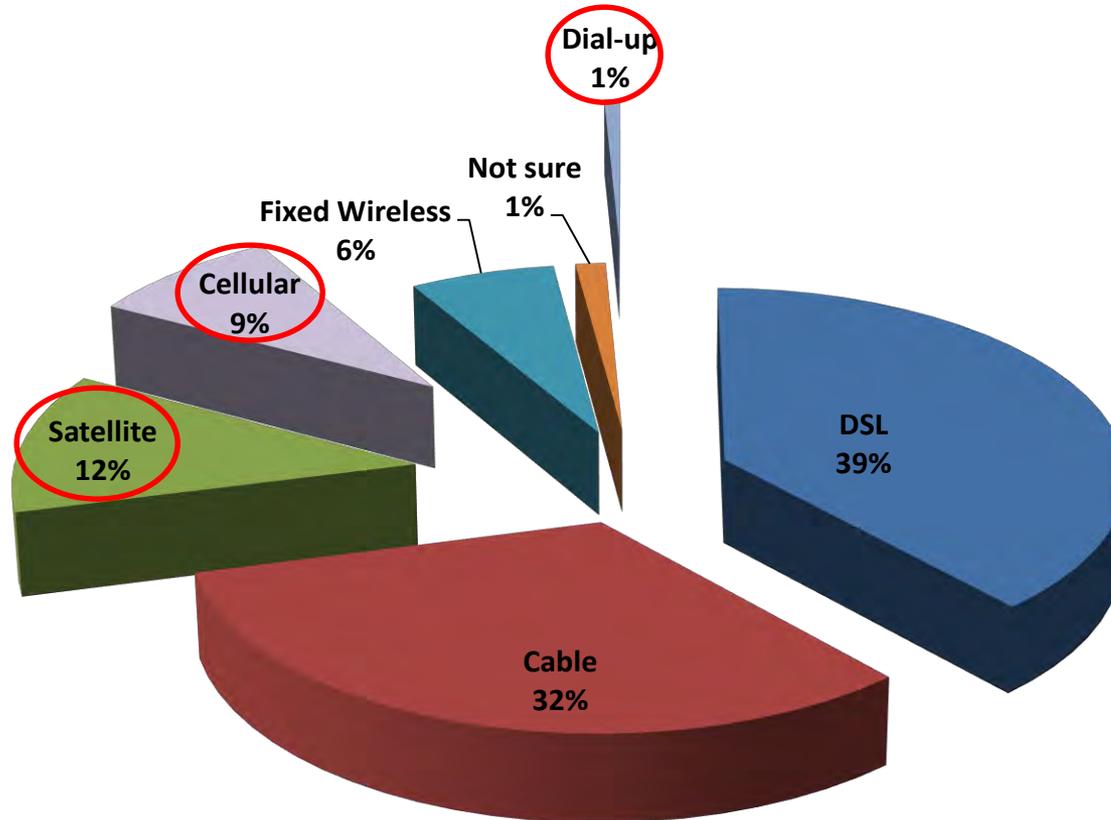
Franklin Co

Reasons 20% do not have Internet



Take away: Over 1/3 without Internet have no access. Over 1/3 of respondents may have affordability challenges.

Franklin County Type of Internet Access

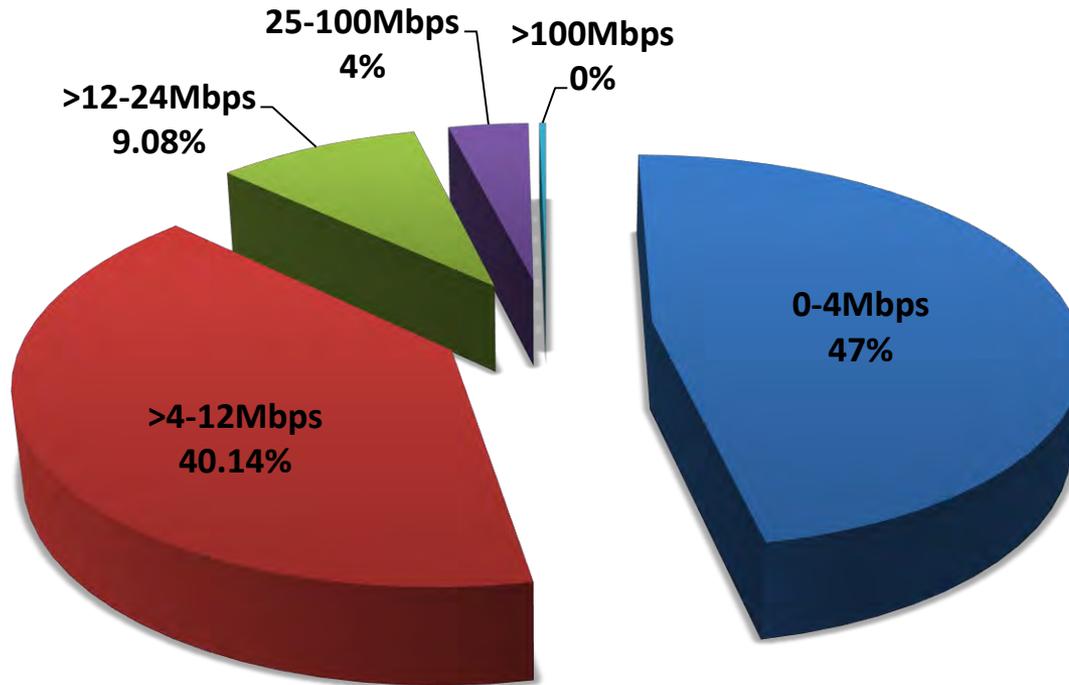


Take away: 22% of respondents depend on inadequate services (circled in red.)
50% of respondents reported they are satisfied with their service, 34% dissatisfied.
Most respondents (78%) consider Internet access very important or critical.

Franklin County Internet Speeds

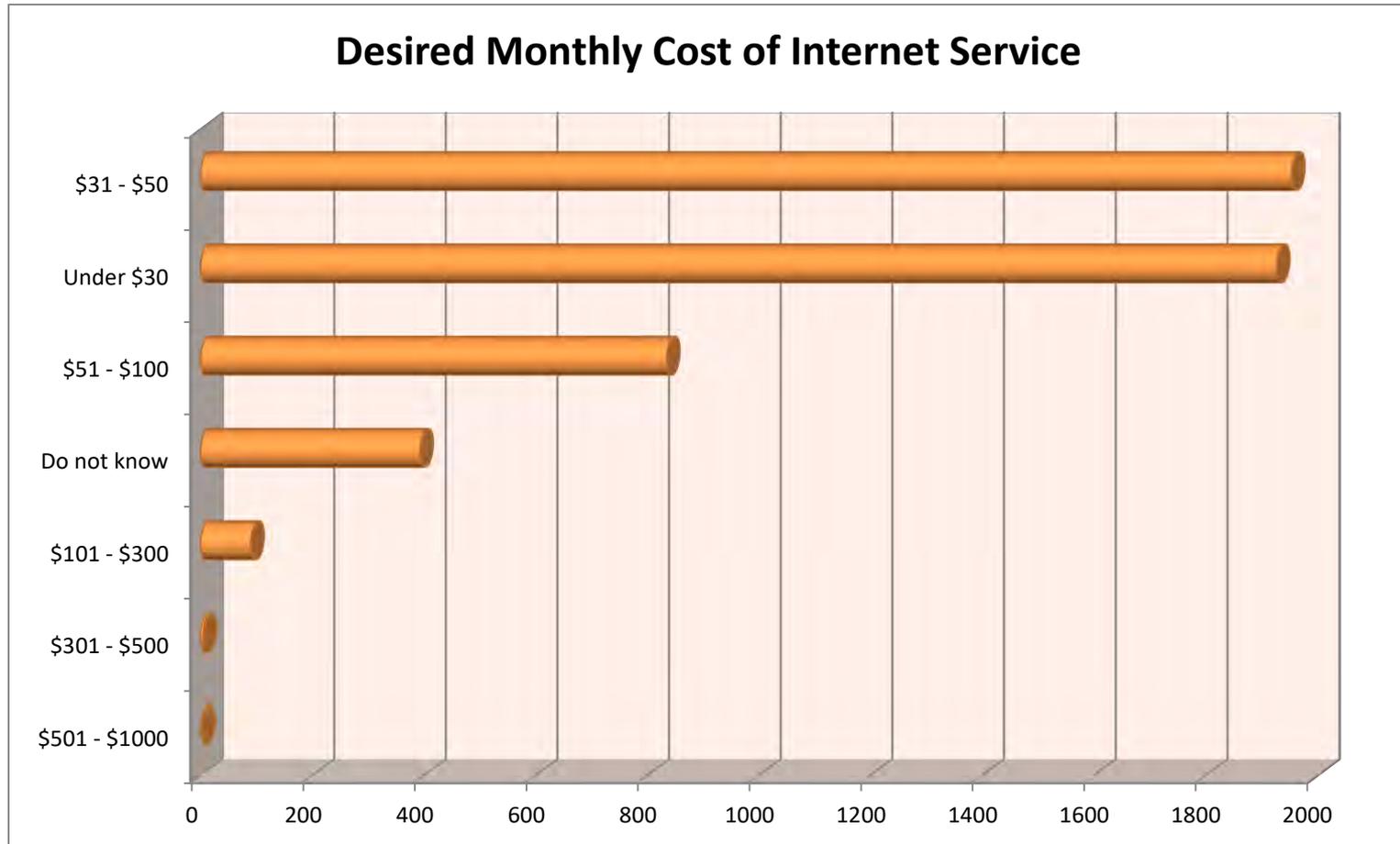
only valid for online surveys

Download Speeds



Take away: The majority of speed tests (47%) registered download speeds between 0-4 Mbps, DSL speeds.

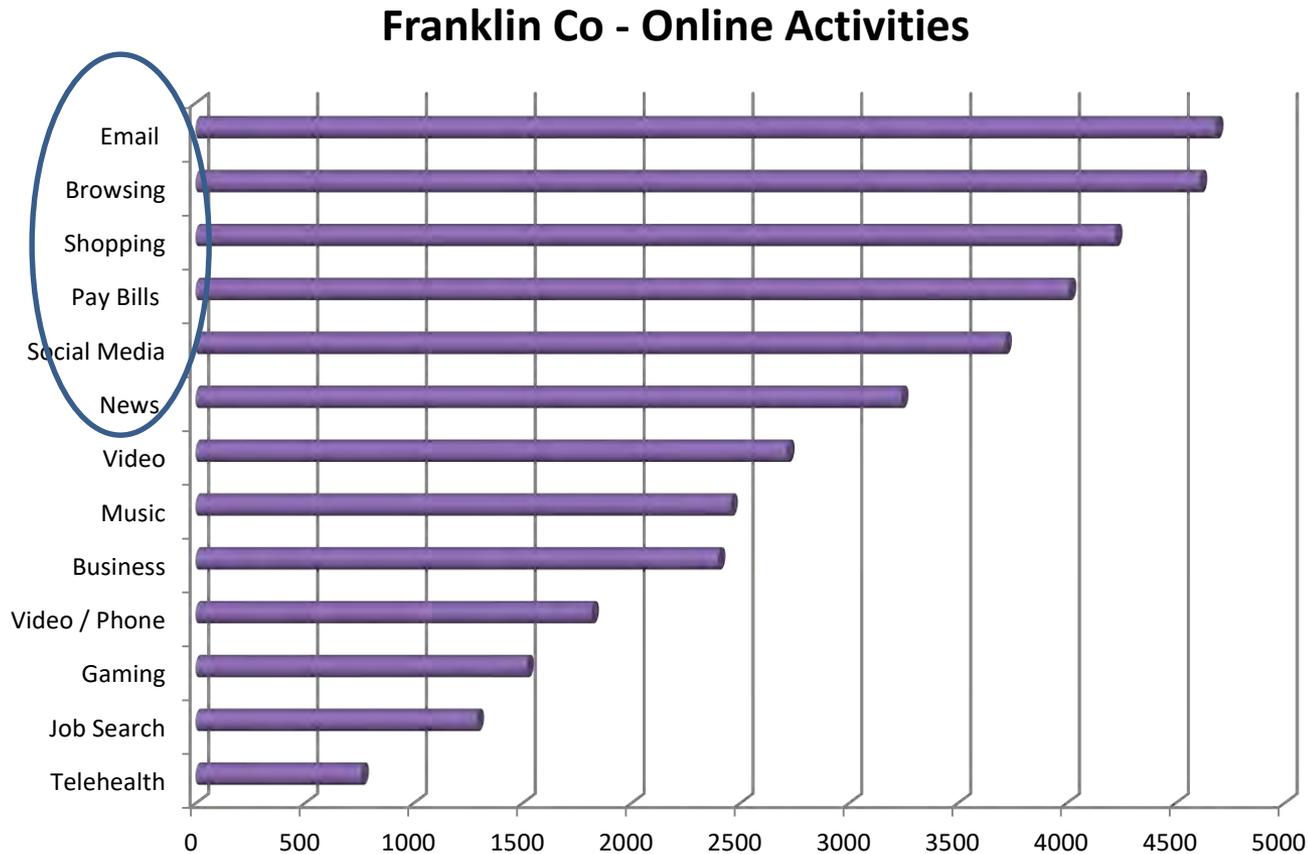
Franklin County Internet Costs



Take Away: Most respondents (48%) report paying \$51-\$100 per month for Internet service, regardless of speed tier or technology type. **Exception:** Fixed wireless users (27%) report paying between \$31-\$50 per month.

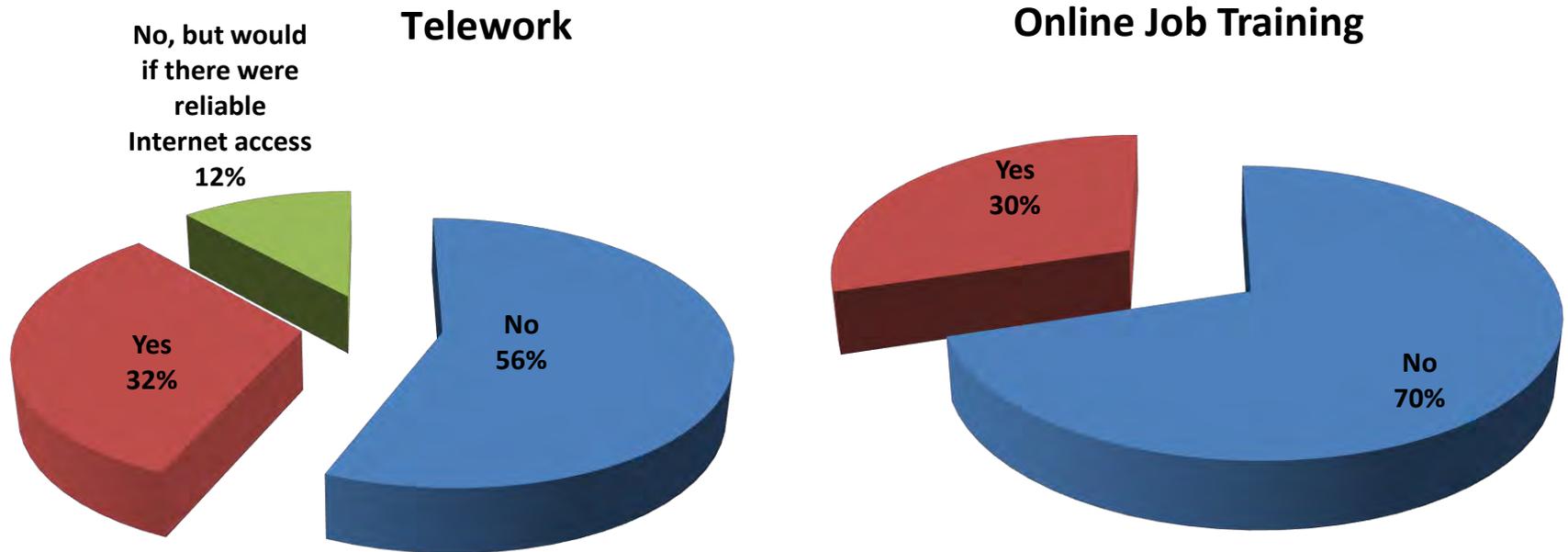
The most desired cost per month for Internet service is between \$31-\$50 , followed closely by under \$30.

Franklin County Online Activities



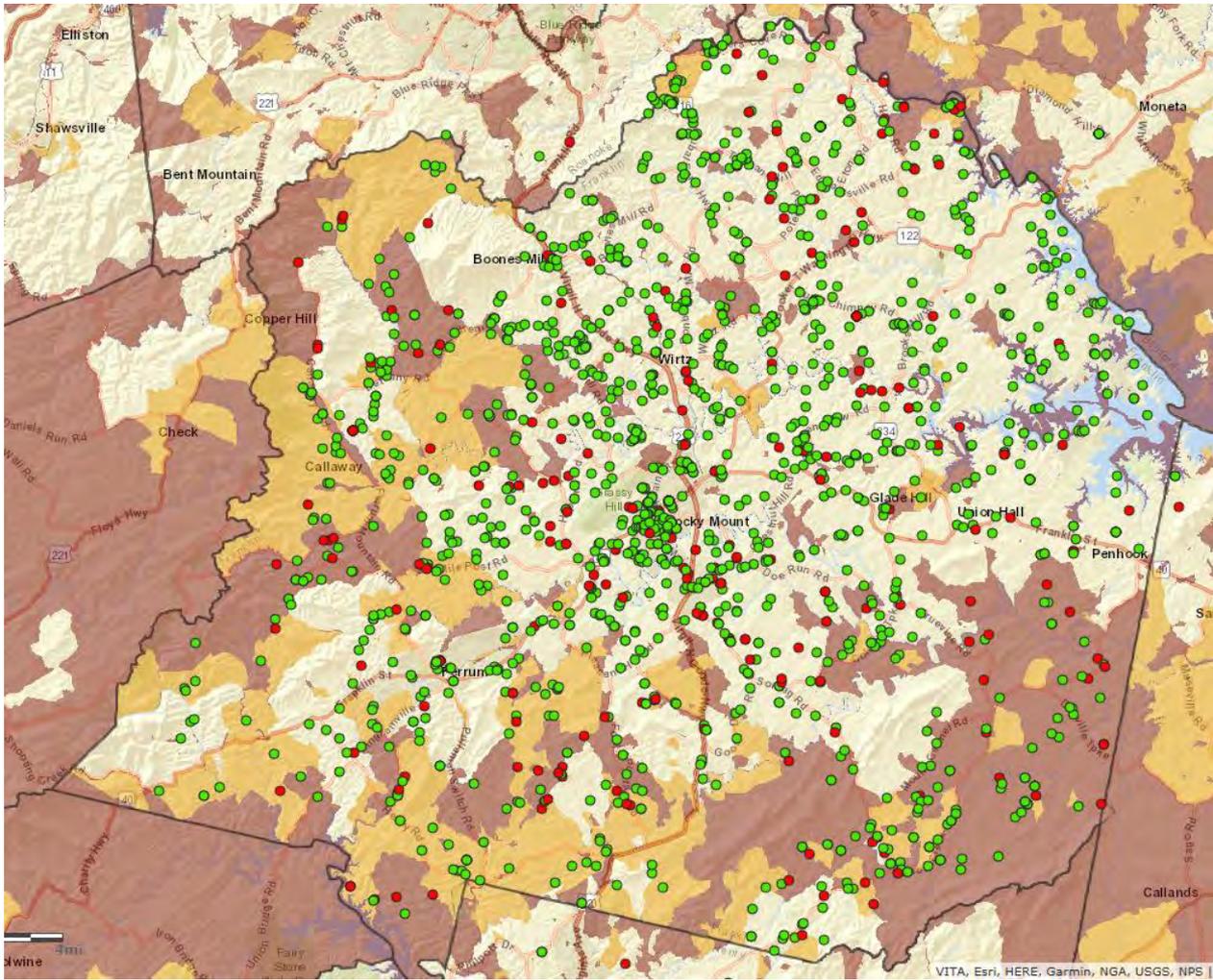
Take away: Primarily low bandwidth activities, consistent low bandwidth speeds recorded from speed tests.

Franklin County – Home Utilization

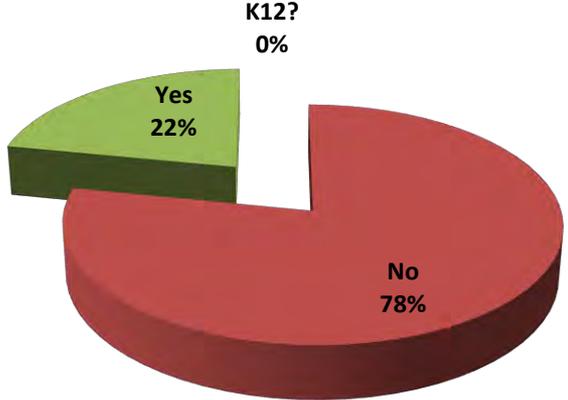


Take Away: 12% of respondents would work from home they had better Internet access.
Approximately 43% of workforce commutes out of the county.
30% report using the Internet for online job training

Franklin County K-12 Households



K-12 Households



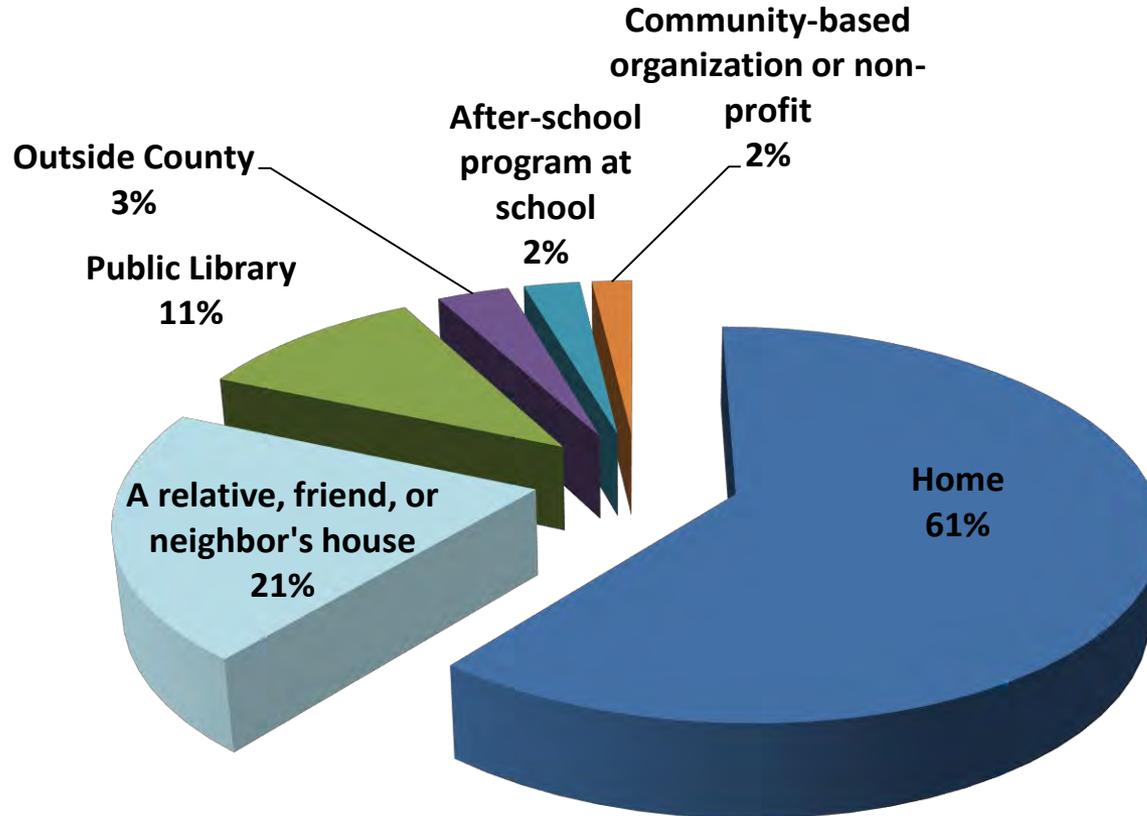
● Unserved = Broadband speed below 10 Mbps Download speed

● Underserved = Broadband speed between 10 Mbps Download speed and 25 Mbps Upload speed

Take away: 1751(22%) reported K-12 students in the household.
6% of those are being home-schooled
15% of K-12 households have no access.

Franklin County

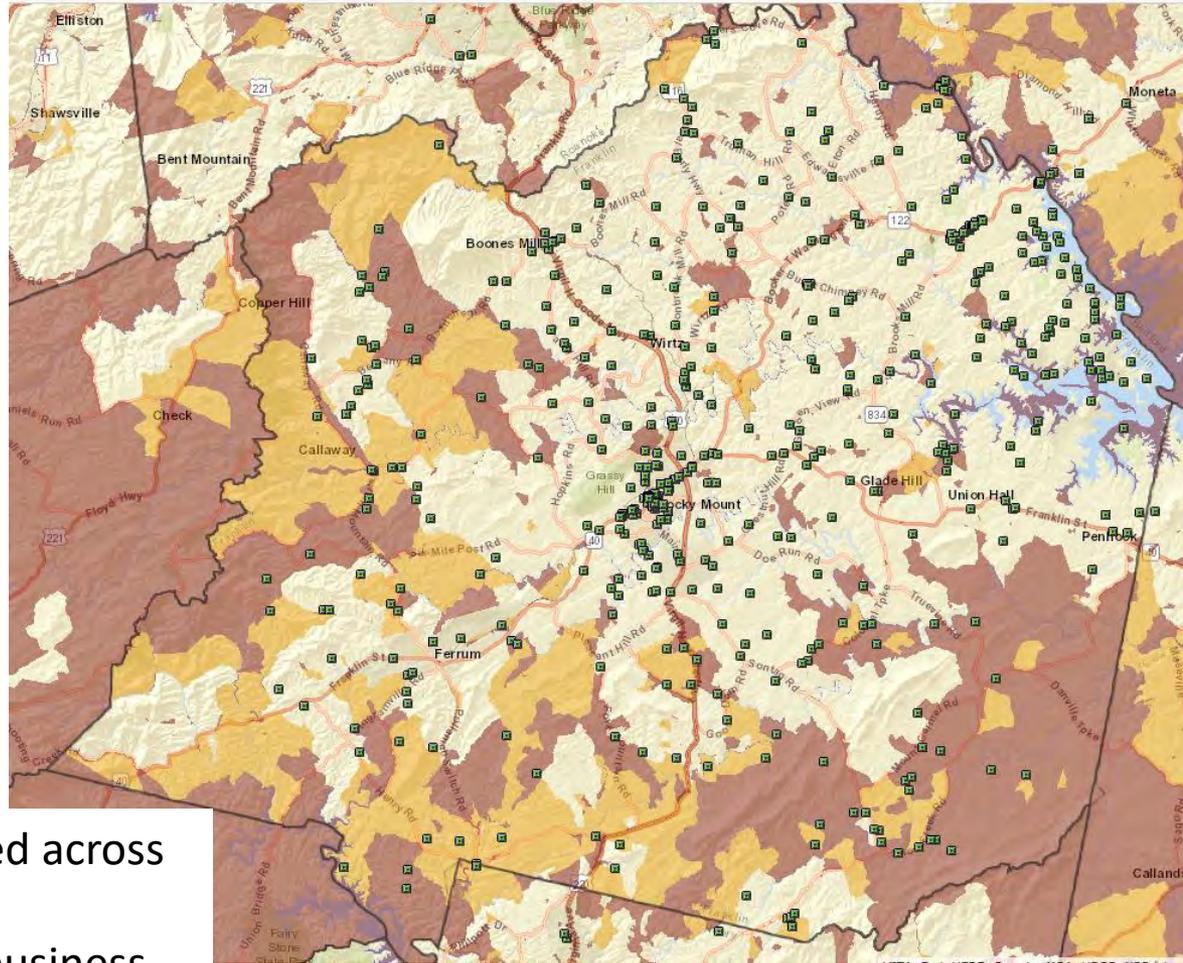
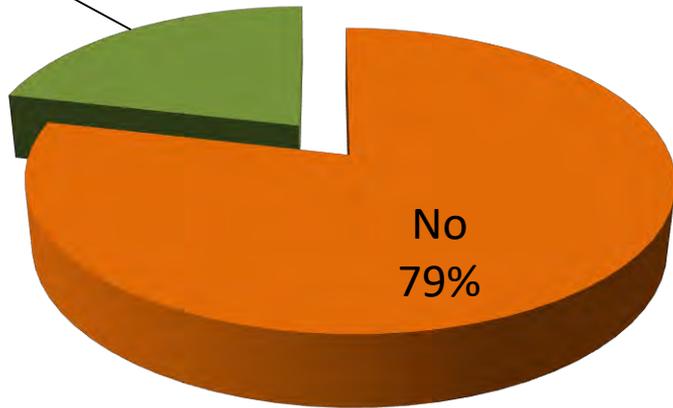
Where Children Access the Internet after School



Take Away: Most K-12 students (61%) have access to the Internet at home after school. 11% depend on access at the public library(s)

Franklin County Businesses

Yes Own/Manage a Business?
21%



Take Away: 1291 businesses scattered across the county.

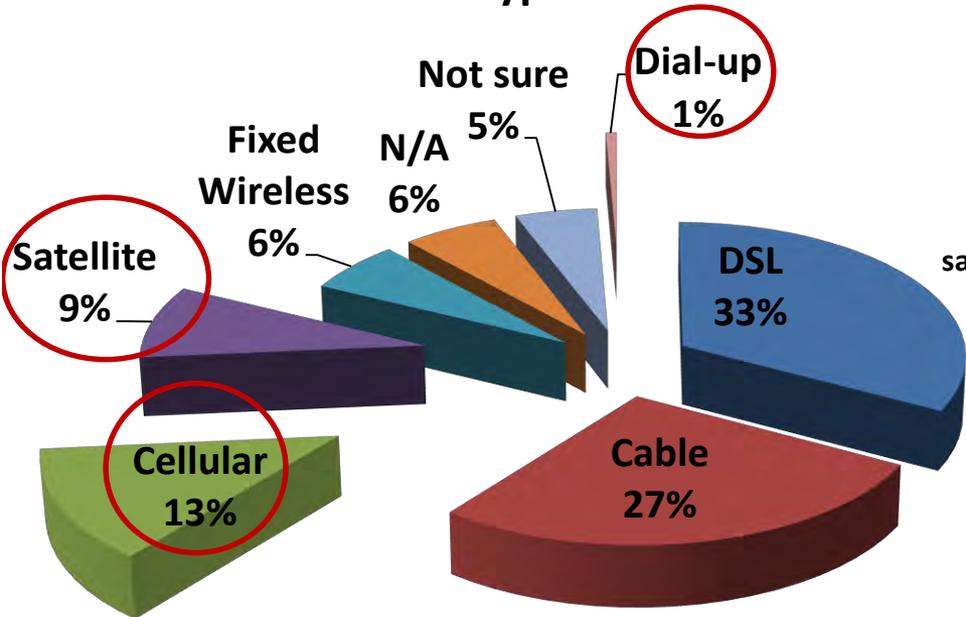
21% of respondents own/manage a business.

90% of businesses consider Internet access very important or critical.

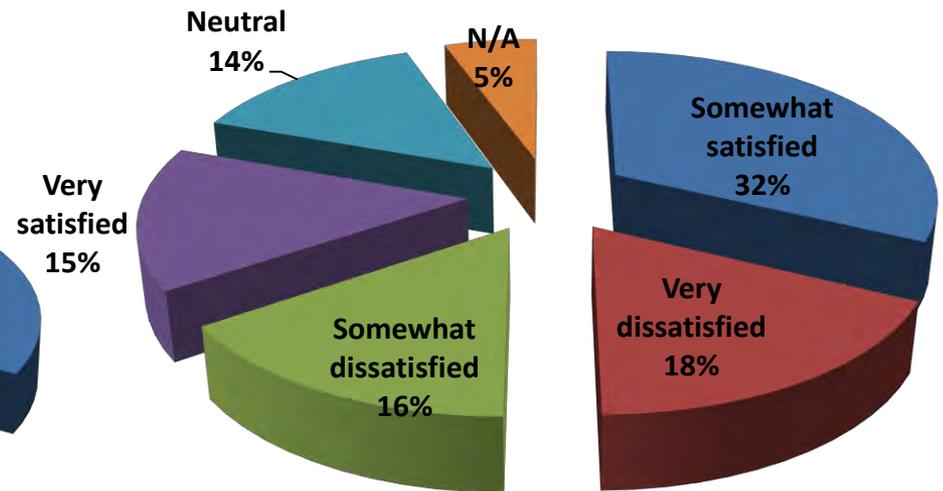
Business Locations:

Franklin County Business Connections

Business Connection Types

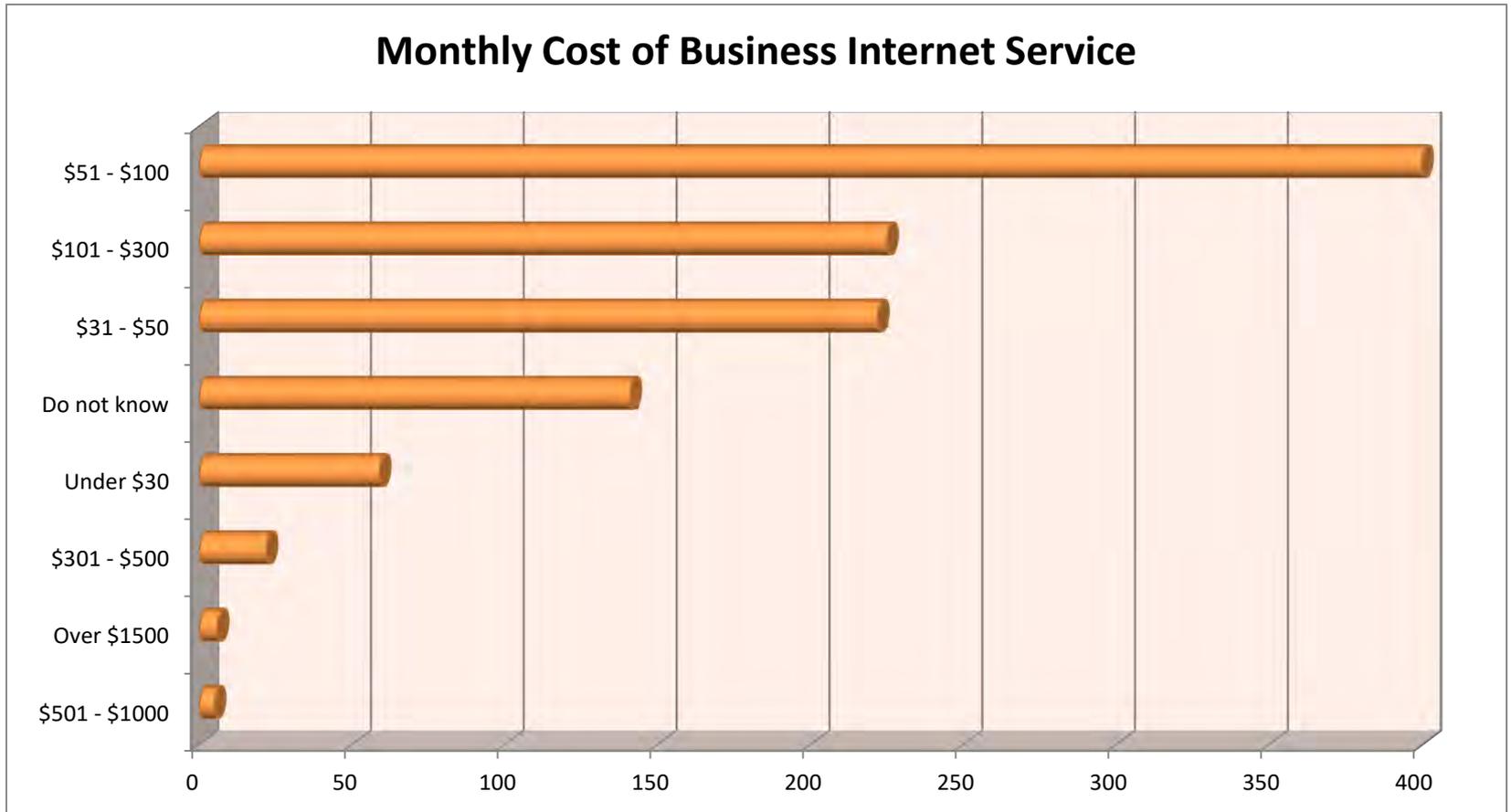


Business Internet Service Satisfaction



Take away: DSL is the most common business connection type, (33%) followed by cable (27%)
23% of businesses depend upon inadequate connection types
34% are dissatisfied with their business Internet service.

Franklin County



Take away: The majority of business owners (37%) pay between \$51-\$100 per month
Most business owners would prefer to pay \$31-\$50 and under

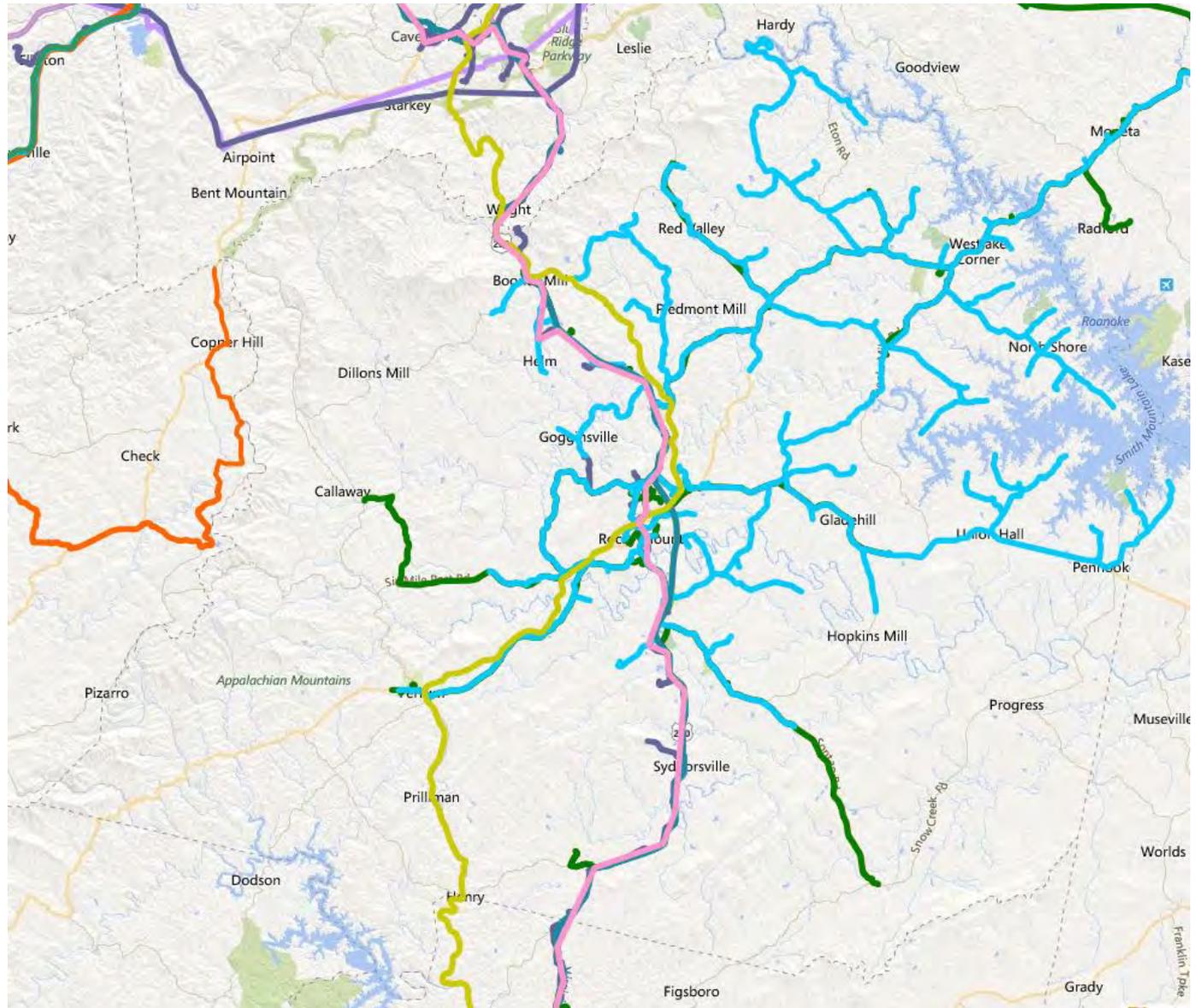
Vertical Assets, Fiber, Conduit and Community Anchors

LOCAL ASSETS

All Commercial Fiber Routes

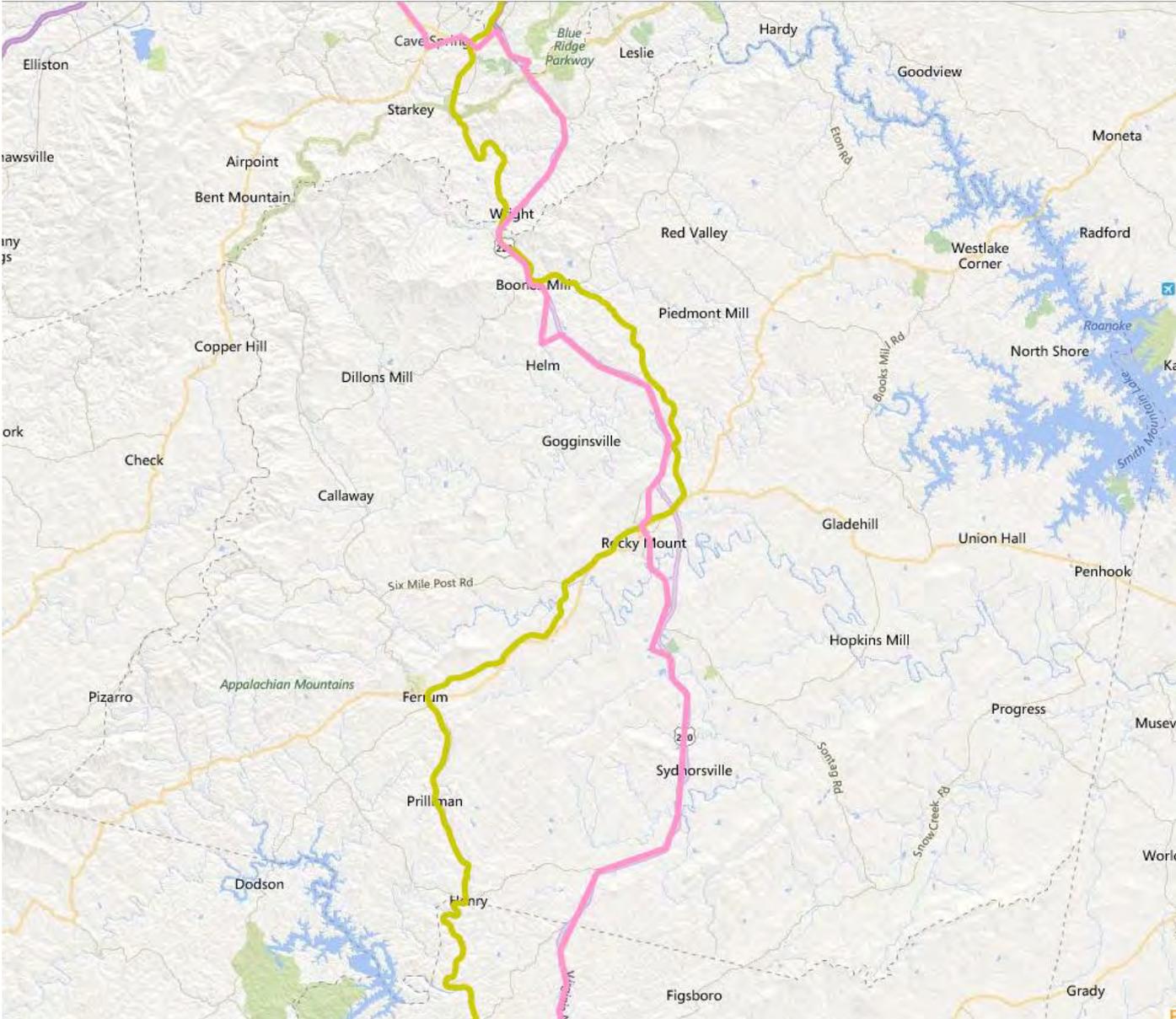
Metro and Long Haul providers

- Conterra
- Level3 Metro
- Lightower
- LIT Networks
- Lumos
- Mid-Atlantic Broadband
- Shentel
- Sunset Digital Com.
- Uniti Fiber
- Windstream



Must ensure conduit is added throughout the new business development location

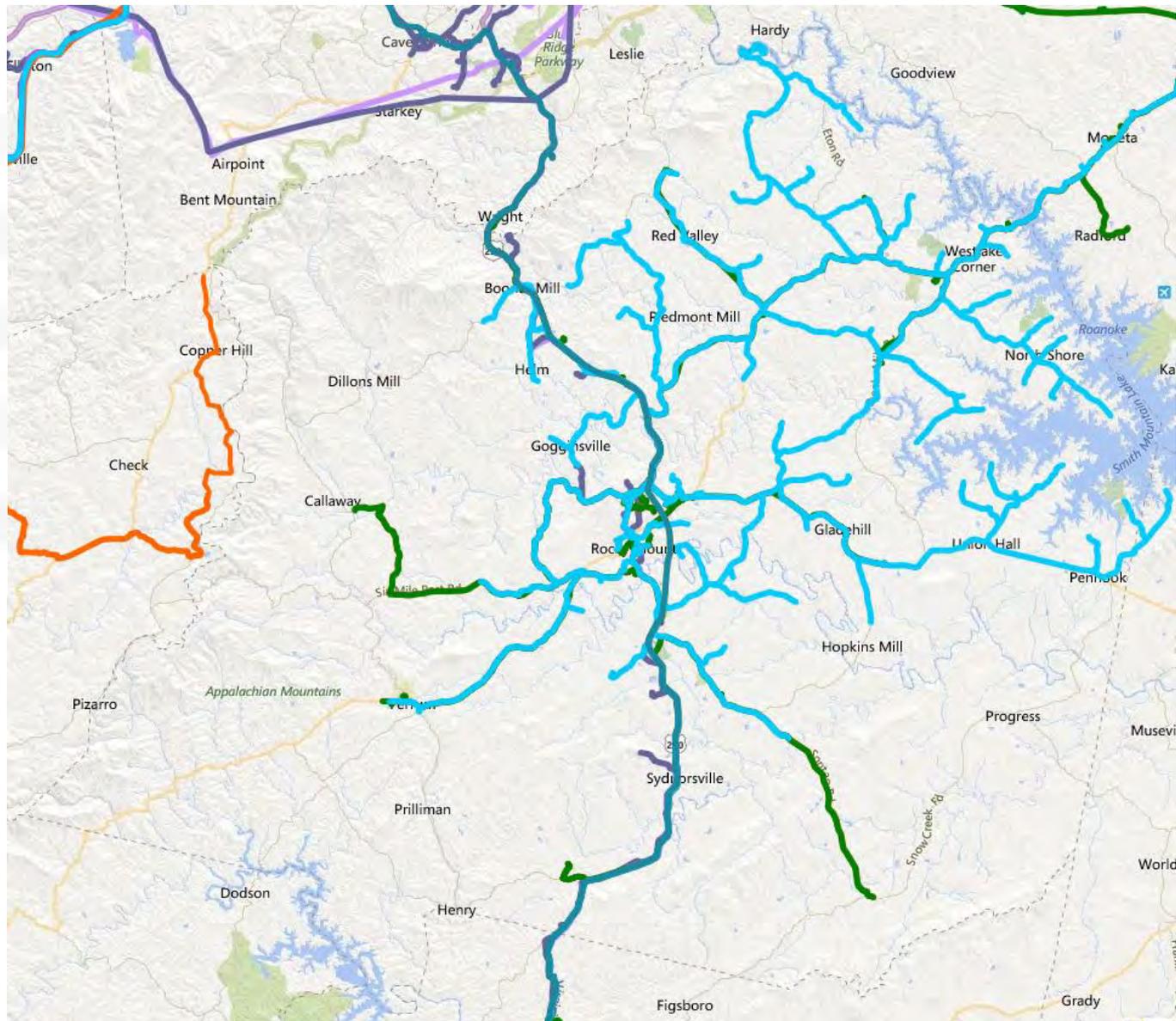
Commercial Long Haul Fiber



Level 3
Sprint

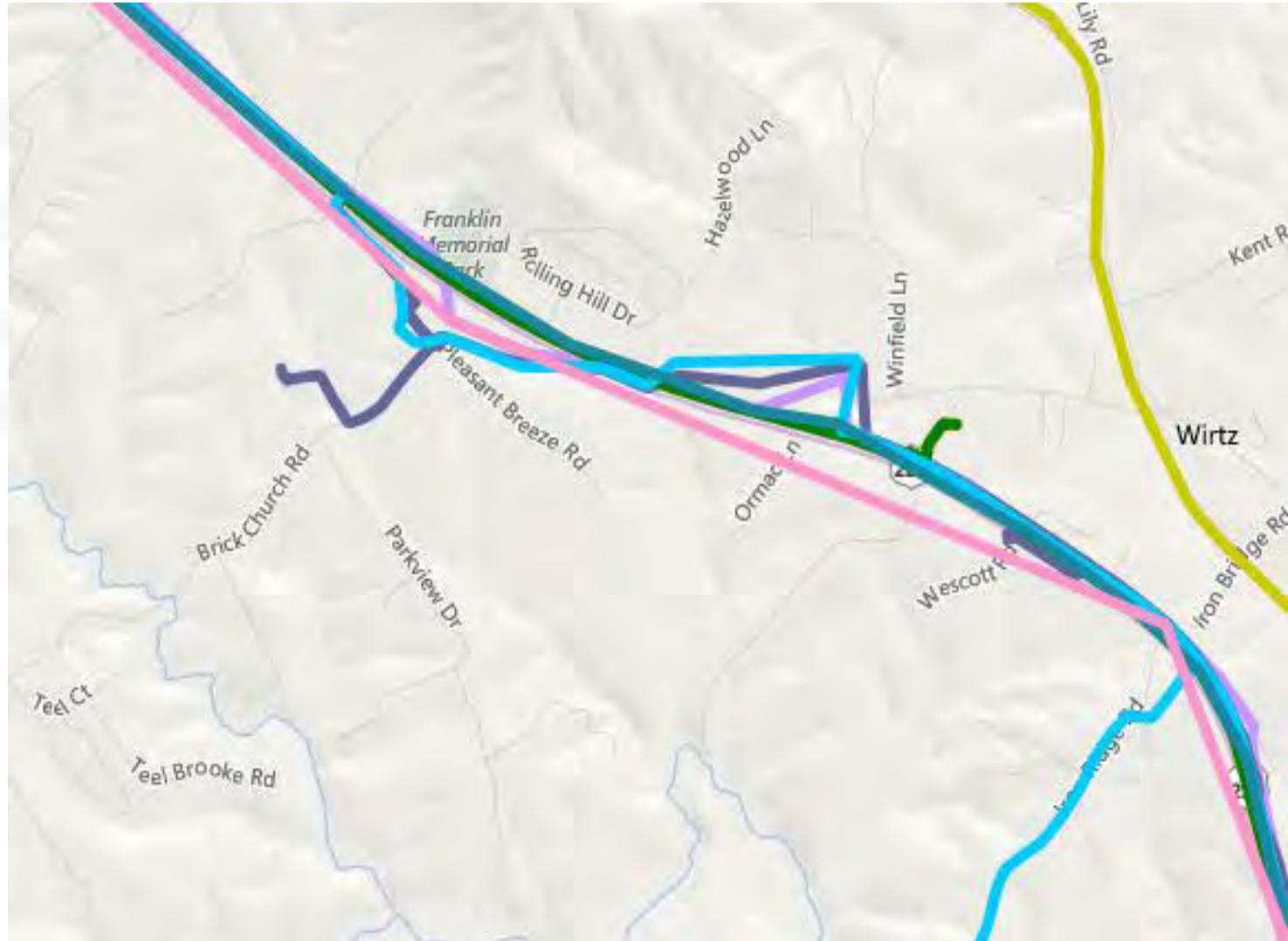
Commercial Metro Networks Fiber

- Conterra
- Level3 Metro
- Lighttower
- LIT Networks
- Lumos
- Mid-Atlantic Broadband
- Shentel
- Sunset Digital Com.
- Uniti Fiber
- Windstream

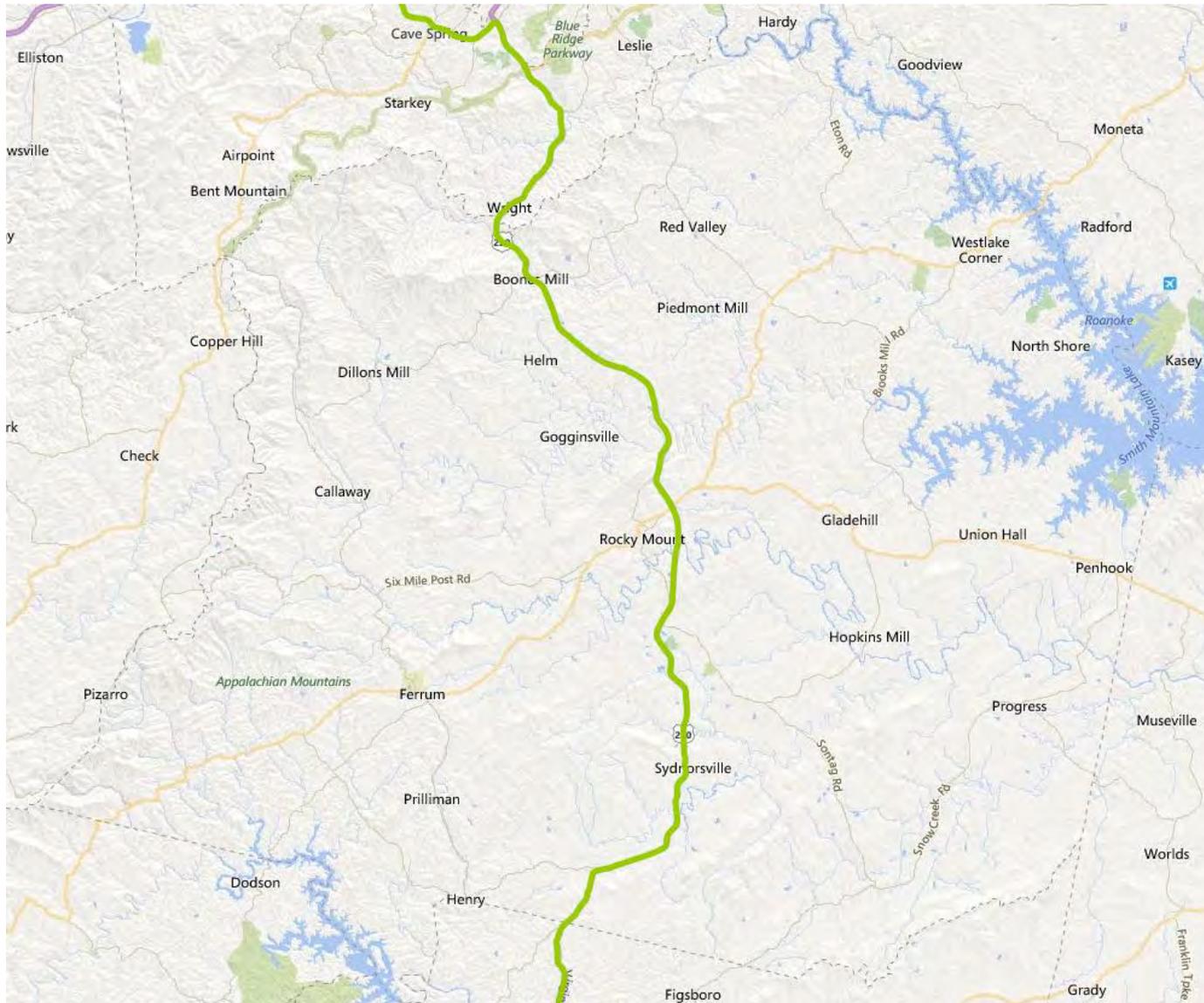


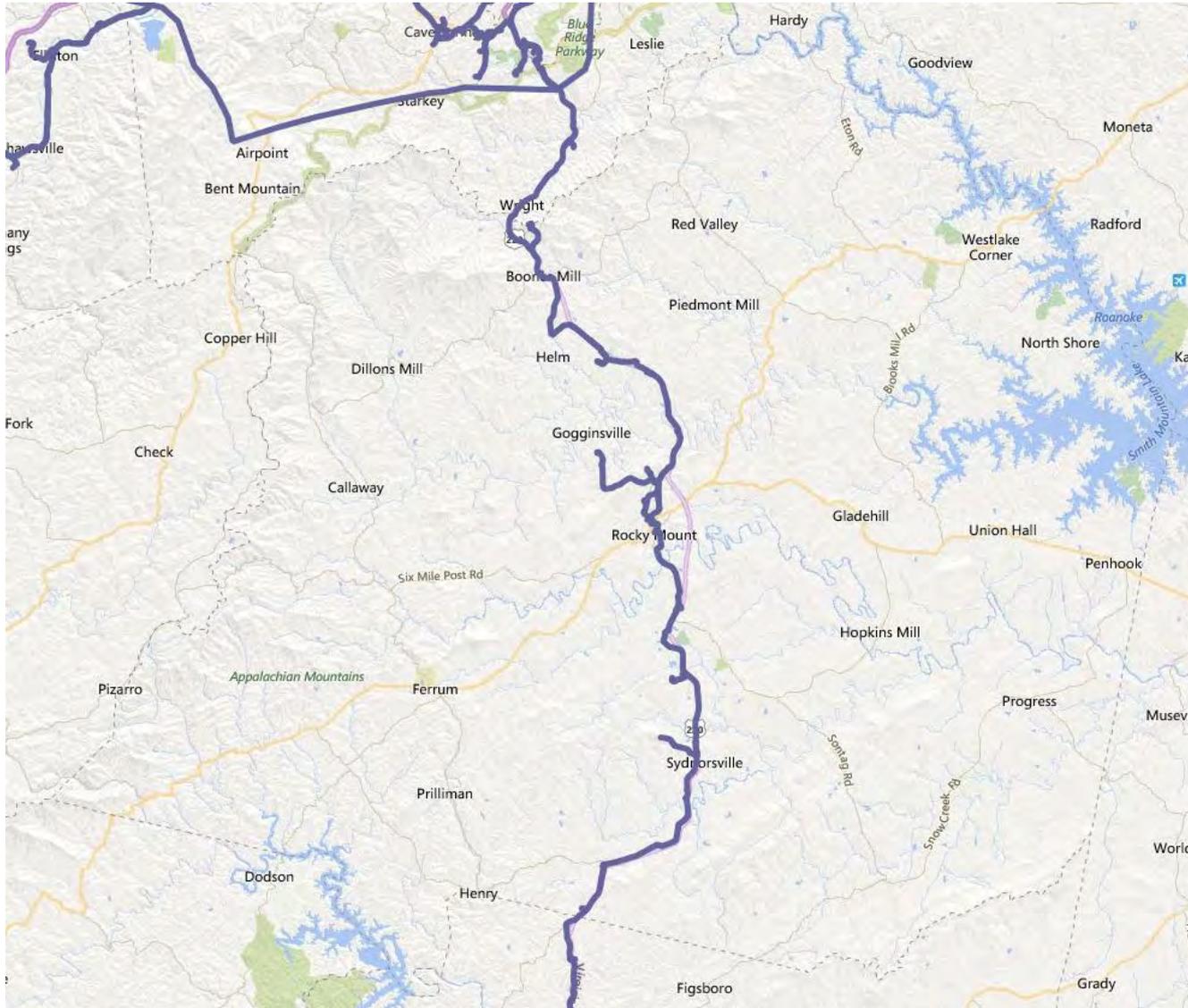
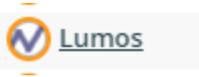
Commercial Fiber at Planned Business Park

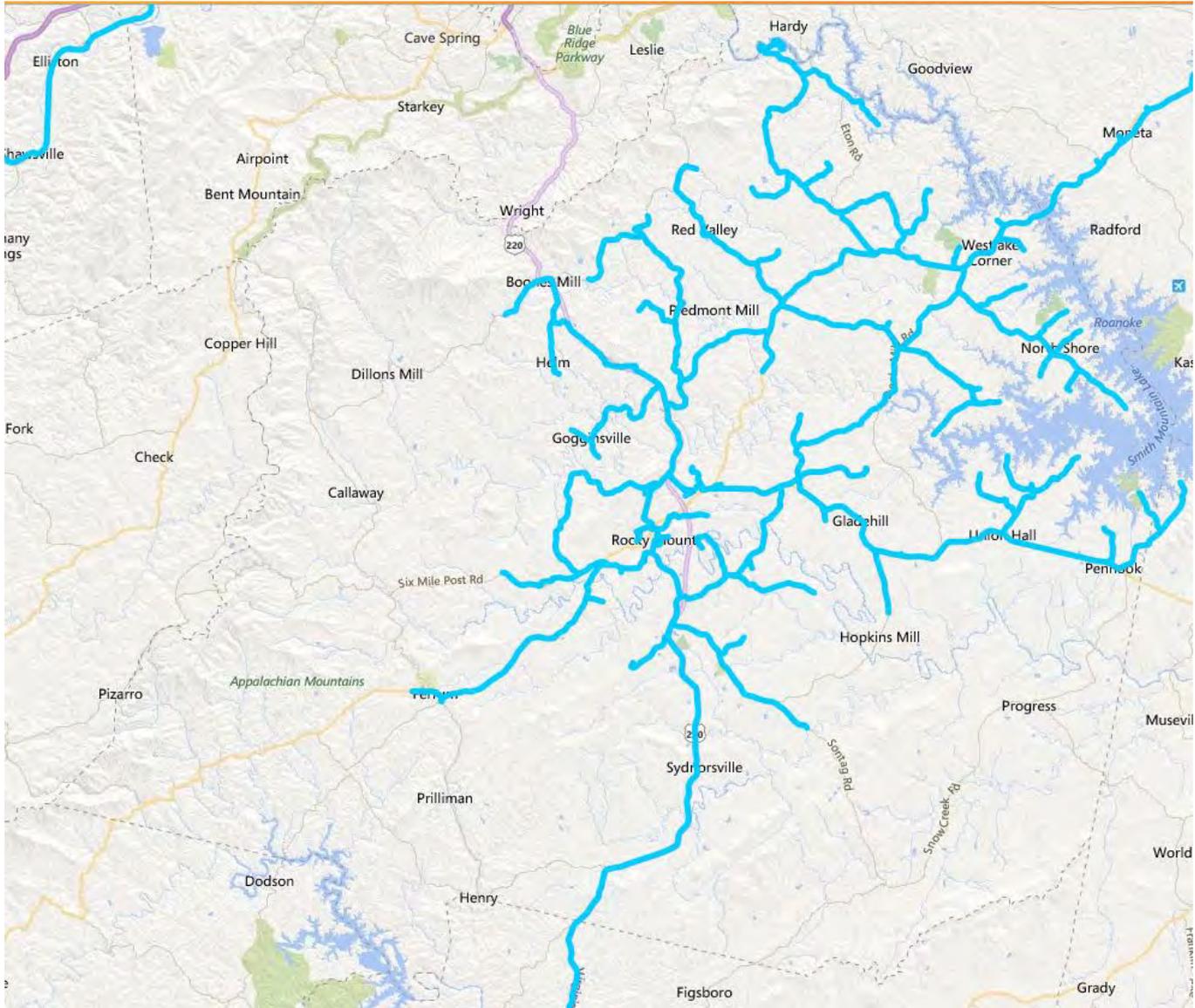
- Lighttower
- LIT Networks
- Lumos
- Mid-Atlantic Broadband
- Shentel
- Uniti Fiber
- Windstream
- Level 3
- Sprint

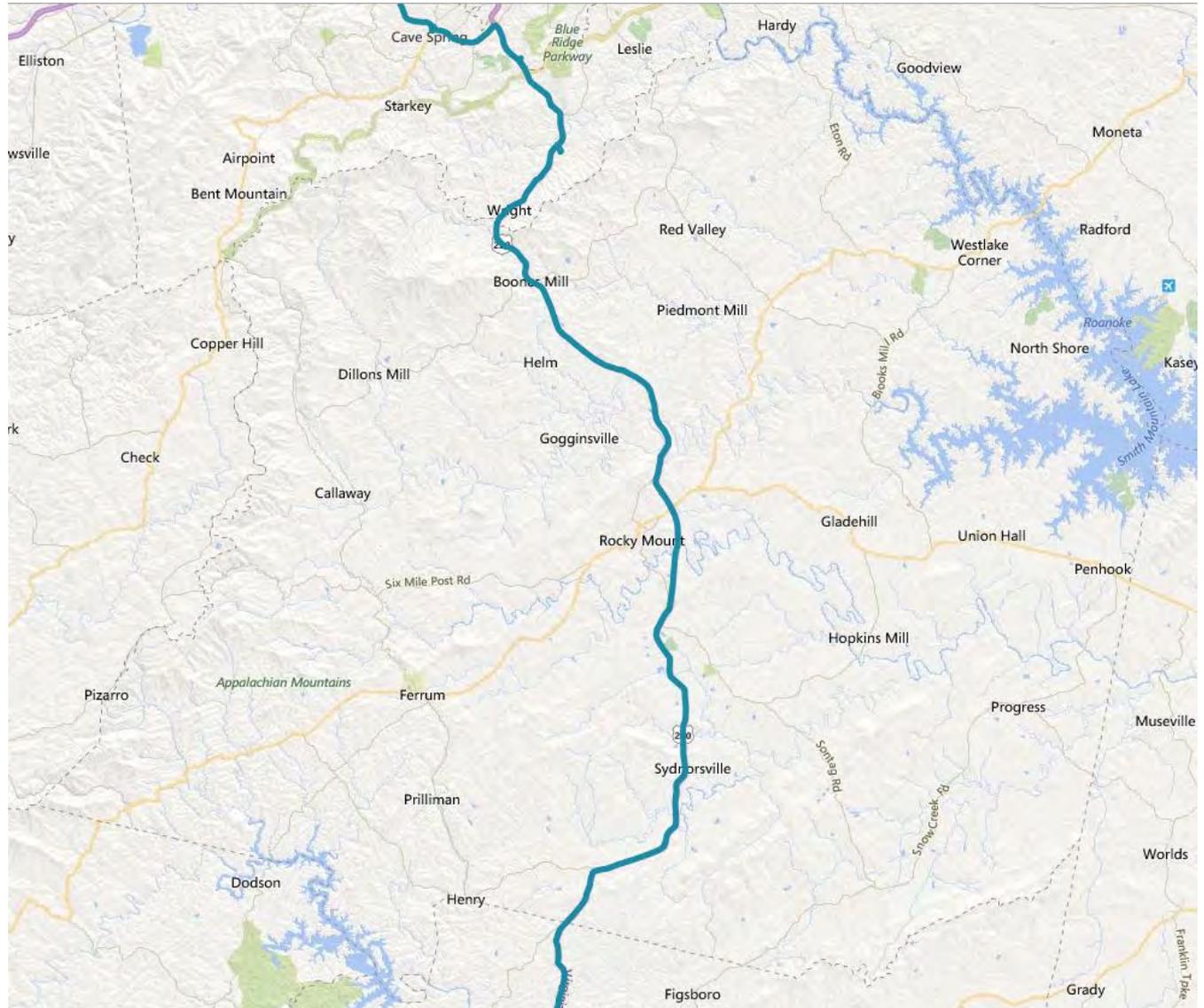
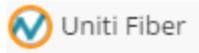


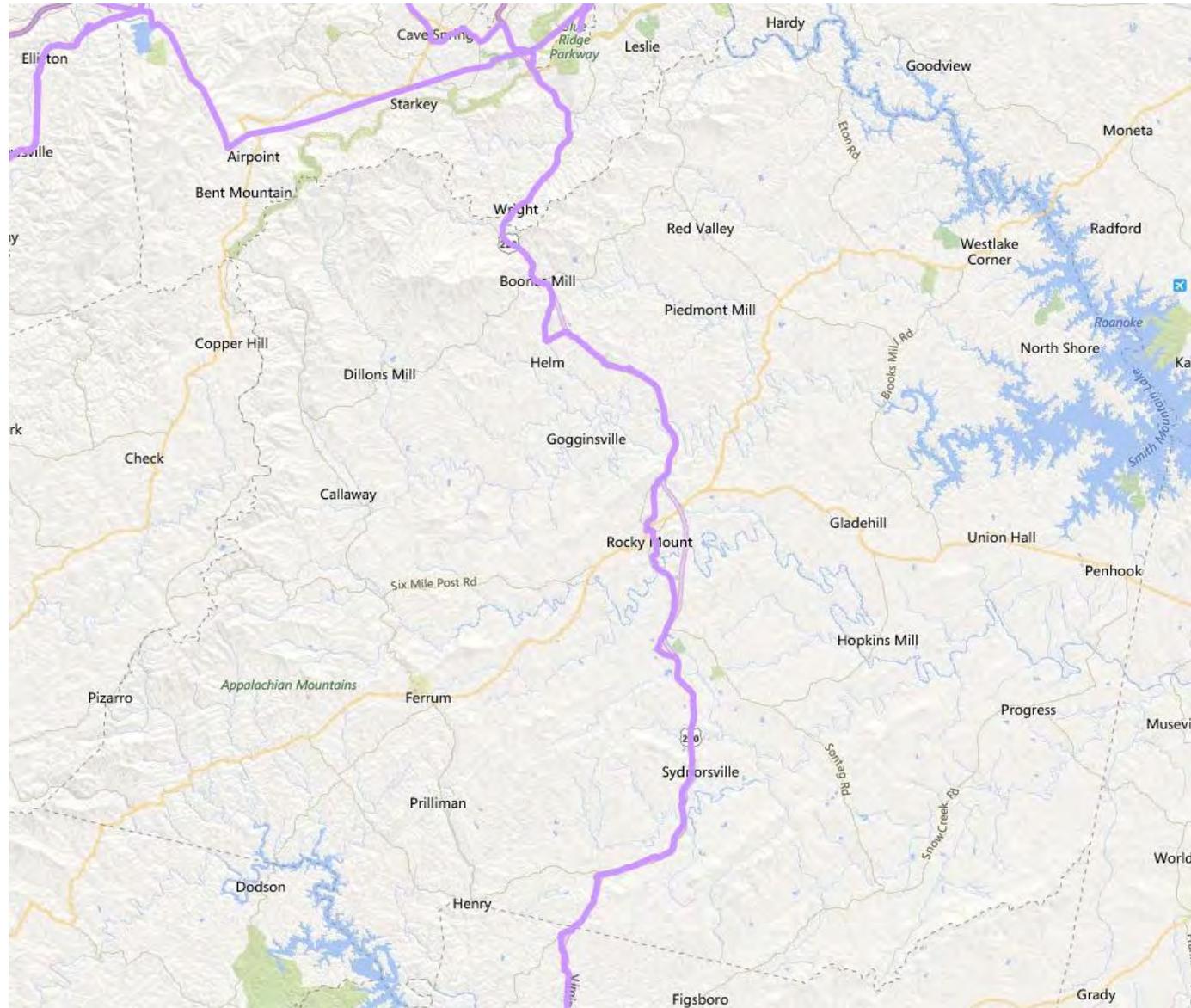
Commercial Fiber









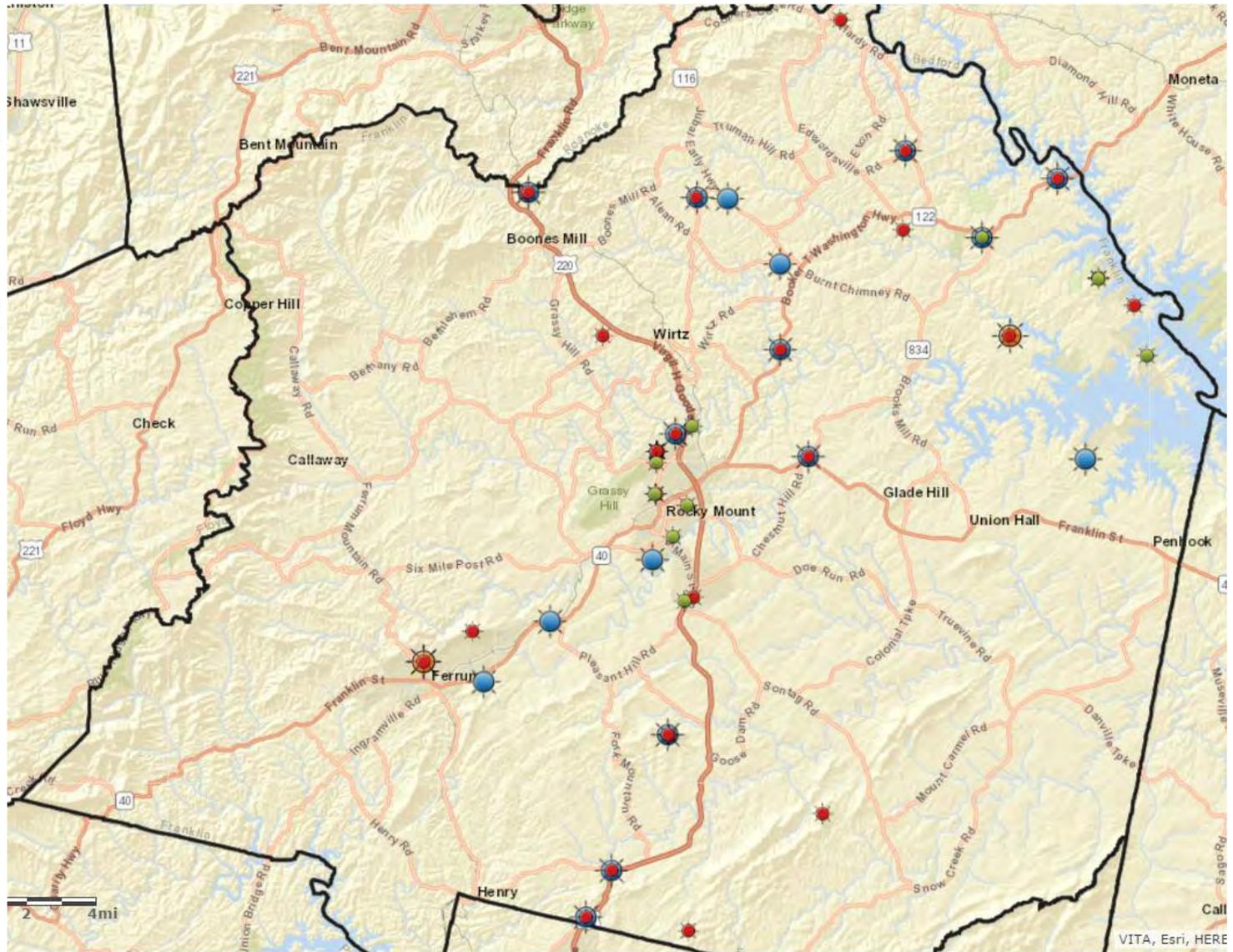


Franklin County Vertical Assets

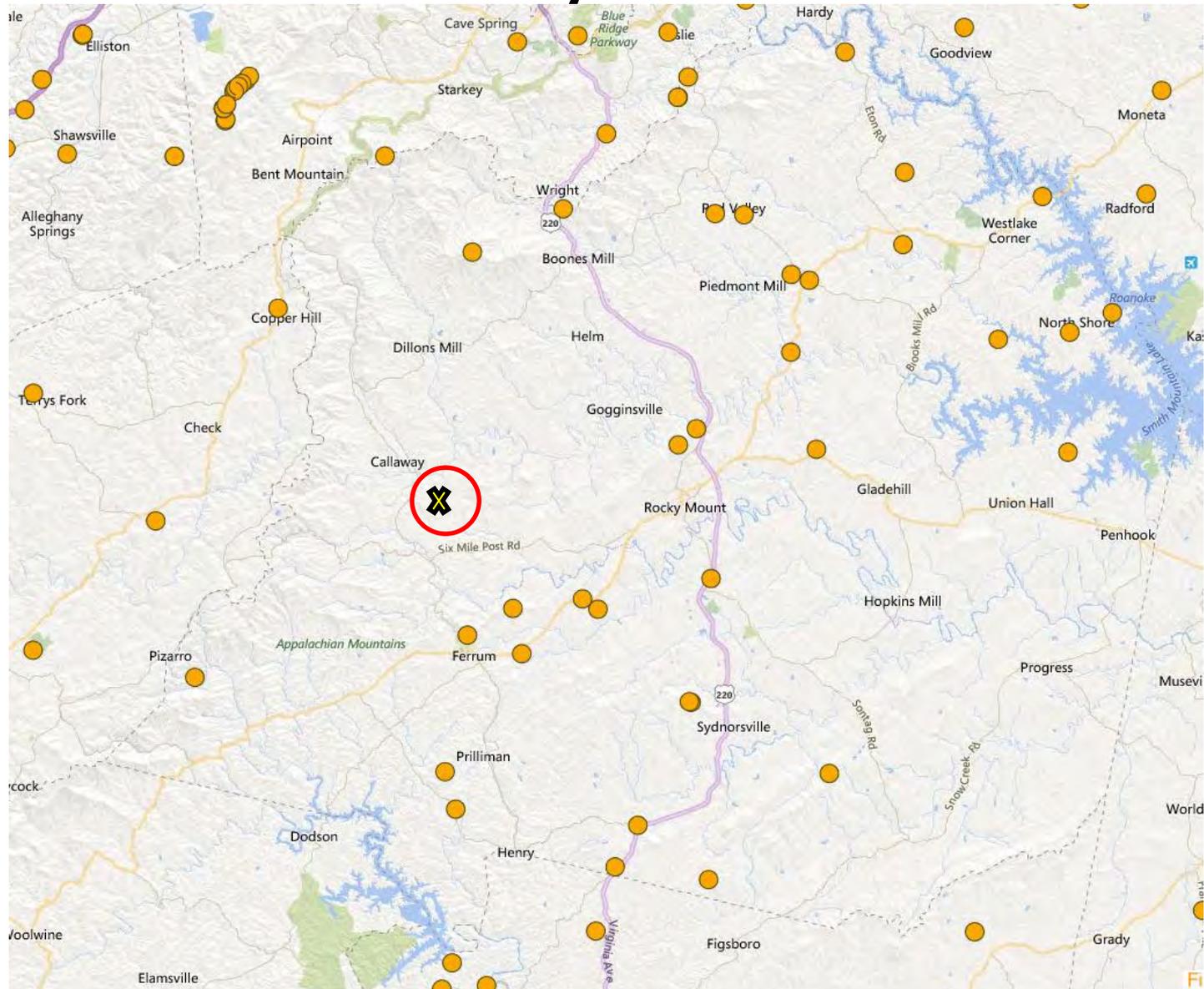
Data Source:

-  'Franklin County GIS'
-  'FCC: ASR'
-  'Virginia Municipal League'
-  'FCC: Cellular'

29
18
10
2



Franklin County Cellular Towers

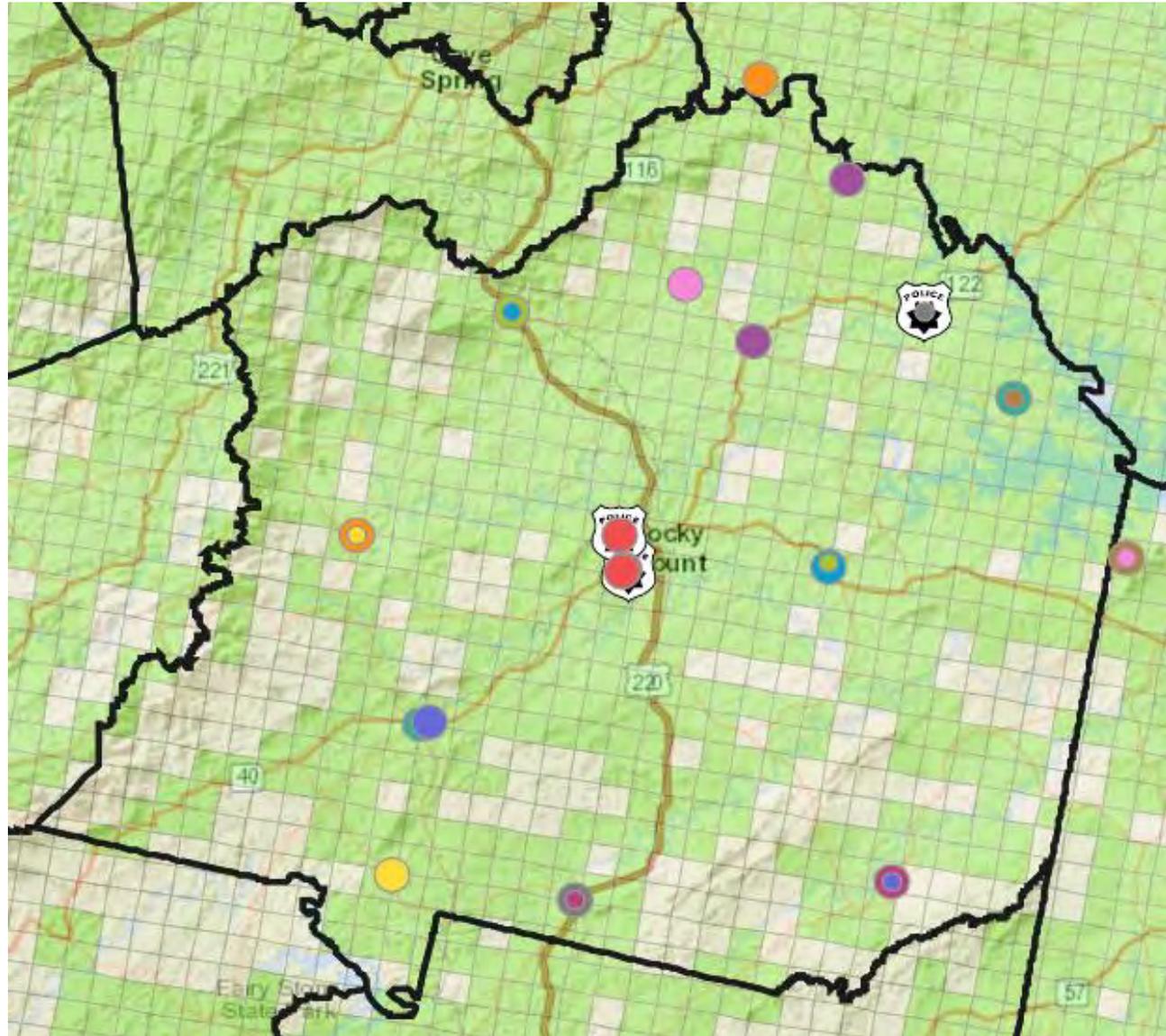


Franklin County Public Safety



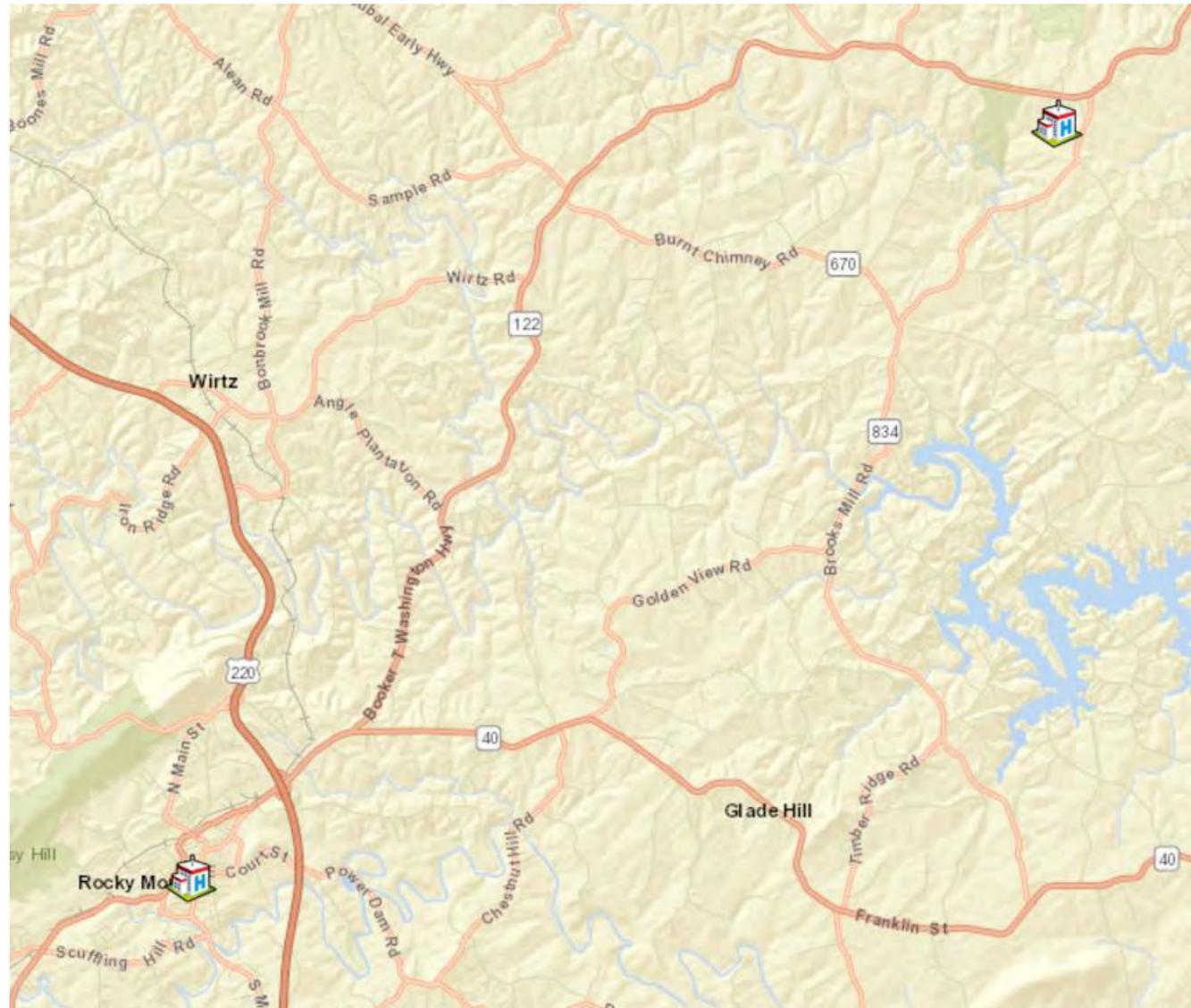
Law Enforcement

- Rocky Mount Fire Company
- Boones Mill Fire Company
- Boones Mill Rescue Dept
- Burnt Chimney Fire Company
- Callaway Fire Company
- Callaway Rescue Squad
- Cool Branch Fire Company
- Cool Branch Rescue Squad
- Ferrum Fire Company
- Ferrum Recue Squad
- Fork Mtn Fire Company
- Fork Mtn Rescue Dept
- Franklin County Rescue Squad
- Glade Hill Fire Company
- Glade Hill Rescue Dept
- Hardy Fire Company
- Hardy Rescue Dept
- Henry Fire Company
- Red Valley Rescue Dept
- Scruggs Fire Company
- Scruggs Rescue Dept
- Snow Creek Fire Company
- Snow Creek Rescue Dist
- Westlake Fire Station



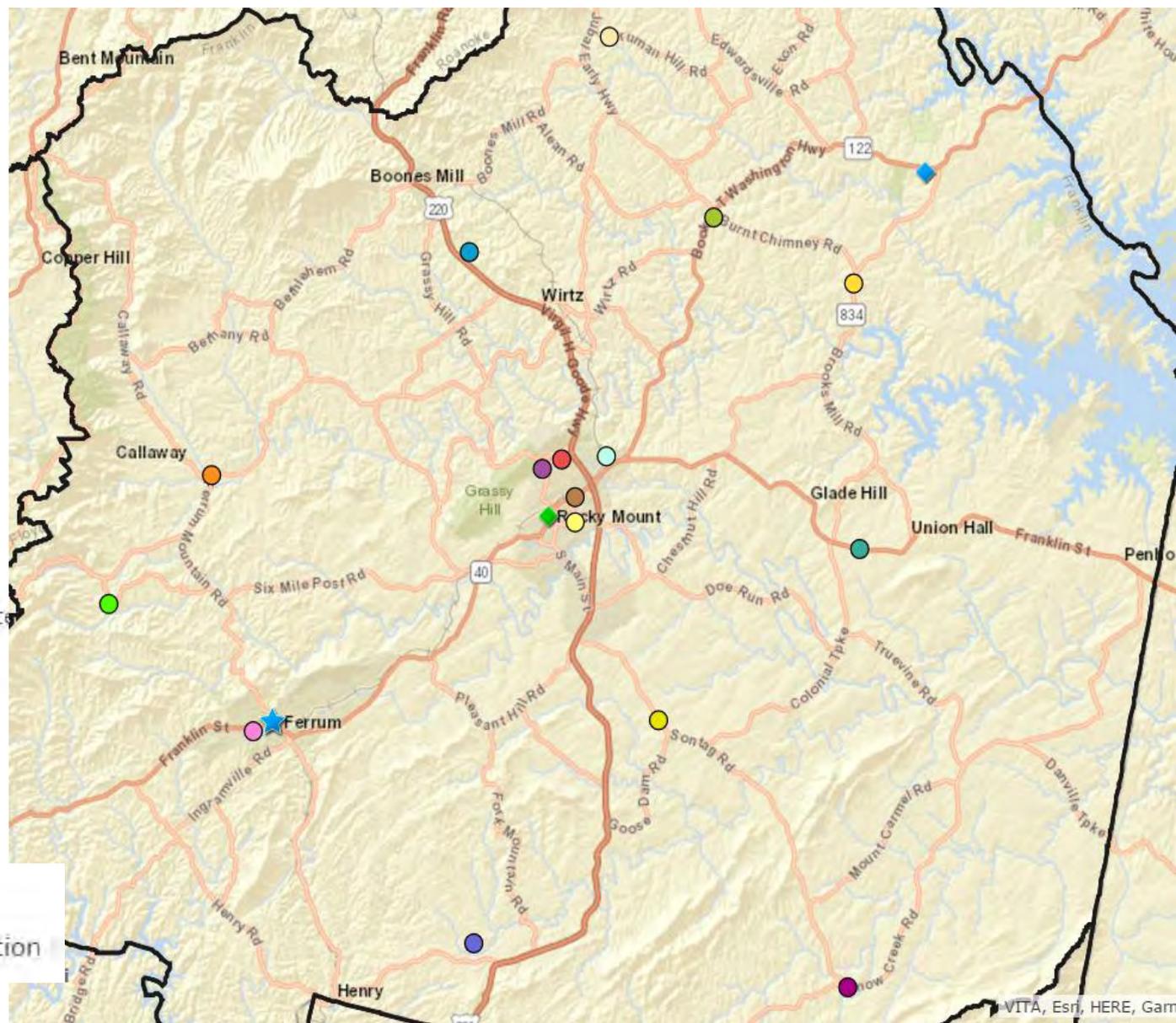
Franklin County Healthcare

-  Carilion Franklin Memorial Hospital
-  Westlake Medical Center



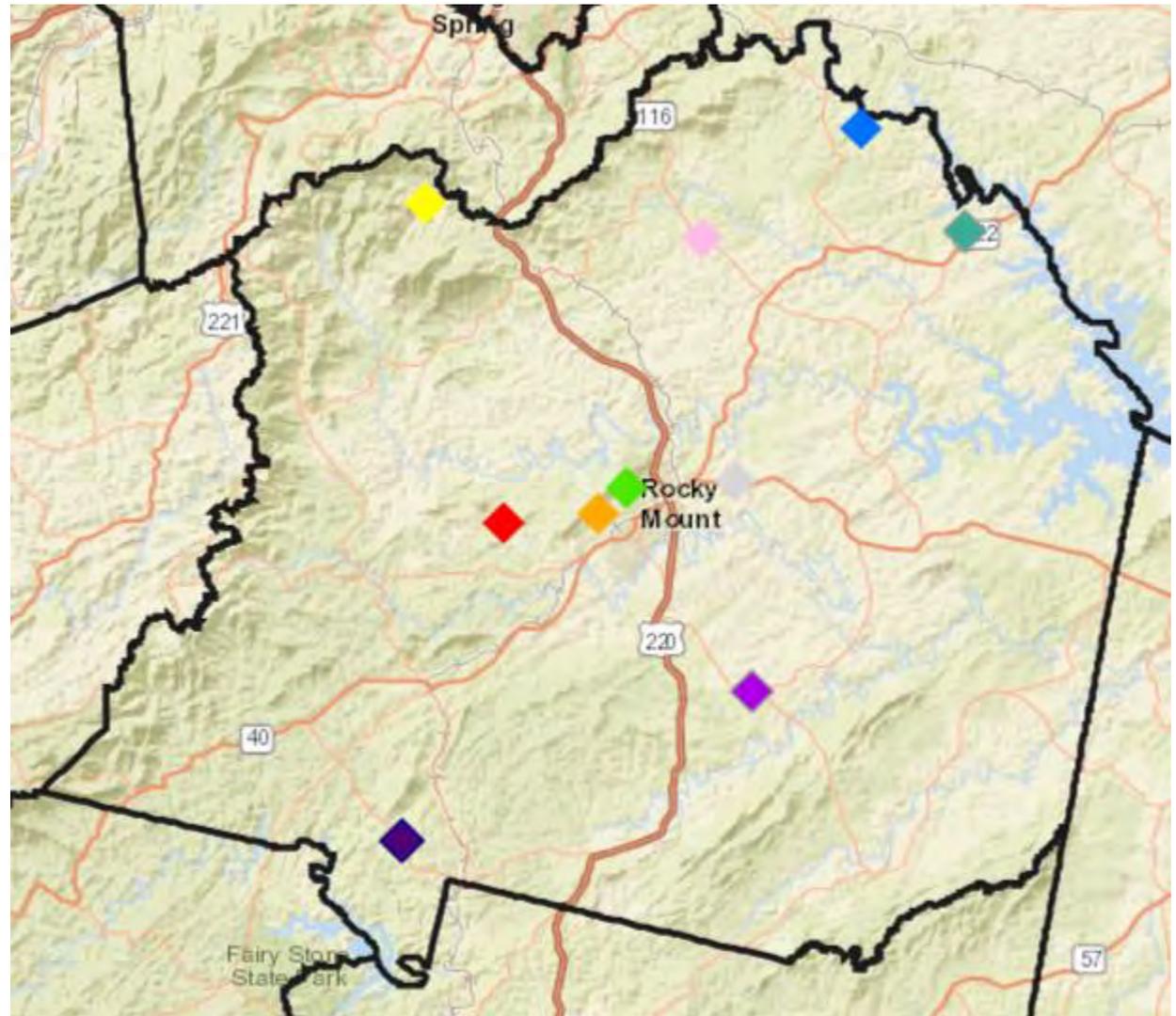
Franklin County K-12 Schools, Libraries, College

- Benjamin Franklin Middle
- Boones Mill Elementary
- Burnt Chimney Elementary
- CATCE (Gereau Center)
- Callaway Elementary
- Dudley Elementary
- Ferrum Elementary
- Franklin County High
- Glade Hill Elementary
- Henry Elementary
- Lee M Waid Elementary
- Phoebe Needles Educational Center
- Rocky Mount Elementary
- Snow Creek Elementary
- Sontag Elementary
- Windy Gap Elementary School
- ◆ County Public Library
- ◆ Westlake Branch Library Location
- ★ Ferrum College



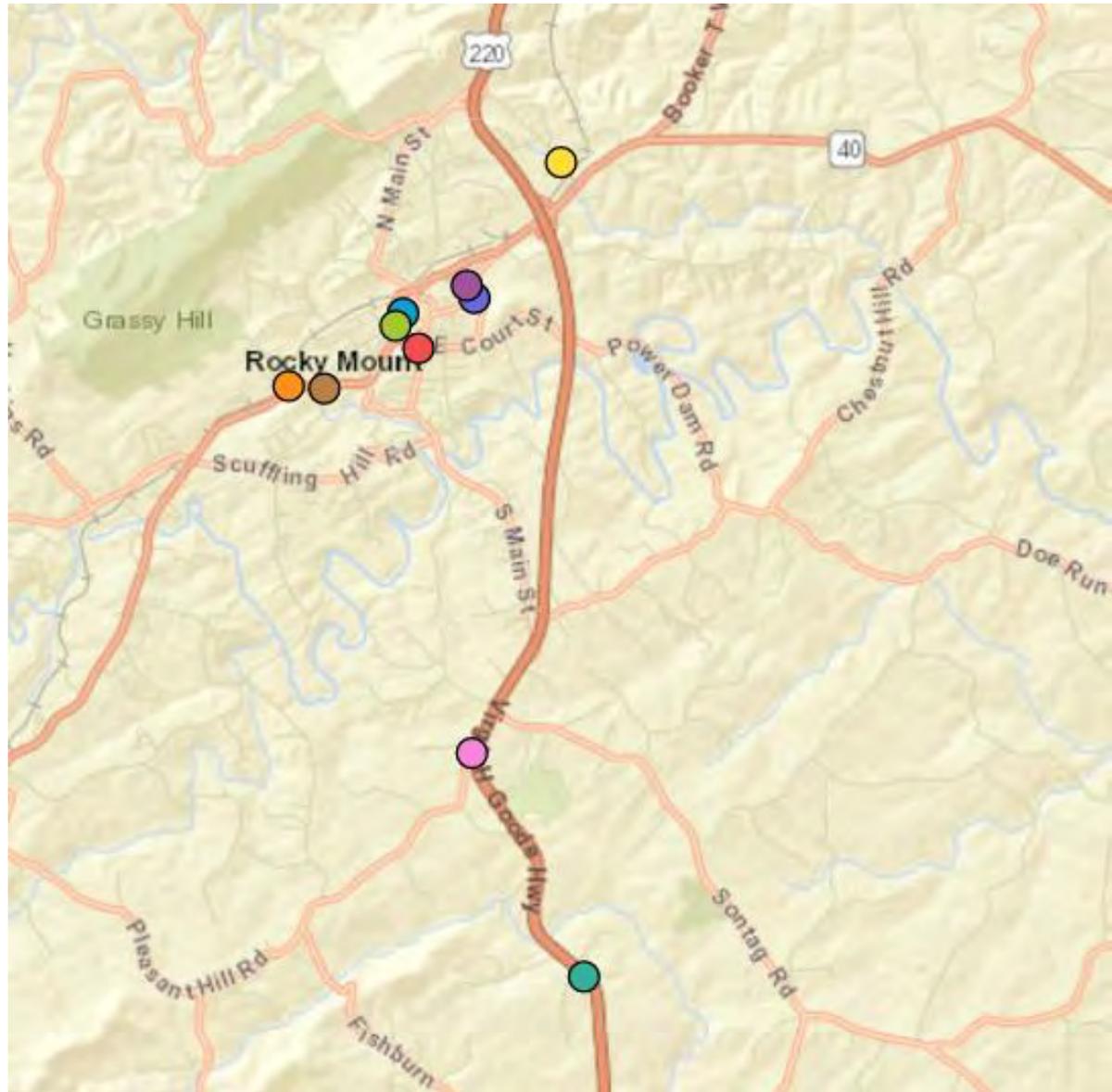
Franklin County Community Centers

- ◆ Coles Creek Community Center
- ◆ Coopers Cove Community Center
- ◆ Franklin County Family YMCA
- ◆ Henry Community Center
- ◆ Masjid An-nur & Islamic Community Center
- ◆ Naff Community Center
- ◆ Red Valley Community Center
- ◆ Redwood Community Center
- ◆ Smith Mountain Lake YMCA
- ◆ Sontag Community Center



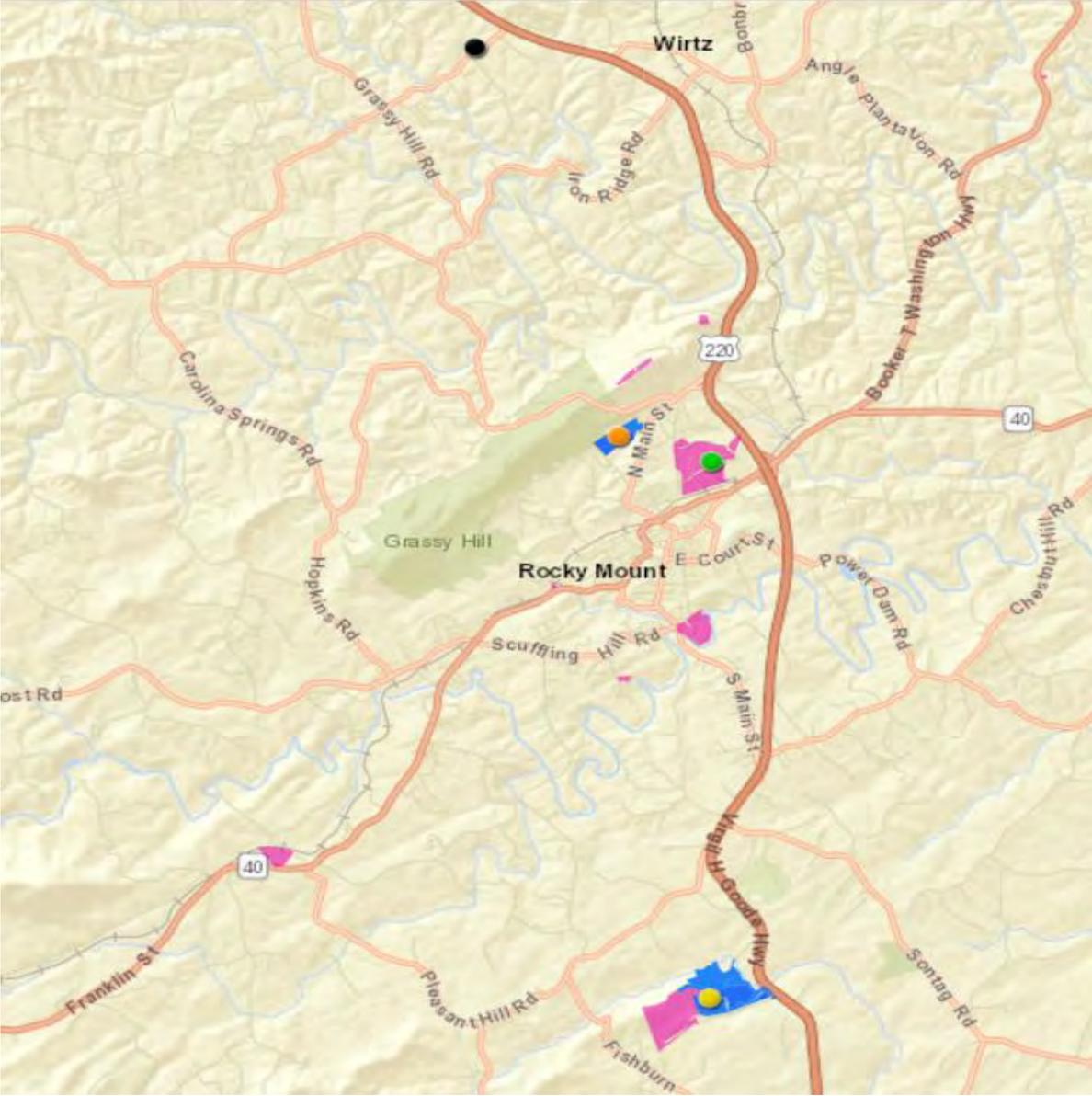
County Government Buildings

- Courthouse
- Franklin Center
- Franklin County Chamber of Commerce
- Franklin County Health Dept
- Franklin County Public Safety
- Franklin County School Board
- Franklin County Social Services
- Government Center
- Landfill
- Rocky Mount Administration Building



Business Parks, Commercial/Industrial Property

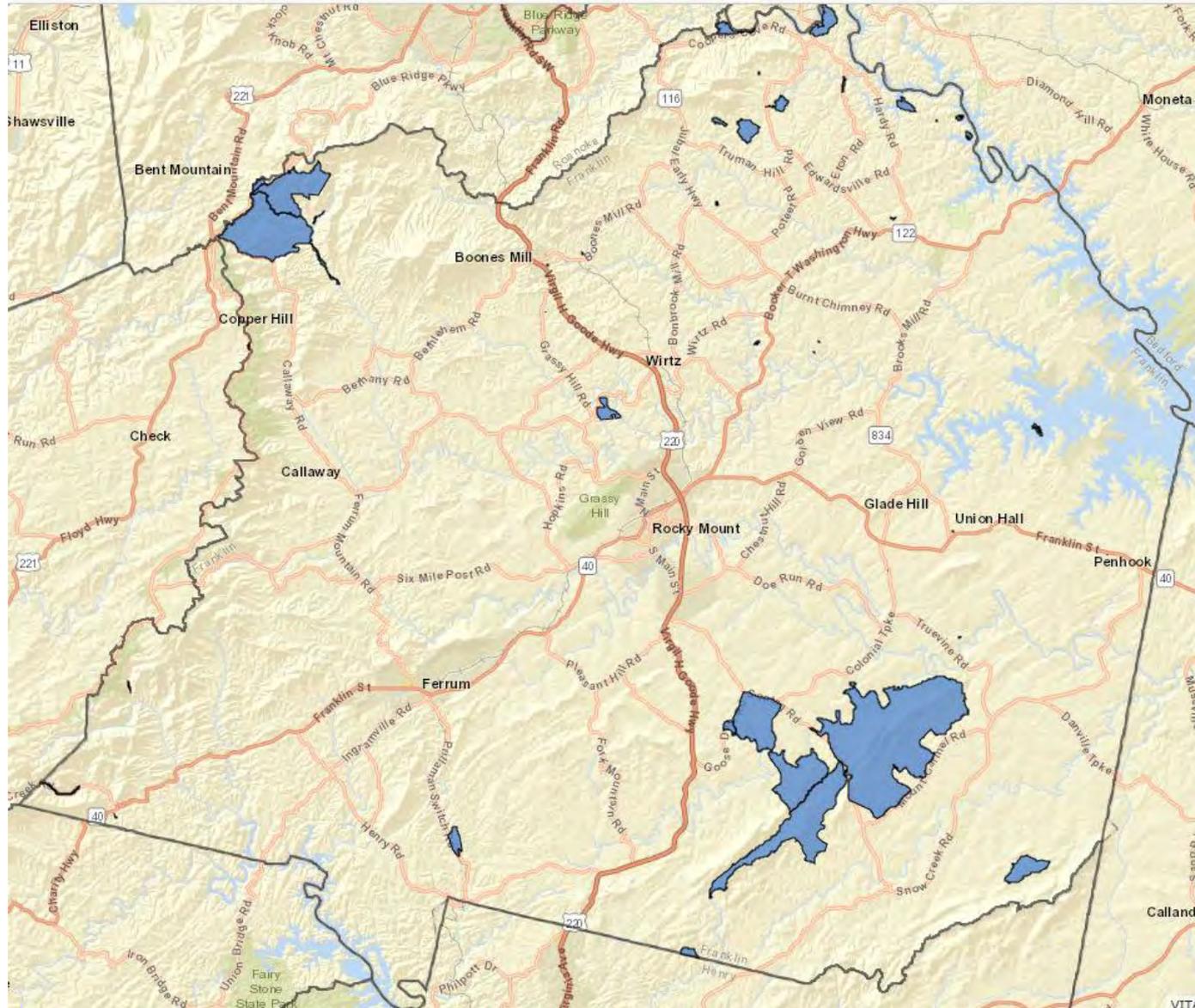
-  Business Park Parcels
-  Commercial/Industrial Parcels
-  County Business Park
-  Franklin County Commerce Center
-  Franklin Rocky Mount Industrial Park
-  Technology Park



Franklin County CAFII Funding Areas

**Connect America
Funds Phase II (CAFII)
Eligible Blocks
(Preliminary)**

Potential Funding
\$80,548.13 per year
over 6 yrs.



Affect the Broadband Economics

REVIEW OF LOCAL POLICIES & FEES

Make sure your policies and procedures are “Broadband Friendly”

Review comprehensive plans, community zoning regulations and process, policies, fees, etc. must **encourage and enable broadband investment.**

Review local franchise agreements for **setback or long-drop** policy. Long-drop policy information should be conveyed to all new homebuilders, and real estate developers.

Adopt Dig Once: Dig Once means less construction disruption, and costs for private providers—who may simply decide not to deploy in an area where the economics don’t work.

Policy Considerations for Telecommunications Deployment

<https://www.wired.virginia.gov/sites/default/files/Telecom%20Deployment%20Policy%20Recs.pdf>

Policy Assessment - Areas to Consider

https://www.wired.virginia.gov/sites/default/files/Policy%20Assessment%20Tool%20Guide_0.pdf

Policy Assessment worksheet:

<https://www.wired.virginia.gov/sites/default/files/Policy-Assessment-Tool.xlsx>

Google Fiber Checklist:

<https://fiber.storage.googleapis.com/legal/googlefibercitychecklist2-24-14.pdf>

Remember: to make it “cheap, quick & easy”

Franklin County Local Policies

The following policies may not represent a comprehensive list of potential local Internet related policies. All local Internet related policies should be reviewed with potential partners and adjusted as necessary to explore incentives and identify barriers to broadband expansion

Source: www.municode.com

Code of Ordinances Chapter 25 - ZONING ARTICLE II. - BASIC REGULATIONS DIVISION 4. - SUPPLEMENTARY REGULATIONS

Sec. 25-128. - *Towers, antennas, satellite dishes*

25-128.a Special Use Permit Requirements Sec..

Franklin County, Virginia - Code of Ordinances Chapter 5 - BUILDING REGULATIONS ARTICLE II. - BUILDING CODE Sec. 5-27. - Permit fees. Sec. 5-27. - Permit fees.

(h) Towers, antennas, and similar regulated structures: Structural fee—\$100.00

Code of Ordinances Chapter 25 - ZONING ARTICLE III. - DISTRICT REGULATIONS DIVISION 7. - RESIDENTIAL PLANNED UNIT DEVELOPMENT DISTRICT (RPD)

Sec. 25-306. – Utilities: Within a planned unit development all newly installed utilities, including television cable and electrical systems, shall be installed underground.

Assessment Based

COMMUNITY BROADBAND NEEDS

Franklin County Needs Identified

- **Demand Survey**

- Residential

- The majority (39%) of residential respondents are connected by DLS, 32% cable.
 - 34% are dissatisfied with their current service
 - 22% rely in inadequate services; upon cellular, satellite or dial up
 - 20% have NO access at home.
 - 22% of all respondents report school aged children at home, 15% of K-12 households have no Internet access.
 - 32% work from home, 12% would work from home if they had better access.
 - **OPTION: Expand access and capacity to county residents – Snow Creek, Penhook, Calloway, Henry, Hardy, Ferrum**

Needs Identified (Cont'd)

– Businesses

- DSL (33%) is the most common business connection type, followed by cable (27%)
- 90% consider Internet very important or critical to their business.
- 34% state they are dissatisfied with their business Internet service.
- 23% of businesses depend on inadequate connection types; cellular, satellite, or dial-up
- **OPTION: Expand access and capacity to county businesses in the following areas; Snow Creek, Penhook, Henry, Calloway, Hardy**

Needs Identified (Cont'd)

- **Technology Adoption**

- Digital Literacy

- 19% of population are seniors
 - 15% of population have a disability
 - ~30% of population may have affordability challenges

- **OPTIONS:**

- Promote computer literacy classes at libraries, community and senior centers for the populations that may be slow to adopt technology, or need special equipment.
 - Consider a computer refurb/donation program such as Virginia Star - a state-wide Student Training and Refurbishment program; <http://vastar.org/> for those with affordability challenges.

Needs Identified (Cont'd)

Libraries

- USAC
 - Does not participate in eRate.
 - **OPTION: Consider eRate participation, consult with Library of Virginia to maximize/coordinate eRate opportunities.**

- LVa speed test:
 - Median Download ~22 Mbps, Upload ~13 Mbps;
 - National recommendation of 1 Gig (1024 Mbps) for libraries serving communities with a population of over 50,000. (Franklin Co. total pop 56,360)
 - Library patrons use 40 Mb connection from B2X. No contract in place
 - **OPTION: Increase capacity at libraries to meet national recommendations.**

- ✓ Public computers, workforce development and computer literacy training classes are available at both library branches.

Needs Identified (Cont'd)

Schools

- 1 Gbps lit fiber from Shentel Communications, LLC at ~\$6,900 per month, ~\$6.70 per Mb. **Contract Expires 06/30/2019**
- (15) 1 Gbps lit fiber WAN connections from Shentel Communications, LLC at \$27,600 per month, ~ \$27 per Mb **Contract Expires 06/30/2019**

OPTION – most cost on WAN – build your own and include dark fiber – leverage eRate .

From NCES - The National Center for Education Statistics :

- ~141 Kbps per Student/Teacher
- ✓ **Above national recommendation of 100Mb per 1000 Students + staff**

Some public schools are in noted un/underserved areas;

OPTION - increase access and capacity to Callaway Elementary, Snow Creek Elementary, and Henry Elementary

Needs Identified (Cont'd)

County Government

- Local government facilities connected by B2X, Shentel, and Lumos
- No active contract in place for B2X county connections

Public Safety

- Fire and Rescue stations in the following areas may need increased access and capacity; Snow Creek, Callaway, Fork Mtn and Henry.

Community Centers

- The following community centers may need increased access and capacity; Henry CC, Naff CC, and Coles Creek CC.

Franklin Needs Summary

4 schools, 3
community centers
potentially need
increased access and
capacity

Schools

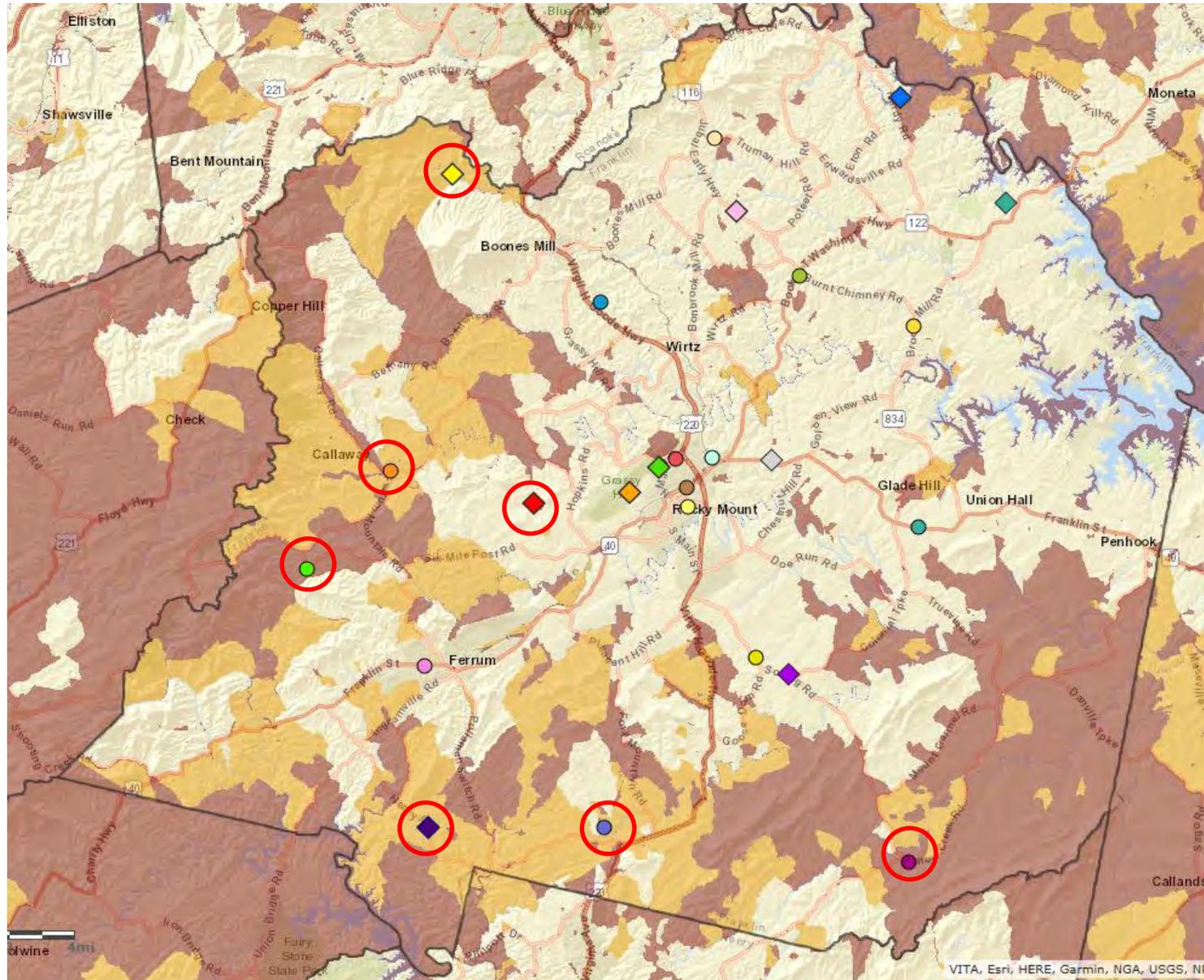
- Phoebe Needles Educational Center
- Callaway Elementary
- Snow Creek Elementary
- Henry Elementary

Community Centers

- Henry CC
- Naff CC
- Coles Creek

● Unserved = Broadband speed below 10 Mbps Download speed

● Underserved = Broadband speed between 10 Mbps Download speed and 25 Mbps Upload speed



Franklin Needs Summary (Cont'd)

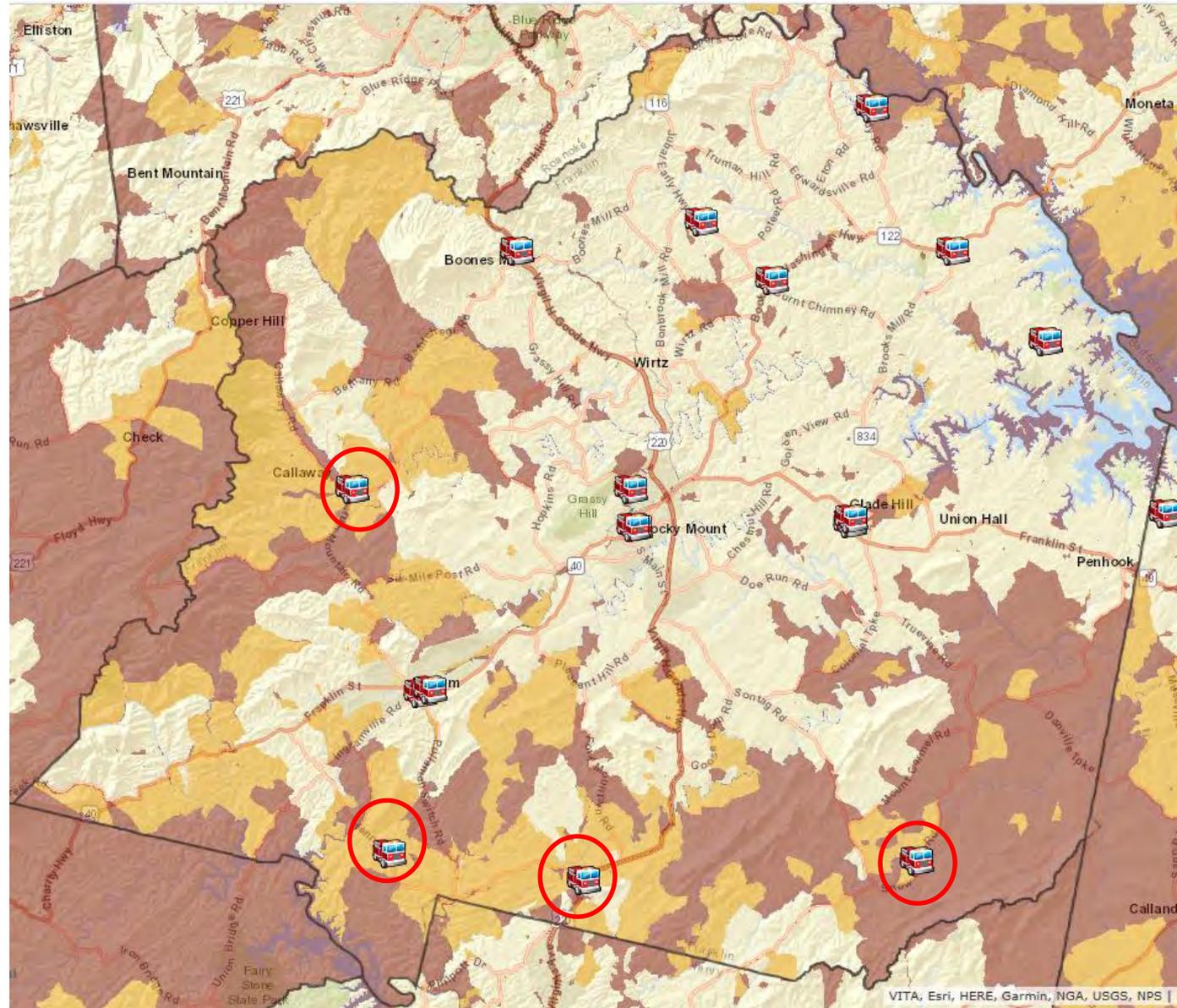
4 Fire/Rescue stations potentially need increased access and capacity

Fire/Rescue Station

- Snow Creek
- Callaway
- Henry
- Fork Mtn

● Unserved = Broadband speed below 10 Mbps Download speed

● Underserved = Broadband speed between 10 Mbps Download speed and 25 Mbps Upload speed





Potential Funding



<https://www.wired.virginia.gov/broadband/resources>

Look Under Funding Options



E-Rate – already participating: February 3 - May 26 (Schools) or July 21 (Libraries and Consortia)

Lifeline Support <http://www.lifelinesupport.org/ls/changes-to-lifeline.aspx> - Open all year

NOW USDA accepting applications for the [Community Connect Grant Program](#) for FY 2017. These grants may be used to provide broadband service in unserved, lower-income and extremely rural areas.

USDA Distance Learning and Telemedicine Program (DLT)
http://www.rurdev.usda.gov/UTP_DLT.html The application window is announced annually

USDA Telecommunications Infrastructure Loans & Loan Guarantees
<http://www.rd.usda.gov/programs-services/farm-bill-broadband-loans-loan-guarantees> **NOTE:**
These loans are for local incumbent providers. Open annually around April

USDA Distance Learning and Telemedicine Program (DLT)
http://www.rurdev.usda.gov/UTP_DLT.html - The application window is announced annually

NOW USAC Healthcare Connect Fund Program
<http://www.usac.org/rhc/healthcare-connect/default.aspx> - Filing Window : Mar 1 – June 30, 2017

DHCD VCI/VTI - <http://www.dhcd.virginia.gov/> - TBA

Next Steps

- Identify and Prioritize Goals Based on Needs
 - Assessment findings need to be conveyed to the BoS.
 - Committee passes their recommendations to BoS, or leaves the decisions to the BoS.
- Determine the role the local government will assume in achieving the goals
 - Review CIT Partnership Models Handout
 - Decision need to be adopted by the COUNTY
- CIT will prepare the Requirements Document and Draft RFP
 - CIT will formally document chosen goals, role, assets to be shared, local considerations etc. to include in RFP
- Seek private partner(s)
 - The County will publish the RFP, evaluate responses and choose partner(s)

Questions? Comments?



Contact Information

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540-250-2751



Franklin County

VATI 2022 Application

Shentel

Attachment 16

Franklin County Broadband Plan
August 2019



Franklin County
A Natural Setting for Opportunity

BROADBAND FOR FRANKLIN COUNTY

Broadband Assessment and Plan

August 2019

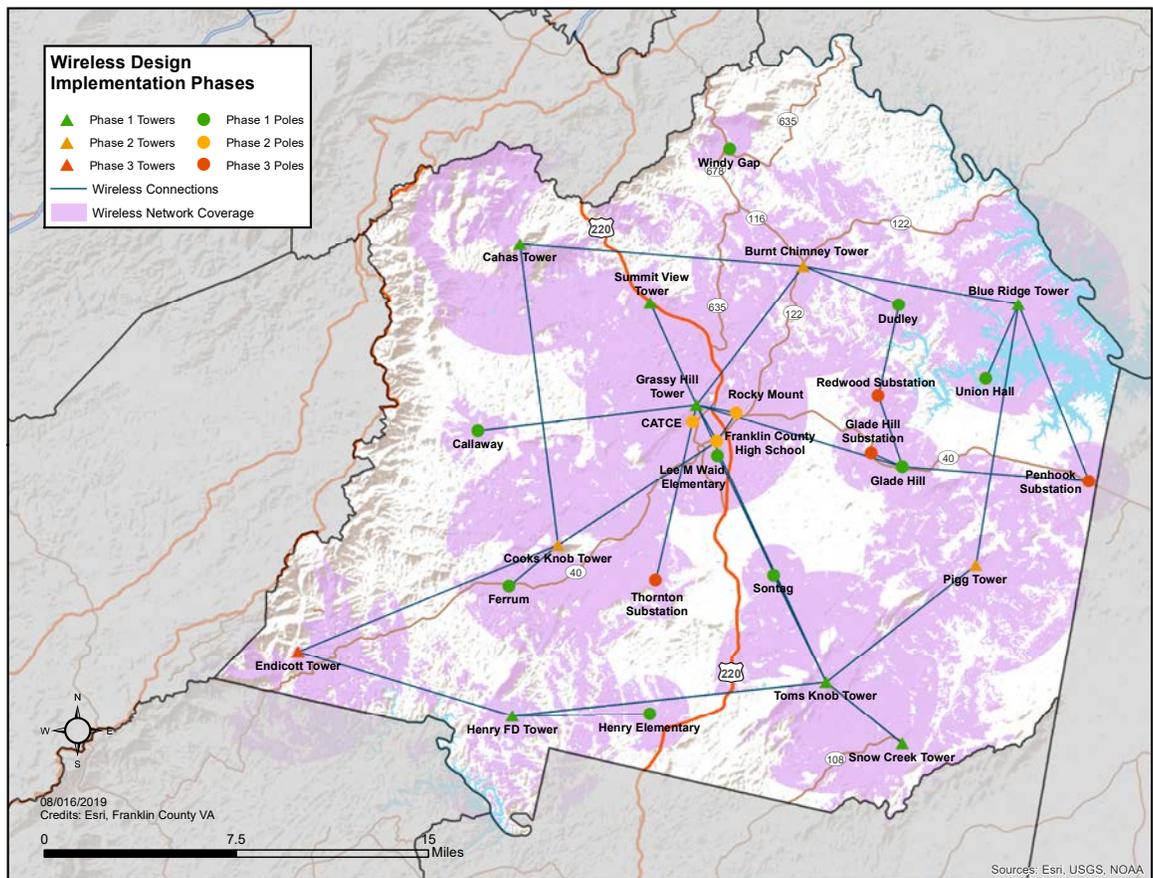


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Disclaimer

The telecommunications business is continually evolving. We have made our best effort to apply our experience and knowledge to the business and technical information contained herein. We believe the data we have presented at this point in time to be accurate and to be representative of the current state of the telecommunications industry.

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1 BROADBAND INFRASTRUCTURE AS A UTILITY

Governments build and manage roads, but don't own or manage the businesses that use those roads to deliver goods and services.

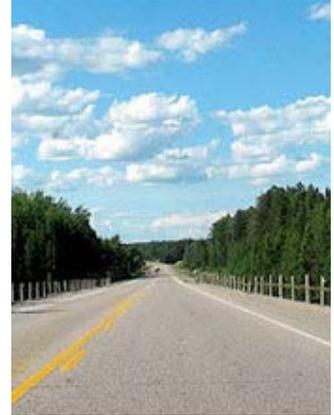
The tremendous versatility of the Internet and the underlying technology bases now allows services that used to require their own, separate (analog) road system (voice telephony and TV services) to be delivered alongside other services like Internet access on a single, integrated digital road system.

If we managed overnight package delivery the way we manage telecom, UPS and Fedex would only deliver packages to residences and businesses where each delivery firm had built a private road for their exclusive use. We recognize immediately the limitations of such a business model-few of us would have overnight package delivery to our homes because the small number of packages delivered would not justify the expense of building a private paved road.

Before the rise of the automobile, most roads were built largely by the private sector. After cars became important to commerce and economic development, communities began building and maintaining roads because it became an economic development imperative to have a modern transportation system in communities.

Before the rise of the Internet, digital networks were built largely by the private sector. As broadband has become critical to commerce and economic development, communities with digital roads are more competitive globally.

The time has come to recognize that it is inefficient and wasteful to build full duplicated digital road systems, which only raise the cost of telecom services to all public and private users. Networks that share capacity among a wide variety of public and private users have a lower cost of construction and a lower cost of operation—benefiting all users.



A UTILITY COMPARISON

SHARED ROADS	SHARED AIRPORTS	SHARED TELECOM
Historically, roads have been built and maintained by the community for the use of all, especially private firms that want to use them to deliver goods and services.	Airports are built and maintained by a community or region as an economic and community development asset. Both public and private users benefit from the shared use of a single, well-designed airport	Towers, duct and fiber may be installed and maintained by the community and/or a neutral owner/operator for the use of all, including private firms that want to use them to deliver goods and services.
Access to the community road system is provided by parking lots and driveways, built by property owners, developers and builders.	Airport assets like departure gates, ticket areas, and runways provide access to the airline services.	In the digital road system, access across private property to the community-wide network in the public right of way is provided by towers, duct and fiber built by property owners and/or developers and builders.
The local government uses roads only to deliver government services. Local government does not offer services like overnight package delivery.	While the local government or a consortium of local governments typically own the airport facility, the local governments do not offer flight services.	Local government uses the digital transport system only to deliver government services. Government does not offer services like Internet access or Voice over IP.
Private sector businesses use roads so that their own cars and trucks can deliver goods and services to customers. Because businesses do not have to build and maintain roads, all businesses benefit directly by being able to reach more customers at less	Private sector airlines are able to offer competitively priced airfares because of the shared cost of the airport terminal facilities. Each airline does not build its own airport (which would sharply increase the cost of airfare).	Private sector businesses use the digital transport system to deliver goods and services to customers. Because businesses do not have to build and maintain a digital road system, all service providers benefit directly by being able to reach more customers at less
There are no road connection fees, and anyone may connect to the road system for free. Governments pay for the cost of maintaining roads largely from those that use the roads . Fees are proportional to use, from taxes on tires and gasoline.	Businesses and citizens do not pay a fee to access the airport facility. The cost of maintaining the airport facility is paid by the airlines, which bundle that cost into the price of airfare. Fees are proportional to actual use by flying customers. Airlines benefit because they do not have to build, own, and operate the airport directly. Those costs are shared across all users.	Any qualified service provider may connect to the digital road system for a nominal fee and begin to offer services, without any significant capital expense. Network capital and operating costs are recovered by charging service providers a small fee that is based on a percentage of their income from services offered over the system.

1.1 THE SHARED INFRASTRUCTURE BUSINESS MODEL

Traditionally, the telecom services market has been vertically integrated, with telephone and cable companies owning the cable infrastructure (i.e. twisted pair copper cable for telephone, and coaxial copper cable for TV). These companies bundled analog services with their own infrastructure, which made sense when only one service could be delivered over the cable.

American residents and businesses needed two networks: one for voice telephone service, and one for television. The rise of the Internet and associated changes in technology led to digital services (voice, video, Internet) that could be delivered simultaneously over a single cable or wireless connection.

By the early 2000s, it was becoming apparent that it was inefficient and costly to have two competing “retail” cable systems (e.g. telephone, cable) delivering the same content and services—it was only creating higher costs for residents and businesses.

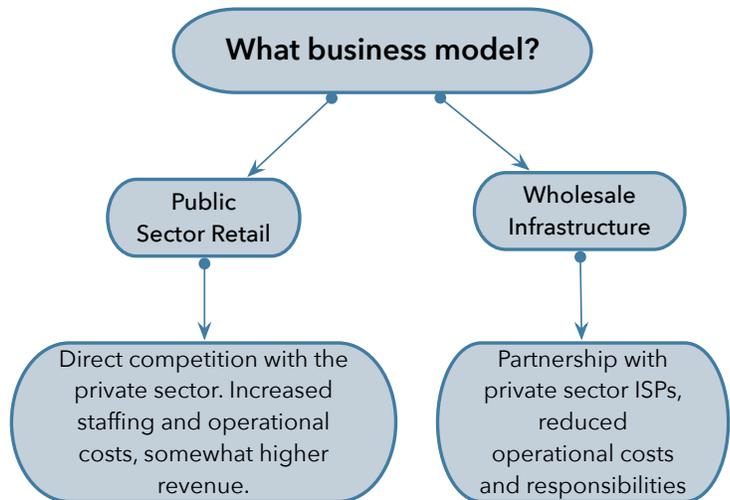
A new business model became possible: wholesale leasing of the cable/wireless infrastructure to private sector service providers, which unbundles the infrastructure from the services. A side effect of this unbundling is that it becomes much easier to determine what a customer is actually paying for a given service: in the vertically integrated 20th century model, with the cost of infrastructure maintenance bundled together with the services, it is much more difficult to determine what a service actually costs.

While a few communities have pursued the retail business model (typically building fiber to the home and business and selling retail Internet and other services directly to customers), most of these retail efforts have been by local governments that are also providing electric service—owning the utility poles is a significant cost advantage not available in most communities.

In the wholesale infrastructure business model, local government investments are limited to passive infrastructure like conduit, dark fiber, and wireless tower space. Services for businesses and residents are offered by private sector providers offering Internet, TV, telephone and other data services. The components of the transport network include conduit, handholes, cabinets and shelters, splice closures, and network equipment.

Recommendation

In the county, improved wireless broadband is going to be an important part of improving broadband service availability and affordability, and WISP access to existing and/or new towers should continue.



Features	Municipal Retail	Wholesale Infrastructure
Basic Concept	Generally more difficult to because of possible legal challenges from incumbent providers.	One or more private sector ISPs would use the infrastructure to sell their own services directly to residents and businesses. Use of County-owned conduit, fiber, and wireless towers makes it less expensive for ISPs to expand service.
Government Involvement	Local government competes directly with the private sector for Internet service.	County involvement is limited to providing basic infrastructure to ISPs.
Management	Local government is responsible for management and operations. Most functions could be outsourced to a qualified third party entity.	ISPs responsible for virtually all day to day customer services and support. The Broadband Authority is only responsible for network and tower maintenance and repairs.
Competition	The incumbent telephone and cable providers would compete vigorously against local government service offerings.	Private sector ISPs would provide competition to the telephone and cable companies.
Service Options	Local government would sell only Internet. Businesses and residents could get TV and voice using their Internet connections.	ISPs would focus on high speed Internet, with some other service offerings like voice and business services.
Risks	The primary risk would be lawsuits from incumbent providers.	Leasing tower space, conduit, or dark fiber is relatively simple to manage, with limited day to day responsibilities. A tower-based radio backhaul network requires some additional management, but most tasks can be outsourced to a qualified private sector firm. It is important to identify prospective service providers early in the process.

2 WHAT IS GOVERNMENT'S ROLE?

Successful improvements in broadband access, affordability, and reliability for the county involves several decision points, as outlined in the illustration below. Government has several "first choice" options.

Do nothing is to accept that businesses and residents in the county will have to continue to use whatever is available, despite the cost and bandwidth limitations that limit what many are able to do online.

Government can **remove barriers** to private sector investment. This can be an effective and low cost strategy. Possibilities include reducing

permit fees for fiber construction and tower installation, incentives to developers to install conduit and meet-me boxes in new residential and commercial construction, simplified permit requirements for rural utility pole installation on private property, and identifying areas of residential and business demand and sharing that information with providers.

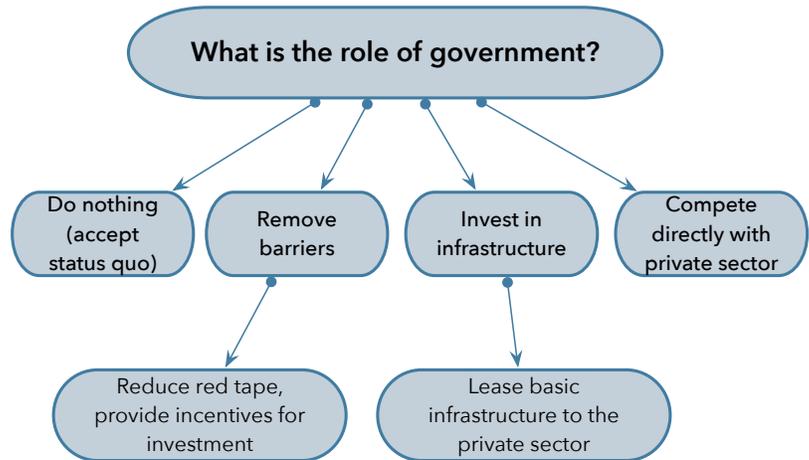
The county could choose to make **investments in basic infrastructure** and make that infrastructure available to the private sector via revenue-generating lease agreements.

When communities have chosen the option to **compete directly with the private sector** by offering retail Internet, phone, and TV services lawsuits from incumbents often create difficulty moving forward as well as expensive legal fees.

Recommendation

The County and the Broadband Authority can both **remove barriers** and **make targeted investments** in infrastructure. These two activities can be executed in parallel, with investments taking place as funding sources are identified. There are a variety of low cost and no cost efforts, mostly at the policy level, that the County can do to encourage more private investment—with a primary focus on keeping the cost of permitting and constructing new wireless towers as low as possible.

As one example, investments in improvements to existing county-owned towers and/or adding new county-owned towers could help the county's existing wireless providers bring more services to underserved areas of the county (e.g. the Snow Creek project) and/or attract much competitive broadband wireless providers into the county.



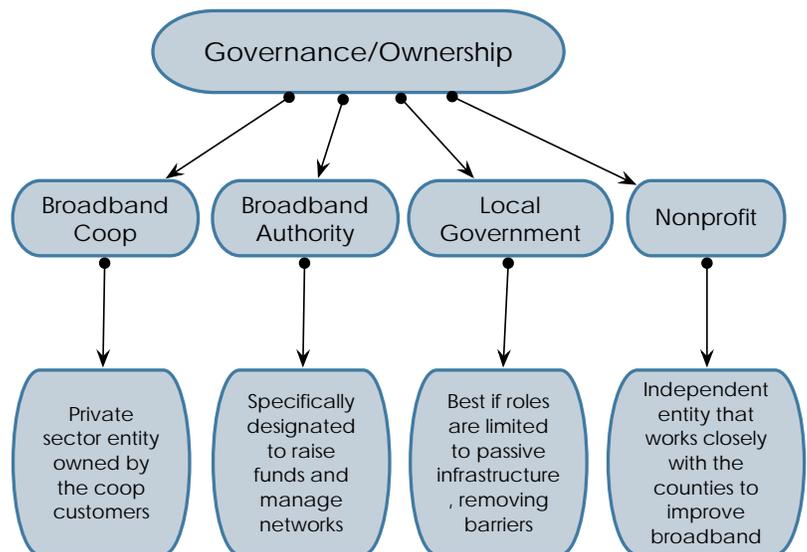
3 GOVERNANCE AND OWNERSHIP OPTIONS

For whatever infrastructure improvements may be made in the county, there will be a limited number of essential roles.

Community and county government investments in telecom improvements can be a mix of passive infrastructure like dark fiber, conduit, and wireless towers and well as some network electronics. These assets can be leased out to the private sector.

Franklin County has already formed a Broadband Authority, and there is no reason to change this structure. County departments can provide assistance as needed. In other areas of the country, where it is often more difficult to form an authority specifically for broadband, other approaches are being adopted.

In Virginia, a **Broadband Authority** has been both popular and effective in improving broadband access, especially in rural Virginia counties. Broadband Authorities are a political subdivision, have bonding privileges, and are able to operate across multiple jurisdictions. The Wired Road Broadband Authority, as one of several Virginia multi-jurisdictional authorities include Carroll County, Grayson County, and the City of Galax.



In some instances, broadband infrastructure projects are owned directly by a **local government** entity. The nDanville fiber network is part of the City of Danville’s Utility Department. The City of Palm Coast, Florida also directly owns its fiber network. However, most direct local government ownership efforts are managed as an enterprise fund to provide full transparency on revenue and expenses related to the network.

Another option is to form a **nonprofit**, which would not be subject to the state level restrictions on local government. A number of communities have formed a nonprofit (typically a 501(c)(4) to provide the governance and ownership roles for a community broadband effort.

A **broadband coop** is becoming evaluated more frequently. Coops are typically formed as a 501(c)(12) and are owned by the members (who are also the customers of the coop). Coops can receive membership fees in advance of providing the service, which can help raise the funds needed for infrastructure. There can also be more than one type of membership (e.g. residential, small business, large business, government, institutional, etc.), and each membership type can have a different membership fee associated with it.

3.1 ABOUT BROADBAND AUTHORITIES

The primary advantages of an Authority as opposed to other ownership options include:

- A single entity manages and coordinates a wide variety of activities effectively with less duplication of effort and overlap.
- Coordination and management of grant funding opportunities, preparation of grant applications, and management of grant funds.
- Coordination of expenditures of County CIP funds when available.
- Work directly with existing incumbent and competitive service providers to assist them in making service improvements, coordinating CAF2 expenditures (Connect America Fund round 2), and coordinating any joint funding opportunities (e.g. DHCD funds).
- Work closely with local government departments (e.g. planning, IT, GIS, etc.) to remove barriers, simplify permitting, and track assets like towers and fiber/conduit.
- Collaborate with public safety initiatives, including shared space on existing towers and shared use of any new towers.

Franklin County has a Broadband Authority in place that is working closely with County staff and public safety officials. The existing Authority should continue to be the lead on broadband in Franklin County.

3.2 ABOUT NONPROFITS

There are various kinds of nonprofit businesses. The most common is the 501(c)(3), which is limited to strictly charitable efforts. A 501(c)(3), according to IRS rules, must have a well-defined charitable purpose targeted toward a specific need and/or a specific target population. In other words, a 501(c)(3) cannot, according to IRS rules, operate as a nonprofit business that provides services to the general public.

Many of the first community networking projects in the early and mid-nineties were formed as 501(c)(3) organizations; it was common for these entities to offer dial-up Internet access to the general public at a time when Internet service providers were still relatively uncommon. But by 2000, most of these organizations had closed their doors and/or discontinued their Internet access services because of IRS challenges.

Today (2019), we have seen new 501(c)(3) and 501(c)(4) organizations being formed, and the Federal government's 2015 endorsement of both community-owned networks and the open access business model has removed the uncertainty of using a nonprofit for this kind of effort. The IRS defines one role for 501(c)(4) entities as *"Social welfare organizations: Civic leagues or organizations not organized for profit but operated exclusively for the promotion of social welfare."*

A 501(c)(3) can accept tax deductible donations, but contributions to a 501(c)(4) are not tax deductible. The advantage of a nonprofit is that they are relatively easy to create and legal fees are usually nominal. Nonprofits are often eligible for certain kinds of grants not available to for profit enterprises, and the nonprofit can provide the needed oversight to manage broadband infrastructure investments.

3.3 ABOUT COOPS

Cooperative business enterprises as formal entities date from the mid-1800s. The first cooperative was set up in England to serve customers unhappy with local merchants. In the United States, the Grange movement began setting up cooperatives in rural areas to sell needed items to members and to help sell produce and other agricultural products that were produced by members. Today, credit unions are the most common form of coop business in the United States, with more than 65 million people obtaining services from over 12,000 credit unions.

Telephone and electric coops continue to be very common in rural parts of the U.S., and in fact, the majority of telephone companies in the United States are coops, but most have very small numbers of customers--often less than a thousand subscribers. Telephone coops serve more than a million subscribers in thirty-one states. The True Value and Ace Hardware chains are actually buying coops that help keep independent hardware stores competitive with the large chain stores.

The U.S. Department of Agriculture (USDA) provides extensive support for existing coops, and also helps communities start coops. One of their publications lists the principles of the coop:

- User-Benefits Principle -- Some purposes of a coop are to help members get services that might otherwise not be available, to get access to markets, or for other "mutually beneficial" reasons.
- User-Owner Principle -- The users of the cooperative own it.
- User-Control Principle -- The owners of the coop (i.e. members) control the coop through voting (annual meetings, etc), and indirectly by electing a board of directors to manage the enterprise. Large users who make high volume purchases of goods or services may receive additional votes.

Because cooperatives are user-managed, control of the enterprise is vested in the community or region where the users reside. Cooperatives also return excess earnings to its members; these refunds are called patronage refunds, and are typically computed at the end of the fiscal year. The expenses and income of the coop are calculated for the year, and any excess is returned to members, based on the percentage paid in by each member (e.g. a member that paid in 1% of total earnings would get a refund of 1% of any excess earnings).

Most cooperatives do not pay dividends on capital. This helps keep outsiders from taking control of the company, which would result in the community losing control over the quality of services and direction of the enterprise.

Coops are organized in part based on the territory they serve, and there are several classifications that may be relevant for community broadband efforts. A local coop serves a relatively small area that may be a single town or county and/or a radius of ten to thirty miles. A super local coop serves two or more counties. A regional coop may have a service area of several counties up to an entire state (or multiple states). For projects that involve several local government entities that are already trading services like local public safety dispatch, a super local coop may be the most appropriate designation.

Most local and super local coops use the centralized governance structure, which means that individuals and businesses represent the bulk of members.

Cooperatives offer one or more of three kinds of services:

- Marketing coops help sell products or services produced by members.
- Purchasing coops buy products and services on behalf of members.
- Service cooperatives provide services to members, and service coops include the credit unions, the electric coops, and the telephone coops.

Equity is typically raised for coops by direct investment from members. In return for an investment, members receive a membership certificate. The member may also receive shares of stock if the cooperative issues stock (some do, and some do not). Once a member has invested, they gain the right to vote in elections. As an example, if a local government made a large initial investment in the cooperative, they could gain substantial influence in the affairs of the organization by gaining multiple shares and increased voting rights. Property owners (residential property owners and business property owners) who paid an initial connection or pass-by fee would also gain shares in the business, so every property owner that pays the connection fee gains ownership in the enterprise--an important selling point when encouraging property owners to, quite literally, invest in the project.

Although cooperatives are typically constrained by both Federal and state laws to do a majority of business with members, in most cases, cooperatives are able to do business with nonmembers up to some percentage of business income that can be as high as 49 percent. Note that this may be affected by the underlying legal incorporation of the cooperative--if incorporated as a 501(c)(12), the IRS requires that 85% of income must come from members for the purpose of meeting ordinary expenses.

In summary:

- Coops are member (subscriber) owned, meaning they are strongly vested in the community. Any effort by the coop board to dispose of assets or to sell the coop would have to be approved by a majority vote of the members.
- Members play an active long term role in governance by nominating and electing board members. So members have a straightforward way of influencing decision-making by the board.
- Coops generally operate on a cost-plus basis. Income that exceeds some preset level is returned to members periodically as a distribution of funds.
- Broadband coop bylaws must be carefully written, especially if there is an interest in several classes of membership. Each class of membership can be charged a different membership fee, and this can be a valuable source of start up funds, but membership categories are difficult to change later.
- Coops are largely immune to challenges by incumbent telecom providers due to the long history of existing coops and because of special legislation passed by Congress.
- Coops can tap USDA funds, but the application process would be time-consuming and expensive for a start up coop.

Advantages of a Coop

The primary advantages of an Coop as opposed to a local government pursuing projects independently include:

- Avoids the strict limitations on local government participation. A coop, as a private sector entity, would have a wider range of infrastructure options, including offering retail wireless and fiber services.
- Coops can raise funds prior to delivering services to its shareholder customers. A broadband coop could solicit memberships from throughout the county (as long as the coop can clearly articulate its mission). Alternately, it could start with smaller "first phase" service areas and only solicit memberships from the initial target areas.
- A coop, with local members as the shareholders and owners, is firmly vested in the community. By comparison, a nonprofit, while easier to set up, does not have the same vesting in the community—the volunteer board of a nonprofit can sell the assets and/or disband it without any input from the community.

A broadband coop would need a carefully selected board of directors with significant business and management experience.

3.4 GOVERNANCE QUANTITATIVE EVALUATION

Six factors can be evaluated to provide a assessment of the governance options. These factors are:

- Transparency - Does the governance structure provide adequate transparency about decision making? Do stakeholders and interested parties have adequate ways to obtain documents, financial reports, and related governance materials?
- Timeliness - How quickly can the governance entity be legally formed? Time may be of the essence.
- Community Oversight - Does the entity have adequate community control and oversight? Does the community at large and the County have adequate representation in the governance structure to ensure that assets are managed properly?
- Legislative Authority to Build/Operate - Does the governance entity have clear legislative approval to build and operate a telecommunications network?
- Financing Options - Are there adequate financing options available to provide the appropriate level of funding over time to meet the long term vision of the county?
- Tax Liability - Does the governance entity incur tax obligations?

3.5 RECOMMENDATION

There is a role for investments by the County, especially if public safety tower needs can be combined with improved broadband wireless tower needs in underserved areas of the county.

In Virginia, the Broadband Authority is an ideal vehicle for obtaining grants and for managing broadband infrastructure. The County should continue to fund and support the existing Broadband Authority.

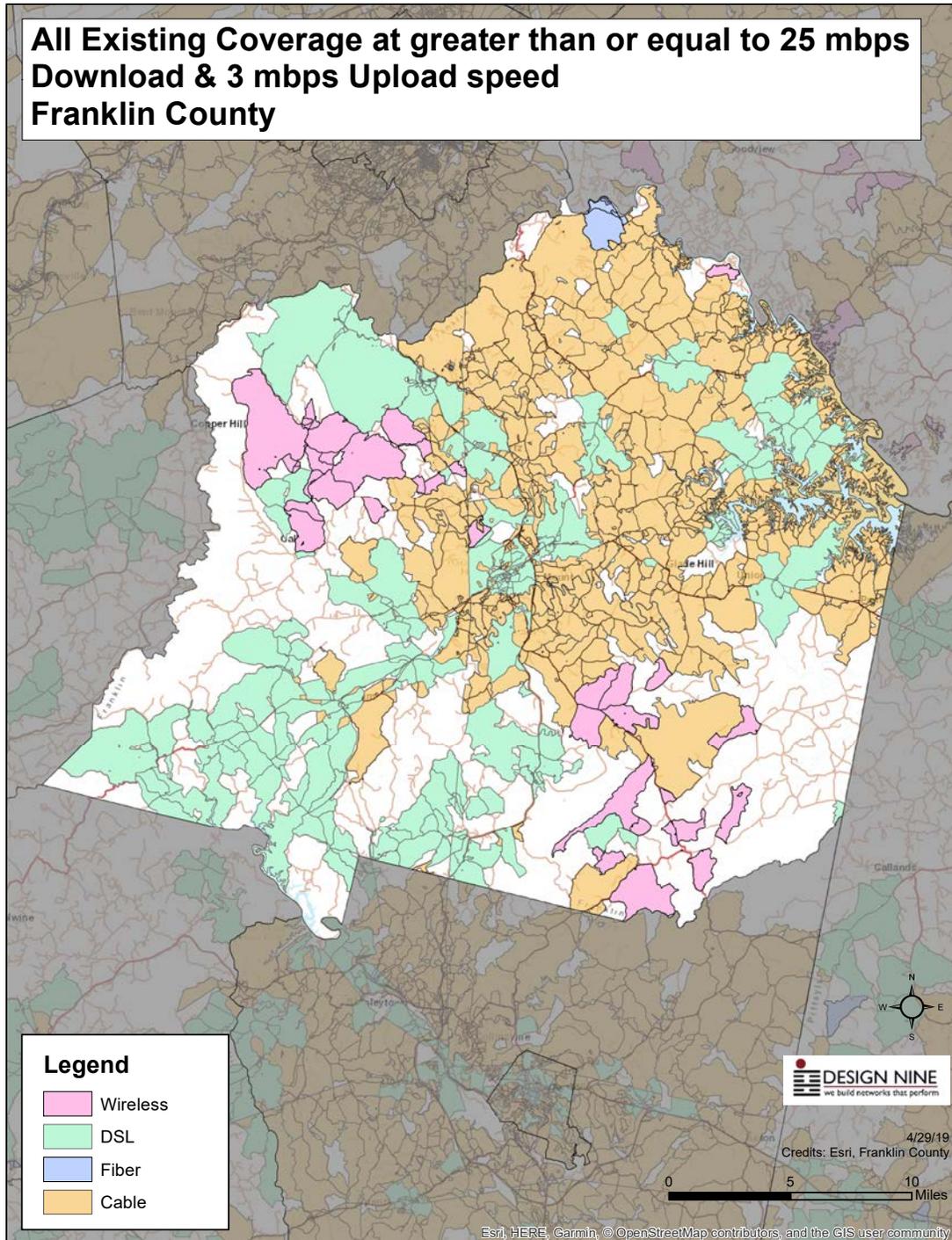
5 EXISTING ASSETS AND DEMOGRAPHY

The maps on the following pages include information on where Internet and cellular phone service is available. Due to the way that the FCC allows the incumbent telephone, cable and Internet providers to report data by census block, if a single location in a census block is able to receive a given service level, every home in the census block is listed as “served.” This leads to coverage maps that are optimistic about where coverage is actually available.

- Existing coverage areas at 25/3 speeds. The FCC defines an area as “served” if provider can deliver 25 Meg down and 3 Meg up to customers.
- DSL coverage at the 25/3 rate.
- Fixed point wireless broadband service in the county at 25/3 speeds.
- Cellular service is widely available in the County, but the cellular providers tend to be very optimistic about where service is available. There are many areas of the County, particularly in the western and southwestern portions of Franklin County, where service is spotty or not available.
- Broadband wireless, cable and DSL at 25/3 or greater, with 17% of locations remain underserved, the actual number of underserved is likely higher.
- At least 4,913 addresses are underserved (less than 25/3 Internet service), mostly in the rural parts of the county.
- Points of interest, including household density (an important factor when evaluating new service areas).
- LMI Areas of the county (Low and Moderate Income). Very important for certain kinds of grants.
- Towers in various parts of the county. These are taken from the FCC tower registry and other sources. The FCC registry which includes both cell towers and other kinds of towers (e.g. radio/TV broadcast towers, public safety towers).
- Long haul fiber routes through the county, which are important data routes to the rest of the Internet.

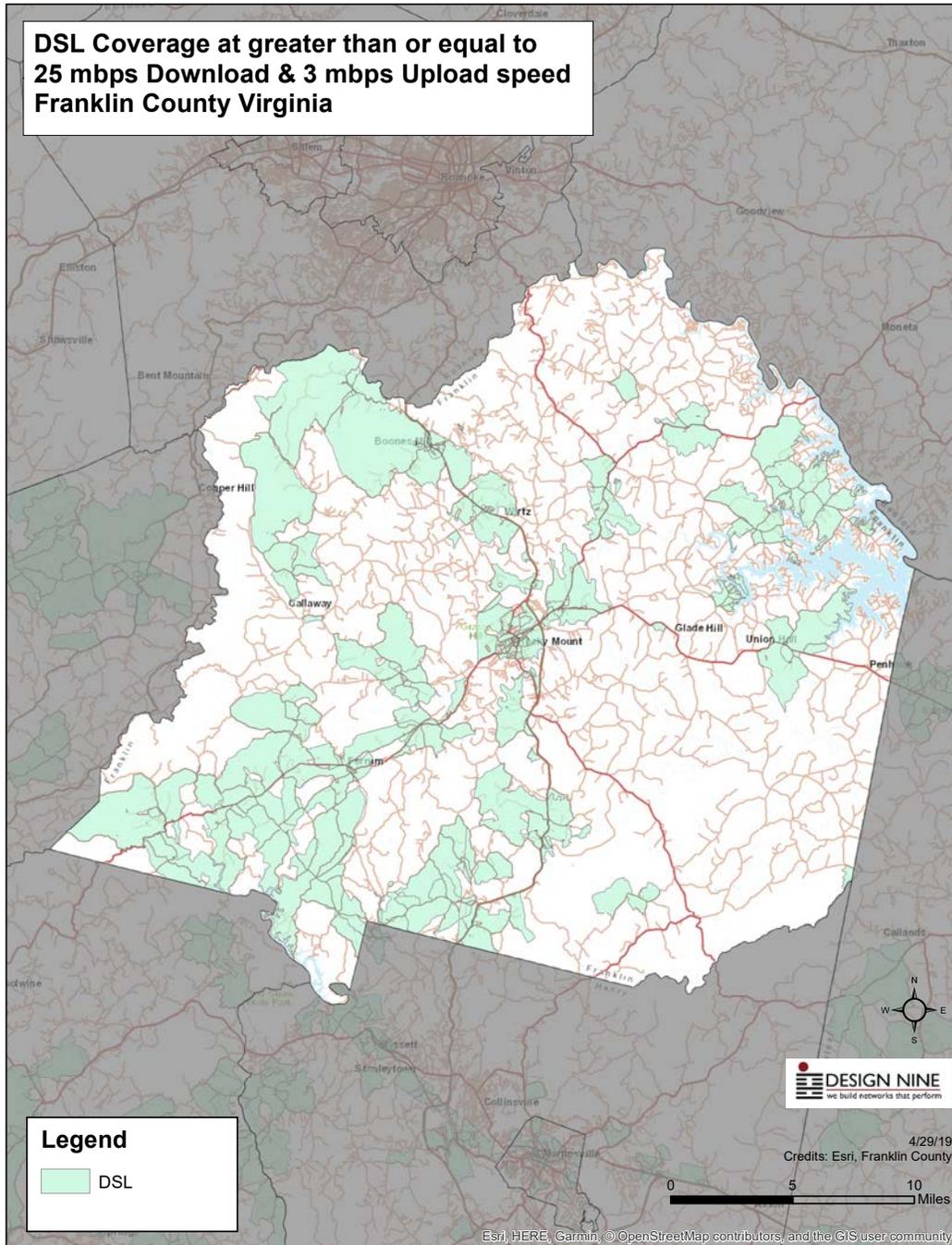
5.1 EXISTING BROADBAND COVERAGE AT 25/3 SPEEDS

Many areas of the County are not able to get service at 25/3 speeds.



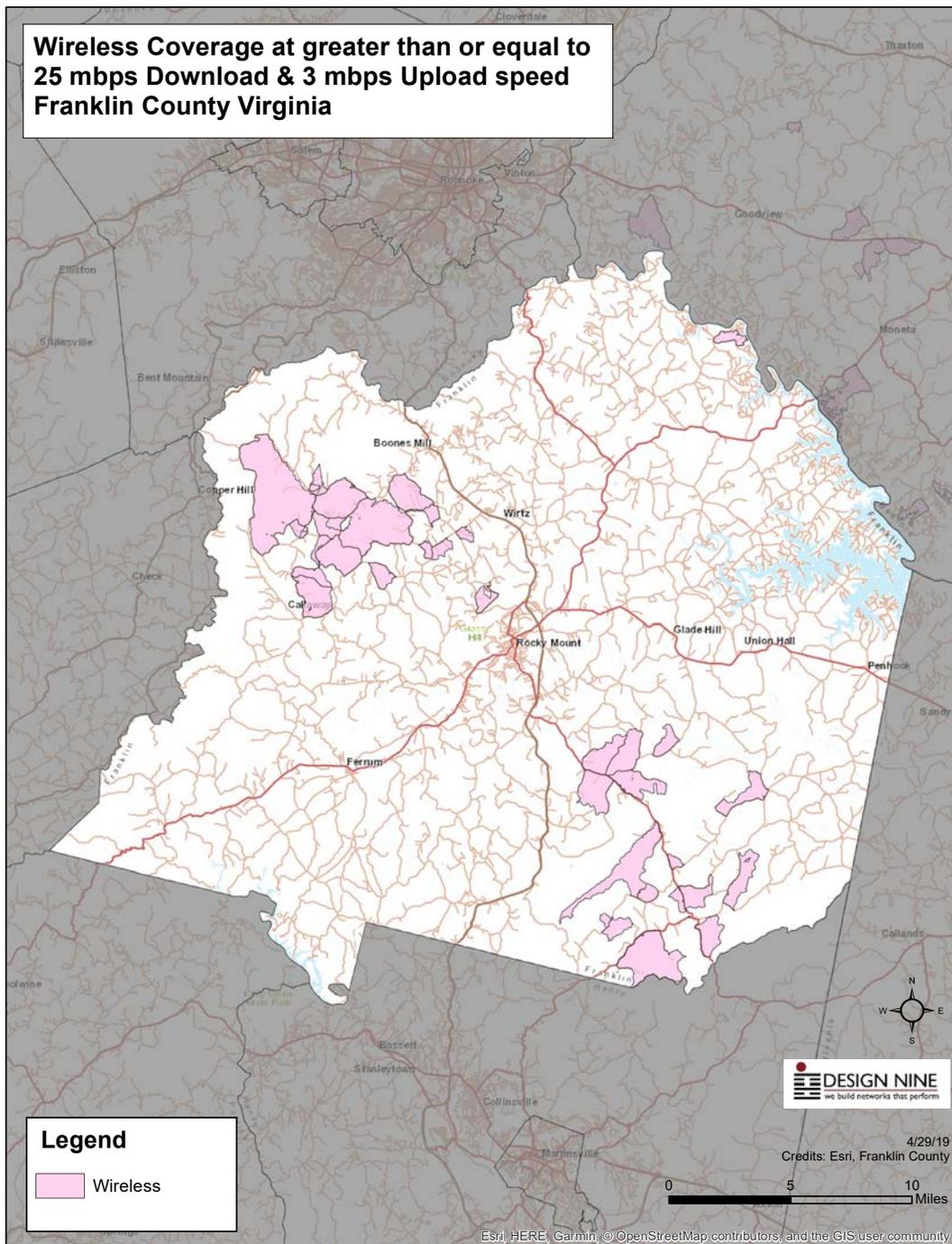
5.2 EXISTING DSL COVERAGE AT 25/3 SPEEDS

Most homes and businesses in the county have access to DSL service, but not all locations can receive DSL service at 25/3 speeds.

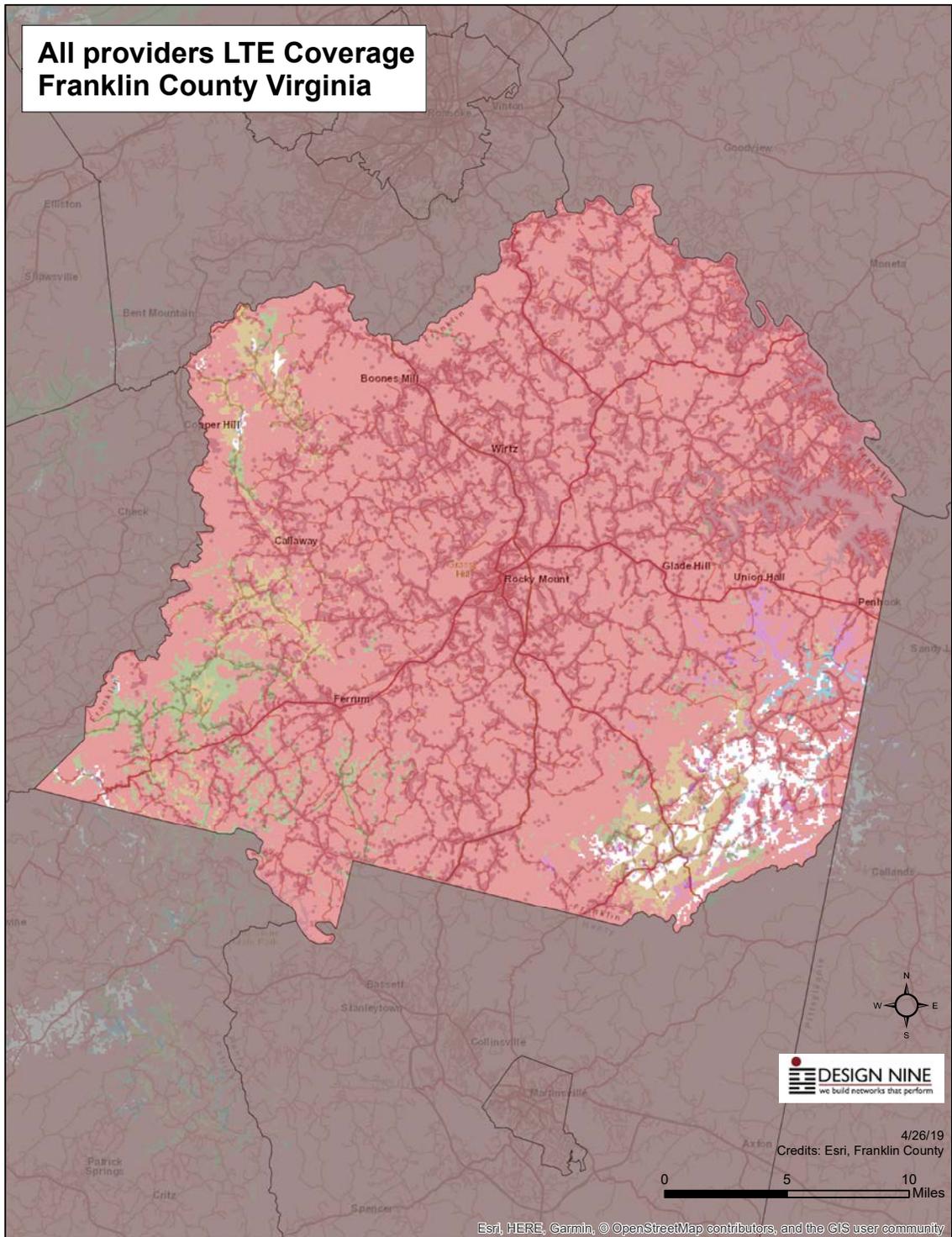


5.3 FIXED POINT WIRELESS AT 25/3 SPEEDS

Fixed point wireless broadband is more widely available in the County than this map indicates, but not all wireless tower sites are able to deliver 25/3 speeds.

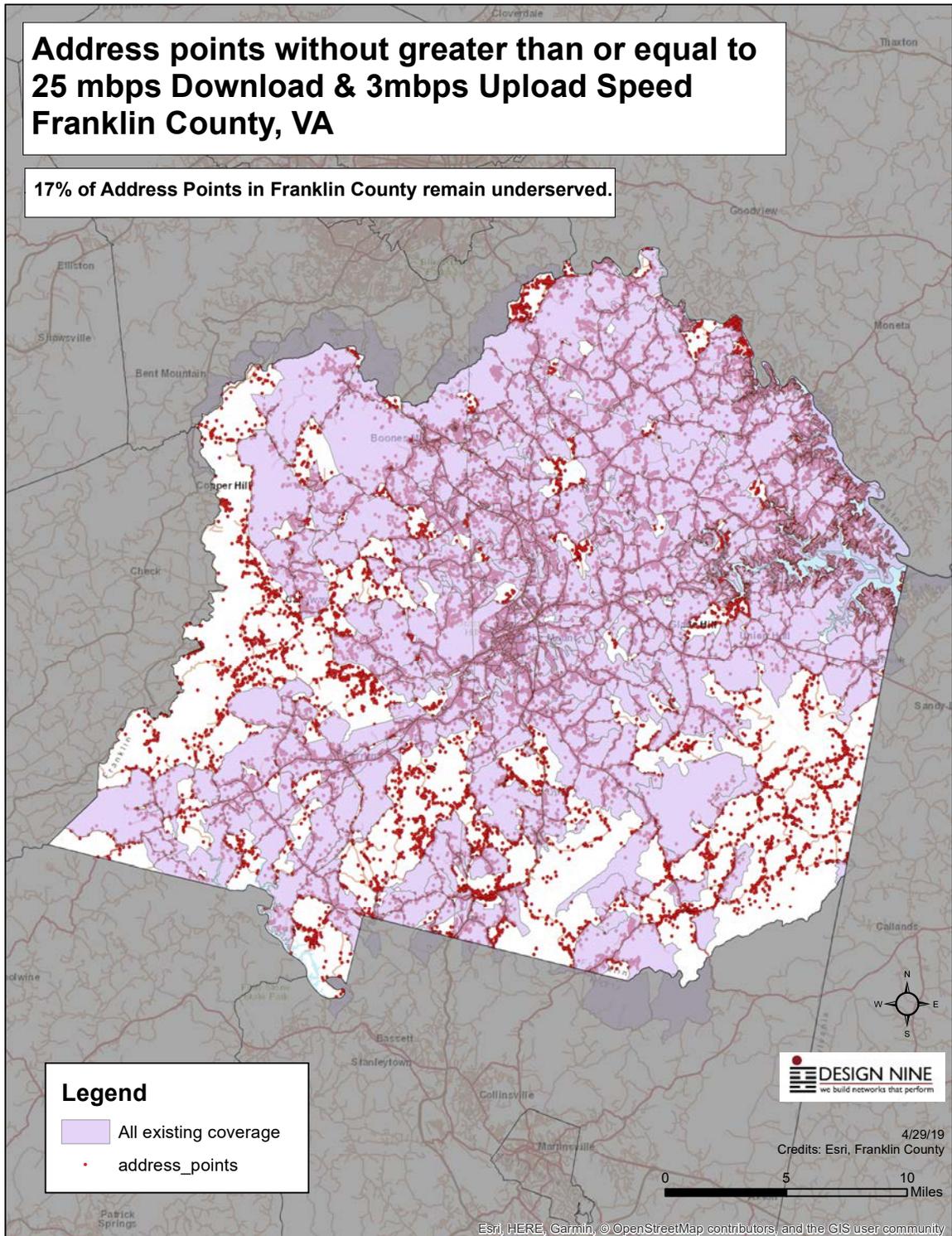


5.4 CELLULAR COVERAGE BY ALL PROVIDERS



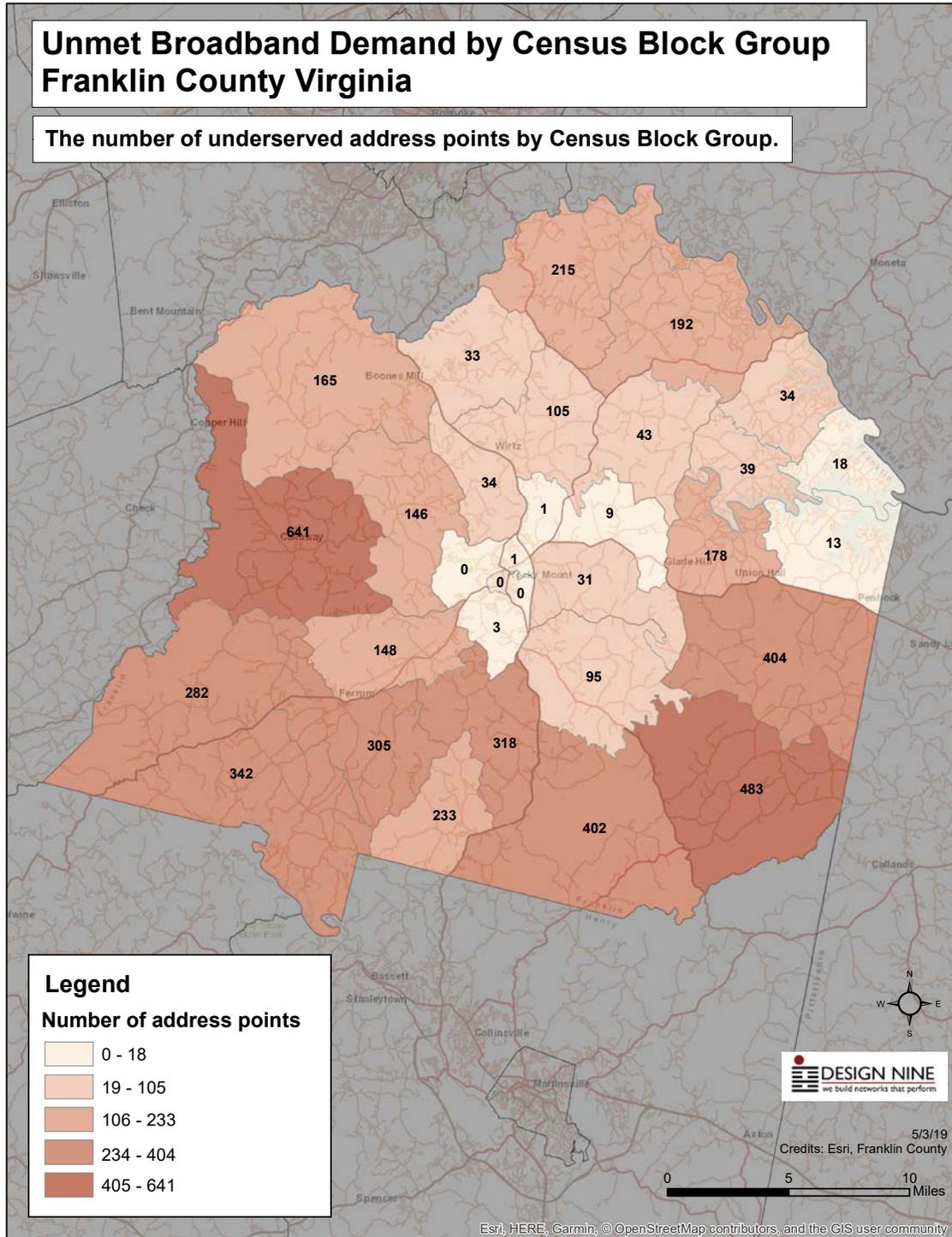
5.5 25/3 COVERAGE WITH ADDRESS POINTS

Broadband wireless, cable and DSL at 25/3 or greater, with 17% of locations remain underserved, the actual number of underserved is likely higher.

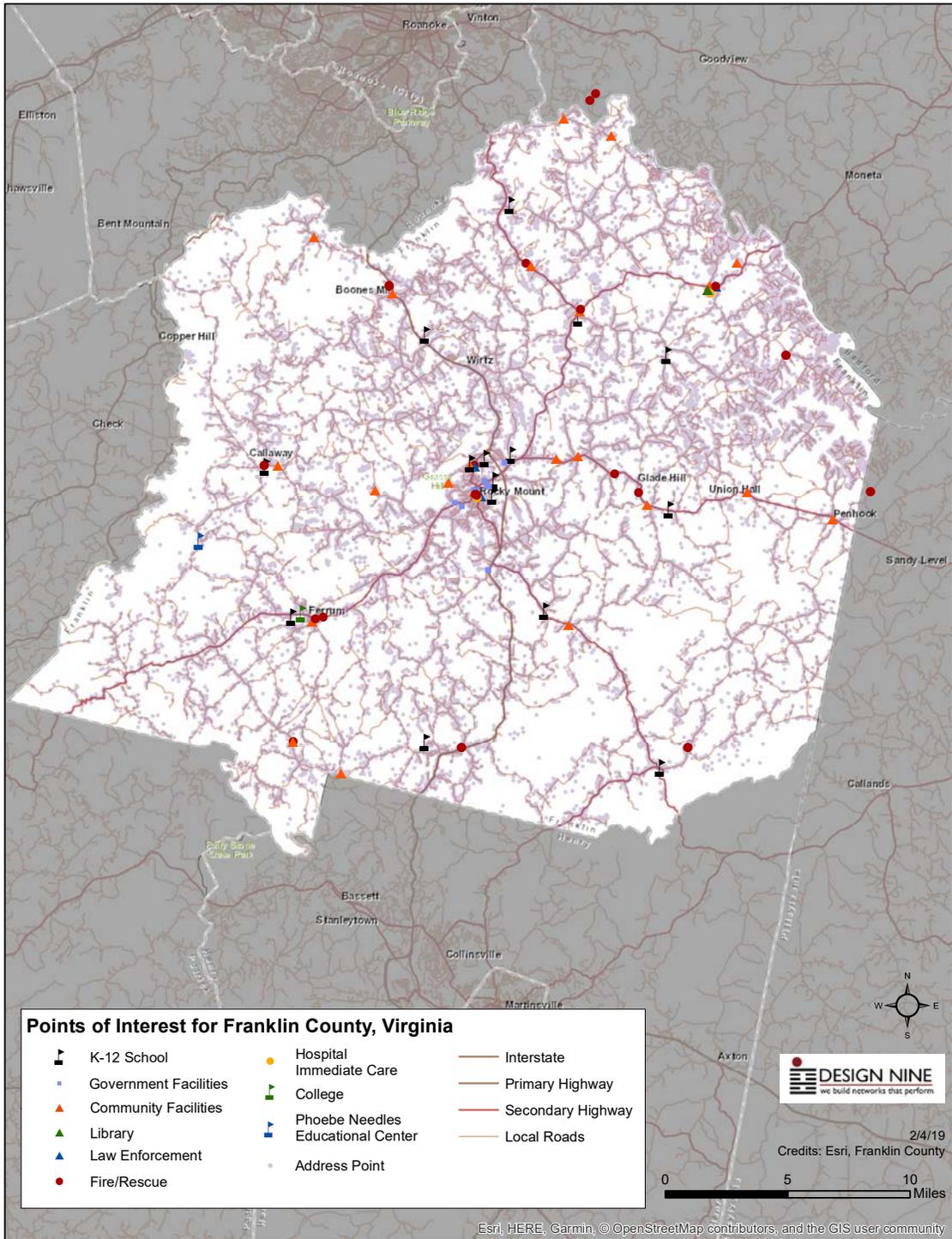


5.6 UNDERSERVED BY CENSUS BLOCK GROUP

At least 4,913 addresses are underserved (less than 25/3 Internet service), mostly in the rural parts of the county.

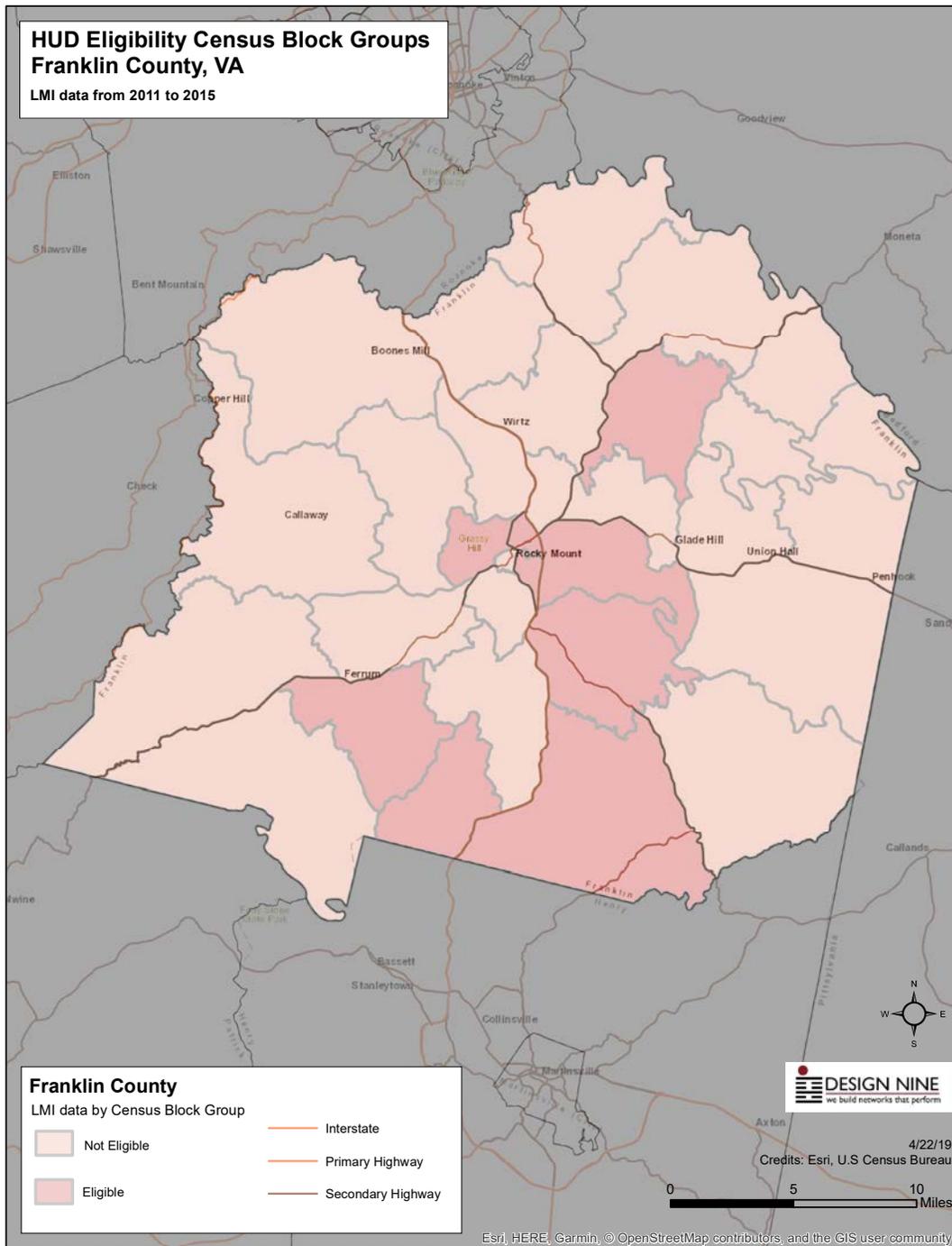


5.7 POINTS OF INTEREST



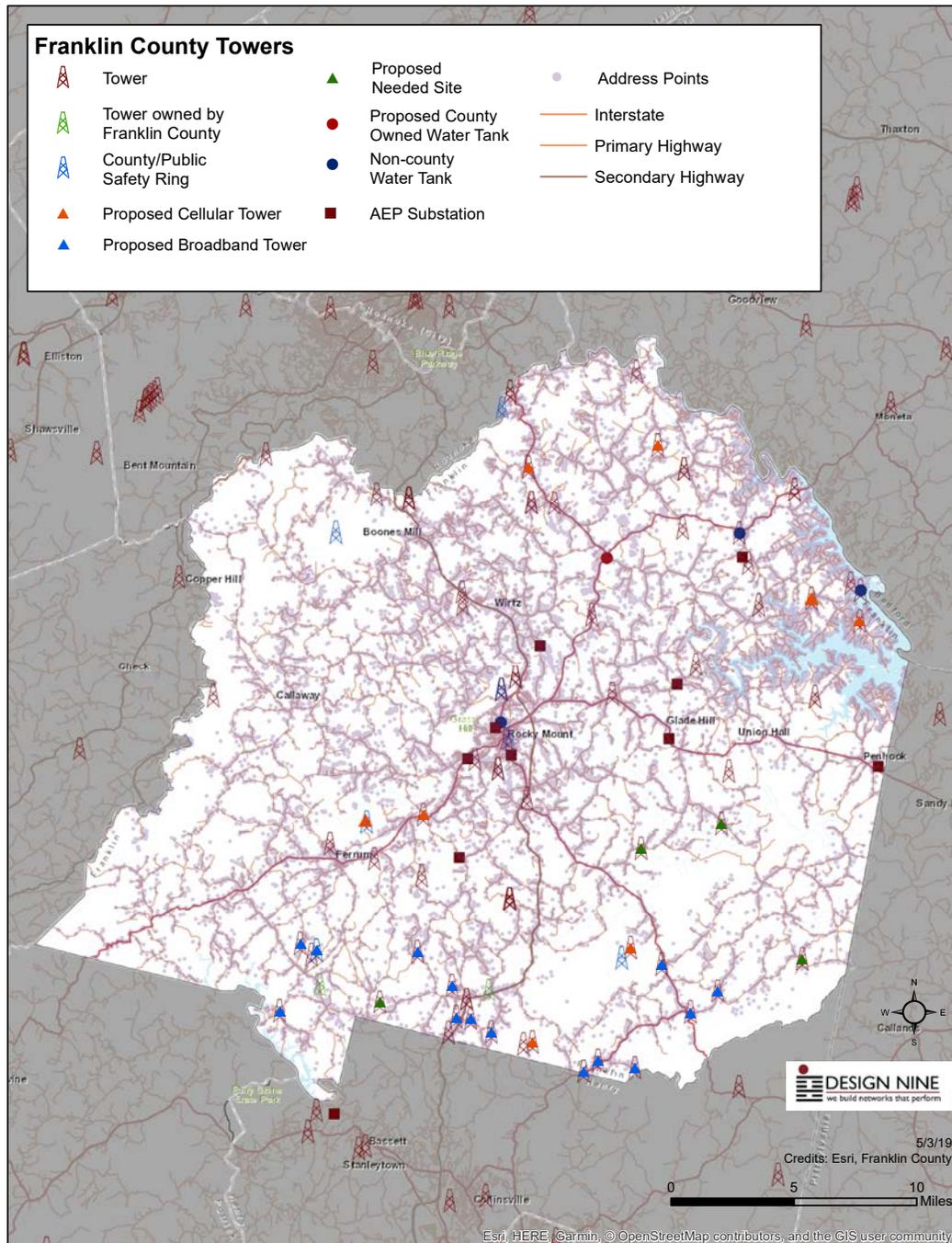
5.8 LMI AREAS OF THE COUNTY

Certain kinds of grants (e.g. CDBG funding) favor LMI (Low and Moderate Income) areas. Large parts of the county would qualify for grants that have a preference for LMI areas.



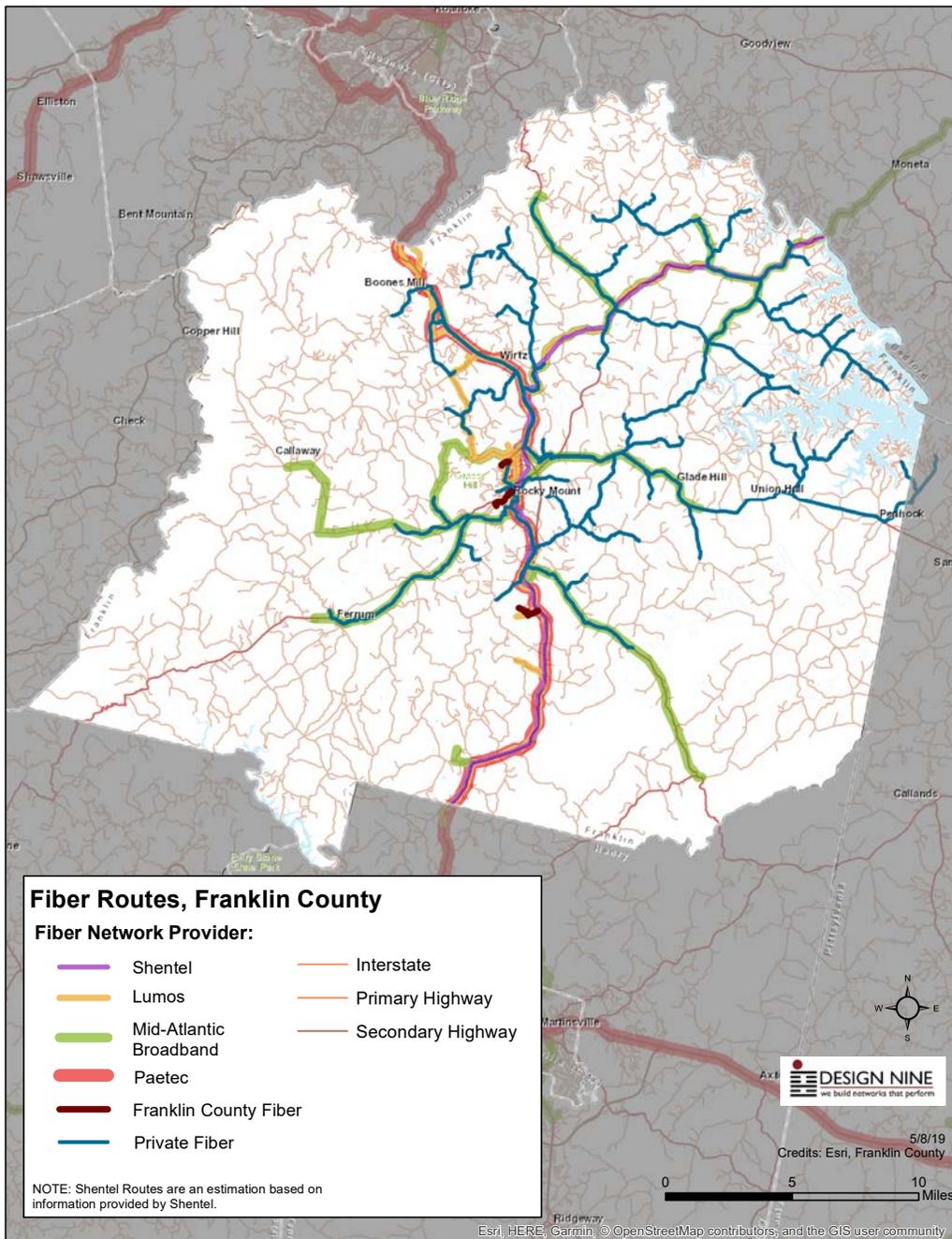
5.9 TOWER ASSETS AND SUB-STATIONS

There are a number of cellular towers in the county. These are clustered along major travel routes, which leaves many areas of the county with marginal or no cellular service. Increased availability of good wireless and/or fiber broadband service would enable many residents and businesses to use inexpensive nano-cell boxes in their home or business. More information on nano-cells is contained in a later section of this report. Appendix B contains a list of known tower owners; this list was developed from the FCC tower registry and from data supplied by Franklin County.



5.10 FIBER ASSETS

Some limited third party (e.g. not incumbent) fiber is in or near the county. These routes are extremely important as more “last mile” broadband improvements are made—competitive ISPs and WISPs can generally get better pricing from companies like Shentel and Lumos than from the telephone or cable companies. Paetec is a long haul fiber firm that is probably leasing fiber pairs from Shentel or Lumos; the company has no apparent service presence in the county (i.e. the fiber just passes through).



6 EXISTING SERVICE AREAS AND SERVICE OPTIONS

Our service provider report provides insights into the services currently available in your county. Our report provides data that show which areas by zip code that are most impacted by poor Internet service and/or the lack of Internet Service Provider options. Because of the unique geography of Franklin County, many Internet Service Providers shown as available online in a particular zip code are likely not available.

NOTE: *This data is collected from publicly available data. Service providers often exaggerate their coverage, and the actual availability of some services as represented in the tables below may be lower than the numbers suggest. Two examples would be Cox showing up in zip code 24059 and Consolidated Communications showing in zip code 24137. It is unlikely that any Franklin County residents in those zip codes have access to those services.*

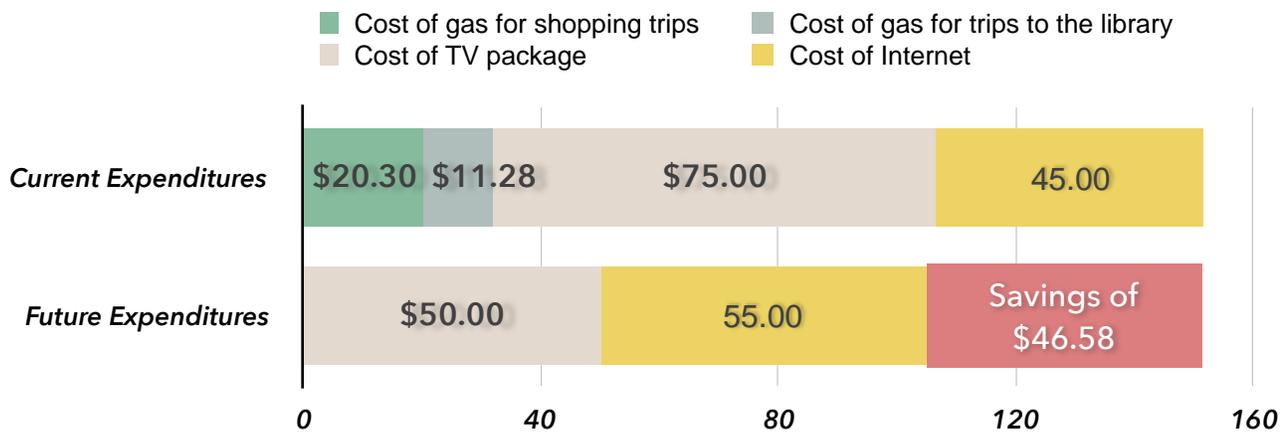
As the following tables and data demonstrate your citizens have the most choice in expensive but slow DSL Internet Service Providers, Most residents have little choice in companies that provide true high-speed Internet. There are eight zip code areas with a high number Franklin County residents dependent on DSL services.

Lack of choice impacts citizens' lives in variety of ways from their budgets to how they spend their time. For the first graph we have used basic CenturyLink DSL at \$45 per month with 10 Mbps download as the base service.

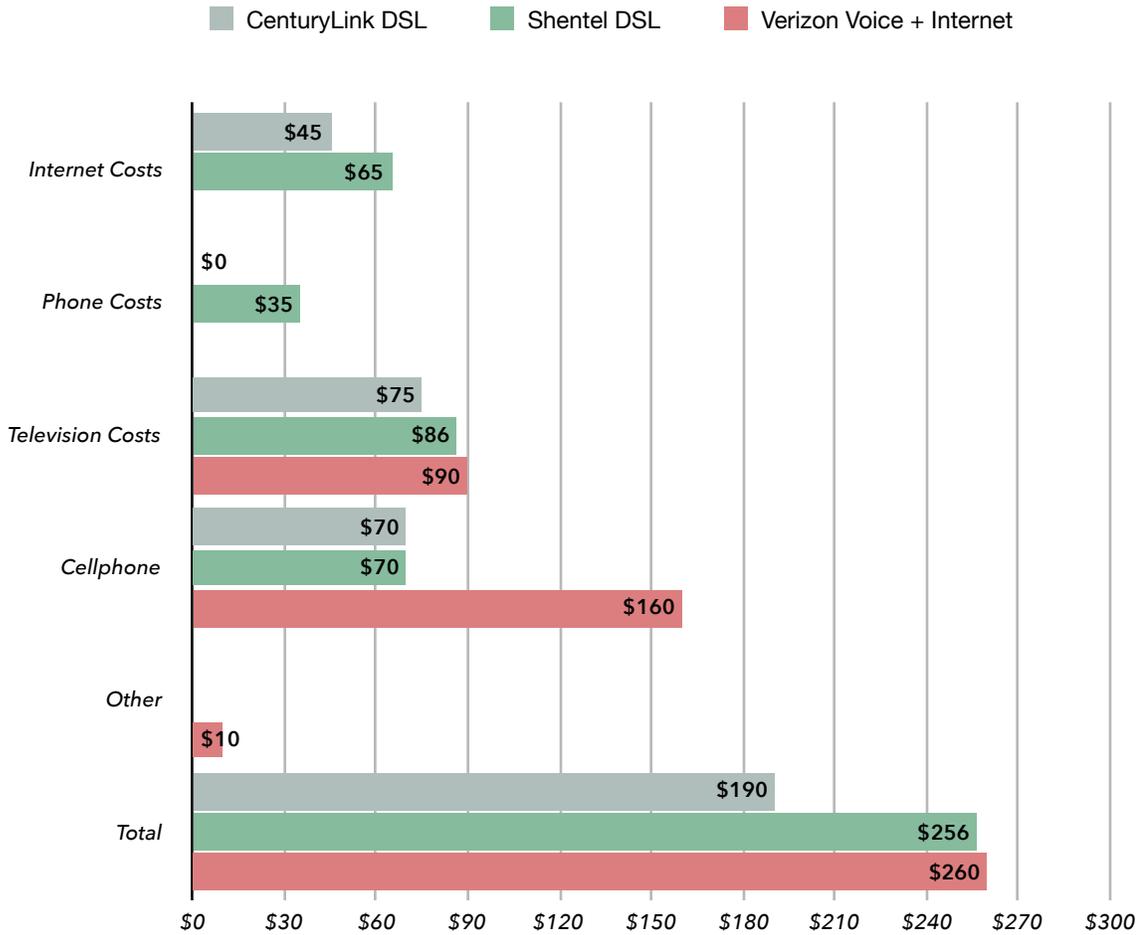
The average household in the United States pays \$67 per month for Internet in their home. Smartphones have become an expensive substitute for reasonably priced Internet services. A single smartphone with an unlimited data plan can cost from \$60 to \$95 per month and adding a single tablet for school work can add an additional \$10 to \$20 per month before taxes and fees for data. Even "unlimited data" often has limitations after a certain amount of data has been used.

Studies have shown that high-speed broadband can save rural residents up to \$754 per year. Our conservative \$559 annual savings number illustrated in the chart below is based on actual services available in Franklin County.

Potential Savings with Better Broadband (Phone not included)



Below are graphs showing communication costs for families receiving the Internet in different ways in Franklin County. CenturyLink appears to be the most available service in the County but provides only 10 Mbps download speeds at best and no bundled services. The next most available service is Shentel DSL. Their mid-range bundle package of TV, Internet and phone is \$135.90 for the first year with the price going to \$185.90 the second year. We have used that Shentel package at its non-promo rate of \$185.90 for our base package. For sake of comparison on CenturyLink services without bundling, we have added satellite TV costs. The other costs (\$10) provide a tablet for people using their cellphones for Internet needing in order to be able to do school work or other Internet activities. Verizon cellphone Internet costs are based on Verizon's \$70 per month 8GB plan with addition 6GB of data purchased at \$15 per GB. That totals 14GBs of data with 4 GBs for phone usage and 10 GBs for Internet usage. **The average monthly cost of these services in Franklin County is \$235.**



6.1 ZIP CODE DATA

Zip Code data or Zip Code Tabulation Area information (ZCTA) was compiled using the Melissa website with all population data coming from the 2010 US census which is the most recent for which ZCTA data is available. ZCTA is the geographic unit closest to a zip code for which the US government provides population data. It is a very approximation. Percentages within the county are based on number of US post office addresses that are actually within the county. Maps in the Appendix are from the Melissa site with best effort estimates of area either not in Franklin County or actually in Franklin County.

Franklin Population 2010 by Zip Code- Population Data from US Census

Zip/ ZCTA	USPS Town	% Franklin House- holds in the Zip	DSL	Cabl e	Fixed Wireless	25 Mbps Coverag e	201 0 Pop.	Land-Sq-Mi	Density Per Sq Mi
24055	Basset (not a Franklin County town)	5.4%	97%	91%		92%	13,674	86.90	157.35
24059	Fishers Hill (not a Franklin County town)	6.6%	69%	35%	13%	35%	872	23.67	36.85
24065	Boone's Mill	87.7%	84%	63%	31%	68%	6,141	85.33	71.97
24067	Callaway	100%	79%	11%	70%	24%	2,230	56.17	39.70
24088	Ferrum	100%	94%	48%		56%	5,408	117.21	46.14
24092	Glade Hill	100%	77%	94%	26%	94%	3,063	35.55	86.17
24101	Westlake Corner	78.9%	91%	77%	38%	78%	6,132	55.47	110.55
24102	Henry	92.1%	77%	1%	12.7%	57%	1,697	32.08	52.90
24121	Moneta (not a Franklin County town)	37%	72%	46%	50.5%	46%	10,501	94.90	110.65
24137	Penhook	78.9%	57%	42%	29.1%	42%	2,582	74.25	34.78
24151	Rocky Mount	100%	84%	86%	31.8%	90%	20,000	162.52	123.07
24176	Union Hall	100%	77%	84%	11.7%	90%	1,360	21.99	61.86
24184	Wirtz	100%	90%	96%	28.5%	96%	4,705	42.83	109.86

Internet Service Providers & Percent Zip Code Coverage

Zip Code	USPS Town	CenturyLINK DSL	Citizens	Consolidated Communications	Verizon	Shentel	Xfinity Cable	Cox	B2X Online Wireles
24055 only 5.4% in Franklin County	Basset (not a Franklin County town)	✓ 97.1%					✓ 95.6%		
24059 No services verified in this area- 6.6% in Franklin County	Fishers Hill (not a Franklin County town)				✓ 69.4%			✓ 79.5%	✓ 13.3%
24065	Boone's	✓ 74.6%			✓ 21.3%	✓ 57.5%		✓ 15.5%	✓ 30.8%
24067	Callaway	✓ 70.1%	✓ 11.8%		✓ 16.4%	✓ 11.1%			✓ 69.9%
24088	Ferrum	✓ 95.2%				✓ 46.8%			
24092	Glade Hill	✓ 72.4%				✓ 92.5%			✓ 26.3%
24101	Westlake Corner	✓ 62.7%			✓ 56.0%	✓ 72.4%	✓ 5.3%		✓ 38.2%
24102	Henry	✓ 84.6%							✓ 12.7%
24121 only 37% in Franklin County	Moneta (not a Franklin County)	✓ 33.1%			✓ 45.3%	✓ 48.2%	✓ 11.0%		✓ 50.5%
24137	Penhook	✓ 36.5%		✓ 17.2%		✓ 43.4%			✓ 29.1%
24151	Rocky Mount	✓ 86.4%				✓ 85.1%			✓ 31.8%
24176	Union Hall	✓ 54%				✓ 79.9%			✓ 11.7%
24184	Wirtz	✓ 91.4%				✓ 93%			✓ 28.5%

6.2 LOCAL PRICING DATA

This information provides pricing data and services available from providers in the area for the Franklin County area. Prices, availability and promotional offers change frequently and sometimes vary within a region. Information was compiled using the Broadband Now and the High Speed Internet (.com) websites. Exact availability requires specific street addresses.

Wireline Providers

CenturyLink ✓

\$45/mo for 10 Mbps ↓ – Mbps ↑ with 1 TB data cap

\$45/mo for 3 Mbps ↓ – Mbps ↑ with 1 TB data cap

Citizens ✓

\$79.95/mo for 50 Mbps ↓ 10 Mbps ↑- with no data cap. Setup fee \$99.00 includes activation. Installation is free. Modem included. Contract term one year with up to \$100 ETF.

\$59.95/mo for 25 Mbps ↓ 5 Mbps ↑- with no data cap. Setup fee \$99.00 includes activation. Installation is free. Modem included. Contract term one year with up to \$100 ETF.

\$39.95/mo for 10 Mbps ↓ 2 Mbps ↑- with a 400 GB/month data cap. Setup fee \$99.95 installation fee may apply. Modem \$8 per month or one-time fee of \$99.

Consolidated Communications ✓

\$36.70/mo for 15 Mbps ↓ 0.768 Mbps ↑- with no data cap. 1-year promo rate. Regular rate is \$75.70. Contract term: 1 year. \$1 per month paper invoice fee. Modem with WiFi \$8 per month.

\$36.70/mo for 20 Mbps ↓ 2 Mbps ↑- with no data cap. 1-year promo rate. Regular rate is \$75.70. Contract term: 1 year. \$1 per month paper invoice fee. Modem with WiFi \$8 per month.

\$31.70/mo for 10 Mbps ↓ 0.768 Mbps ↑- with no data cap. 1-year promo rate. Regular rate is \$70.70. Contract term: 1 year. \$1 per month paper invoice fee. Modem with WiFi \$8 per month.

\$21.70/mo for 6 Mbps ↓ 0.768 Mbps ↑- with no data cap. 1-year promo rate. Regular rate is \$60.70. Contract term: 1 year. \$1 per month paper invoice fee. Modem with WiFi \$8 per month.

\$21.70/mo for 3 Mbps ↓ 0.768 Mbps ↑- with no data cap. 1-year promo rate. Regular rate is \$60.70. Contract term: 1 year. \$1 per month paper invoice fee. Modem with WiFi \$8 per month.

Verizon ✓

\$34.99/mo for 3 Mbps 3 Mbps ↓ up to – Mbps ↑

\$24.99/mo for 1 Mbps 1 Mbps ↓ up to – Mbps ↑

Shentel ✓

\$145.90/mo for 50 Mbps 50 Mbps ↓ 10 Mbps ↑ 500 GB Data Cap. TV 238 channels, Internet and Unlimited Phone. 1- year promo rate. 50 Mbps Internet speed available for \$50 per month for 12

months for new Internet customers only. 50 Mbps Internet speeds regularly \$99.95. Half Off professional installation with Internet = \$49.98 (regularly \$99.95)

\$135.90/mo for 50 Mbps 50 Mbps ↓ 10 Mbps ↑ 500 GB Data Cap. TV 238 channels, Internet and Phone. 1- year promo rate. 50 Mbps Internet speed available for \$50 per month for 12 months for new Internet customers only. 50 Mbps Internet speeds regularly \$99.95. Half Off professional installation with Internet = \$49.98 (regularly \$99.95)

\$133.40/mo for 50 Mbps 50 Mbps ↓ 10 Mbps ↑ 500 GB Data Cap. TV 158 channels, Internet and Phone. 1- year promo rate. 50 Mbps Internet speed available for \$50 per month for 12 months for new Internet customers only. 50 Mbps Internet speeds regularly \$99.95. Half Off professional installation with Internet = \$49.98 (regularly \$99.95)

Xfinity Cable ✓

\$149.99/mo for 1,000 Mbps 1,000 Mbps ↓ and 35 Mbps ↑ with no data cap. TV: Limited Basic + Digital Premier Tier, Xfinity Voice Unlimited, Contract term: 2 years. Setup \$0 (Free professional installation. Modem w/WiFi \$11 per month

\$119.99/mo for 400 Mbps 400 Mbps ↓ and 10 Mbps ↑ with no data cap. TV: Limited Basic + Digital Preferred Tier, Unlimited nationwide calling, Contract term: 2 years. Setup \$0 (Free standard shipping of self-install kit. Professional Install is \$29.99. Modem w/WiFi \$11 per month

\$49.99/mo for 100 Mbps 100 Mbps ↓ and 5 Mbps ↑ with no data cap. TV: Choice TV. Setup \$0 (Free standard shipping of self-install kit. Professional Install is \$29.99. Modem w/WiFi \$11 per month

\$92.95/mo for 250 Mbps 250 Mbps ↓ and 10 Mbps ↑ with no data cap. Setup \$0 (Free standard shipping of self-install kit. Professional Install is \$29.99. Modem w/WiFi \$11 per month

\$89.99/mo for 1,000 Mbps 1,000 Mbps ↓ and 35 Mbps ↑ with no data cap. Setup \$59.99 includes professional installation. Modem w/WiFi \$11 per month

\$89.95/mo for 150 Mbps 150 Mbps ↓ and 5 Mbps ↑ with no data cap. (Free standard shipping of self-install kit. Professional Install is \$59.99. Modem w/WiFi \$11 per month

\$79.99/mo for 400 Mbps 400 Mbps ↓ and 10 Mbps ↑ with no data cap. 1 year promo rate. Regular rate is \$99.95. (Free standard shipping of self-install kit. Professional Install is \$59.99. Modem w/WiFi \$11 per month

\$39.99/mo for 60 Mbps 60 Mbps ↓ and 5 Mbps ↑ with no data cap. 1 year promo rate. Regular rate is \$74.95. (Free standard shipping of self-install kit. Professional Install is \$59.99. Modem w/WiFi \$11 per month

Cox Cable ✓

\$159.99/mo for 1,000 Mbps 1,000 Mbps ↓ up to 35 Mbps ↑ Unlimited data. TV 250 channels, Internet and Phone. 1- year promo rate, regularly \$296.97 per month. Two year contract. Free professional install.

\$129.99/mo for 300 Mbps 300 Mbps ↓ up to 30 Mbps ↑ Unlimited data. TV 250 channels, Internet and Phone. 1- year promo rate, regularly \$296.97 per month. Two year contract. Free professional install.

\$109.99/mo for 300 Mbps 300 Mbps ↓ up to 30 Mbps ↑ Unlimited data. TV 170 channels, Internet and Phone. 1- year promo rate, regularly \$278.93 per month. Two year contract. Free professional install.

\$89.99/mo for 100 Mbps 100 Mbps ↓ up to 10 Mbps ↑ Unlimited data. TV 140 channels, Internet and Phone. 1- year promo rate, regularly \$190.97 per month. Two year contract. Free professional install.

\$64.99/mo for 10 Mbps 10 Mbps ↓ up to 1 Mbps ↑ Unlimited data. TV 75 channels, Internet and Phone. 1- year promo rate, regularly \$91.98 per month. Two year contract. Free professional install.

Fixed Wireless Providers

B2X Online

Pricing not yet discovered. Speed appears to 4.7 Mbps on the downlink and 1.5 Mbps on the uplink. (Call placed 540 389-7924, No response as of 12/5/18).

Residential Satellite Internet Pricing

HughesNet

\$59.99/mo for 25 Mbps ↓ 3 Mbps ↑ 10 GB/mo data cap. Two year contract with up to \$400 ETF. Two year prom rate. Speeds will be reduced and will typically be in the range of 1 to 3 Mbps once monthly plan data is use. From 2am-8am, customers have access to 50 GB/month of additional plan data. Setup \$99. Modem: \$14.99/mo.

\$69.99/mo for 25 Mbps ↓ 3 Mbps ↑ 20 GB/mo data cap. Two year contract with up to \$400 ETF. Two year promo rate. Speeds will be reduced and will typically be in the range of 1 to 3 Mbps once monthly plan data is use. From 2am-8am, customers have access to 50 GB/month of additional plan data. Setup \$99. Modem: \$14.99/mo.

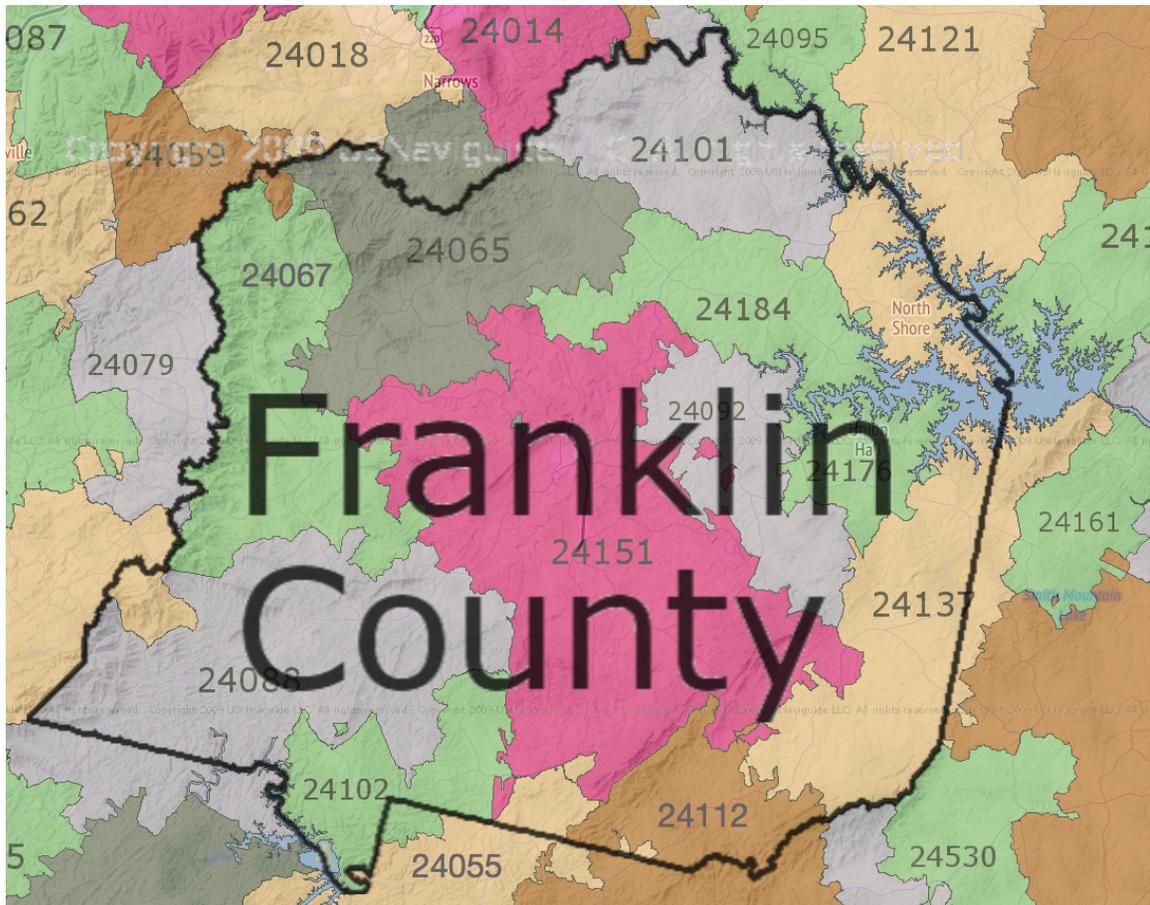
ViaSat/Excede

\$50/mo for up to 12 Mbps ↓ Unlimited priority data. \$70/mo after three months

\$70/mo for 25 Mbps ↓ Unlimited priority data. \$100/mo after three months

\$100/mo for 25 Mbps ↓ Unlimited priority data. \$150/mo after three months

Zip Code Maps



7.1 HOW MUCH BANDWIDTH IS ENOUGH?

Bandwidth needs for the past several years have been growing by an estimated 30% per year, and show no sign of slowing.

This means residential and business bandwidth needs are doubling every three years.

As computers and associated hardware (e.g. video cameras, audio equipment, VoIP phones) become more powerful and less expensive, new applications and services are continually emerging that drive demand for more bandwidth.

In most areas of the county, residents currently have, at best, the FCC 10 Megabits down/1 Megabit up bandwidth. This slow speed service is impacting economic and community development:

- It limits resident's ability to work from home.
- It limits school children's ability to access the K12 and higher education resources needed to complete homework assignments.
- It limits resident's ability to access cost-saving tele-medicine and tele-health services from home.
- It limits resident's ability to shop from home to save money on gas and travel expenses.

"Next generation" is the term used to describe future planning for network connectivity and infrastructure. Next generation broadband reaps substantial benefits. There are several key benefits of "Next-Generation Broadband":

- Dramatically faster file transfer speeds for both uploads and downloads
- The ability to transmit streaming video, transforming the Internet into a far more visual medium
- Means to engage in true-real time collaboration
- The ability to use many applications simultaneously
- Ability to maintain more flexible work schedules by being able to work from home on a part time or full time basis
- The ability to obtain health-related services for an occasional illness and/or long term medical services for chronic illnesses.

Clearly, consumers have a strong interest in a visual medium from when and wherever they are. YouTube is the second most popular search engine after Google, which demonstrates the need to support the infrastructure to transmit streaming video. In addition to video streaming, true-real time collaboration also provides an effective way for people to interact from wherever they are. People can engage in a two-way, real-time collaboration, so that fruitful, visual conversations can be held between friends, family, business associates from the state, country, or internationally.

Because of fiber networks, employees have the capabilities of working from their home. Findings suggest that if all Americans had fiber to the home, this would lead to a 5 percent reduction in gasoline use, a 4 percent reduction in carbon dioxide emissions, \$5 billion in lower road expenditures, and 1.5 billion commute hours recaptured.

7.2 RESIDENTIAL BANDWIDTH NEEDS

In Franklin County, most residents and businesses are relying on copper-based services. The table below depicts the bandwidth needed for typical residential services which are available now or will be available in the near future. In a next generation network all services will be delivered over a single network infrastructure which will require a network that can support providing most services to most consumers simultaneously. Today's shared networks (cable and wireless in particular) rely on the "bursty" nature of traffic to provide services to end users. If all end users were consuming their "advertised" bandwidth today's cable and DSL networks would grind to a halt.

Existing cable modem network users are overwhelming the digital cable networks that were upgraded as little as three or four years ago, and the firms have had to artificially reduce the bandwidth available for certain kinds of high bandwidth services (e.g. peer to peer file sharing). Some cable providers have even run into capacity issues with the TV portion of their networks, and some consumers have observed that some HD TV channels have been so highly compressed that picture quality has been noticeably degraded.

Description	Residential Daytime		Early Evening		Evening and Late Night		Snow Day	
	Concurrent Use	Mbps	Concurrent Use	Mbps	Concurrent Use	Mbps	Concurrent Use	Mbps
	Intermittent Television and Internet use across a small percentage of households.		Increased video, voice and Internet use as children arrive home from school and employees from work.		Peak television and Internet use. Multiple TV's are on, phone and computer being used.		On top of typical daytime traffic children are home from school, and many employees are home working.	
Telephone	1	0.064	1	0.064	1	0.064	1	0.064
Standard Definition TV	1	2.5	1	2.5	1	2.5	1	2.5
HD TV	1	4	2	8	2	8	3	12
Security System	1	0.25	1	0.25	1	0.25	1	0.25
Internet	1	1.5	1	1.5	2	3	3	4.5
Online Gaming		0.25		0.5		1		1
VPN Connection	0	0	1	2	1	2	2	4
Data Backup		0	1	5	1	5	1	0
Telehealth (subscriber)	1	4	1	4	1	4	0	0
Distance Learning / Workforce Training		0	1	10	1	10	2	20
HD Videoconferencing		0		0		0	1	14
Totals		12.6		33.8		35.8		58.3
5 years from now (Megabits)		38		101		107		175
10 years from now (Megabits)		113		304		322		525

7.3 ACTIVITIES IN NEIGHBORING COUNTIES

Bedford County recently became the recipient of a substantial VATI (Virginia Telecommunications Initiative) for approximately \$1 million. In partnership with Blue Ridge Towers (BRT), the project expects to construct nine new towers the county, and Bedford County will provide space for BRT wireless equipment on two existing county-owned towers. A subsidiary of BRT, BriscNet, will be the ISP for the project. Also included is twenty-one miles of fiber that will be installed by BRT. The fiber will be used to provide connectivity between some of the towers.

In Floyd County, Citizens Telephone Coop has announced a three year plan to install Gigabit fiber to nearly all county homes and businesses. The cost of the project will be financed with Federal funds, one time \$199 fees charged to each connected premises, and operating revenue generated by Citizens Coop services.

In Roanoke County, the Roanoke Broadband Authority now has more than sixty miles of middle mile fiber that is marketed primarily to business and wholesale customers.

8 LEVEL OF SERVICE

8.1 CLOSING THE BROADBAND GAP

In most areas of the county, residents and businesses currently have, at best, the FCC 10 Megabits down/1 Megabit up bandwidth. This slow speed service is impacting economic and community development. Instead, the question is:

“What do businesses and residents of Franklin County need to be able to compete globally over the next thirty years?”

In short, the county today has “little broadband” in the form of DSL, very limited wireless, expensive satellite Internet, and very limited cable modem service, along with a very limited amount of “big broadband” in the form of fiber to a few businesses and institutions.

If the County and the Authority make investments in broadband and telecommunications infrastructure, it is absolutely critical that those investments are able to scale gracefully to meet business and economic development needs for decades.

To close that gap between the FCC definitions and what the county needs to support future work opportunities and to support K12 and higher education school work, the county needs the following:

Broadband Service	Target Date	Technology	Where Needed
10 Megabits upload/10 Megabits download	2020	Wireless	As much of the county as possible, given funding constraints
20 Megabits upload/10 Megabits download	2020	Wireless	In some locations in the county
50 Megabits upload/10 Megabits download	2021	Wireless, fiber	In some locations in the county
Gigabit upload/Gigabit download	2020	Fiber	In key business and commercial areas
100 Megabits upload/100 Megabits download	2021	Fiber	Available to a minimum of 50% of residents in the county

8.2 LIMITING FACTORS

The factors that are limiting broadband availability and affordability in the county includes:

- Low population density - The generally low density of homes and businesses in the county make it more difficult for competitive service providers (e.g. WISPs) to justify the expense of building towers and offering Internet service.

- Poor service - Like most areas of Virginia, CenturyLink and Verizon have not upgraded infrastructure and DSL service is slow and unreliable.
- Limited cable Internet service - Related to the low density, cable Internet service is very limited.
- Lack of regional entity to manage infrastructure improvements - At the present time, there is no coordinated three county effort to plan broadband infrastructure improvements and coordinate funding and grant applications.
- Difficult terrain for wireless service - The terrain in the county has many low hills, which blocks wireless broadband signals and requires more towers and community poles than some other parts of Virginia.

8.3 CURRENT AND FUTURE USES AND SERVICES

When analyzing future service needs, it is important to take into account ALL services that may be delivered over a broadband connection. "Broadband" is not a service--it is a delivery medium. If we think about broadband using a roads analogy, broadband is the road, not the trucks that use the road. Internet access is a service delivered by a broadband road system, and that Internet service is just one of many services that are in demand. Today, congestion on broadband networks is not due just to increased use of email and Web surfing, but many other services.

This means that current DSL, wireless, and cable modem services are completely inadequate for future needs. Current DSL offerings are in the range of 1 Megabit to 3 Megabits for most residential users, 3 Megabits to 5 Megabits for business DSL users, and there are severe distance limitations on DSL. Higher bandwidth is possible, but as the DSL bandwidth goes up, the distance it can be delivered goes down.

Typical wireless broadband (i.e. not cellular data service) offerings are in the range of 5 Megabit to 10 Megabits. Some wireless providers are rolling out 10-20 Megabit services. As bandwidth increases, the cost of the equipment also increases, and even a 20 Megabit service is well short of the FCC definition of broadband: 25 Megabits down and 3 Megabits up.

Across the U.S., current average bandwidth for cable modem services is typically 10 to 25 Megabits, with cable companies promising much more using the phrase "up to..." to obscure actual bandwidth being delivered.

The challenge for the area is to ensure that the businesses, residents, and institutions have a telecommunications infrastructure in place that will meet future needs.

Distance learning, entertainment, and video conferencing are three major applications of internet video. Distance learning from home with live video feeds requires high performance 2-5 Megabit connections in the near term (next 2-4 years), and over the next 4 to 7 years, there will be many distance learning courses that will incorporate live HD two-way video feeds, enabling students to participate in classroom discussions at a much higher quality level. Distance learning could be an important home-based application for workforce training and retraining.

"U.S. homes now have more than half a billion devices connected to the Internet, according to a study by the NPD Group. Furthermore, the overall number of connected devices per household is 10. This is more than three times the average number of people per household."

The table below lists these and other services that all represent broadband-enabled applications and services that must be available in at least parts of the county if it is to remain economically viable.

Residential and Business	Videoconferencing
	IP TV (Internet Protocol TV)
	HD streaming video
	Ultra hi-def (BluRay) video streaming
	Video on demand (e.g. Netflix)
	Place-shifted video
	Cloud computing services
	Online and cloud-based gaming
	Smart homes, buildings, and appliances, including smart electric meters, AMR (automated meter reading), and AMI (advanced metering infrastructure)
	Remote computer aided design (CAD)
	Work from home jobs
	Business from home
	3D graphic rendering and CGI server farms
	Remote network management and managed services
Virtual collaboration spaces (e.g. enhanced GoToMeeting, Webex style services)	
Public Safety	Intelligent transportation applications (smart road systems)
	Public safety and first responder networks
	Emergency dispatch and coordination
	Webcast agency meetings (e.g. virtual meetings)
	Online training for first responders, fire, and rescue
Society	Broadcast of local sports events
	Videoconferencing of community and town hall meetings for wider participation
	Wider availability of nonprofit and community organization services

Health Care	Teleconsultations
	Telepathology
	Telesurgery
	Remote patient monitoring
	Remote diagnosis
	Remote medical imaging
	Grid computing for medical research
Education and Research	Distance education
	Virtual classrooms
	Remote instrumentation
	Multi-campus collaboration
	Digital content repositories and distribution (digital libraries)
	Data visualization
	Virtual laboratories
	Grid computing for academic research

12 LAST MILE CONNECTIVITY SOLUTIONS

12.1 OVERVIEW OF NETWORK TECHNOLOGIES

In Franklin County, broadband wireless has already become an important strategy for improved Internet access for businesses and residents. But both fiber and wireless technologies and systems are going to be important to meet the goal of improving access to broadband. The rest of this section provides more detail and some specific build out strategies.

Businesses and residents in the county may obtain Internet service:

- With a small radio directly attached to their home or business that receives a signal directly from a towers owned by a private provider, from a County-owned tower (e.g. shared with public safety use), or from a community-owned tower (e.g. a coop).
- With a small radio attached to a utility pole (60 or 70') to improve line of sight to a tower.
- With a small radio directly attached to their home or business that receives a signal from a "community" utility pole. The "community" pole will receive a signal from a distant tower and redistribute it locally to a cluster of customers (typically within a half mile).
- With a fiber connection to the fiber installed in areas where economic development is important, and in other areas as additional fiber network segments are added.

The table below summarizes how fiber and wireless can work together in a variety of ways.

Distribution Type	Access Type	Capacity
Wireless	Wireless	Typical customer connection starting at 5 to 10 Megabits, can be higher, with 50 Meg connections common. More dependent on the capacity of the wireless Distribution link.
Wireless	Fiber	Users can have fiber Gigabit connections locally, but total throughput dependent upon the capacity of the wireless link, which can be up to a Gigabit, depending on distance and budget.
Fiber	Fiber	Any amount of bandwidth needed, with standard connection typically a Gigabit (1,000 Megabits).
Fiber	Wireless	Typical customer connection starting at 5 to 10 Megabits, can be higher, with 50 Meg connections common.

12.2 WIRELESS TECHNOLOGIES

WISPs (Wireless Internet Service Providers) use a wide variety of radio frequencies to deliver fixed point wireless broadband. By "fixed point," this means that these systems are not designed to support roaming in the way that cellular voice/data radios are (that is, mobile phone and data services).

Fixed point broadband is broadcast from a tower to individual homes and businesses (fixed points). Most of the frequencies used require clear line of sight between the tower and the location where service is desired. In Virginia and many parts of the east, tree cover is often an obstacle to getting good service.

The hilly topography of Franklin County can work for or against good wireless broadband service. Towers located on the tops of hills and mountains can provide service over a larger area than a tower in relatively flat terrain, but hills also block the signal. A residence can be a short distance from a large tower, but heavy tree cover or an intervening hill will block service. The solution to this can be addressed in several ways:

More larger towers of 180' to 300'

The taller the tower, the wider the coverage, but as tower height increases, the cost of the tower also increases. Towers taller than 190' require a light at the top to make them visible to low-flying aircraft, and lighted towers are more expensive to erect, and the bulbs have to be changed periodically at significant expense. Many broadband towers are 180' to avoid the additional cost of lighting.

Small cell broadband towers

Small cell broadband towers, often called community poles, are shorter towers or utility poles of typically 60' to 80', located in or very near a cluster of homes. The towers can be wooden utility poles or relatively low cost steel monopoles or steel lattice towers. These towers are located to get above local tree cover so that clear line of sight to a distant taller tower is available. Local access point radios provide service to homes and businesses with line of sight to the pole. In Franklin County, these are going to be an important part of a strategy to get better broadband to rural residents and businesses.

Variety of radio frequencies

WISPs are beginning to deploy a wider range of licensed and unlicensed radio frequencies to overcome distance, bandwidth, and line of sight issues. Traditional 2.4 Ghz and 5.7 Ghz WiFi and WiMax frequencies are being supplemented or replaced with LTE broadband radios that provide better bandwidth and will tolerate light tree cover better (2.5 Ghz, 3.5-3.7 Ghz). Some WISPs are also using lower frequencies (e.g. 900 Mhz) that will travel farther and will also provide better penetration in light tree cover.

12.3 EMERGING WIRELESS TECHNOLOGIES

MIMO Wireless

MIMO (Multiple Input, Multiple Output) describes a variety of technologies that can be summarized as using more than one receive and transmit antenna for wireless data applications. Wireless protocols that are using the MIMO concept include IEEE 802.11n (Wi-Fi), IEEE 802.11ac (Wi-Fi), 4G, LTE (Long Term Evolution), and WiMAX. Each of these protocols use the MIMO technology to increase the amount of available bandwidth in a given section of radio frequency spectrum.

New hardware is required to make effective use of MIMO. While the technology increases wireless bandwidth, the typical amount of bandwidth being used by wireless devices is also increasing

rapidly. Some applications where MIMO is likely to provide noticeable improvements are in home wireless routers, where the effective throughput will be able to better handle the demanding bandwidth requirements of HD and 4K video streams. MIMO is slowly being developed for use with cellular smartphones, but both the phones and the cell tower radios have to be upgraded to support MIMO.

LTE/4G/5G

LTE (Long Term Evolution) is a set of protocols and technologies designed to improve the performance of voice/data smartphones. Like MIMO, both the user phone and the cell tower radios have to be upgraded to support LTE improvements. In 2013, only 19% of U.S. smartphone users were able to take advantage of LTE speeds, although that percentage has been increasing rapidly since then, and more than 85% of the U.S. cellular towers have been upgraded to LTE. As noted previously, the actual bandwidth available to a smartphone user is highly variable and depends on distance from the cell tower, the number of smartphones accessing the same tower simultaneously, and the kinds of services and content being accessed by those users.

The primary purpose of cellular bandwidth caps is to keep cellular users from using too much bandwidth and degrading the overall service. While LTE and MIMO improvements will improve overall cellular service, these technologies are not going to replace fiber to the home and fiber to the business.

In 2017, new fixed broadband wireless systems entered the marketplace using LTE frequencies, and many WISPs have begun to replace existing wireless radio systems with LTE equipment. These LTE systems do not provide any cellular voice services; they are designed specifically to support only broadband/Internet service.

Reports of performance have been mixed. In our conversations with both vendors of these systems and WISPs that have begun testing them, we get two very different stories. The vendors have been conservative in discussing the improvements, while some WISPs have been taking single user test results and suggesting that they will be able to deliver higher speeds at greater distances to all users.

There is little debate that the LTE equipment offers higher bandwidth, at somewhat greater distances, and with somewhat better penetration of light foliage and tree cover. Over the next two to four years, most WISPs will change out most of their existing radio systems for the improved LTE radios.

The much touted 5G wireless technology, as of 2019, is still largely marketing hype. The official standard for 5G radio technologies is planned for release later in 2019, although some companies, like Verizon, have begun trials of the equipment with a few customers.

5G does bring much higher speeds to wireless broadband (e.g. it might be able to deliver 30 to 50 Meg of bandwidth consistently). But 5G has significant limitations that do not make it a good solution in rural areas of the U.S.

The fact that 5G can deliver much higher bandwidth means that 5G cell sites will require fiber connections. This is going to effectively limit 5G deployments to denser urban environments where both customers and fiber are plentiful.

There is no free lunch in the physics of radio frequencies. The higher bandwidth of 5G means that cell sites need to be closer together

To achieve the full benefit of 5G technology, more fiber is needed.

because the 5G frequencies do not travel as far as existing 4G/LTE frequencies currently being used by the cellular industry. Most users will have to be within

Some experts estimate that more than a million miles of new fiber will have to be deployed just to support the 25 largest metro areas in the U.S. 5G will not appear overnight.

As many as 60 cell sites per square mile may be needed to make 5G widely available in a given area. If, as an example, about 25%, or 172 square miles of Franklin County is underserved, a thousand or more cell sites would be needed to provide ubiquitous coverage.

For rural areas, the cost of 5G service may be one of the most significant obstacles. The cellular carriers see the increased customer bandwidth use possible on 5G networks as a major revenue opportunity. While they will increase the “standard” bandwidth package for monthly service, bandwidth caps and rate limiting is likely to keep 5G cellular customers bills high.

White space broadband

White space broadband uses some of the frequencies that were formerly used by analog TV channels. These lower frequencies travel farther and provide better penetration of light foliage. Microsoft has been supporting a number of community white space experiments, and has promised much wider support for this technology, but there are few other users, equipment is still relatively expensive, and few WISPs have ventured into this still largely experimental technology. The Microsoft white space project in southern Virginia, although still underway, serves less than three hundred households and is still regarded as experimental.

12.4 DARK FIBER AND LIT FIBER

About Dark Fiber

Dark fiber is installed in conduit underground and/or hung on utility poles. It is called “dark” because no network electronics are installed to “light” the fiber (using small lasers in a fiber switch). For small municipal/local government fiber installations, dark fiber has a significant advantage in terms of management—very little ongoing operational responsibility is required.

Dark fiber is leased out to service providers, who install their own network electronics in cabinets or shelters attached to the fiber cables. The providers typically lease fiber pairs between the cabinet and their customers, and are responsible for all equipment-related management and maintenance.

Dark fiber networks do not generate large amounts of revenue, but this is offset by very low maintenance costs—primarily an emergency break-fix arrangement with a local or regional firm qualified to splice fiber. Emergency break-fix contracts are usually based on a time and materials basis, so there is little or no expense if there are no fiber breaks.

Other costs include “locates,” which are called in to Gopher State One Call (Miss Utility) and are performed by either the local Public Works department or a private sector contractor. For small fiber networks, locate costs are generally modest.

About Lit Fiber

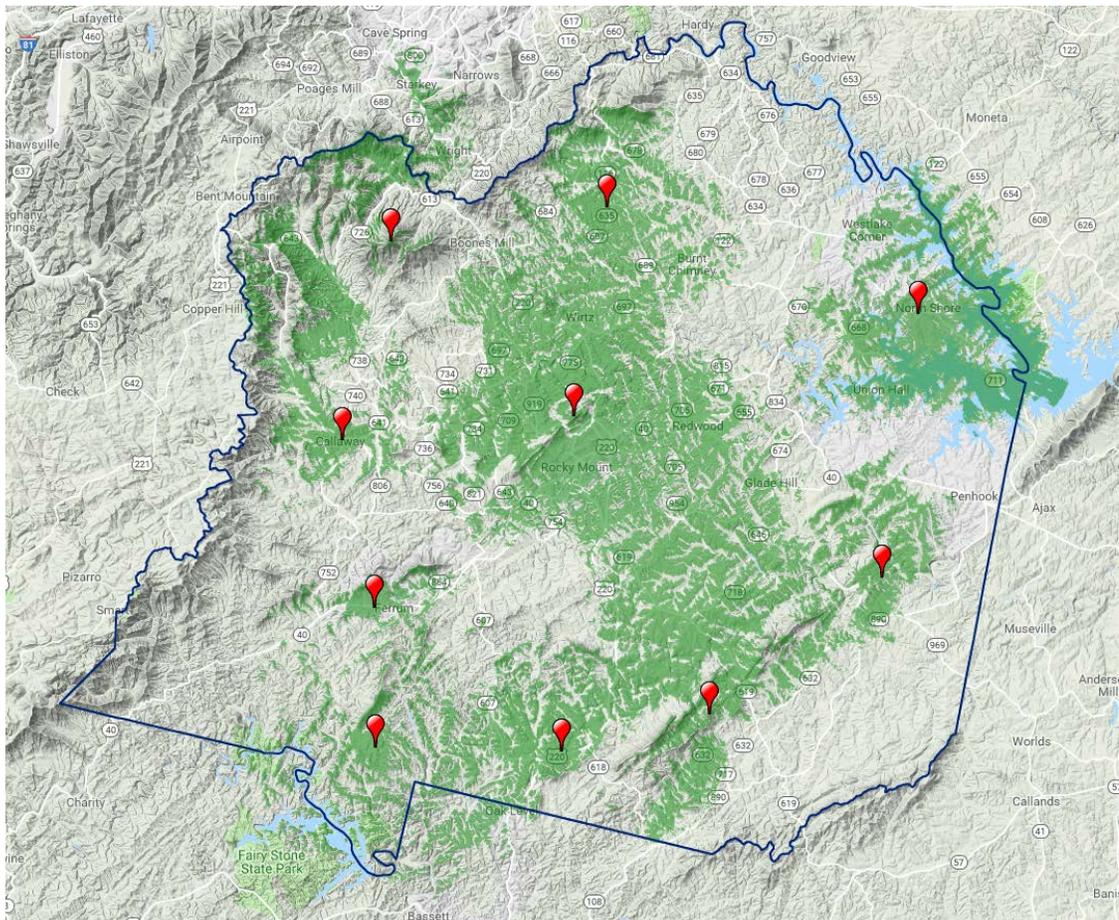
A “lit” fiber network includes the network electronics needed to transmit data over the fiber (using the small lasers in a fiber switch, hence there is light traveling over the fiber cable). In a lit network, “lit circuits” are leased out to service providers rather than fiber pairs. The muni/local government/

community network provides the network electronics, which reduces costs for the service provider –meaning they are able to pay higher lease fees for the circuits they use to deliver services (like Internet) to their customers. Lit networks generate more revenue, but also have higher expenses because the network electronics have to be monitored and managed on a 24/7/365 basis (this task can usually be outsourced at reasonable cost). However, very small fiber deployments often do not pass enough homes or businesses to generate sufficient revenue to cover the higher costs.

Like dark fiber, a lit network incurs break-fix and locate costs as well.

12.5 TERRAIN CHALLENGES

The propagation study map below illustrates the challenge of providing adequate fixed point wireless Internet service in the county. The mountainous terrain, especially in the western portions of the county, shows that even ten towers does not provide an adequate solution. A combination of taller towers (180' in this study) and shorter community poles (as many as 40 or 50) may be needed to provide good service to most areas of the county.

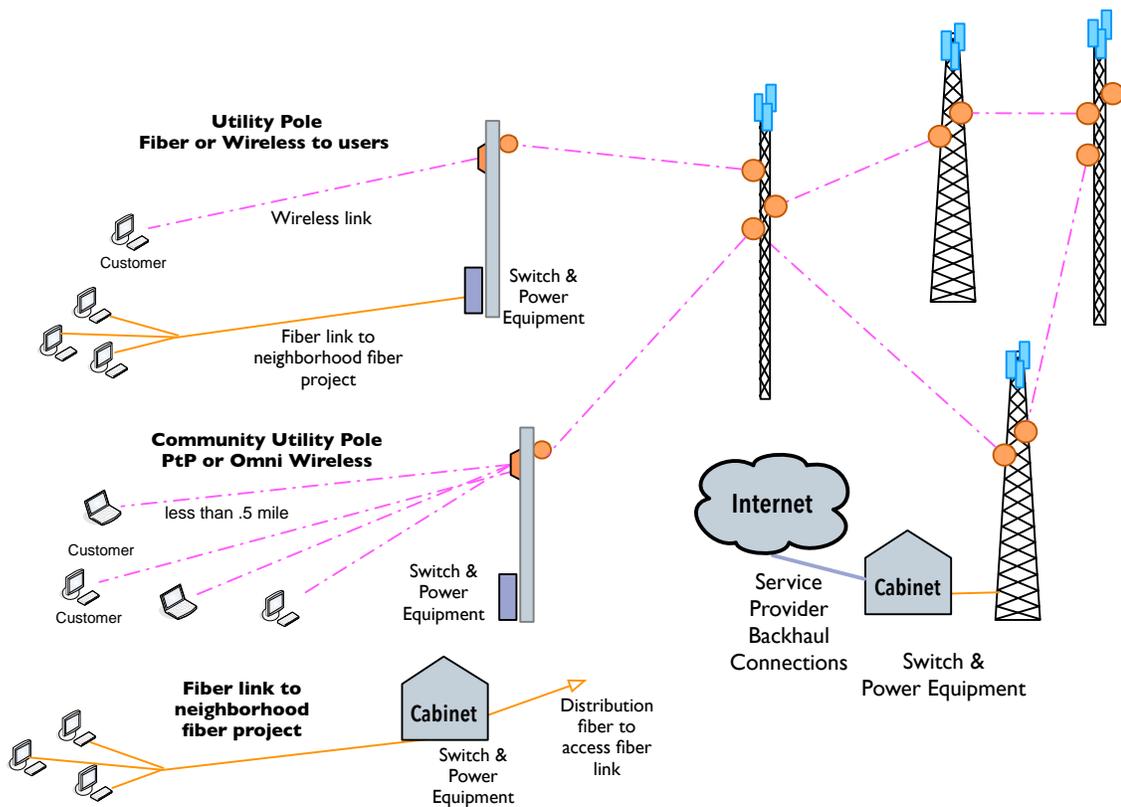


12.6 CONNECTIVITY SOLUTIONS

Both wireless and fiber networks, as well as legacy copper-based networks, all share three primary components. How these are designed and deployed can vary greatly, but all networks have these three parts in some form.

- The **Core Network** provides access to the Internet, a place for service providers (ISPs) to distribute their services locally on the network, and for larger institutional and business customers to meet service providers. The county has both landline and wireless service providers, but there are still areas that are underserved. Each of these providers has their own Core Network, but wireless broadband could be more widely available if additional county-owned towers were available to the private sector providers.
- The **Distribution** portion of the network connects the Core Network with collections of users. A Distribution network can include both fiber and wireless portions of a network.
- The **Access or Last Mile** portion of the network connects residential users and businesses to the network, and like the Distribution network, that connection will be by fiber or by a wireless link.

The illustration below shows the full range of technology options (fiber and wireless) and how they can be connected together in various ways to meet the diverse needs of the county. More detail is provided on the following pages.



Last Mile Access

The Last Mile Access is the portion of the network that connects customers to their service provider and the Internet. Both broadband wireless and fiber links can be utilized to provide service. There are several ways that customers can receive service:

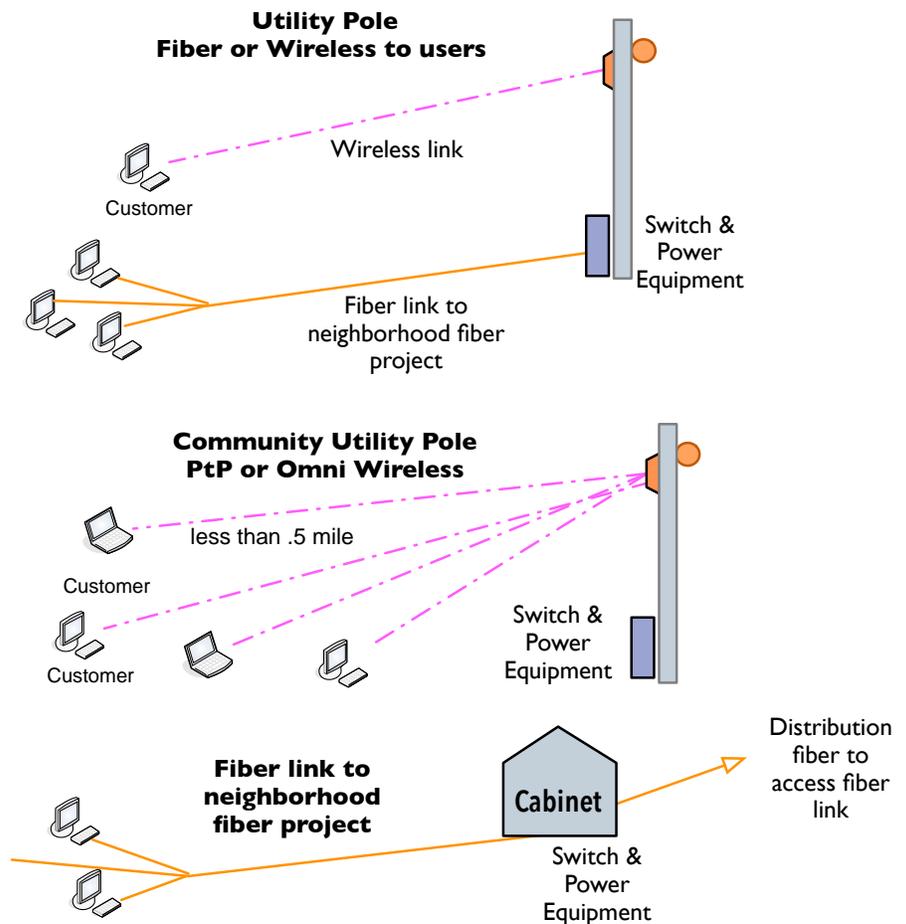
- Service providers can install their own local access radios on the Distribution towers, using both point to multi-point and point-to-point radios to deliver service to their customers.
- A single user utility pole (or inexpensive steel lattice tower) can be installed on the property of a single resident or business. A radio at the top of the pole receives service from another tower site (typically one of the Distribution towers).



- A utility pole (or inexpensive steel lattice tower) can be installed near a cluster of homes (e.g. a rural residential sub-division, several homes in close proximity on a rural road). Service providers can install their point to multi-point radios on this pole and provide economical service to several customers from a single pole.

- A utility pole (or inexpensive steel lattice tower) can be installed in a rural subdivision. A service provider installs a point to point radio on the pole, and fiber cable can be run from the pole past several homes to offer fiber service with wireless backhaul.

- Customers near existing fiber can have a fiber drop installed directly to their home or business.



Distribution Network

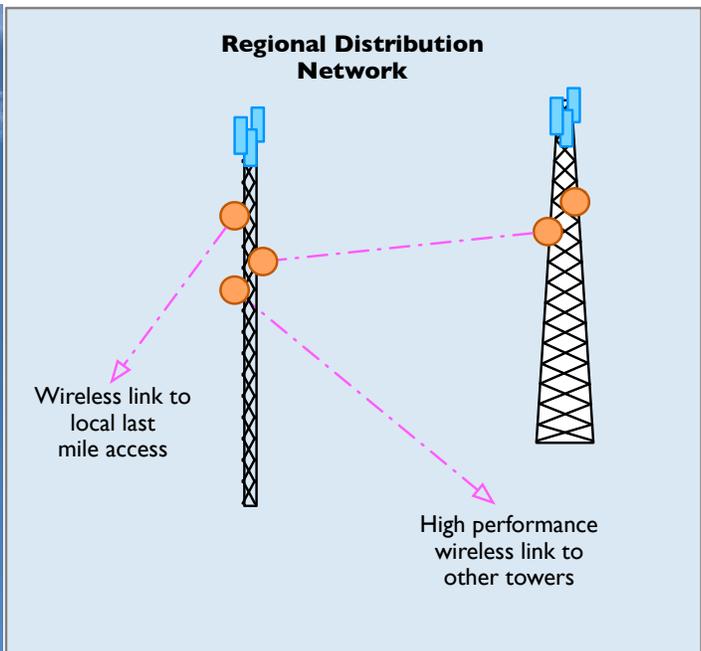
Distribution is the portion of the network between the Distribution sites to the Last Mile Access portion of the network. It is desirable for each distribution site to have a connection back to more than one Distribution site (tower) on a redundant ring. This ring topology protects against hardware failure at the port level and does provide some protection if one of the tower to tower wireless links is disabled by an equipment failure.

These tower sites are typically 120' to 180' tall to provide the height needed to enable Line Of Sight (LOS) between towers, and for local access, to enable service providers to mount point to multi-point radios on the towers.

Towers taller than 199' become subject to FAA regulations because the height can be a potential hazard to airplanes. Towers that exceed 199' usually have to be painted (alternating red/white) and have a blinking light at the top. These requirements increase the long term maintenance costs, but the taller towers can improve line of sight to other towers.

The towers can provide two functions:

- Space for backhaul connections to other towers in the county.
- Space for local access radios to provide Internet access within 2-3 miles of the tower (or farther with good Line Of Sight).



Core Network and Service Providers

In the past, the telephone company switch office (Central Office, or CO) has provided that function. Today, many communities have either a community-owned data center or a privately owned data center that offers an affordable range of options for customers of broadband services.

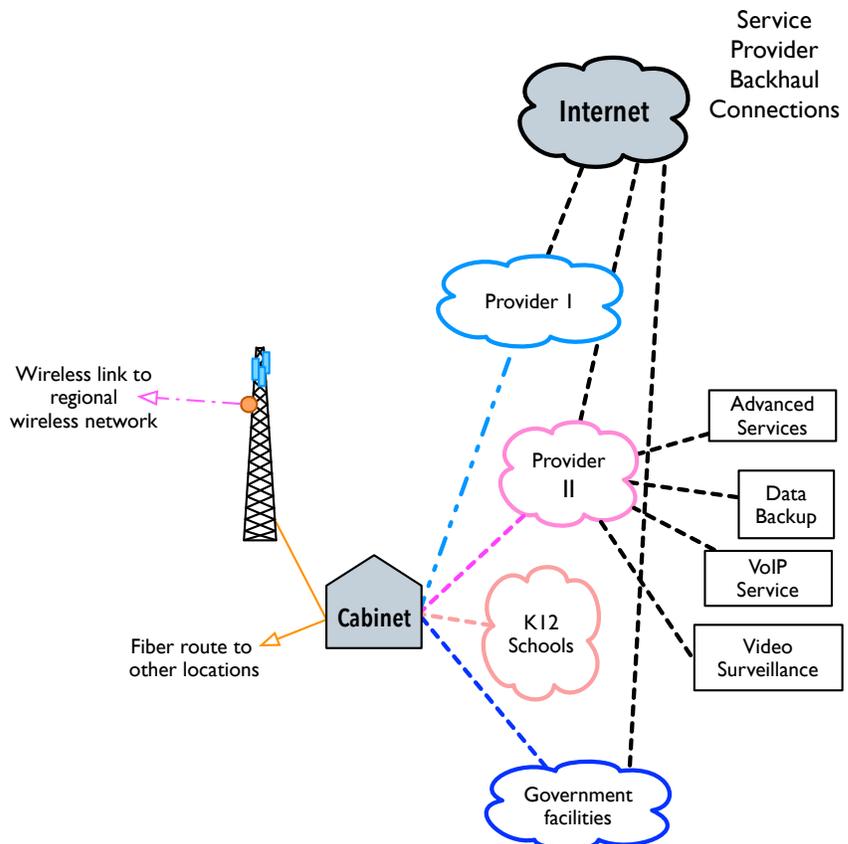
The Co-Location facility provides a meet point for various public and private fiber cables and networks to inter-connect. In the county, there are no shared peering points, and a local facility with space available for both public and private uses could help attract additional private sector investments (e.g. a long haul fiber provider builds into the county to connect to this facility because of increased access to customers).

A colocation facility is a controlled environment (i.e. secure, heated, and air-conditioned) room with Internet access through wired and/or wireless systems. The colocation facility is a place where fiber, wireless, and copper-based network facilities meet. It is equipped to house high-end network equipment, servers, and other electronic gear.

A variety of middle layer network components and services can be located within the co-lo including, for example, directory services, replicated content servers, routing services, and other elements needed to deliver new multimedia services to the home and small office from multiple, competing providers.

Characteristics of the colocation facility are:

- A reliable source of AC electric power is required, with backup UPS (Uninterruptible Power Supply) service, and additional power backup available by an onsite generator.
- Controlled access to the facility (e.g. by electronic keycard) 24 hours/day, seven days a week.
- Racks for locating network equipment and servers, and optionally locked cages for equipment racks.
- Sufficient cooling capacity for the network's current and long-term needs.



12.7 SMALL CELL BROADBAND POLES

Line of sight issues are a constant problem for rural residents and businesses, as clear line of sight (or near line of sight) is required for fixed wireless Internet services. Even newer technologies like white space and LTE systems work better with clear line of sight to distant towers.

The increased use of wooden utility poles is already common in some other areas of the country, and increased use of this technique to get the customer CPE radio/antenna above tree cover is a relatively simple solution.

Ownership and Governance

The utility poles would normally be placed on private property, subject to existing or updated ordinances governing the placement of wooden utility poles. The local government would have no responsibility for maintenance and repairs.

Cost Discussion

The cost of placing an eighty foot pole can range from a low of about \$2,000 to \$7,000 or more, depending on permitting, engineering requirements, and the location of the pole. The Virginia General Assembly recently passed legislation requiring localities to allow small wireless facilities of 50 -feet or less by-right. The County is currently working on amendments to its tower ordinances to allow more flexibility for broadband deployment.

Funding Options

Because these are placed on private land, local government would not have to provide any direct funding. However, the localities could encourage wider use of this option with a public awareness campaign developed in partnership with wireless providers. Local banks could be encouraged to provide low cost financing of the poles so that property owners could make a small interest and principal payment monthly over several years to reduce the financial impact.

Operation and Management Considerations

Local government would incur no ongoing operational or management costs.

Recommendation and Next steps

Given that this strategy requires minimal financial support from the County and that it has the potential of improving broadband access in rural areas of Franklin County quickly, the County should support "by right" permitting of wood utility poles in rural areas, including allowing a minimum of fifteen feet above existing tree cover and subject to a very limited set of restrictions (e.g. a minimum set back from public right of way).

County support for an awareness campaign developed with local wireless service providers would also be beneficial.



12.8 NANO-CELL AND WIFI CALLING SERVICE

A common complaint in the county is the poor cell service in many areas. In some parts of the county, there may be adequate broadband service via DSL or cable modem Internet, but poor cellular phone/data service. There are now two solutions to improving rural cellular service that do not involve the expense or difficulty of attracting and/or building more cellular towers.

WiFi Calling – This approach takes advantage of the WiFi Calling feature that is now common in many late model cellphones. Once the phone is connected to a WiFi network (e.g. in the home using the home’s broadband Internet service), the phone will automatically route the call over the WiFi network—phone calls and text work normally, as if the phone is connected to a cellular tower.

Nano-cell Calling – Poor or no cellular service in rural areas can be addressed by promoting the wider use of “nano-cell” devices. These small pieces of equipment are connected to the DSL or wireless broadband connection and provide improved cell service in the home or business. The working distance of these devices is limited, and service generally drops off once you leave the house itself (it may work for some short distance in the yard). These devices work very well and do not

require an upgrade to a newer phone. The cellular providers do not always promote the use of these devices, so many cellular users who would benefit from their use are not aware that this option is available. The device averages around \$200 retail, but the cellular providers often provide substantial rebates (50% discount or more) and in some cases may provide them at no charge.

If there is success in making more tower space available for WISP use, the improved wireless broadband service will also support use of WiFi calling and/or nano-cell devices.

This strategy is important because improved broadband service can also improve cellular service without the need for more cellular towers, especially in parts of the county where cellular providers have not been able to make the business case for more towers.

Cost Discussion

This strategy does not require any direct funding from the County, but the Broadband Authority should play an active role educating residents and businesses about this option. One strategy would be to prepare a simple one page overview of this option and ask local library branches to make it available.

Funding Options

No special funding required.

Operation and Management Considerations

None.

Recommendation and Next Steps

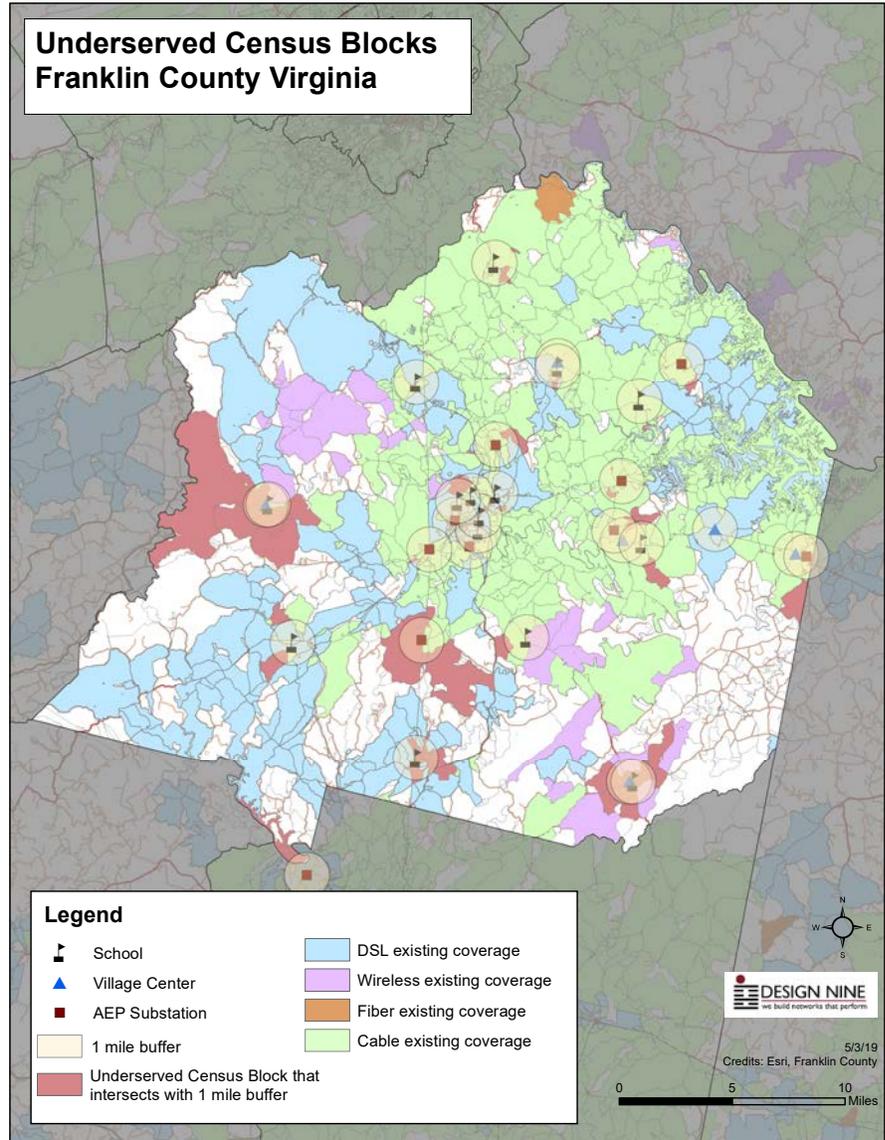
The County could promote awareness of WiFi calling and nano-cell boxes as part of a broader awareness campaign about improving broadband availability.



13 RECOMMENDATIONS FOR IMPLEMENTATION

To develop a county-wide strategy for improving broadband availability, K12 schools, sub-stations, and villages were identified. Fiber is already at all K12 school locations in the county. Sub-stations have been included because of a recent state initiative to encourage AEP and other electric providers in the Commonwealth to build open access fiber to their sub-stations. Fiber availability at sub-stations would allow both the County and/or private sector service providers to expand service in the area around the sub-stations, using the sub-station fiber to support Internet backhaul and to connect the service areas together.

Both wireless service expansion and fiber to the home (FTTH) expansion from the three types of target areas (K12 schools, villages, sub-stations) are possible. The map to the right shows the underserved census block locations in relation to the target areas.



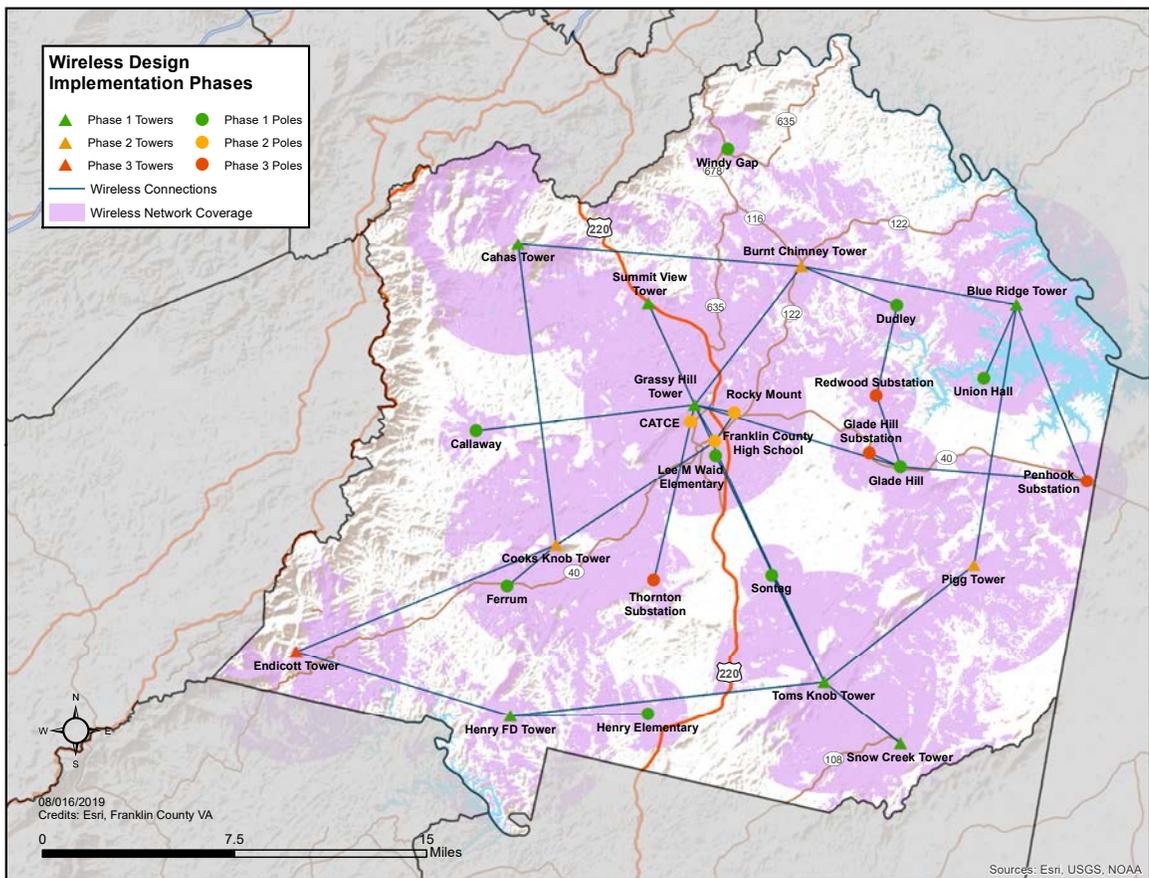
13.1 FIXED POINT WIRELESS EXPANSION

The map below shows the projected wireless broadband coverage in Franklin County, using a network of existing towers, new towers, and shorter community poles. The propagation estimate shows that approximately 65% of the county could receive coverage if clear line of sight or near line of sight is available from a particular home or business.

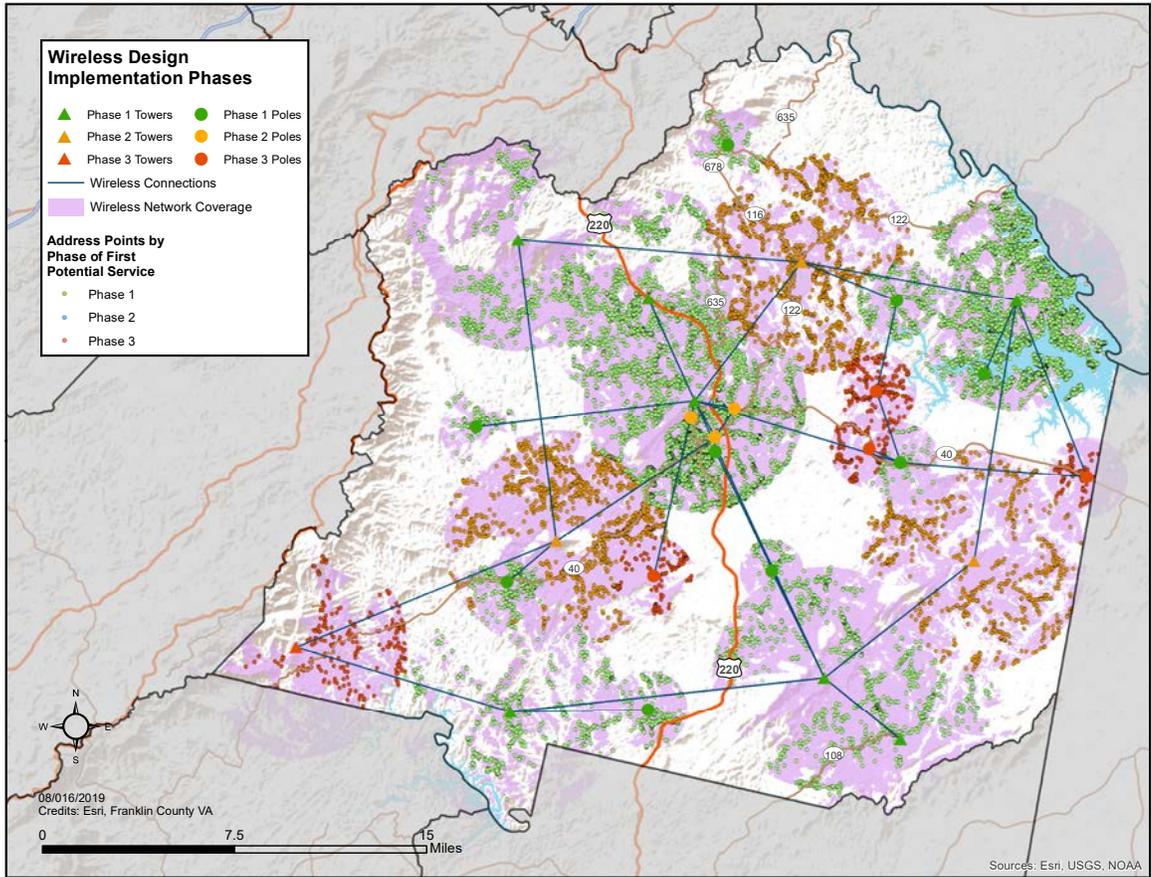
The wireless strategy could be built out in three phases, with the exact phasing of towers and poles somewhat dependent upon the availability of funding. Franklin County intends to apply for VATI funds and Tobacco Commission funds, and may also consider submitting a USDA ReConnect grant application—all of which could support completing some or all of the proposed improvements.

In the map below, the shaded areas show the estimated wireless coverage for each tower or pole. Not all community poles that are recommended in the three phase plan in this chapter are represented on this map—some locations for new tower community poles should be evaluated after Phase One improvements have been made.

Estimated coverage by fixed point wireless broadband service can vary because of trees, hills, buildings, and other obstacles that may block the line of sight or near line of sight between a customer and a tower or pole.



The map below shows the estimated address points in each propagation survey area.



Phase	Estimated Coverage of Addresses
One	14,237
Two	4,668
Three	910
Total Estimated Coverage	19,815

Phase One Wireless Improvements

PHASE	ITEM	SITE WORK	SITE COSTS	ACCESS EQUIPMENT	ACCESS EQUIPMENT COST	POINT TO POINT	PROJECT MGMT COSTS	TOTAL COST
1	Blue Ridge Group	Tower Improvements	\$26,375	Sectors, LTE	\$30,303.80	\$11,025.00	\$5,000.00	\$72,704
1	Cahas	New Tower	\$170,000	Sectors, LTE	\$30,304	\$11,025	\$14,500	\$225,829
1	Callaway Elementary	New Pole (School)	\$7,865	Omni	\$7,428.50		\$2,500.00	\$17,794
1	Dudley Elementary	New Pole (School)	\$7,865	Omni	\$7,428.50	\$5,512.50	\$2,500.00	\$23,306
1	Ferrum Elementary	New Pole (School)	\$7,865	Omni	\$7,428.50		\$2,500.00	\$17,794
1	Glade Hill Elementary	New Pole (School)	\$7,865	Omni	\$7,428.50		\$2,500.00	\$17,794
1	Grassy Hill Tower	Tower Improvements	\$26,375	Sectors, LTE	\$30,303.80	\$21,760.20	\$5,000.00	\$83,439
1	Henry Elementary	New Pole (School)	\$7,865	Omni	\$7,428.50		\$2,500.00	\$17,794
1	Henry Fire Station Tower	Tower Improvements	\$26,375	Sectors, LTE	\$30,303.80	\$5,512.50	\$5,000.00	\$67,191
1	Lee M Waid	New Pole (School)	\$7,865	Omni	\$7,428.50		\$2,500.00	\$17,794
1	Snow Creek	New Tower	\$170,000	Sectors, LTE	\$30,304	\$5,512.50	\$5,000.00	\$210,816
1	Summit View Tower	Tower Improvements	\$26,375	Sectors, LTE	\$30,304	\$5,512.50	\$5,000.00	\$67,191
1	Sontag Elementary	New Pole (School)	\$7,865	Omni	\$7,428.50		\$2,500.00	\$17,794
1	Toms Knob	Tower Improvements	\$26,375	Sectors, LTE	\$30,303.80	\$14,030.10	\$5,000.00	\$75,709
1	Union Hall	New Pole (Village)	\$7,865	Omni	\$7,428.50	\$5,512.50	\$5,000.00	\$25,806
1	Windy Gap Elementary	New Pole (School)	\$7,865	Omni	\$7,428.50		\$2,500.00	\$17,794
							Total Wireless Estimated Cost	\$976,546

Phase Two Wireless Improvements

PHASE	ITEM	SITE WORK	SITE COSTS	ACCESS EQUIPMENT	ACCESS EQUIPMENT COST	POINT TO POINT COSTS	PROJECT MANAGEMENT COSTS	TOTAL COST
2	Burnt Chimney Elementary	Water Tank Improvement	\$26,375.0	Sectors, LTE	\$30,303.80		\$5,000.00	\$61,679
2	CATCE	New Pole (School)	\$7,865.00	Omni	\$7,428.50	\$1,108.80	\$2,500.00	\$18,902
2	Cooks Knob	Tower Improvements	\$26,375	Sectors, LTE	\$30,303.80	\$11,025	\$5,000	\$72,704
2	Franklin County High	New Pole (School)	\$7,865.00	Omni	\$7,428.50		\$2,500.00	\$17,794
2	Pigg Tower	New Tower	\$170,000	Sectors, LTE	\$30,303.80	\$11,025	\$14,500	\$225,829
2	Rocky Mount Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50	\$1,108.80	\$2,500.00	\$18,902
							Total	\$415,810

In Phase 3, the partner ISP will determine the best placement for new poles, based on customer demand.

Phase Three Wireless Improvements

PHASE	ITEM	SITE WORK	SITE COSTS	ACCESS EQUIPMENT	ACCESS EQUIPMENT COST	POINT TO POINT COSTS	PROJECT MGMT COSTS	TOTAL COST
3	Blain Substation	Covered	—	—	—	—	—	—
3	Endicott	New Tower	\$170,000	Sectors, LTE	\$30,304	\$11,025	\$14,500	\$225,829
3	Franklin Substation	Covered	—	—	—	—	—	—
3	Glade Hill Substation	New Pole (Substation)	\$7,865	Omni	\$7,428.50	\$6,300.00	\$2,500.00	\$24,093.50
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	ISP Determines Loc.	New Pole	\$7,865	Omni	\$7,429	\$1,109	\$2,500	\$18,902
3	Orchard Substation	Covered	—	—	—	—	—	—
3	Penhook Substation	New Pole (Substation)	\$7,865	Omni	\$7,428.50	\$2,217.60	\$2,500.00	\$20,011.10
3	Redwood Substation	New Pole (Substation)	\$7,865	Omni	\$7,428.50	\$2,217.60	\$2,500.00	\$20,011.10
3	Tank Hill Substation	Covered	—	—	—	—	—	—
3	Thornton Substation	New Pole (Substation)	\$7,865	Omni	\$7,428.50	\$1,109	\$2,500	\$18,902
							Estimated Total	\$516,772

13.2 FIBER TO THE HOME EXPANSION

Using the K12 school and village locations, fiber to the home project costs were developed. Many of the designated villages in Franklin County overlap with K12 school locations, so a total of twelve fiber studies were developed. The map below shows the areas that set evaluated.

For each location, fiber would be extended from the school or village center to all households within a one mile radius.

Fiber Summary

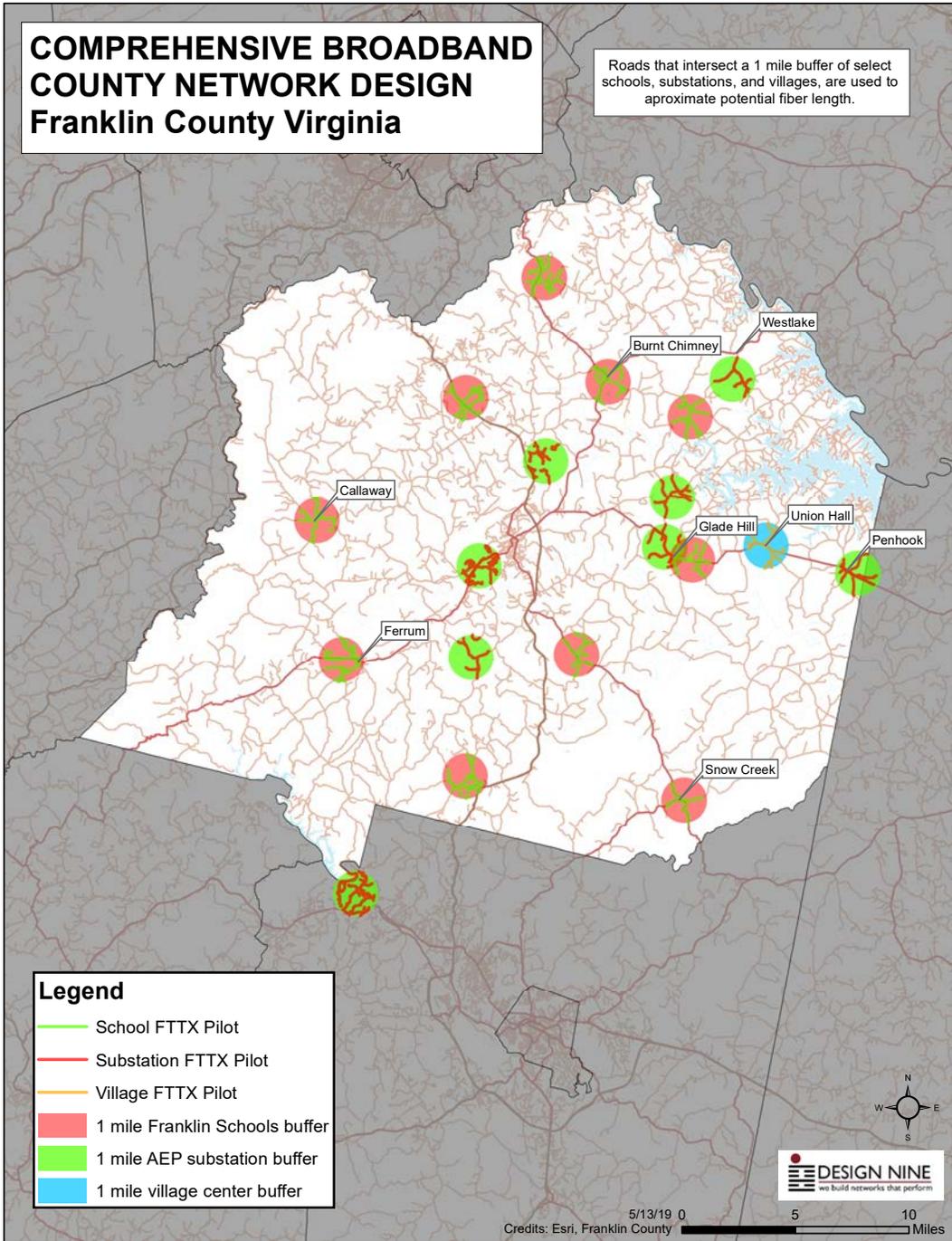
Phase	Locations	Premises Passed	Premises Connected	Estimated Cost
Phase One	Callaway, Ferrum, Burnt Chimney, Boones Mill	776	467	\$5,199,334
Phase Two	Union Hall, Henry, Dudley, Westlake	519	323	\$3,699,538
Phase Three	Sontag, Snow Creek, Glade Hill, Windy Gap	390	235	\$3,239,451
Totals		1685	1025	\$12,138,323
	<p>Notes:</p> <p>1) Fiber projects in Villages and near school facilities can be accommodated as funding becomes available. Phasing order may change based on funding.</p> <p>2) There are likely to be significant savings if several fiber projects are combined into a single build. Each fiber cost estimate was calculated with the assumption that it was a standalone effort. Budget categories that would see reductions include engineering, project management, and construction.</p>			

The table on the next page shows the summary costs for each of the twelve fiber project areas. The full estimate tables are included in the appendix of this report.

Location	Premises Passed	Premises Connected	Estimated Cost
Union Hall	91	65	\$1,009,972
Windy Gap	136	82	\$1,140,471
Ferrum	296	178	\$1,651,793
Sontag	80	48	\$733,291
Snow Creek	86	52	\$632,719
Henry	177	106	\$1,148,921
Glade Hill	101	61	\$946,001
Dudley	118	71	\$915,124
Callaway	123	74	\$927,440
Burnt Chimney	186	112	\$1,072,896
Boones Mill	158	95	\$1,334,174
Westlake	133	81	\$625,521
	1461	879	\$12,138,323

COMPREHENSIVE BROADBAND COUNTY NETWORK DESIGN Franklin County Virginia

Roads that intersect a 1 mile buffer of select schools, substations, and villages, are used to approximate potential fiber length.



Legend

- School FTTX Pilot
- Substation FTTX Pilot
- Village FTTX Pilot
- 1 mile Franklin Schools buffer
- 1 mile AEP substation buffer
- 1 mile village center buffer



5/13/19 0 5 10 Miles
Credits: Esri, Franklin County

13.3 ABOUT IMPLEMENTATION STUDIES

NOTE: The costs contained in these implementation recommendations represent the best information available, based on similar costs from other projects, from vendor price lists, and/or estimates from contractors and construction firms. These estimates are generally reliable for up to six months. Note also that the time of year that the work is bid out can have a substantial effect on the estimate. We use an average weighted value for most costs to try to compensate for this, but as an example, construction work bid out in spring or early summer may have higher costs than a project bid out in late fall or early winter.



Tower Construction

The line items for each named tower include the cost of the tower, site preparation, estimated cost of electric service, generator cost and placement, cost of the tower, and labor to assemble and erect the tower, and backbone equipment.

13.4 WIRELESS CONSTRUCTION COST FACTORS

The cost estimates are developed using the the categories below. For each category, the items, labor, and activities associated with that category are calculated, using vendor price quotes, prices for labor and materials from previous construction projects, and other sources of cost information.

Buildings, Improvements, and Prefabricated Shelters

This category includes any buildings and shelters constructed as well as improvements to the buildings such as redundant HVAC systems, power improvements, fire suppression systems, security and surveillance systems, etc.

Outside Plant Construction Materials

Network construction includes the outside plant materials needed to build the network. Items like conduit, pedestals, cabinets, hand holes, and splice enclosures are all included in network construction.

Outside Plant Construction Labor

Labor is typically included with network construction for the bidding process but is separated here to help identify money that could be saved by leveraging local labor resources. Labor includes the placement of pedestals and hand holes, the underground or aerial placement of conduit, the construction of foundations (pads) for various structures throughout the network, and more.

Several material costs such as concrete and gravel are included in labor depending on the type of job to be performed.

Network Equipment, Software, and Related Costs

Network equipment includes any network electronics that will be used in the network such as routers, switches, and CPE. Network equipment also includes some items that do not use any AC power but fall into a similar category such as patch panels, and patch cables. The equipment cost will vary widely depending on the type of architecture chosen.

Administrative and Legal

Specialized legal counsel will be required to review contracts with service providers, contractors, and other participants in the project. Legal costs can vary with a particular location and tend to go down over time. The most legal work is needed early in the first construction phase to develop business contracts with service providers, to review construction and vendor contracts, and to broker lease agreements for use of public or private property (where network equipment like cabinets or shelters have to be located).

Leases, permits, and rights of way

Some costs will be incurred based on the permitting requirements of the project. If the County is able to place the colocation facility and any cabinets in public right of way or on County properties at no charge, the cost of leases will be lower. If cabinets or shelters have to be placed on private property, the cost of the land or long term leases will increase. The cost of permits needed for crossing wetlands, streams, other sensitive areas, and VDOT permits are also included in this category. Formal leases and negotiated lease payments are more desirable than providing some form of free access to services.

Project Management

Project management for a community network build requires thorough and detailed planning, experience in procuring construction materials for the project, and the ability to oversee and convey project information to contractors through the duration of the project, including construction inspection work (ensuring construction contractors have done their job properly).

Network Design and Engineering

This work include a full design of the outside plant network, cabinet and shelter specifications, and extensive detail (blueprints) that specifies how all fiber cable, towers, buildings, and network equipment is to be installed. These documents have to be completed prior to bidding out any construction work, and are usually included as part of a construction bid package. The detail includes fiber optic cable route determination and size determination, active and passive network equipment selection and placement planning, splicing layouts and documentation, network configuration planning, and all engineering necessary to complete construction.

Network Integration and Testing

Some configuring and testing will take place after the network is built and before it is ready for use. In a dark network this involves labeling and documenting the routes of individual fiber strands, and testing of any other features of the network such as generators, air conditioners, and locks. In an active network the testing and integration includes integration requirements for a dark

fiber network plus the configuring and installation of switches, routers, and other network equipment. Work in this category requires a skilled professional who is familiar with the network architecture and the business model (e.g. open access).

Miscellaneous

This category provides a small budget for miscellaneous expenses that will arise during the course of construction (e.g., bid advertisement costs, inventory tags, etc.).

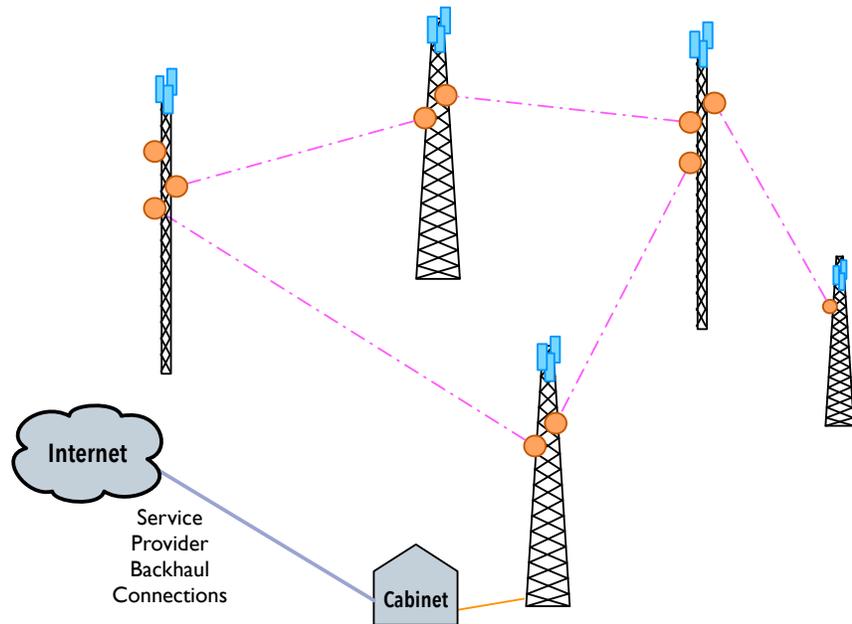
Contingencies

The Contingency category is included and calculated as a percentage of the total estimated cost (e.g., 5% of total cost) to provide flexibility in managing the overall budget. Equipment costs can and do change between the time an estimate is made and construction commences. Labor costs can vary depending upon the time of year the work starts, the state of the local economy, and the state of the national economy. Material costs and lead times can vary based on demand on certain industries, energy costs, and location.

13.5 WIRELESS TOWER COST ESTIMATES

This section of the report provides an estimate of the cost of using existing towers to provide improved Internet access. The diagram below shows the logical design of a five tower network. Four of the five towers have adequate line of sight between the towers to build a fully redundant ring between the towers, which will provide much more reliable service (that is, a single tower or equipment failure will not affect service).

Any placement of new towers should be preceded by a careful viewshed analysis (how much area/users are likely to be able to receive service). Site acquisition and site preparation costs can affect the overall cost of such a project. Existing county properties (e.g. fire/rescue stations, county parks, dump transfer sites, etc.) may be candidates for towers. Note that existing towers may require an engineering study to confirm that additional antennas can be added without exceeding the tower load limits.



13.6 TOWER SPACE ONLY COST ESTIMATE

For towers currently owned by the county, and/or State-owned towers (where permission is obtained to lease space) or other stakeholders that might be candidates for project use, modest upgrades to equipment at the base of the tower would make them "broadband-ready."

Upgrades to existing towers typically may include adding or upgrading generators, additional cabinet or shelter space for service provider equipment, and sometime fencing and physical access changes.

Note that this estimate represents a "worst case" scenario. If the site already has a generator that can be used by a new WISP co-locating on the tower, that could reduce the cost by as much as \$7,500. If no road improvements are needed and existing electric service does not require a new H-frame and meter, another savings of up to about \$3,000 is possible. If the tower has a current certification (i.e. had a formal engineering inspection), additional savings are possible, bringing the "best case" cost to about \$11,000 to \$12,000.

TOWER SITE DEVELOPMENT AND IMPROVEMENTS

ITEM/PROJECT	UNITS	UNIT COST (LOW)	UNIT COST (HIGH)	COST (AVG)
Tower Study / Survey	1	\$4,500	\$7,000	\$5,750
Site Development (Clearing, Road Improvements, etc.)	1	\$0	\$1,500	\$750
Small Telecom Cabinet AMPROD AM47P-2636-24RU OR EQUIVALENT, ALUMINUM CABINET - FRONT AND REAR DOORS- HVAC/HEAT - ADJUSTABLE RACK RAILS 19"	1	\$6,000	\$7,500	\$6,750
10kW Liquid Propane Generator	1	\$4,000	\$6,000	\$5,000
Cabinet Foundation and Installation	1	\$2,500	\$4,000	\$3,250
New Power Service / Installation ASSUMES POWER AVAILABLE ON SITE, New meter placement required to support WISP equipment	1	\$1,500	\$2,500	\$2,000
Power System Installation Labor	1	\$300	\$500	\$400
Generator Installation Labor	1	\$1,250	\$1,700	\$1,475
Propane Service Installation TANK FURNISHED / INSTALLED BY LOCAL GAS PROVIDER	1	\$750	\$1,250	\$1,000
Total:				\$26,375

13.7 POINT TO POINT BACKHAUL NETWORK

A countywide backhaul network between towers has several desirable characteristics:

- It reduces the cost to providers of being able to affordably offer service on all the towers.
- It increases the reliability and robustness of the WISP services because of the ring design (on at least four of the towers).
- County government data and/or public safety services could also be carried on the backhaul network to provide improved access to some remote facilities.
- K12 schools may be interested in having a redundant network to improve reliability of their existing fiber connections. This can be important during periods when online standardized testing is taking place.

Point to point links are estimated with consideration for the distance required, the bandwidth required, available space on the tower, and frequencies already in use on the tower. In the wireless phase cost estimates equipment is estimated according to the pricing below.

AirFiber 11FX Pair Including Licensing

Item	Units	Unit Cost	Total
AF11X Radio	2	\$799.00	\$1,598.00
AF11-CA Adapter Kit	2	\$49.00	\$98.00
AF11FX Duplexer	4	\$199.00	\$796.00
AF11 X Antenna 11GHz, 35dBi	2	\$379.00	\$758.00
FCC Licensing	1	\$2,000.00	\$2,000.00
Shipping @ 5%	1		\$262.50
TOTAL			\$5,512.50

AirFiber 24 Pair

Item	Units	Unit Cost	Total
AirFiber 24HD	2	\$3,000.00	\$6,000.00
Shipping at 5%	1		\$300.00
TOTAL			\$6,300.00

AirFiber 5XHD Pair

Item	Units	Unit Cost	Total
AF5XHD Radio	2	\$429.00	\$858.00
AirFiber X Antenna 5GHz, 23dBi Slant 45	2	\$99.00	\$198.00
Shipping at 5%	1		\$52.80
TOTAL			\$1,108.80

13.8 NEW TOWER ONLY COST ESTIMATE

New towers have a range of configurations and cost options. This estimate is for a new 180' tower with no radio equipment (that is, the cost of the bare tower). If located on existing county properties, the time needed to plan for construction can be shortened. If site acquisition or a site lease (of private property) is required, purchase or lease negotiations can add several months to the process. Note that a full permitting process may be required even if a new tower is placed on existing county-owned property. The permit process can add sixty to one hundred and twenty days to the time needed to put a new tower in service.

ITEM/PROJECT	Units	UNIT COST LOW	UNIT COST HIGH	TOTAL (AVG)
Labor and Contracting: \$82,540.00				
Site Development (Clearing, Road Improvements, etc.)	1	\$15,000.00	\$15,000.00	\$15,000.00
New Power Service / Installation	1	\$1,250.00	\$3,400.00	\$2,325.00
180' Guyed Tower Construction Labor & Contracting	1	\$50,000.00	\$74,750.00	\$62,375.00
Cabinet Installation Labor	1	\$600.00	\$1,000.00	\$800.00
Power System Installation Labor	1	\$300.00	\$575.00	\$437.50
Generator Installation Labor	1	\$1,250.00	\$1,955.00	\$1,602.50
Materials: \$34,985.00				
180' Guyed Tower Construction Materials	1	\$17,000.00	\$27,000.00	\$22,000.00
Small Telecom Cabinet	1	\$4,000.00	\$5,500.00	\$4,750.00
Cabinet Foundation and Installation Materials	1	\$1,000.00	\$1,500.00	\$1,250.00
10kW Liquid Propane Generator	1	\$4,000.00	\$6,000.00	\$5,000.00
Spare Fuses	1	\$10.00	\$20.00	\$15.00
Power System Installation Materials	1	\$20.00	\$40.00	\$30.00
Samlex 1000W Inverter	1	\$350.00	\$450.00	\$400.00
Samlex SEC1230-UL Battery Charger	1	\$200.00	\$300.00	\$250.00
100ah 12v Non Spillable Backup Battery	4	\$250.00	\$350.00	\$1,200.00
DC Voltage Monitoring Device	1	\$40.00	\$60.00	\$50.00
Unmanaged Rack Mount PDU (60)	1	\$35.00	\$45.00	\$40.00
Total:				\$117,525.00
Project Management, Network Engineering, Testing				\$23,505.00
Site Engineering, Surveying, Viewshed Analysis, Etc.				\$9,500.00
Misc Fees, Technical Services				\$7,500.00
Contingency				\$12,000.00
TOTAL (rounded):				\$170,000.00

13.9 SMALL CELL BROADBAND UTILITY POLE ACCESS COSTS

A single wooden utility pole with a wireless connection to a 180' tower and local access radios could provide access to any residence with line of sight within a half mile or more. This would spread the cost of pole construction and equipment costs across several households or businesses. There are many areas in the county where there is a cluster of homes along a relatively short stretch of road. All of those homes could share the use of a single local utility pole access site.

VI	VARIABLE	VALUE	NOTES
V2	Weight Variable	5	0-10 scale used in Best Estimate column (10 is best)
V3	Towers	1	Number of Towers
V4	Height	60	Tower Height
V5	Type	Wooden Utility Pole	Tower Type
V7	Backbone Radio System Licensed / Un-licensed	Un-licensed	
V8	Backbone Links	1	
	Site Development (Average)	1,000	

I	ITEM/PROJECT	UNITS	COST (LOW)	COST (HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE
2	Site Development (Clearing, Road Improvements, etc.)	1	- n/a -	- n/a -	- n/a -	- n/a -	\$1,000
3	3x3 NEMA Box	1	\$300.00	\$600.00	\$300.00	\$600.00	\$450
4	New Power Service / Installation	1	\$500.00	\$1,250.00	\$500.00	\$1,250.00	\$875
5	60' Wooden Utility Pole Construction Materials	1	\$2,500.00	\$3,500.00	\$2,500.00	\$3,500.00	\$3,000
6	Spare Fuses	1	\$10.00	\$20.00	\$10.00	\$20.00	\$15
7	Power System Installation Materials	1	\$20.00	\$40.00	\$20.00	\$40.00	\$30
8	Samlex 1000W Inverter	1	\$350.00	\$450.00	\$350.00	\$450.00	\$400
9	Samlex SEC1230-UL Battery Charger	1	\$200.00	\$300.00	\$200.00	\$300.00	\$250
10	100ah 12v Non Spillable Backup Battery	4	\$250.00	\$350.00	\$1,000.00	\$1,400.00	\$1,200
11	DC Voltage Monitoring Device	1	\$40.00	\$60.00	\$40.00	\$60.00	\$50
12	Unmanaged Rack Mount PDU (60)	1	\$35.00	\$45.00	\$35.00	\$45.00	\$40
13	60' Wooden Utility Pole Construction Labor & Contracting	1	\$2,000.00	\$3,000.00	\$2,000.00	\$3,000.00	\$2,500
14	Power System Installation Labor	1	\$300.00	\$500.00	\$300.00	\$500.00	\$400
15	Ubiquiti IsoBeam PTP System	2	\$200.00	\$400.00	\$400.00	\$800.00	\$600
16	Ubiquiti Access Point + 120° Sector	3	\$375.00	\$500.00	\$1,125.00	\$1,500.00	\$1,313
17	Total:				\$8,780.00	\$13,465.00	\$12,122.50

This estimate below includes just the cost of placing the pole and providing electric service to the pole. The WISP leasing the pole would be responsible for providing access radios for local access and for a point to point radio link backhaul connection to another tower (to supply the local Internet service).

1	ITEM/PROJECT	UNITS	COST (LOW)	COST (HIGH)	BEST ESTIMATE
2	Site Development (Clearing, Road Improvements, etc.)	1	0	2000	\$1,000
3	3x3 NEMA Box	1	\$300.00	\$600.00	\$450
4	New Power Service / Installation	1	\$500.00	\$1,250.00	\$875
5	60' Wooden Utility Pole Construction Materials	1	\$2,500.00	\$3,500.00	\$3,000
6	Unmanaged Rack Mount PDU (60)	1	\$35.00	\$45.00	\$40
7	60' Wooden Utility Pole Construction Labor & Contracting	1	\$2,000.00	\$3,000.00	\$2,500
8	Total:				\$7,865.00

14 BROADBAND EDUCATION STRATEGIES

Businesses and residents in Franklin County have shared widespread frustration with the current levels of broadband service, especially in the rural areas of the county. The Broadband Authority will have to simultaneously keep all audience segments well-informed with regular updates, but also manage expectations. The Authority is not responsible for a traditional “sales” approach to marketing Internet—that is the job of ISPs and WISPs, but rather the focus must be on “awareness marketing.” That is, ensuring that all of the residents, businesses, and various stakeholders and interested parties in the county have enough information to feel like they know what is happening and when, but also understand that this is a problem that has developed over decades, and will take several years to solve.

14.1 RECOMMENDATIONS FOR AN EDUCATION CAMPAIGN

A successful education and awareness plan for the county does not have to be expensive or time consuming. The attributes that need attention are:

- Consistent – Use a single, easy recognized logo, tag line, and message consistently across all platforms—paper, Web, social media, and email.
- Ongoing – Regular updates and news postings on the Authority portion of the County Web site and a complementary Facebook page will keep residents, businesses, and local officials up to date and well-informed about broadband development activities.
- Interesting Content – Posted news items should emphasize quality over quantity. One interesting broadband article per week is better than three marginally interesting articles per week.
- Well-defined Distribution – Distribution of news items should be well understood—as an example, most news items should be posted on the Facebook page.
- Well-defined Goals – The Committee should develop a short list of short term and long term goals that can be described concisely (e.g. one sentence each). Goals should be included as needed and as appropriate on the Web site, on the Facebook page, and on paper media. The goals should also be highlighted in presentations, interviews, and in public meetings.

DISTRIBUTION

Social Media – A dedicated Facebook page is an important part of the education and awareness strategy. Regular posting of news items will keep residents and businesses engaged and seeing those items in their news feeds. Occasional use of “boosted” posts is extremely effective in reaching a wider audience. Boosted posts should be reserved for significant and timely news about the project itself.

Instagram and Twitter can be used occasionally for high profile news announcements.

Perhaps the most important feature of Facebook is the interactivity that is possible between the Broadband Authority and Facebook users. Residents and businesses can “like” and share the

page, but they can also post questions. The Facebook page should be visited regularly by a member of Authority who will review activity, write responses to questions, and pass interesting or important comments on to other Authority members.

Traditional Media – Local newspapers and local radio stations can be a valuable resource for getting news about the work of the Broadband Authority to the wider community, especially for news about work completed (e.g. new WISP coming to the area, new tower completed, etc.).

Web Site – The Authority should consider having an expanded presence on the County Web site. At a minimum, as new infrastructure and service provider agreements are in place, these accomplishments should be described and permanently available via the Web page(s).

Mailing Lists – It will be useful to have one or more “invite only” mailing lists to keep key stakeholders and interested parties informed.

Media Partners – The main Web page on the County Web site and the Facebook page should be linked prominently on partner Web sites (e.g. Chamber of Commerce site, economic development Web pages, etc.).

14.2 MARKETING MATERIALS

The Authority needs only a small amount of printed/PDF materials for distribution. These might include a one page **overview** of the project, **vision and project goals**, and **efforts currently underway**. These materials can be distributed to County Supervisors, placed in libraries, or emailed (as a PDF) to people asking for more information.

Regular posting of news items related to broadband generally and postings related specifically to local broadband efforts can be cross-posted to reach a wider audience. The same news item can be posted to the Facebook page and the Web site.

15 ECONOMIC DEVELOPMENT STRATEGIES

15.1 JOB AND WORKFORCE CHALLENGES

In most areas of the county, residents and businesses currently have, at best, the FCC 10 Megabits down/1 Megabit up bandwidth. This slow speed service is impacting economic and community development:

- It limits resident's ability to work from home.
- It limits the ability of the county to retain existing businesses and to attract new businesses and jobs.,

In Franklin County, the real issue as it relates to broadband speeds is the future of work. In eastern Kentucky's rural Jackson and Owsley counties, the People's Rural Telephone Coop has deployed high speed fiber service and the improved infrastructure brought more than 800 new work from home jobs to the two counties. Franklin residents will not have the opportunity to pursue the kinds of jobs that are now available without better and more affordable access to broadband.

A recent study in 95 counties in Tennessee found that improved access to high speed broadband can significantly reduce unemployment rates, especially in rural counties (Broadband Communities, March 2019).

The FCC has defined the next broadband tier (fully served) to be 25 Megabits down/3 Megabits up. The problem with the 25/3 definition is that the upload speed (3 Megabits) is not always going to be adequate to support work from home, especially where home-based workers need to connect to a corporate VPN (Virtual Private Network). Work from home and business from home activities should have, at a minimum, 10 Megabits download and 10 Megabits upload speeds. Higher speed service could include service levels like 25 Megabits down/10 Megabits up. The critical requirement is an upload speed that supports work from home.

If the goal is to enhance business access to broadband, there can be no upper limit on the definition of broadband. Saying that broadband (as an example) is 5 Megabits/second of bandwidth or 10 Megabits/second is to tell the residents and businesses in the county that there will be limits on their work and job opportunities.

Broadband is a community and economic development issue, not a technology issue. The essential question is not, "What system should we buy?" or "Is wireless better or cheaper than fiber?" Instead, the question is:

"What do businesses of Franklin County need to be able to compete globally over the next thirty years?"

In short, the county today has "little broadband" in the form of DSL, very limited wireless, expensive satellite Internet, and very limited cable modem service, along with a very limited amount of "big broadband" in the form of fiber to a few businesses and institutions.

If the County and the Authority make investments in broadband and telecommunications infrastructure, it is absolutely critical that those investments are able to scale gracefully to meet business and economic development needs for decades.

Two key concepts that should drive community investments in telecom are:

"Broadband" is not the Internet

Bandwidth is not a fixed number

Broadband and “the Internet” are often used interchangeably, but this has led to much confusion. Broadband refers to a delivery system, while “the Internet” is just one of many services that can be carried on a broadband network. The challenge for the County and the Authority is to ensure that businesses and homes have a broadband network with sufficient bandwidth to deliver all the services that will be needed and expected within the next three to four years, including but not limited to “the Internet.”

The economic impact on Franklin county can include the following effects:

- Difficulty retaining some existing businesses - As business bandwidth needs continue to increase over the next several years (see Section 8.4), some businesses may need to move out of the area to ensure that they have the right bandwidth to support their business operations.
- Difficulty attracting new businesses - New businesses interested in some of the advantages available in the county (e.g. low cost of living, good recreational opportunities, good workforce ethic, etc.) may be deterred by the cost and limited bandwidth available, and therefore choose other areas to locate.
- Difficulty keeping younger workers and families in the county - Younger workers and families tend to be heavy users of Internet services, and real estate agents are reporting that younger house buyers are reluctant to live in areas with poor Internet service.
- Reductions in real estate value - Homes with poor Internet service are more difficult to sell, leading to reduced prices and then impacting county property taxes negatively.

15.2 BUSINESS BANDWIDTH NEEDS

The table below shows bandwidth consumption for several types of businesses and a projection of the bandwidth needed 5 and 10 years out. The cost of fuel is already affecting business travel decisions, and more and more businesses will invest in HD quality business videoconference systems to reduce the need for travel. These HD systems require substantial bandwidth; a two way HD video conference requires 20-25 Megabits during the conference, and a three way conference requires 30-35 Megabits during the conference. As more workers try to reduce the cost of driving to and from work by working from home, the business location must provide network access (Virtual Private Network, or VPN) to the employees working from home. These home-based workers will make extensive use of videoconferencing to attend routine office meetings remotely and to enhance communications with co-workers, including videoconferences with other home-based workers in the company. A VPN network providing remote access to just two or three home-based employees could require 50 Megabits of bandwidth during normal work hours.

	Large Business		Small Business		Home Based Worker		Business From Home	
Description	A larger business with about 50 workstations.		A small business with 10 to 15 employees, and 7-10 workstations.		A single employee working at home for his/her company.		A home business with one or two employees working at home.	
	Concurrent Use	Mbps	Concurrent Use	Mbps	Concurrent Use	Mbps	Concurrent Use	Mbps
Telephone	20	1.28	5	0.32	1	0.064	1	0.064
TV		0		0		0		0
HDTV		0		0		0		0
Credit Card Validation	4	4	1	1		0		0
Security System	1	0.25	1	0.25	1	0.25	1	0.25
Internet	20	30	7	10.5	1	1.5	1	1.5
VPN Connection	5	25		0	1	5		0
Data Backup	5	7.5	1	1.5	1	1.5	1	1.5
Web Hosting	1	2		0		0		0
Workforce Training (online classes)	2	20	1	10	0	0	1	10
HD Videoconferencing	10	100	2	20	1	10	1	10
Telecommuting workers	5	15	2	6	0	0	0	0
Totals		205.0		49.6		18.3		23.3
5 years from now (Megabits)	615		149		55		70	
10 years from now (Megabits)	1845		446		165		210	

16 PARTNERSHIPS AND FUNDING STRATEGIES

16.1 PARTNERSHIP OPPORTUNITIES

The Broadband Authority work will, by necessity, have to include both public and private partners. Among some public and private entities, the common synergies are:

- The need for more bandwidth,
- The need for more affordable bandwidth, and
- The need for more affordable bandwidth to be more widely available.

Potential project partners include:

County government

Franklin County is already a strong supporter of the Broadband Authority, and has been providing staff support, grant application support, and related services.

Public Safety

The Sheriffs departments, fire, and rescue departments all need better access to broadband and improved wireless voice/data communications. Throughout the United States, public safety voice and data communications systems are being upgraded, often at staggering cost. Many of the upgrades include new towers to eliminate “holes” in the served area where first responder, fire, and rescue radios do not work. Combining public safety needs with community broadband needs can bring new sources of funding and cut costs, sometimes dramatically. Elected officials may need to take the lead in this area to ensure that public safety officials work collaboratively with the broadband efforts.

As additional towers and community pole sites are deployed in the county, first responders will benefit from lower Internet costs. Sharing tower space (WISP access and first responder voice/data) is extremely efficient, and all tower improvement and tower construction activities should be coordinated closely. There are some grants and funding sources available for public safety infrastructure like towers that may be available to help support new tower development.

County public safety officials participate regularly in Broadband Authority meetings and are strong supporters of sharing tower space to improve broadband access.

K12 Schools

Franklin County schools have adequate broadband service at existing school locations. But K12 students often lack adequate Internet service at home, and some schools are careful not to assign homework that requires Internet access. Parents consistently report on the burden of having to drive children to a public library or some other WiFi hotspot to get Internet access for school work. Every school in the county should configure a WiFi hotspot outside the building and make it available after school hours, when classroom instruction would be impacted. It would be possible to make this access controlled, so that students would have to a userid/password to use it. The Authority should work with the schools to apply for education grant funds to achieve this goal, and to keep K12 parents informed about broadband activities.

ISPs and WISPs

Internet Service Providers (ISPs) and Wireless Internet Service Providers (WISPs) are important partners, as they will be the companies leasing tower space and/or conduit/fiber infrastructure.

County and Authority telecom investments will be a public/private enterprise, and service providers are the primary customers of the infrastructure. Service providers cannot be taken for granted. Instead, a fair fee structure, high quality infrastructure, excellent maintenance and operations (where needed), and flexibility on business agreements and pricing will be required to recruit and retain service providers.

See the chapter later in this report (*Tower and Service Provider Management*) for more information on how to work with providers. For providers that express interest in using community infrastructure, it will be important to meet with them on a regular basis. These companies may also be partners on grant applications, where it may be required to show that the infrastructure being constructed has a service provider already committed to using it.

Area Businesses

Businesses in the county and the local Chamber of Commerce chapters have an important role to play as advocates for the the work of the Authority. At both the county and state level, businesses that need more affordable and better broadband should ensure that elected officials understand the urgency. The Authority, as part of its marketing program, should ensure that local businesses are kept up to date with work activities, grants, and other efforts (e.g. attend CoC meetings at least quarterly to report on the work of the Broadband Authority).

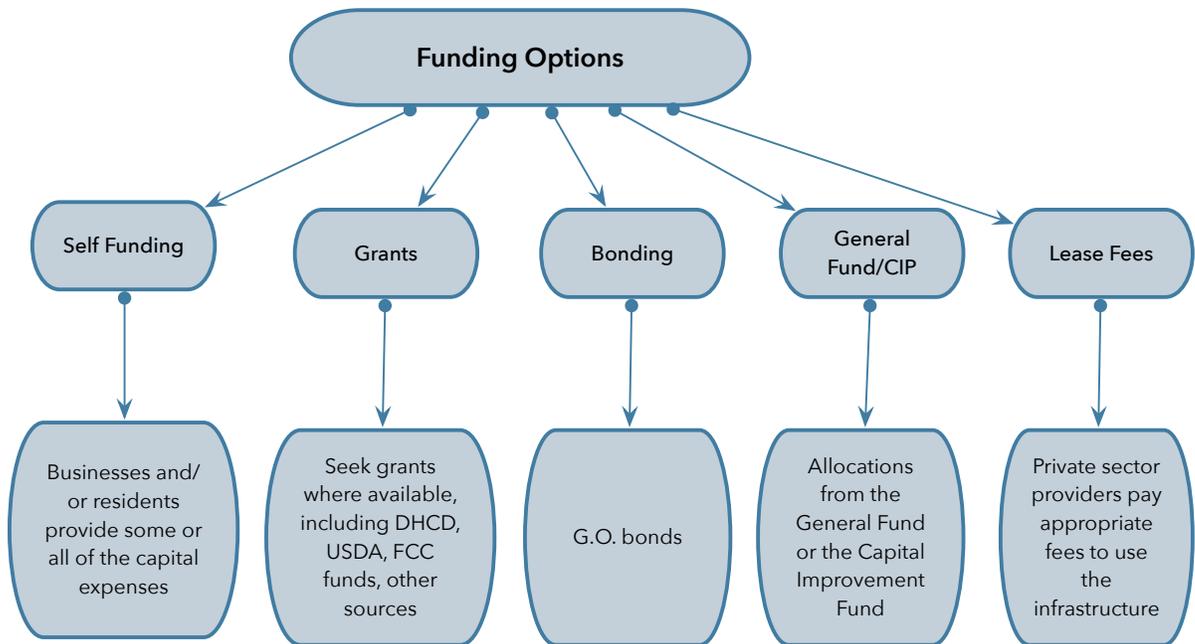
Electric Utilities

Electric utilities are natural partners in any municipal broadband venture. Electric utilities own utility poles, bucket trucks, and the equipment needed to install aerial fiber. Chattanooga's fiber to the premises (FTTx) initiative has enabled millions in savings for the city-owned electric service. When power outages occurs from events like ice storms or tree damage, the utility is able to use the fiber network to very accurately pinpoint where the outage occurs, enabling a more rapid repair of the electric network at less cost.

The Broadband Authority should meet from time to time with AEP to assess their interest in Authority projects, especially if the Authority and the electric utility could collaborate on fiber to electric service substations.

16.2 FUNDING STRATEGIES

It is important to note that any County investment in broadband infrastructure is likely to be passive infrastructure. These assets will have a conservative life span of thirty years or more (e.g. wireless towers, conduit, fiber cable). These types of infrastructure investments create hard assets that have tangible value and can then be leveraged for additional borrowing. The demand for services and the associated fees paid for those services will provide the revenue that will pay back loans over time. There is ample time to recoup not only the initial capital investment, but also to receive regular income from the infrastructure.



The financing of community-owned telecommunications infrastructure faces several challenges with respect to funding.

- Not all local governments are willing to commit to making loan guarantees from other funding sources like property taxes, because the idea of community-owned telecom infrastructure has a limited track record and therefore a higher perceived risk.
- Similarly, citizens are not always willing to commit to the possibility of higher taxes that may be needed to support a telecom infrastructure initiative, for many of the same reasons that local governments are still reluctant to make such commitments: perceived risk and a lack of history for such projects.
- Finally, banks and investors are also more skeptical of community telecom projects because of the relative newness of the phenomenon. By comparison, there are decades of data on the financial performance of water and sewer systems, so the perceived risk is lower.

Somewhat paradoxically, the cost of such a community digital road system is lower when there is a day one commitment to build to any residence or business that requests service. This maximizes the potential marketplace of buyers and attracts more sellers to offer services because of the larger potential market. This is so because:

- Service providers are reluctant to make a commitment to offer services on a network without knowing the total size of the market. A larger market, even if it takes several years to develop, is more attractive.
- Funding agencies and investors that may provide loans and grants to a community network project want to know how the funds will be repaid and/or that grants will contribute to a financially sustainable project. Knowing that the size of the customer base is the maximum possible for a service area helps reduce the perceived risk for providing loans and grants.

Community Reinvestment Act

The Community Reinvestment Act (CRA) was developed forty years ago to encourage banks and savings institutions to help meet the credit needs of their local communities, with a focus on low and moderate income areas of those communities. The Federal agencies that oversee private banks assign a CRA rating to each institution. Banks are often looking for well-planned community efforts that need loans. Such loans can improve a bank's CRA rating.

The CRA was revised in 2016 to encourage banks to support community broadband efforts. A community broadband project may be able to get some loan financing from a local bank that wants to get credit for their CRA work.

HUD Community Development Block Grants

The U.S. Housing and Urban Development CDBG State Program allows the Virginia state government to award grants to smaller units of general local government (e.g. counties, towns) that develop and preserve decent affordable housing, to provide services to the most vulnerable in our communities, and to create and retain jobs. In recent years, CDBG funds have been successfully used for broadband infrastructure development where the local government applicant can show the improvements meet the general guidelines of the program—so grant funds have to spent in low and moderate income areas.

Over a 1, 2, or 3-year period, as selected by the grantee, not less than 70 percent of CDBG funds must be used for activities that benefit low- and moderate-income persons. In addition, each activity must meet one of the following national objectives for the program: benefit low- and moderate-income persons, prevention or elimination of slums or blight, or address community development needs having a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community for which other funding is not available. More information is available here (https://www.hud.gov/program_offices/comm_planning/communitydevelopment/programs).

Virginia Telecom Initiative (VATI)

The Virginia Telecommunication Initiative (VATI) fund is to provide financial assistance to supplement construction costs by private sector broadband service providers to extend service to areas that presently are **unserved** (i.e. less than 10 Meg down/1 Meg up) by any broadband provider. The Department of Housing and Community Development (DHCD) manages the appropriation to eligible applicants to provide Last-Mile services to Unserved areas of the State. The VATI program has a target that unserved areas of the Commonwealth have access to broadband speeds of at least 10 Mbps download and 3 Mbps upload. Projects proposing higher speeds in the most cost efficient manner will receive funding priority.

The Virginia legislature has allocated \$18M for 2020, significantly more than in previous years. DHCD has not yet released guidelines for the 2020 funds, but applications will most likely be due very early in 2020. Franklin County has submitted a 2019 request with BRISNET for \$465,000, with a \$269,451 match amount.

USDA ReConnect Program

The ReConnect program is a new funding program managed by the USDA Rural Development Office. This program is sometimes called the USDA e-Connectivity pilot program. Grant applications can be a combination of 100% grant, 50% grant/50% loan, or 100% loan. \$600

million has been allocated to the program, and a wide variety of entities can apply, including non-profits, coops, and state and local governments. Successful applications will require a very credible business plan that shows the project can be financially sustainable. Up to \$25 million is available for a 100% grant application. The application deadline for 2019 has passed, but a second round of funding will be available for 2020. USDA ReConnect grants require extensive preparation time to gather data needed for the application. Planning for submission should start at least four months in advance of the deadline. More information is available here: (reconnect.usda.gov). A mapping tool is available on the Web site to show areas that are eligible. To qualify as an eligible area, households must have less than a minimum of 10 Meg down/1 Meg up broadband service.

911 Fees

Improved broadband access in the county can improve household access to 911 services by using broadband Internet to carry 911 voice calls, using one or more strategies to include:

WiFi calling – now a commonly available feature on new cell phones. WiFi calling switches voice telephone call from the cellular network to a nearby WiFi Internet network seamlessly. The reduces the need for additional large cell towers in low density areas of the county.

Nano-cell Devices – Nano-cells are a small box attached to a home wireless router. The nano-cell, which is typically obtained from the cellular provider, enables a cellphone to operate inside the home or business even if there is no cell tower near by.

A modest increase in the 911 fee to improve 911 access in Franklin County could generate funds to support additional broadband towers and community poles. State level legislation would be required to change the 911 fees, so this is a longer term strategy.

Bonding

Revenue bonds are repaid based on the expectation of receiving revenue from the network, and do not obligate the local government or taxpayers if financial targets are not met. In that respect, they are different from general obligation bonds. Many kinds of regional projects (water, sewer, solid waste, etc.) are routinely financed with revenue bonds. We believe many community projects will eventually finance a significant portion of the effort with revenue bonds, but at the present time, the limited financing history of most community-owned broadband networks has limited using revenue bonds.

Selling revenue bonds for a start up municipal network can be more challenging because there is no financial or management history for the venture. Bond investors typically prefer to see two or three years of revenue and expenses and a track record of management success. It would be advisable for the County to have an early conversation with qualified municipal bond counsel to assess the viability of this approach.

Obtaining funding using revenue bonds requires an excellent municipal credit rating and an investment quality financial plan for the operation and management of the network. Revenue bonds must be used carefully, and a well-designed financial model is required to show investors that sufficient cash flow exists to pay back the loans.

General obligation bonds are routinely used by local governments to finance municipal projects of all kinds. G.O. bonds are guaranteed by the good faith and credit of the local government, and are not tied to revenue generated by the project being funded (i.e. revenue bonds). G.O. bonds

obligate the issuing government and the taxpayers directly, and in some cases could lead to increased local taxes to cover the interest and principal payments. Some bond underwriters have indicated a willingness to include telecom funds as part of a larger bond initiative for other kinds of government infrastructure (e.g. adding \$1 million in telecom funds to a \$10 million bond initiative for other improvements).

In discussions with bond underwriters, it has been suggested that it would be easier to obtain bond funds for telecom if the telecom bonding amount was rolled into a larger water or sewer bond, or some other type of bond request that are more familiar to the bond market.

CAF 2 Funds

The second round of the FCC Connect America Fund (CAF2) continues to provide funds to incumbent and competitive service providers. The funds must be used in unserved or underserved areas as defined by Federal census blocks. To be eligible, a census block could not have been served with voice and broadband of at least 10/1 Mbps (based on Form 477 data) by an unsubsidized competitor or price cap carrier.

The FCC published the final eligible census blocks for the auction on February 6, 2018. The final areas were based on FCC Form 477 data as of December 31, 2016 (the most recent publicly available FCC Form 477 data at the time). So there is a time lag between the determination of a qualifying census block or blocks and the schedule for submitting a bid to serve those areas.

Because many CAF2 qualifying areas are only served by low performance DSL (e.g. less than 10/1 Mbps service), incumbent carriers use the awards to upgrade DSL switches, which is not a long term solution. More recently, competitive carriers are applying for CAF2 funds to provide higher performance broadband wireless and in some cases fiber to the home. Because the use of CAF2 funds are so restricted, it has not had as much impact as many hoped.

A local (e.g. community) broadband entity could apply for CAF2 funds, but the application must include, at a minimum, two years of experience offering broadband service and one year of audited financials. This underscores the importance of getting some service in place to support a longer term goal of applying for CAF2 funds.

Qualified Opportunity Fund Investments

The 2018 Federal tax changes included a little known item called the Investing in Opportunity Act. Opportunity Zones, designated by each state, are eligible for investments that have very attractive tax benefits. The tax advantages include avoidance of most local, state, and Federal taxes, and the ability to have those investments grow and compound tax-free. The intent of the law is to funnel private sector capital gains into low growth and no growth areas of the U.S. by offering substantial tax benefits.

While Opportunity Zones are most likely to attract real estate investments, it should be possible to create Opportunity Zone projects that include telecom infrastructure improvements. As an example, a manufacturing plant investment is made in an Opportunity Zone, along with broadband fiber improvements needed by the plant to support operations.

Opportunity Zones are defined by census tract, and the Census Bureau's Geocoder online tool can provide census tract ID numbers. A link to the list of currently qualified census tracts can be found on this page (<https://www.cdfifund.gov/Pages/Opportunity-Zones.aspx>).

Coop Membership Fees

If the Authority deemed it useful to create an independent broadband cooperative, coop members would pay a one time membership fee to join the coop. For fiber and wireless improvements, this fee could be set at a level that pays for part or all of the cost of building the fiber to the business or residential premises and/or placing the towers and equipment to deliver wireless service. It may also be possible to work with local banks to provide a financing option (e.g. the membership fee could be paid monthly over a period of several years to reduce the financial burden on a household or business).

The coop membership fee offers the area a way to self-finance a substantial portion of the initial network, as well as providing a long term framework for expansion. Coop membership fees can be collected in advance of providing service.

Lease Fees

Initiatives like tower access and access to local government-owned conduit and fiber can create long term revenue streams from lease fees paid by service providers using that infrastructure. The City of Danville has recovered their entire initial capital investment from lease fees paid by providers on the nDanville fiber network.

Special Assessment/Service District

Communities like Bozeman, Montana and Leverett, Massachusetts have been funding broadband infrastructure improvements with special assessments (in Leverett, \$600/year for five years), and in Bozeman, TIF (Tax Increment Funding) is being used in some areas to add telecom conduit, handholes, and dark fiber. In some localities, it is possible to levy a special assessment in a service district designated for a particular utility (like broadband) or other kind of public service.

Charlemont, Massachusetts intends to add an \$11/month assessment to every household to build a town-owned Gigabit fiber network that will pass every household in the community. A town-wide vote supported this funding approach. Put in perspective, the average cost of a large, single topping pizza in the U.S. is currently \$9 to \$12.

A small city in Utah is currently evaluating the potential of a \$7-\$10 utility tax levied on every household and business to finance a full fiber to the premises build out, including a modest “free” Internet service that would be adequate for email and light Web use. Most households will probably choose to select a higher performance Internet package from a private provider on the network.

The table below shows the kind of funds that could be generated over several time periods. If ten dollars per month were collected from each household for thirty years, it would easily finance the

Franklin County Special Assessment (all 18,963 households)		
Monthly Assessment Amount	Twenty Year Assessment	Thirty Year Assessment
\$1	\$4,551,120	\$6,826,680
\$2	\$9,102,240	\$13,653,360

Franklin County Special Assessment (all 18,963 households)				
Monthly Assessment Amount	Twenty Year Assessment		Thirty Year Assessment	
\$5	\$22,755,600		\$34,133,400	
\$10	\$45,511,200		\$68,266,800	
Individual Service District Examples				
Monthly Assessment Amount	Fifty Homes Five Year Assessment	Fifty Homes Ten Year Assessment	100 Homes Five Year Assessment	100 Homes Ten Year Assessment
\$5	\$15,000	\$30,000	\$30,000	\$60,000
\$10	\$30,000	\$60,000	\$60,000	\$120,000
\$25	\$75,000	\$150,000	\$150,000	\$300,000
\$50	\$150,000	\$300,000	\$300,000	\$600,000

immediate build out of Gigabit fiber that would pass nearly all homes and businesses in each county. A less amount (e.g. \$2/month over twenty years) would easily finance the immediate build out of a comprehensive wide area wireless tower network in Franklin County, as well as some fiber infrastructure.

Property Tax Increase

While raising taxes can be politically very difficult, a very small incremental increase in property taxes, with the increase clearly earmarked specifically designated for broadband development (.e.g. one-quarter cent) might be possible to sell to citizens and businesses. The table below is adjusted to reflect the cost of borrowing over the listed periods of time.

	Assessed property value	Broadband increment	Annual Broadband Fund	Ten Year Aggregate	Twenty Year Aggregate	Thirty Year Aggregate
1/4 of one cent	\$6,679,915,940	\$0.0025	\$150,298	\$1,502,981	\$3,005,962	\$4,508,943
1/2 of one cent	\$6,679,915,940	\$0.0050	\$300,596	\$3,005,962	\$6,011,924	\$9,017,887
1 cent	\$6,679,915,940	\$0.0100	\$601,192	\$6,011,924	\$12,023,849	\$18,035,773

Connection Fees

Tap fees, pass by fees, and connection fees are already commonly used by local governments for utilities like water and sewer. The revenue share model can be strengthened from additional

sources of revenue, including one time pass by fees, connection fees and sweat equity contributions. It is important to note that the Coop Membership Fee can be treated as a connection fee in whole or in part.

Pass By Fees - Pass by fees could be assessed once the fiber passes by the property, just as some communities assess a pass by fee when municipal water or sewer is placed in the road or street- and the fee is assessed whether or not the premise is connected, on the basis that the value of the property has been increased when municipal water or sewer service passes by. At least one study has indicated that properties with fiber connections have a higher value by \$5,000 to \$7,000 that similar properties without fiber access.

One Time Connection Fees - A one time connection fee can be assessed to property owners (e.g. residents and businesses) when the fiber drop from the street to the premise is installed. This is similar to the kinds of connection fees that are typically charged when a property is connected to a municipal water or sewer system. The fee is used to offset the cost of the fiber drop and the Customer Premise Equipment (CPE) needed to provide the operational access to the network. The connection fee can be modest (e.g. \$100) or it can be a larger percentage of the actual cost of the connection. Fiber CPE may range from \$250 to \$350 and a fiber drop may cost from \$200 for a premise very close to the distribution fiber passing along the property to \$1,000 or more if the premise is hundreds of feet from the road. One variant would be to charge a minimum connection fee for up to some distance from the road (e.g. \$100 for up to 75' and \$2 for each additional foot).

There is already some data that indicates that residential property values increase by as much as \$5,000 to \$7,000 if fiber broadband services are available, so pass by fees can be justified on the basis of increased property values accruing to the property owner. Given the novelty of this approach, pass by fees may need more time to become an accepted finance approach, but tap fees (for installing the fiber cable from the street or pedestal to the side of the home or business) may be easier to use, especially for businesses that may need improved broadband access. Tap fees have the potential of reducing the take rate in the early phases of deployment, but as the value of the network becomes established, it is likely that there will be much less resistance to paying a connection fee.

Grants

Grant funding should be viewed as part of a larger basket of funding. Federal funds from sources like the USDA and the FCC are highly competitive and often come with substantial limitations on who can qualify and how the funds can be used. CDBG funds can support telecom infrastructure construction but must be tied to job creation and/or job retention.

New Markets Tax Credit

New markets tax credits are a form of private sector financing supported by tax credits supplied by the Federal government. The New Markets Tax Credit (NMTTC) Program permits taxpayers to receive a credit against Federal income taxes for making qualified equity investments in designated Community Development Entities (CDEs). The CDEs apply to the Federal government for an allotment of tax credits, which can then be used by private investors who supply funds for qualifying community projects. Substantially all of the qualified equity investment must in turn be used by the CDE to provide investments in low-income communities.

The credit provided to the investor totals 39 percent of the cost of the investment and is claimed over a seven-year credit allowance period. In each of the first three years, the investor receives a credit equal to five percent of the total amount paid for the stock or capital interest at the time of purchase. For the final four years, the value of the credit is six percent annually. Investors may not redeem their investments in CDEs prior to the conclusion of the seven-year period.

Throughout the life of the NMTC Program, the Fund is authorized to allocate to CDEs the authority to issue to their investors up to the aggregate amount of \$19.5 billion in equity as to which NMTCs can be claimed.

These tax credits can be quite useful, and there may be some areas that qualify. However, it can take up to a year or more to apply and then finally receive NMTC-related cash. This can be a useful long term source of funds.

17 ORGANIZATION AND NETWORK OPERATIONS

With more than a dozen years of operation for a variety of community-owned network infrastructure projects around the country, there is very little “experimentation” that is still necessary. With more than three hundred communities making investments in broadband infrastructure, there is now enough information about what works and what does not work to be able to identify best practice across nearly all areas of operations, planning, management, and finance.

It is now relatively easy to identify the obstacles, challenges, and opportunities that the County is likely to face if it moves forward.

17.1 WISP TOWER LEASE MANAGEMENT

Once existing and/or new towers have space available to lease to WISPs, there are policy and contract decisions that must be evaluated.

- There should be a single public fee schedule for all providers.
- There should be a single tower space agreement that is used for all providers.
- Tower access should be made available in ten foot vertical segments, as high as possible on the tower without interfering with other uses (e.g. public safety antennas). Note that it is unlikely that any tower will have more than two providers on it.
- Leases should be a minimum of two years and should auto-renew if the ISP is meeting performance requirements.
- It may be more effective to have a single lease agreement with access to all towers, and the contract should require the ISP to put equipment on all towers within a certain period of time (e.g. nine to twelve months). This limits ISPs from “cherry picking” towers with more potential customers and ignoring towers in parts of the county with lower population density.
- Monthly tower lease fees should be on the order of \$200 to \$250 per tower. Higher fees make it difficult for providers to make a business case for the cost of equipment and the extensive marketing required to develop a customer base around a tower.
- If there are two vertical spaces available for lease, the lower segment could be made more attractive to a WISP by offering a reduced lease fee.
- An initial grace period of three to six month should be offered on fees, and/or offer a one year sliding scale of fees (e.g. first three months, fee waived; months four to six, 25% of normal fee; months seven to nine, 50% of normal fee; months ten to twelve, 75% of normal fee). There are many ways to structure the initial fee period, but it is important to recognize that the WISPs incur substantial early costs to develop revenue and customers for a new tower.

- All tower leases should expire on the same date even if started at different times. This allows the regional enterprise to potentially make a smoother transition to a new provider if there are performance issues, and will give the regional entity more leverage and control over the WISPs.
- In contracts, fee reductions should be worded as discounts that can be revoked if performance requirements are not adequately being met.
- There are considerations for ground-space (e.g. WISP cabinets, shelters, H-frames for electric service) that will have to be evaluated at each tower site. If new shelters will be allowed, the regional entity should set minimum standards for new shelters.

Tower Space Revenue Estimate

Tower revenue opportunities are limited. It takes WISPs many months to acquire enough customers on a new tower to break even, and even longer to begin to show a profit. Fees for tower space need to be modest to attract one or two providers, and it is good practice to offer several months of free service while the WISP markets in the new service area and tries to sign up customers.

Because of interference problems, two providers are the most that are desirable on a tower, and offering towers on an exclusive basis (e.g. an open auction for tower space) could bring in more revenue from a single provider.

Sample Tower Leasing Revenue Projection

Service Item	Description	Monthly Fee	Max Number of WISPs per Tower	Projected Annual Revenue
Tower Space on One Tower	10 feet of vertical space leased to one ISP	\$200	1	\$2,400
Tower Space on Three Towers	10 feet of vertical space leased to one ISP	\$200	1	\$7,200
Tower Space for Six Towers	10 feet of vertical space leased to one ISP	\$200	1	\$14,400

Tower Space Operational Expenses

Assumptions include:

- Each provider on a tower will install their own electric service (meter) and pay their own utility costs.
- Site leases on private land can be negotiated for \$1000/year with a single up-front payment of \$10,000 (for ten years).

If several towers are available (e.g. three, four), there will be some efficiencies gained in costs so that revenue would likely exceed expenses—costs like legal services and insurance will not increase proportionally with more than one tower.

Tower Lease Annual Expense Projections

Budget Item	Description	Annual
Legal Services	Legal counsel on an as-needed basis for review of construction and service contracts, IRU agreements, and other business documents.	\$1,500
Accounting	Part time accounting and bookkeeping services will be required	\$2,400
Generator Maintenance/ Fuel	Generators require periodic maintenance and occasional fuel (propane) tank refills.	\$950
Site Maintenance	Routine tasks like trimming weeds and grass around the tower.	\$600
Site Leases	Some towers may be placed on private property which would require annual site leases. This will vary depending on the availability of local government properties that may be available for tower placement.	\$1,000
Insurance	Some insurance is likely to be needed (general liability, unemployment, asset insurance, umbrella policy).	\$2,500
Total Costs	Projected annual expenses	\$8,950

17.2 OPERATING A DARK FIBER NETWORK

As the network is completed and customers are connected, the project must have resources in place to maintain and repair the dark fiber and conduit if damage occurs (break-fix repair). A plan for the maintenance of the network will need to be developed.

- Outside Plant Maintenance - The project will be responsible for maintaining the conduit and both the lit and dark fiber that is installed in the conduit. These responsibilities will include utility locates, routine maintenance of conduit/fiber (relatively rare), and emergency break-fix (also rare, but requires immediate response).

Passive equipment is equipment that is not addressable on the network (that is, no network electronics), but still plays an important role.

- Fiber patch cables

- FTU - A Fiber Termination Unit is the enclosure mounted to a customer premise where fiber is terminated. ("Wall Box").
- Closures, Splice Cases, or FOSCs are the enclosures in a handhole that protect the splicing from distribution fiber to drop fiber.
- Patch panels (connector types). In a dark fiber installation of the kind planned for the business park in Rocky Mount, a patch panel would be installed in cabinet. Providers would cross-connect their fiber to the Authority fiber via the patch panel.



- Hand holes and vaults - These are part of the fiber network.
- Cabinets, Shelters - Installed as needed to meet the requirements of the dark fiber design. In most cases, a ground-mounted cabinet will be adequate.
- Equipment Racks - The project may wish to offer rack space for provider equipment. A project patch panel will be used to cross connect leased fibers as needed. All patch cable installs and cross-connections will be performed by project staff.

The conduit (and dark fiber, if included) network will require some limited routine maintenance and some unscheduled maintenance. Routine maintenance could include physical inspection of facilities and equipment, and repairs required by normal wear and tear and weather. Unscheduled maintenance could include repairs due to ice and wind damage, vandalism, or other accidental damage (car/truck accidents, snowplow damage, backhoe and other kinds of damage to underground facilities).

Locates

- The budget allocation for locate services must be part of the network's Operations and Maintenance budget. Note that with the purchase of some relatively inexpensive equipment, locates could be done by project staff at significant cost savings.
- The Network will have a membership in the Virginia 811 (Miss Utility) locate service.
- The Network should maintain a list of qualified locate contractors and engage at least one to perform regular locate services for the network. Optionally, project staff can perform locates at significantly less cost with nominal training.

Fiber Strand Management

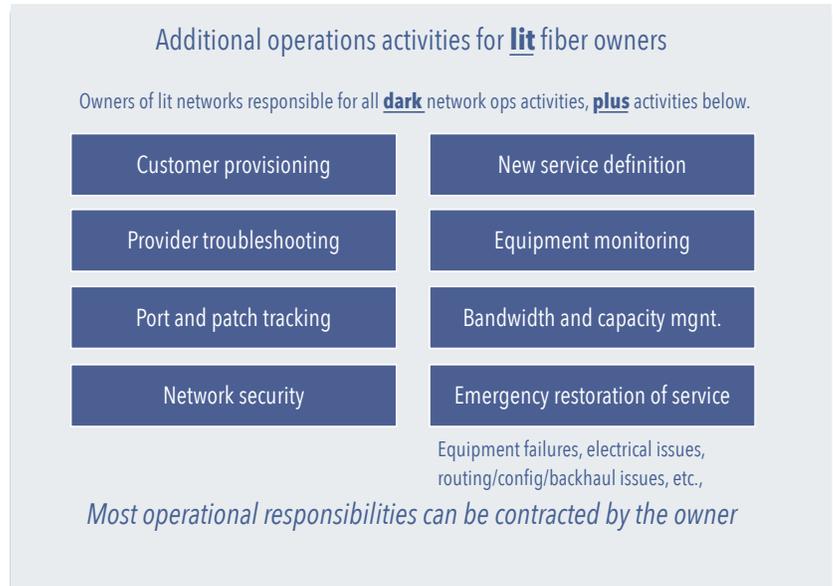
- Project staff will maintain GIS mapping and documentation of assets for the network.

- If dark fiber has been placed in the conduit network, project staff will track all fiber splices in an appropriate tracking database.
- Project staff can manage break/fix services and procedures with appropriate training and the purchase of a fiber splicing machine.

17.3 OPERATING A LIT FIBER NETWORK

A lit fiber network requires a series of ongoing daily, weekly, and monthly activities. While no lit network is currently under consideration in Franklin County, these activities will not be onerous and can largely be handled on a part time basis.

- Provisioning – When a new customer is connected, a circuit has to be allocated for that customer. Switch configurations have to be updated.
- Troubleshooting – Occasional faults and problems occur, and the source of the issue must be identified and then corrected.



- Port tracking – As customers and services are assigned, the ports and patch panel assignments have to be recorded and tracked.
- Network security – Network switches and services have to be kept up to date with current software patches and security software.
- Service definitions – As customers request new services, these have to be added to the network switches and core network management server.
- Monitoring – Customers expect the network to be available and operational at all times. Automated monitoring alerts and alarms have to be in place to alert network staff of problems. Some one has to be designated to respond to these alerts (i.e. a network problem) around the clock–24/7/365.
- Bandwidth management – Internet backhaul is purchased in increments, and this has to be monitored to ensure that adequate bandwidth is available to customers.
- Emergency restoration – Radios on towers fail due to the harsh environmental conditions: ice, wind, snow, rain, heat, insects, rodents, and birds. Aerial fiber can be damaged by tree limbs, ice, and rodents. Underground

fiber can be damaged by unauthorized digging. A plan has to be in place to address equipment and network failures.

Equipment inventory

- Periodic audits of the network inventory will be especially important during network expansions.

Spares management

- The project will need to store spare equipment, and OSP construction materials in a secure location.
- Non-tagged network inventory such as connectors, patch cables, clamps, and consumables should be included in the spare inventory.

17.4 NETWORK EXPANSION

If the conduit/fiber network is expanded over time, there will be a period of time when some construction is underway. During a network expansion phase, parts and materials have to be ordered, delivered and stored until put into operation. Shipments have to be reconciled with orders prior to payment. The project will construct new conduit segments through the management of contracts with outside firms and contractors.

Construction and Contractor Management Activities

- Build new conduit and install dark fiber as needed.
- Inventory and track all significant equipment, parts, and equipment.
- Reconcile shipped items with shipping tickets and purchase orders.
- Maintain and repair existing fiber facilities as needed.
- Ensure all procurement meets local and state procurement rules.

17.5 TYPICAL CONTRACT SERVICES

Contract services may be used or required as needed, with some services starting prior to service provider or lessee use of the network. For many work roles and responsibilities, this approach helps manage cash flow and will help match revenue and expenses better.

- Project management – Expansion of the network may require the use of a firm to manage the construction process (or the project provides this work).
- Conduit network design and strategy – The project may make occasional use of a network planning firm to help develop expansion routes, assist with pricing strategy, help with service provider negotiation, and other related tasks.
- Conduit network build out – The project, as it expands the network, will typically use a qualified construction firm and/or locally trained and qualified workers to perform the construction.
- Legal services – An attorney will assist as needed with lease agreements and IRU contracts.

- Bookkeeping and accounting – Part time bookkeeping and accounting services will be entirely adequate.
- Marketing services – The project may make occasional use of a local ad agency or marketing firm for assistance with marketing materials (e.g. logo design, Web design, brochure design, etc.).

17.6 OTHER MANAGEMENT ROLES

A wide range of high level activities will take place regularly. Some of the items on this list also appear in other sections of this document, but are listed here to provide a high level overview of key business and management related activities.

Activities

- Provide continuity of leadership and project management.
- Provide monthly reports to grant agencies and other stakeholders and funding sources.
- Meet as needed with interested parties and stakeholders (e.g Chamber of Commerce, Merchants Association, etc.).
- Monitor network performance and assist with customer dispute resolution.
- Manage leases, right of way agreements, and other real estate-related activities.
- Manage contract and work activities of outside plant repair and maintenance contractor.
- Meet with local groups as needed to promote use of the network.
- Represent the project at state level meetings and hearings.
- Meet with visitors and interested parties from other cities and regions.

The project will have the primary responsibility for ensuring that management and administration of the enterprise is handled appropriately.

17.7 ASSET MANAGEMENT

A primary role of the project will be to manage assets owned directly. These assets will include conduit, fiber, cabinets, network electronics, easements, and right of way use. Additionally, these assets have to be managed and tracked during the construction and build out process prior to being put into operation.

The asset management will consist of two primary areas of responsibility:

- Legal contracts, ranging from simple documents of a page or two for property easements, pole attachment rights, or tower access for an antenna to more complex legal documents that might cover twenty or thirty year leases of significant assets. These longer documents will have payment schedules and fee calculations. Legal counsel and review will be required for many if not most of these documents, at least for the first time they are written. Some documents will become “standard” contracts that will likely not require review for each lease unless significant changes are needed.

- Management of hard assets, which will include fiber cable, conduit, and handholes, and other fiber-related materials.

Activities

- Procure and manage leases for access to public right of way, private property
- Select, purchase, and track location and value of passive infrastructure, including fiber, duct, cabinets, and other facilities.

The project will need the help of an attorney to assist with creating leases and other legal documents related to asset management. The network may need additional assistance from qualified legal counsel for occasional review of legal documents. The network will have to maintain a complete inventory of all physical items and real property.

A network inventory management process, which could be as simple as a set of spreadsheets or modest database, with an accompanying process to ensure that data is entered and updated in a timely manner. For all major pieces of equipment (i.e. purchases of more than \$100, typically), data like vendor, model number, serial number, date put in service, and service notes will need to be maintained.

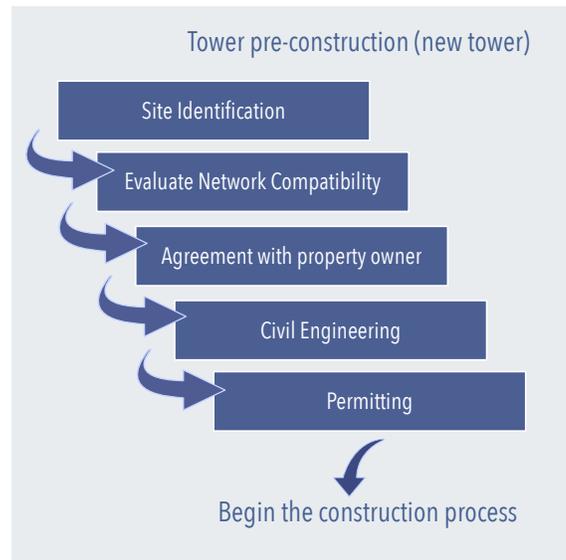
Note that asset management is extremely important, especially fiber strand management. We know of at least one small project that did not maintain adequate strand in-use records and had to install additional fiber cable at significant cost.

17.8 TOWER SITE AND TOWER MANAGEMENT

Tower Site Identification

When a site for a new tower is being considered for use, the diagram below illustrates the steps that need to be followed. For example, if an existing public safety tower or an existing cellular provider tower may have space for fixed point wireless broadband equipment (i.e. co-location).

- Site identification – Identify areas of poor service and look for existing towers.
- Network Compatibility – Line of sight to other towers and to key service locations and customers needs to be evaluated. A wireless propagation study and line of sight study will provide the data needed to make this determination.
- Property owner negotiation – A lease has to be negotiated with the property owner. Local government sites (e.g. K12 schools, parks, recreation areas, fire/rescue stations) are candidates for towers because of reduced or no lease fees.

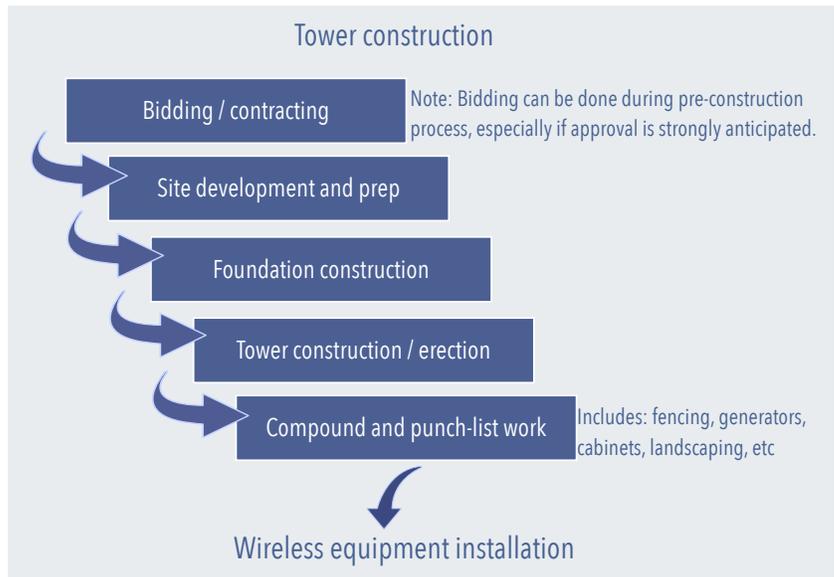


- Engineering – An engineered site plan will be required to as part of the permitting process.
- Leases and permits – A permit to place the tower is required in most localities, and there may be a multi-stage permitting process that can take several months.

Tower Construction

Once the engineering work is completed and a construction permit has been issued, tower construction can proceed. For a typical fixed point wireless tower of 199' feet or less, construction usually takes less than a month, but weather and soil conditions can create delays.

- Bidding and contracting – Bid documents and construction specifications have to be prepared and sent to candidate contractors. Once bids are received, proposals have to be reviewed, and depending upon funding sources, may require review by local government and/or a funding agency prior to awarding a contract.
- Site development – The tower site has to be cleared of trees, brush, and any other obstructions. The area directly around the tower has to be leveled, and electric service (underground or aerial) has be brought to the site. Depending upon the location a road (usually gravel) may have to be placed.
- Foundation construction – Once site clearing and any road work is completed, the foundation for the tower is installed. If it is a guyed tower, guy wire anchors have to be installed.
- Tower construction – Once the foundation is in place, the tower is erected. For towers of 199' or less, this is usually only two days.
- Final work details – Once the tower is in place, final work items are completed, including fencing, generators, fuel tanks, landscaping, and any site restoration work.

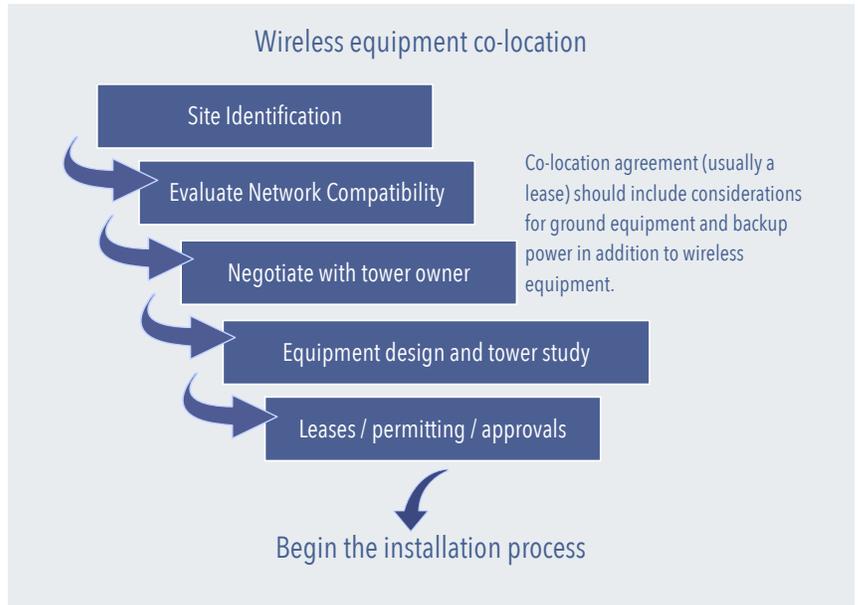


Wireless Equipment Co-Location

When an existing tower is being considered for use, the diagram below illustrates the steps that need to be followed. For example, if an existing public safety tower or an existing cellular provider tower may have space for fixed point wireless broadband equipment (i.e. co-location).

- Site identification – Identify areas of poor service and look for existing towers.

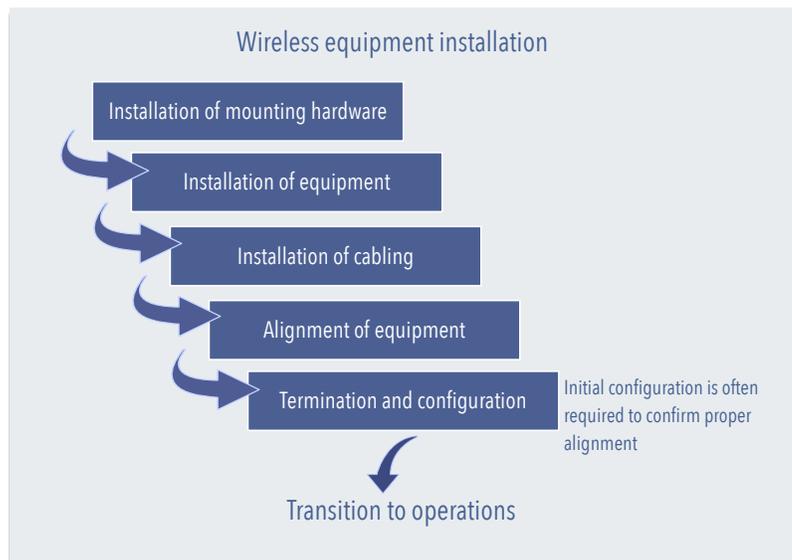
- Network Compatibility – If there are towers in the service area, the first step is to determine if a minimum of ten vertical feet of space is available at an appropriate height for broadband wireless equipment. A wireless propagation study will provide the data needed to make this determination.
- Tower owner negotiation – If the tower is in a suitable location and if space is available at an appropriate height, a lease has to be negotiated with the tower owner.
- Tower study – An engineering study may be required to determine if the tower is able to support the additional weight and wind load of the equipment. Additional electric service and a cabinet for network electronics may also be needed.
- Leases and permits – If new electric service and/or a cabinet or shelter has to be installed at the site, local government permits and/or construction approvals may be required.



Wireless Equipment Installation

Wireless equipment installation follows the completion of construction on a new tower or the acquisition of space on an existing tower. Electric power is already in place.

- Mounting hardware – Brackets and other mounting hardware have to be attached to the tower at the designated height. This requires a tower climb conducted by a firm with trained tower climbers.
- Equipment installation – Once the mounting hardware is in place, radios are attached to the tower. On the ground, network equipment including



switches, power supplies, battery backup, and other equipment is installed. A backup generator and fuel tank may also be installed and wired into the equipment cabinet or shelter.

- Cabling installation – Cables are connected between the equipment in the cabinet on the ground to the radios on the tower.
- Alignment of radios – Radios on the tower have to be adjusted. Local access radios that provide service to local customers with line of sight to the tower have to be aligned for optimum coverage. If there are also point to point radios on the tower for connections to other towers or locations, these also have to be aligned. Tower climbers are needed to perform these steps.
- Configuration and testing – Once the physical alignment of the radios is complete and all cabling is connected, the new network equipment is integrated into the rest of the network.

17.9 LEGAL AND REGULATORY

Investments in community telecom infrastructure require attention to local, state, and Federal regulatory issues. The management of telecom infrastructure is a business enterprise that requires a variety of legal contracts, service agreements, maintenance and work agreements, procurement and performance contracts, and corporate legal documents of various kinds.

- Identification of state and Federal laws that may affect operations.
- Development of service provider master agreements and service agreement addendums.
- Leases for easements and rights of way.
- Review of work contracts for consultants, contractors, and engineering firms.
- Review of maintenance and operations agreements.

The project will require the services of an attorney with some demonstrable experience with community telecom agreements. Many attorneys are not familiar with community-owned open access networks, and some time and effort should be made to carefully qualify an attorney or firm prior to hiring them.

18 OBSTACLES, CHALLENGES, AND SUCCESSES

18.1 OBSTACLES AND CHALLENGES

Market Size

Market size is a key consideration for evaluating risk. Market size (called “addressable market,” or the number of potential customers) determines the level of interest of service providers, who are the primary customers of an open network. Certain kinds of services are essential to the financial viability of a community network, especially TV and telephone services. While telephone services can be offered affordably in even very small markets, the overhead costs of establishing a local or remote TV head end (equipment that manages and distributes the channels available from a provider) is still relatively expensive compared to providing other services like Internet access. A rule of thumb for evaluating market size is that a minimum of four to five thousand potential residential customers (households) are needed to attract an IP TV provider. Note that fiber is required for adequate TV package offerings.

The county represents a business opportunity for service providers who can make a business case for providing advanced services beyond Internet access, TV, and telephone: home health care, home security monitoring, computer backups, pay per view/video on demand, and other high margin services are going to become increasingly common. Alternatives to existing cable and satellite TV offerings will not become available until fiber connections are more widely available.

Take Rate

Take rate refers to the number of customers that actually subscribe to one or more services. Take rate targets are established in a detailed financial projection, and are adjusted over time as actual take rate data becomes available once the network is in operation. If the take rate is too low, revenues will not meet goals, and lowered revenues may affect the project’s ability to pay its bills and maintain and operate the network.

Take rate projections are a significant risk factor in any project of any size, and must be considered carefully. Take rate risk can be managed by only building in areas where businesses or residents (or both) have made a threshold commitment to buy a minimum dollar value of services (e.g. 40% of businesses in a defined area must commit in advance before build out would commence).

For example, if the Authority develops a community pole program in partnership with an ISP, Authority or County funds should not be committed to place a pole until the ISP has collected a specified number of service contracts from residents that could receive service from the community pole.

Funding

Excellent leadership and hard-nosed business management of the enterprise are essential to the project’s ability to obtain necessary funding. Although the network may be operated as a government effort, it must be managed with the same attention to costs, revenue, and financial administration as any private sector business. The project must be able to develop and maintain “investment quality” financial reports and business models to attract private sector sources of funding like revenue bonds, municipal leases, commercial loans, and business contributions. If investments are restricted to basic infrastructure like tower sites, fiber, towers, and equipment

shelters, maintenance costs will be relatively low and it should be possible to structure attractive tower space lease rates to cover routine maintenance, minimizing financial risk and requiring limited funding.

Service Providers

While in many respects a community broadband network shares many similarities with other public utilities (e.g. roads, water, sewer) there is one fundamental difference. Other public utilities like water and sewer have a captive audience and the utility is able to operate as a monopoly—meaning the customer base can be taken for granted. Early discussions with service providers have been positive, with at least two providers making requests for additional information about the effort.

A community broadband network is a public/private enterprise, and service providers are the primary customers of the network. Service providers cannot be taken for granted. Instead, a fair fee structure, a high quality network, excellent maintenance and operations processes, and organizational flexibility will be required to recruit and retain service providers.

Projects that are not successful in attracting service providers will fail. Affordable lease rates for tower space and/or fiber connections will attract service providers. Other open access projects (e.g. Danville, VA; New Hampshire FastRoads,; Bozeman Fiber; Utopia/Salt Lake City area) have not had any difficulty getting service providers to use the infrastructure. Indeed, the Utopia project has twenty-three providers on its network.

Franklin County has had a very successful WISP in the county (BitX) for several years, and BriscNet has expressed a strong interest in the Franklin County market. Shentel and Lumos both have fiber in the County and are potential partners, and Mid-Atlantic Broadband (MBC) also has fiber in the county and there are numerous providers on the MBC network that represent additional partner prospects.

Technology

A question that often dominates early discussions of community broadband projects is, “Are we picking the right technology and systems?” Everyone has experienced the rapid obsolescence of computers, cellphones, printers and other IT equipment.

There is always some risk associated with making a substantial investment in a network. However the risk can be managed. In a predominantly fiber network, a large portion of the investment will be dedicated to getting fiber in the ground or on poles throughout the community. Properly installed fiber has a minimum 25 to 30 year useful life, and fiber installed by the telephone companies in the seventies is still in use today. Fiber also has a useful property not shared with other public systems like water, roads, and sewers. The capacity of fiber can be increased without replacing the fiber or adding additional fiber. Instead, fiber capacity can be increased indefinitely by replacing the electronics at each end of the fiber. This means that a community investment in fiber creates a stable, long term asset for the community with long lasting value.

The equipment used to light the fiber has a shorter useful life, and is usually depreciated over a period of 7 to 9 years. Some equipment may remain useful longer than that. Wireless equipment must be replaced much more often (typically 2 to 4 years of useful life) because it is typically exposed to much harsher conditions (extreme heat and cold, lightning strikes, ice, snow, rain, wind).

The primary technology risk is selecting a vendor who provides equipment that does not perform as advertised. This risk can be managed by a careful procurement process which would include a careful analysis of network capacity and features, detailed RFPs that specify equipment features and functions explicitly, and a thorough RFP evaluation process.

Legal and Regulatory Issues

Community-owned broadband projects are subject to state and Federal regulations of various kinds, but unless a project is offering retail services (e.g. the local government is selling Internet, TV, and/or voice services directly to residents and businesses), there are limited regulatory issues. The City of Eagan's AccessEagan Gigabit fiber network has been in operation for seven years, and has four private sector service providers offering services. There has never been an incumbent legal challenge because incumbent providers like Comcast and CenturyLink have been invited to use the network (both have repeatedly declined).

The key strategy is for community-owned projects to adopt the wholesale model of leasing passive infrastructure like towers and dark fiber and for active networks (with network electronics) to lease circuits to providers on a wholesale basis rather than selling retail services. The Utopia project, which offers services in fourteen communities in the Salt Lake City area, has been targeted in the past as a "failed" effort but has overcome some early financial challenges and today has 23 private sector providers offering a wide range of price points and service packages—delivering true choice and competition to citizens and businesses. The wholesale model is not subject to many of the FCC (Federal Communications Commission) regulatory requirements.

18.2 SUCCESSES

Town of Ashland, Virginia

The Town of Ashland recently completed the construction of two miles of conduit and dark fiber that passes by a large number of businesses in the community. The goal is to provide local businesses with more broadband and Internet service options, making more bandwidth available at lower prices. The Town is not going to be an ISP. Dark fiber will be leased out to private sector Internet Service Providers, who will install their own equipment on the fiber network and market directly to businesses in the community. A major regional ISP (Segra) became the first provider on the network, and the Town has begun planning extensions to the network.

Wired Road Broadband Authority

The Wired Road Broadband Authority is owned by Carroll and Grayson counties and the City of Galax, in far southwest Virginia. The enterprise is in its eleventh year. The project started with a single grant of \$200,000, and additional state, Federal, and local funds have been used to develop more than \$4 million in network assets, including more than 40 miles of fiber and twenty-plus wireless access points. Wireless service covers large areas of the mountainous region, and fiber services are available in the region's business parks and the larger downtown areas. The project continues to develop and evolve, with a major wireless equipment upgrade underway and the completion of a fiber ring between Galax and Hillsville, the two largest towns in the region. Two private sector service providers lease circuits and sell services on the open access network.

Eastern Shore of Virginia Broadband Authority

The ESVBA offers services in Accomack and Northampton counties on the Eastern Shore of Virginia. The Authority, with Federal and state grant assistance, built an 80 mile fiber backbone through both counties in 2009. The network generated modest revenue that provided incremental expansion funds and returned some funds to the two county General Funds. In 2018, the Authority announced a significant expansion plan to bring fiber services to most homes and businesses in the two counties over a period of several years.

Bozeman Fiber

Bozeman Fiber is a community nonprofit formed in 2015 to bring Gigabit fiber services to the business community in the Montana city. The network was completed in 2016, with more than 25 miles of Gigabit fiber constructed to pass many of the city's main business and commercial areas. Five private sector service providers lease capacity on the open access network.

City of Richwood, West Virginia

A water line extension to some rural neighborhoods just outside the City of Richwood has led to a project to leverage the water line work to bring fiber and wireless broadband to those same areas. A nonprofit start up (Richwood Scientific) led by a small group of community leaders has worked with the Region 4 PDC to get a grant to both develop a technical plan and to build a "phase one" portion of the network. The planning work was completed in the fall of 2018, and construction on the network will begin later in 2019. The project includes two miles of fiber to the home, with a high performance wireless link from the mountain top neighborhood back down into the Richwood Scientific office in town.

Charlemont, MA

The town of Charlemont, Massachusetts has decided to combine a grant from the state with an \$11/month/household assessment to build fiber throughout the entire town of 524 households. Comcast had offered to make modest upgrades to the existing copper-based cable network but was asking for nearly half a million dollars from the town. Instead, voters agreed with Town officials to build their own network. Once finished, Internet service will be provided by a private sector ISP. Gigabit fiber Internet service is expected to cost about \$80/month with no data caps. Phone service is expected to cost \$23 month, and Internet, phone, and several Over The Top (OTT) services like Netflix, Hulu, and YouTube TV is expected to cost around \$140/month, or about 15% to 20% less than Comcast service.

Danville, Virginia

The City of Danville, Virginia had high unemployment rates in the early 2000s after most of the city's textile manufacturing jobs had left. City leaders recognized that simply trying to attract traditional manufacturing jobs was not going to be an effective economic development strategy. The City began investing in open access fiber in 2008 and put fiber in five business parks and the downtown area. The City also began working with private developers to re-purpose and rehabilitate empty and underused building in the City's downtown, creating live/work apartments and condos and class A office space. The combination of affordable fiber, improved housing options, class A office space, and a focus on attracting high tech businesses that needed all three (fiber, class A office space, and housing) has revitalized the City and brought hundreds of new jobs to the City's downtown. The fiber network has been in the black for several years, and some revenue is sent to the City's General Fund, while some revenue is used to expand the network into residential areas of the city. Services on the open access network are provided by three private sector ISPs.

APPENDIX A: GLOSSARY

Active network: Typically a fiber network that has electronics (fiber switches and CPE) installed at each end of a fiber cable to provide “lit” service to a customer.

Asymmetric connection: The upload and download bandwidth (speed) are not equal. Cable Internet and satellite Internet services are highly asymmetric, with upload speeds typically 1/10 of download speeds. Asymmetric services are problematic for home-based businesses and workers, as it is very difficult to use common business services like two way videoconferencing or to transfer large files to other locations.

Backhaul: Typically refers to a high capacity Internet path out of a service area or locality that provides connectivity to the worldwide Internet.

Colo facility: Colo is short for Colocation. Usually refers to a prefab concrete shelter or data center where network infrastructure converges. A colo or data center can also refer to a location where several service provider networks meet to exchange data and Internet traffic.

CPE: Customer Premises Equipment, or the box usually found in a home or business that provides the Internet connection. DSL modems and cable modems are examples of CPE, and in a fiber network, there is a similarly-sized fiber modem device.

Dark fiber: Dark fiber is fiber cable that does not have any electronics at the ends of the fiber cable, so no laser light is being transmitted down the cable.

Fiber switch: Network electronic equipment usually found in a cabinet or shelter

FTTH/FTTP/FTTx: Fiber to the Home (FTTH), Fiber to the Premises (FTTP), and Fiber to the X (FTTx) all refer to Internet and other broadband services delivered over fiber cable to the home or business rather than the copper cables traditionally used by the telephone and cable companies.

Handhole: Handholes are open bottom boxes with removable lids that are installed in the ground with the lids at ground level. The handholes provide access to fiber cable and splice closures that are placed in the handhole. Handholes are also called **pull boxes**.

IP video: Video in various forms, including traditional packages of TV programming, delivered over the Internet rather than by cable TV or satellite systems.

Latency: The time required for information to travel across the network from one point to another. Satellite Internet suffers from very high latency because the signals must travel a round trip to the satellite in stationary orbit (22,500 miles each way). High latency makes it very difficult to use services like videoconferencing.

Lit network: A “lit” network (or lit fiber) is the same as an active network. “Lit” refers to the fact that the fiber equipment at each end use small lasers transmitting very high frequency light to send the two way data traffic over the fiber.

Passive network: Refers to infrastructure that does not have any powered equipment associated with it. Examples include wireless towers, conduit (plastic duct), handholes, and dark fiber.

Pull boxes: Pull boxes (also called handholes) are used to provide access to fiber cable and splice closures. They are called pull boxes because they are also used during the fiber cable construction process to pull the fiber cable through conduit between two pull boxes.

Splice closures: Splice closures come in a variety of sizes and shapes and are used to provide access to fiber cable that has been cut open to give installers access to individual fiber strands. Splice closures are designed to be waterproof (to keep moisture out of the fiber cable) and can be mounted on aerial fiber cable or placed underground in handholes.

Splicing: The process of providing a transparent joint (connection) between two individual fiber strands so that laser light passes through. A common use of splicing is to connect a small “drop” cable of one or two fiber strands to a much larger (e.g. 144 fiber strand) cable to provide fiber services to a single home or business.

SCADA: Supervisory Control and Data Acquisition. Used by the electric utility industry and some other utilities (e.g. water/sewer) to manage their systems.

Symmetric connection: The upload and download bandwidth (speed) is equal. This is important for businesses and for work from home/job from home opportunities.

Virtual Private Network: A VPN creates a private, controlled access link between a user’s computer and a corporate or education network in a different location. VPNs are often encrypted to protect company and personal data. VPNs usually require a symmetric connection (equal upload and download speeds) to work properly.

APPENDIX B: TOWER OWNER DATA

Note that owner locations are different from the actual location of the towers. Franklin County has all towers accurately mapped as to actual location.

CELL_SITE	ADDRESS	CITY	OWNER	STATUS	Map Symbol
Franklin County E911	1247 Summit Drive	Rocky Mount	County of Franklin	Public Safety	Green Tower/County Owned
Fork Mountain Fire Station To			Franklin County	Public Safety	Green Tower/County Owned
Henry Fire Dept	5241 Henry Road	Henry	Franklin County	Public Safety	Green Tower/County Owned
Tom's Knob	1198 Toms Knob Rd	Martinsville	Franklin County	Public Safety	Green Tower/County Owned
Burnt Chimney Water Tank	52 Burnt Chimney Rd Wirtz VA 24184	Wirtz	Franklin County	Proposed	Red Circle/County Watertank
Triton	10704 BOOKER T WASHINGTON HWY	Wirtz	American Tower	In Service	Red Tower/County provided
Hales Ford	16007 BOOKER T WASHINGTON HWY	Moneta	US Cellular	In Service	Red Tower/County provided
Grassy Hill Crown Castle	1245 Summit Drive	Rocky Mount	Crown Castle	In Service	Red Tower/County provided
Briar Mountain Crown Castle	605 BRIARPATCH DR	Rocky Mount	Crown Castle	In Service	Red Tower/County provided
Boones Mill US Cellular	1350 MURRAY KNOB RD	Boones Mill	US Cellular	In Service	Red Tower/County provided
Boones Mill	1350 MURRAY KNOB RD	Boones Mill	Crown Castle	In Service	Red Tower/County provided
Franklin	1889 Brick Church Rd	Rocky Mount	AEP Towers	In Service	Red Tower/County provided
Morningside	148 Northside Dr	Rocky Mount	Crown Castle	In Service	Red Tower/County provided
Briar Mountain US Cellular	605 BRIARPATCH DR	Rocky Mount	US Cellular	In Service	Red Tower/County provided
Windy Gap	1060 Red Valley Rd	Boones Mill	US Cellular	In Service	Red Tower/County provided
Ferrum College	185 FIELDVIEW DR	Ferrum	US Cellular	In Service	Red Tower/County provided
Rocky Mount USCC	135 REDBUD HILL RD	Rocky Mount	US Cellular	In Service	Red Tower/County provided
Cooks Knob	1299 Isolane Road	Callaway	American Electric Power	In Service	Red Tower/County provided
Proposed Verizon Tower	JUBAL EARLY HWY	Boones Mill	Verizon	Proposed	Red Tower/County provided
Highland Paging	1249 Summit Drive	Rocky Mount	Highland Paging	Small	Red Tower/County provided
Valley Communications	1251 Summit Drive	Rocky Mount	Valley Communications	No Carriers	Red Tower/County provided
Valley Communications	1253 Summit Drive	Rocky Mount	Valley Communications	No Carriers	Red Tower/County provided
Proposed nTelos Tower			nTelos	Proposed	Red Tower/County provided
nTelos Tower	1237 Dillard's Hill	Union Hall	TowerCo, LLC	In Service	Red Tower/County provided
Oak Level	245 Virgil H. Goode Hwy	Henry	American Tower	In Service	Red Tower/County provided
Fork Mountain		Fork Mountain	Sprint	Public Safety	Red Tower/County provided
Sprint CO Building	South Main Street	Rocky Mount	Sprint	Other	Red Tower/County provided
AEP Transmission	21890 Virgil H. Goode Hwy	Rocky Mount	AEP	In Service	Red Tower/County provided
Roanoke County	11221 SLINGS GAP RD		Unknown	In Service	Red Tower/County provided
Smith Mountain - Bedford			Crown Castle	In Service	Red Tower/County provided
Smith Mountain - Microwave			Unknown	Other	Red Tower/County provided
Smith Mountain -Ranger			Chuck Hurtz	Other	Red Tower/County provided
Smith Mountain - AEP			AEP	Other	Red Tower/County provided

Smith Mountain - Crown			Crown Castle	Other	Red Tower/County provided
US Cellular Burnt Chimney	4312 Booker T. Washington Hwy	Rocky Mount	US Cellular	In Service	Red Tower/County provided
Boardwalk Water Tank	Boardwalk Dr	Moneta	Ron Willard	Proposed	Red Tower/County provided
Fork Mountain Alternate locati			Unknown	Proposed	Red Tower/County provided
US Cellular - Redwood	47 Webster Rd	Glade Hill	US Cellular	In Service	Red Tower/County provided
Nextel Brandy Drive	428 Bandy Drive	Hardy	Nextel	In Service	Red Tower/County provided
Moorman Road nTelos	188 Moorman Road	Hardy	Ntelos	In Service	Red Tower/County provided
CROWELLS GAP	VISTA PARKWAY	Mount Pleasant	Roanoke Co.	Public Safety	Red Tower/County provided
Naff Road Nextel	819 Naff Road	Boones Mill	Nextel	In Service	Red Tower/County provided
Monestry		Callaway	Unknown	Other	Red Tower/County provided
WYTI Radio tower	275 Glenwood Dr	Rocky Mount	Unknown	Other	Red Tower/County provided
Fork Mountain Road	1114 Fork Mountain Road	Bassett	Unknown	Proposed Broadband	Red Tower/County provided
South 220 Broadband	300 Cherokee Hills Rd	Bassett	Unknown	Proposed Broadband	Red Tower/County provided
Gilley's Mountain Ln	351 Gilley's Mountain Ln	Bassett	Unknown	Proposed Broadband	Red Tower/County provided
Henry School	200 Henry School Road	Henry	Unknown	Proposed Broadband	Red Tower/County provided
Providence Church	1993 Providence Church Rd	Henry	Unknown	Proposed Broadband	Red Tower/County provided
Snowcreek 2	25 James Street	Martinsville	Unknown	Proposed Broadband	Red Tower/County provided
Snowcreek 1	107 Snow Creek Road	Martinsville	Unknown	Proposed Broadband	Red Tower/County provided
Snowcreek 3	319 Whittle Lane	Martinsville	Unknown	Proposed Broadband	Red Tower/County provided
Snowcreek 4	5393 Snow Creek Road	Penhook	Unknown	Proposed Broadband	Red Tower/County provided
Snowcreek 6	210 Oriole Road	Rocky Mount	Unknown	Proposed Broadband	Red Tower/County provided
Snowcreek 5	7081 Snow Creek Road	Penhook	Unknown	Proposed Broadband	Red Tower/County provided
Henry 1	2376 Horseshoe Road	Henry	Unknown	Proposed Broadband	Red Tower/County provided
Henry 3	975 Brown Hill Drive	Ferrum	Unknown	Proposed Broadband	Red Tower/County provided
Henry 2	825 Republican Church Road	Ferrum	Unknown	Proposed Broadband	Red Tower/County provided
Needed Site			Unknown	Proposed Need Site	Red Tower/County provided
Needed Site			Unknown	Proposed Need Site	Red Tower/County provided
Needed Site			Unknown	Proposed Need Site	Red Tower/County provided
Needed Site			Unknown	Proposed Need Site	Red Tower/County provided
Proposed Mitchell Tower				Proposed	Red Tower/County provided
Philpott 563368	595 Brown Hill Rd	Ferrum	US Cellular	In Service	Red Tower/County provided
WROV	1609 CAHAS MOUNTAIN RD	Boones Mill		In Service	Red Tower/County provided
WAIDSBORO II		FERRUM		Proposed	Red Tower/County provided
	1654 SCUFFLING HILL RD	ROCKY MOUNT	TOWN OF ROCKY MOUNT	In Service	Red Tower/County provided
Middle Creek Triton	20 MIDDLE CREEK CT	Moneta	American Tower	In Service	Red Tower/County provided
Juggs Gap	1831 Virgil H Goode Hwy	Henry	Crown Castle	In Service	Red Tower/County provided
					Red Tower/County provided
AT&T Boones Mill	2900 JUBAL EARLY HWY	BOONES MILL	AT&T		Red Tower/County provided

Ferrum East	2849 Beech Mt. Rd.	Ferrum	Prime Tower Development	Foundation complete	Red Tower/County provided
B99.9 Tower	2160 WAIDSBORO RD	Rocky Mount	B99.9 Radio Tower	Other	Red Tower/County provided
Verizon Wireless	4351 Webster Rd.	Glade Hill	Frances S. Poindexter Child's Trust/ Charle Poindexter, Trus	199' tall tower	Red Tower/County provided
nTelos Tower	170 Edwardsville Rd	Hardy	nTelos	In Service	Red Tower/County provided
Lovely Valley Rd	1351 Lovely Valley Rd	Wirtz	American Tower	In Service	Red Tower/County provided
Jacks Mountain Rd	1177 Jacks Mountain Rd	Union Hall	Apex Towers LLC	Approved 4/24/2017	Red Tower/County provided
Blue Ridge Group LLC Site	2075 Bluewater Dr Hardy VA 24101	Hardy	Leased	Proposed	Red Tower/County provided
Westlake Water Tank	130 Westlake Rd	Moneta	Ron Willard	In Service	Blue Circle/ Non County Watertank
Park Place Water Tank	110 Pacific Ave	Moneta	James McKelvey	In Service	Blue Circle/ Non County Watertank
Rocky Mount Water Tank	44 Pendleton St	Rocky Mount	Town of Rocky Mount	In Service	Blue Circle/ Non County Watertank
Cooks Knob	1299 Isolane Road	Callaway	American Electric Power	In Service	Blue Tower/Radio Site Matrix
Franklin County E911	1247 Summit Drive	Rocky Mount	County of Franklin	Public Safety	Blue Tower/Radio Site Matrix
CROWELLS GAP	VISTA PARKWAY	Mount Pleasant	Roanoke Co.	Public Safety	Blue Tower/Radio Site Matrix
WROV	1609 CAHAS MOUNTAIN RD	Boones Mill		In Service	Blue Tower/Radio Site Matrix
Tom's Knob	1198 Toms Knob Rd	Martinsville	Franklin County	Public Safety	Blue Tower/Radio Site Matrix
Blue Ridge Group LLC Site	2075 Bluewater Dr Hardy VA 24101	Hardy	Leased	Proposed	Blue Tower/Radio Site Matrix
Prillaman?	975 Brown Hill Drive	Ferrum			Blue Tower/Radio Site Matrix
911 Dispatch Center	70 E Court St #101, Rocky Mount, VA 24151	Rocky Mount	Rocky Mount		Blue Tower/Radio Site Matrix
Ferrum Tower	1299 Isolane Road?	Ferrum		Proposed	Blue Tower/Radio Site Matrix
	3 MI WNW OF HOT SPRINGS	ROCKY MOUNT	United States Cellular Corporation	FCC Registered	Red Tower/FCC
	9.9 MI W	Hot Springs	United States Cellular Corporation	FCC Registered	Red Tower/FCC
	ON TOP BRIER MOUNTAIN 7 MI W OF HWY 220	ROCKY MOUNTA	United States Cellular Corporation	FCC Registered	Red Tower/FCC
	275 GLENWOOD DR	ROCKY MOUNT	WYTI, INC.	FCC Registered	Red Tower/FCC
	MURRAY KNOB ROAD	BOONES MILLS	United States Cellular Corporation	FCC Registered	Red Tower/FCC
	Cherokee Rd (Henry Rd)	Juggs Gap	Crown Communication Inc.	FCC Registered	Red Tower/FCC
	245 Virgil Goode Highway (010282)	Bassett	American Towers, Inc.	FCC Registered	Red Tower/FCC
	664 Red Valley Road	Boones Mill	United States Cellular Corporation	FCC Registered	Red Tower/FCC
	Arthur Circle	Ferrum	United States Cellular Corporation	FCC Registered	Red Tower/FCC
	110 PACIFIC AVE	MONETA	BROOMIK, LLC	FCC Registered	Red Tower/FCC
	130 WESTLAKE ROAD	MONETA	County of Franklin	FCC Registered	Red Tower/FCC
	4250 Booker T. Washington Hwy	Rocky Mount	United States Cellular Corporation	FCC Registered	Red Tower/FCC
	1183 Dillard's Hill Road	Union Hall	SBA Towers II LLC	FCC Registered	Red Tower/FCC
	55 Webster Road	Redwood	United States Cellular Corporation	FCC Registered	Red Tower/FCC
	0.09 mi North of SSR 678 (Edwardsville Rd)	Hardy	SBA Towers II LLC	FCC Registered	Red Tower/FCC

APPENDIX C: WIRELESS COST DATA

Phase One Wireless Improvements

PHASE	ITEM	SITE WORK	SITE COSTS	ACCESS EQUIPMENT	ACCESS EQUIPMENT COST	POINT TO POINTS	PTP BOM	POINT TO POINT COSTS	PROJECT MANAGEMENT COSTS	TOTAL COST
1	Blue Ridge Group Tower	Tower Improvements	\$26,375.00	Sectors, LTE	\$30,303.80	BH Burnt Chimney PTP Penhook	AF11FX Pair AF11FX Pair	\$11,025.00	\$5,000.00	\$72,704
1	Cahas	New Tower	\$170,000.00	Sectors, LTE	\$30,304	PTP Cooks PTP Burnt Chimney	AF11FX Pair AF11FX Pair	\$11,025	\$14,500	\$225,829
1	Callaway Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50	PTP Grassy Hill	✓		\$2,500.00	\$17,794
1	Dudley Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50	PTP Burnt Chimney	AF11FX Pair	\$5,512.50	\$2,500.00	\$23,306
1	Ferrum Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50				\$2,500.00	\$17,794
1	Glade Hill Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50	PTP Grassy Hill PTP Penhook PTP Redwood Substation PTP Glade Hill Substation	✓ ✓ ✓ ✓		\$2,500.00	\$17,794
1	Grassy Hill Tower	Tower Improvements	\$26,375.00	Sectors, LTE	\$30,303.80	PTP Burnt Chimney Boones Mill Omni PTP Callaway Omni AF5XHD Pair PTP Glade Hill Omni PTP Toms Knob AF11FX Pair BH Franklin County HS BH Rocky Mount PTP Thornton Substation	AF11FX Pair AF5XHD Pair AF5XHD Pair AF5XHD Pair AF11FX Pair AF24HD Pair AF5XHD Pair ✓	\$21,760.20	\$5,000.00	\$88,439
1	Henry Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50	PTP Henry FD	✓		\$2,500.00	\$17,794
1	Henry Fire Station Tower	Tower Improvements	\$26,375.00	Sectors, LTE	\$30,303.80	PTP Henry ES Omni	AF11FX Pair	\$5,512.50	\$5,000.00	\$67,191
1	Lee M Waid Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50	PTP Toms Knob	✓		\$2,500.00	\$17,794
1	Snow Creek	New Tower	\$170,000.00	Sectors, LTE	\$30,304	BH Toms Knob	AF11FX Pair	\$5,512.50	\$5,000.00	\$210,816
1	Summit View Tower	Tower Improvements	\$26,375.00	Sectors, LTE	\$30,304	BH Grassy Hill	AF11FX Pair	\$5,512.50	\$5,000.00	\$67,191
1	Sontag Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50	PTP Toms Knob	✓		\$2,500.00	\$17,794
1	Toms Knob	Tower Improvements	\$26,375.00	Sectors, LTE	\$30,303.80	BH Grassy Hill PTP Snow Creek PTP Sontag PTP Henry FD PTP LM Wade	AF5XHD Pair AF24HD AF11FX Pair AF5XHD Pair	\$14,030.10	\$5,000.00	\$75,709
1	Union Hall	New Pole (Village)	\$7,865.00	Omni	\$7,428.50	BH BRT	AF11FX Pair	\$5,512.50	\$5,000.00	\$25,806
1	Windy Gap Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50				\$2,500.00	\$17,794
									Total Wireless Estimated Cost	\$976,546

Phase Two Wireless Improvements

PHASE	ITEM	SITE WORK	SITE COSTS	ACCESS EQUIPMENT	ACCESS EQUIPMENT COST	POINT TO POINTS	PTP BOM	POINT TO POINT COSTS	PROJECT MANAGEMENT COSTS	TOTAL COST
2	Burnt Chimney Elementary	Water Tank Improvement	\$26,375.00	Sectors, LTE	\$30,303.80	PTP Blue Ridge PTP Dudley Omni PTP Grassy Hill	√ √ √		\$5,000.00	\$61,679
2	CATCE	New Pole (School)	\$7,865.00	Omni	\$7,428.50	PTP Rocky Mount ES	AF5XHD Pair	\$1,108.80	\$2,500.00	\$18,902
2	Cooks Knob	Tower Improvements	\$26,375	Sectors, LTE	\$30,303.80	PTP Ferrum PTP Grassy Hill	AF11FX Pair AF11FX Pair	\$11,025	\$5,000	\$72,704
2	Franklin County High	New Pole (School)	\$7,865.00	Omni	\$7,428.50				\$2,500.00	\$17,794
2	Pigg Tower	New Tower	\$170,000	Sectors, LTE	\$30,303.80	PTP Blue Ridge PTP Toms Knob	AF11FX Pair AF11FX Pair	\$11,025	\$14,500	\$225,829
2	Rocky Mount Elementary	New Pole (School)	\$7,865.00	Omni	\$7,428.50	BH Franklin High	AF5XHD Pair	\$1,108.80	\$2,500.00	\$18,902
									Total	\$415,810

Phase Three Wireless Improvements

PHASE	ITEM	SITE WORK	SITE COSTS	ACCESS EQUIPMENT	ACCESS EQUIPMENT COST	POINT TO POINTS	PTP BOM	POINT TO POINT COSTS	PROJECT MANAGEMENT COSTS	TOTAL COST
3	Blain Substation	Covered	-	-	-	-	-	-	-	-
3	Endicott	New Tower	\$170,000.00	Sectors, LTE	\$30,304	PTP Cooks PTP Henry FD	AF11FX Pair AF11FX Pair	\$11,025	\$14,500	\$225,829
3	Franklin Substation	Covered	-	-	-	-	-	-	-	-
3	Glade Hill Substation	New Pole (Substation)	\$7,865.00	Omni	\$7,428.50	PTP Glade Hill Omni	AF24HD	\$6,300.00	\$2,500.00	\$24,093.50
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	ISP Determines Location	New Pole	\$7,865.00	Omni	\$7,429	TBD	AF5XHD Pair	\$1,109	\$2,500	\$18,902
3	Orchard Substation	Covered	-	-	-	-	-	-	-	-
3	Penhook Substation	New Pole (Substation)	\$7,865.00	Omni	\$7,428.50	PTP Blue Ridge Group PTP Glade Hill	AF5XHD AF5XHD	\$2,217.60	\$2,500.00	\$20,011.10
3	Redwood Substation	New Pole (Substation)	\$7,865.00	Omni	\$7,428.50	PTP Glade Hill Omni PTP Dudley Omni	AF5XHD AF5XHD	\$2,217.60	\$2,500.00	\$20,011.10
3	Tank Hill Substation	Covered	-	-	-	-	-	-	-	-
3	Thornton Substation	New Pole (Substation)	\$7,865	Omni	\$7,428.50	PTP Grassy Hill	AF5XHD Pair	\$1,109	\$2,500	\$18,902
								Estimated Total		\$516,772.10

APPENDIX D: ESTIMATED WIRELESS COVERAGE

Site Name	Estimated Number of New Addresses Served
Phase 1	
<u>towers</u>	
Blue Ridge Tower	3434
Grassy Hill Tower	3717
Cahas Tower	588
Summit View Tower	1375
Snow Creek Tower	490
Toms Knob Tower	568
Henry FD Tower	477
<u>poles</u>	
Glade Hill	93
Callaway	113
Sontag	149
Windy Gap	173
Henry Elementary	263
Dudley	336
Ferrum	402
Union Hall	568
Lee M Waid Elementary	1491
Phase 1 total	14237
PHASE 2	
<u>towers</u>	
Burnt Chimney Tower	1665
Cooks Knob Tower	1332
Pigg Tower	753
<u>poles</u>	
CATCE	250
Rocky Mount	325
Franklin County Highschool	343
phase 2 total	4668
PHASE 3	
<u>towers</u>	
Endicott Tower	247
<u>poles</u>	
Glade Hill Substation	165
Penhook Substation	113
Redwood Substation	245
Thornton Substation	140
Eleven additional poles TBD	unknown
phase 3 total	910
Final County-wide total	19815