

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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**Application ID:** 86509142021103345  
**Application Status:** Pending  
**Program Name:** Virginia Telecommunications Initiative 2022  
**Organization Name:** County of Wythe  
**Organization Address:** 340 South Sixth Street  
Wytheville, VA 24382-2513  
**Profile Manager Name:** Elizabeth Sweeney  
**Profile Manager Phone:** (276) 223-4522  
**Profile Manager Email:** wythepio@wytheco.org

**Project Name:** Wythe County Fixed Wireless Broadband  
**Project Contact Name:** Matt Hankins  
**Project Contact Phone:** (276) 223-4514  
**Project Contact Email:** mchankins@wytheco.org  
**Project Location:** 340 S 6th Street  
WYTHEVILLE, VA 24382-2513  
**Project Service Area:** Wythe County, Rural Retreat Town, Wytheville Town

**Total Requested Amount:** \$1,415,290.00  
**Required Annual Audit Status:** No Current Audits Found

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County of Wythe

Wythe County Fixed Wireless Broadband

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## Budget Information:

Cost/Activity Category	DHCD Request	Other Funding	Total
<b>Telecommunications</b>	<b>\$1,415,290.00</b>	<b>\$2,124,671.00</b>	<b>\$3,539,961.00</b>
Other: Total Consolidated Cost Per HP	\$0.00	\$1,737.00	\$1,737.00
Other: Proposed Shantel Contribution	\$0.00	\$1,061,467.00	\$1,061,467.00
Other: Proposed County Contribution	\$0.00	\$1,061,467.00	\$1,061,467.00
Other: Proposed VATI Contribution	\$1,415,290.00	\$0.00	\$1,415,290.00
<b>Total:</b>	<b>\$1,415,290.00</b>	<b>\$2,124,671.00</b>	<b>\$3,539,961.00</b>

### Budget Narrative:

Shentel will be responsible for funding the following related to the thirteen new Fixed Wireless cell sites: • 30% of the initial network capital cost for the thirteen new cell sites (with the remaining 70% of initial network capital cost being paid by the County and VATI) • 100% of the annual network support expense • 100% of the spectrum cost • 100% of the customer premise cost to connect • 100% of the customer care expense Please see Attachment 12 – Derivation of Costs and Attachment 13 - Documentation of Supporting Cost Estimates. With respect to Attachment 13 - Documentation of Supporting Cost Estimates, Shentel provide a detailed budget based on historical average cost per cell site. Shentel then included supporting invoices, quotes and other information generally supporting most of the averaged costs depicted in the budget.

## Questions and Responses:

### 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:

#### Introduction

The Applicant, Wythe County, has collaborated with the Co-Applicant, Shenandoah Cable Television, LLC (“Shentel”), to submit this VATI application. Shentel is a regional and diversified communications company, with corporate headquarters in Edinburg, VA. Shentel has 119 years of experience providing advanced telecommunications services, including cable television (CATV), Broadband Internet, local phone, and mobile phone service. Shentel is a publicly traded company (NASDAQ: SHEN). The company serves Broadband Internet customers in the states of Maryland, Virginia, West Virginia, Pennsylvania and Kentucky. Shentel has remarkable breadth and depth of experience as a full-service Broadband provider, continuing to successfully grow, expand, and adapt in the rapidly changing telecommunications space. Shentel’s long history of providing advanced communication services to rural America makes Shentel uniquely qualified for this project. Shentel has prided itself on cost-effectively building advanced, reliable, and scalable communications services in rural America. The Shentel plan includes highly experienced leadership, competitive bidding, local insight, advanced engineering platforms, efficient supply chain management, local and motivated workforce, and public accounting oversight. As evidenced by both Shentel’s Vision Statement and Shentel’s Mission Statement below, Shentel has learned over the last 119 years that building networks correctly the first time results in higher network reliability and greater customer satisfaction. Shentel may not always be the lowest cost option, but Shentel believes that rural customers deserve carrier grade reliability.

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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- Shentel Vision Statement – *“Shentel will ensure that rural communities have access to the same level of telecommunication services as those found anywhere else in the U.S.”*
- Shentel Mission Statement – *“Shentel is committed to enriching the lives of the customers we serve with the highest quality telecommunication services by making major investments in technology, using innovative thinking and delivering high quality local customer service that makes using technology easy.”*

Notably, Shentel has twice been named to “Forbes Most Trustworthy Companies in America” and Shentel was named the 2017 Cablefax Independent Cable Operator of the Year.

## Background

In April 2021, Shentel responded to a Wythe County Request for Proposal (“Wythe County Broadband Partnership Solicitation”). The goal of the Request for Proposal was to provide Broadband to as many of the unserved County residents in the most efficient means, given the County’s lack of home density and rugged terrain. In June 2021, the Wythe County Board of Supervisors authorized County Staff to negotiate a contract with Shentel. While that contract is pending, Wythe County and Shentel agreed to collaborate on a VATI application as part of this project. Wythe County subsequently submitted the required 2022 Virginia Telecommunications Initiative Application Notice to Virginia Department of Housing & Community Development, effective July 26, 2021.

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## Project Area

The project area is anywhere the County had unserved homes which are (i) not part of another VATI grant and which have no federally funded coverage commitment, and (ii) such homes had sufficient density to support either a Fixed Wireless macro cell or a Fixed Wireless small cell. The unserved area was determined through a collaborative, multi-stage approach drawing on many different sources of data to identify all existing unserved homes without a federally funded coverage commitment, or a previous VATI award commitment. Local knowledge, historical service requests, surveys, FCC Form 477 data, and internal engineering estimates were used to estimate all unserved addresses.

## Project Overview

Shentel will develop thirteen (13) new Beam Fixed Wireless cell sites in the County that will cover 2,037 unserved County households. These thirteen sites are depicted on Attachment 1 – Project

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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Area Map. Please note, per the paragraph labelled “Defining Homes Passed and Wireless Risk” later in this proposal (see response to question 9), Shentel believes this is a highly conservative estimate of the unserved County homes that will be covered by Shentel’s thirteen proposed new Beam Fixed Wireless cell sites.

These targeted 2,037 unserved households will chose from three rate plans offering the following speeds:

- 25 Mbps downlink, and 3 Mbps uplink.
- 50 Mbps downlink, and 5 Mbps uplink.
- 100 Mbps downlink, and 20 Mbps uplink.

Primarily due to the lack of home density, Shentel’s design includes 7 macro cell sites and 6 small cell sites to achieve the required 2,037 homes passed. Specifically, in areas that lack sufficient unserved density to support the comparably higher costs of macro cell sites, Shentel will surgically deploy small cell sites. The mix of cell site types (e.g., small cell versus macro cell, collocation vs. new tower, etc.) is also depicted on Attachment 1 – Project Area Map. For more detailed technical information on Shentel’s proposed 13 new Fixed Wireless cell sites and customer premise equipment, please see these additional attachments:

- Attachment 6 – Propagation Map Wireless Project
- Attachment 17 – Cell Site Equipment Infrastructure
- Attachment 18 – Customer Premise Equipment (CPE)
- Attachment 20 – Targeted Cell Site Locations and Design

Shentel will take a hybrid approach to infrastructure ownership. Specifically, where efficiencies can be gained by attaching to existing vertical assets that are owned either by the County or a private company, Shentel will pursue that course via tower lease, and attach Shentel-owned equipment to the third-party tower (“Collocation(s)”). Shentel contemplates seven (7) likely Collocation leases in this proposal. By contrast, where Collocation opportunities are not possible, Shentel will fully develop new towers on behalf of the County, which expects to utilize them for both Broadband deployment and E911 public safety radio communications. Shentel contemplates six (6) new towers being required in this proposal. After Shentel develops these six (6) new towers, the County will take title to them. This flexible approach will maximize the coverage area while minimizing costs and limiting the need for new towers in the County.

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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2. 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:**

To gather the following data regarding existing providers in Wythe County, Shentel used FCC Form 477 data, existing provider web sites, independent web sites, records of prior State and Federal grant awards, local Broadband Commission records, and local knowledge from our embedded base of Shentel CATV employees. Shentel was unable to confirm the exact service area of the two Fixed Wireless operators in yellow.

For graph, please see attached pdf labeled as "AA-VATI Wythe Application Narrative"

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:**

Shentel's analysis shows that its proposed project will not materially overlap and will therefore not conflict. Please see Attachment 2 – Documentation on Federal Funding Area.

Given the universal nature of this project and the extensive federal grant funding that has already been awarded across the country, there are naturally areas adjacent to this project area with federal grant program awards. As noted in question 1, the goal of this project is to work towards functional universal coverage in keeping with the Virginia Governor's goal. Therefore, some unserved locations which are in close proximity to areas which have received federal funding are included in this project. Per the VATI guidelines, we did not consider satellite awards as overlap. These Federal Awards are shown in Attachment 2 – Documentation of Federal Funding and were removed from the project area.

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:**

This is not applicable to this project. Please see Attachment 3 – RDOF Awarded Areas Form in VATI Area

There are no RDOF funded blocks awarded to Shentel included in this VATI application. As noted in our response to question 3, we identified all RDOF awarded locations and removed them from our analysis.

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

---

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. Due to the fact that the unserved areas are estimates in some cases, and 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 is carried out, Shentel has some limited 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.

Please see Attachment 4 – Documentation of Unserved Area VATI Criteria

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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6. 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.
- 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)
  - 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.
  - 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.
  - 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.
  - 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:**

Please see Attachment 5 – Passings Form. In summary, this project will provide Broadband to 2,037 total net passings. Please note, per the paragraph labelled “Defining Homes Passed and Wireless Risk” later in this proposal (see response to question 9), Shentel believes 2,037 net passings is a conservative estimate of the unserved County homes that will be covered by Shentel’s 13 proposed new Beam Fixed Wireless cell sites.

- 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)

Please see Attachment 5 – Passings Form. In summary, 210 business, 29 community anchor, and 20 nonresidential are included in the project.

- 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.

Part b is not applicable to the project

- 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.

Part c is not applicable to the project - none of the 2,037 home passings will require special construction costs.

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

There are an estimated 937 County homes in the project area that have speeds of 10 mbps down and 1 mbps up or less. This estimate is based off of FCC Form 477 data for DSL providers. As already discussed, without detailed information is it impossible to accurately predict competing Fixed Wireless coverage.

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

---

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:**

Shentel will take a hybrid approach to infrastructure ownership. Specifically, where efficiencies can be gained by attaching to existing vertical assets that are owned either by the County or a private company, Shentel will pursue that course via tower lease and attach Shentel-owned equipment to the third-party tower ("Collocation(s)"). Shentel contemplates seven (7) likely Collocation leases in this proposal. All equipment proposed to be attached to these Collocation sites as part of this project will continue to be owned and managed by Shentel.

By contrast, where Collocation opportunities are not possible, Shentel will fully develop new towers on behalf of the County. Shentel contemplates six (6) new towers being required in this project. After Shentel develops these six new towers, the County will take title to the new towers and manage them going forward. Shentel will then have a long-term lease with the County to use these six new towers for Fixed Wireless at mutually agreeable lease rates given the collaboration on this project.

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 part of the customer installation process, Shentel will professionally install a directional exterior antenna (Outdoor Modem), and up to two interior Wi-Fi units connected via Ethernet cabling. The Outdoor Modem will be approximately 12" x 12" and will be typically mounted near the eave of the customer's roof. Please see the following schematic description of our network.

For graph, please see attached pdf labeled as "AA-VATI Wythe Application Narrative"

- Shentel will provide the following rate plans for its Beam Fixed Wireless service:
  - \$60.00 monthly - up to 25 Mbps downlink, and up to 3 Mbps uplink.
  - \$80.00 monthly - up to 50 Mbps downlink, and up to 5 Mbps uplink.
  - \$160.00 monthly - up to 100 Mbps downlink, and up to 20 Mbps uplink.
- The aforementioned service fees include up to two in-home Amazon Eero Wi-Fi routers with no additional charges.
- CPE Equipment will be owned and supported by Shentel post-installation.
- Beam does not require service contracts. All services are month to month.
- \$99.00 – professional home installation performed by Shentel Technician.

More technical information can be found on Attachment 18 - Customer Premise Equipment (CPE).

The Shentel network supports the aforementioned speeds via a shared fixed wireless medium. However, please note the following capacity efficiencies offered by the Shentel Fixed Wireless network:

- Shentel will build a network that leverages dedicated licensed spectrum to ensure maximum capacity and reliability. Shentel has licensed spectrum in the County and will dedicate a full 60 MHz of 3.5 GHz CBRS spectrum. Shentel firmly believes that its priority right to use this



# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

---

vast amount of robust spectrum is a key differentiator from other Fixed Wireless providers.

- Shentel's Fixed Wireless network uses 4G LTE Advanced technology leveraging the 3GPP standard. Shentel will be deploying the most advanced wireless technology to ensure maximum coverage, maximum capacity, and maximum reliability. Further, this 4G LTE network will be constructed to gracefully evolve to support 5G technology in the near future. As an example, Shentel will be deploying the Ericsson Air 6488 – this tower-top equipment is carrier-grade, standards based, and upgradeable to 5G without equipment replacement. These smart antennas are the very latest technology to allow for the most efficient use of radio spectrum resources (e.g., multi-user MIMO, carrier aggregation, beam forming, LTE Transmission Mode 8, etc.). This is the same equipment that national wireless mobility carriers use in their networks (e.g., Sprint, T-Mobile, AT&T, etc.). More technical information can be found on Attachment 17 – Cell Site Equipment Infrastructure.
  - Shentel CPE –The Outdoor Modems (customer premise antennas) are manufactured by Seowon Intech, a South Korean company. The Outdoor Modem's comply with the 3GPP 4G LTE Advanced standard, and feature a 15 dBi high gain antenna resulting in an EIRP of 39 dBm. These LTE Category 15 Outdoor Modems support the very latest in customer premise equipment advances (e.g., 4x4 MIMO, 4-carrier aggregation, 256 QAM, Transmission Mode 8, etc.). More technical information can be found on Attachment 18 - Customer Premise Equipment (CPE).
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:

Shentel will develop thirteen (13) new Beam Fixed Wireless cell sites in the County. In addition to the detail below, please see the following attachments:

- Attachment 1 – Project Area Map
- Attachment 6 – Propagation Map Wireless Project
- Attachment 17 – Cell Site Equipment Infrastructure
- Attachment 18 – Customer Premise Equipment (CPE)
- Attachment 20 – Targeted Cell Site Locations and Design
- The following high-level schematic description of our network

## Advanced RF Engineering - Targeting the Unserved

Shentel cell site 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.

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

---

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 downlink 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 a carrier plans 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 a 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. Because of this serviceability risk, Shentel has taken a conservative position in designating serviceable homes in this proposal. As an example, while our prediction model showed that 2,546 unserved homes will be covered by these thirteen proposed Fixed Wireless cell sites, Shentel has assumed that only 80% (2,037) of the unserved homes will actually be successfully covered by Fixed Wireless. Further, Shentel has only counted those 2,546 gross unserved homes within the project area that our prediction model indicated would receive a minimum of 13 SINR and -115 dBm RSRP. These minimum signal levels are more conservative than VATI's guidelines to ensure a better customer experience and maximize network performance. Additionally, Shentel used drive-test data from our existing Beam Fixed Wireless cell sites to further optimize the Shentel propagation model – this allows Shentel to better account for foliage and other obstacles that can affect the signal levels.

For the thirteen new cell sites information, please see attached pdf labeled as "AA-VATI Wythe Application Narrative"

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

---

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 does not initially achieve universal broadband coverage. However, in conjunction with the prior Point Broadband VATI award and RDOF award winners, this application will provide significant improvement in the County's digital divide. In aggregate, this proposed Shentel project (2,037 homes passed), plus the pending Point Broadband VATI and RDOF areas (2,152 homes passed), will reach an estimated 4,189 of the remaining 5,680 unserved homes (74%). Unfortunately, there will still be an estimated 1,491 homes remaining in the County without access Broadband. These homes represent the most difficult to reach homes in the County, situated in areas that Fixed Wireless service will have trouble reaching.

While this application (service area) will not achieve full universal coverage, the County and Shentel have a Phase 2 engineering design that would reach the remaining 1,491 unserved homes. Shentel will continue to explore Phase 2 options with the County to expand coverage to the remaining unserved homes in 2023, subject to obtaining additional subsidy.

Unfortunately, the extremely rugged terrain, foliage, and lack of home density, Shentel estimates the Phase 2 will take an additional 45 new Fixed Wireless small cells to cover these remaining unserved homes. However, this Phase 2 design is based on the following assumption constraints, which will likely change for the better in the near future:

- The current 4G LTE standard – for example, 5G and even 6G may improve RF propagation limitations of cell site equipment and customer premise equipment.
- The use of 3.5 GHz CBRS spectrum – for example, low band spectrum may become available in the future and thereby significantly improve propagation for the proposed Fixed Wireless cell sites.
- The FCC's requirement to limit power in the 3.5 GHz CBRS band - This FCC power limitation is being questioned by at least one Tier 1 Wireless Carrier (AT&T), and a normalization of power levels for this spectrum band would definitely improve coverage for both these proposed 13 new Fixed Wireless cell sites in this application, as well as the contemplated Phase 2 cell sites.

Additionally, Shentel has also signed a Non-Disclosure Agreement ("NDA") and has had several meetings with the local power company, Appalachian Power (a/k/a "American Electric Power", "AEP") regarding possible "middle mile" fiber collaborations. A successful collaboration with Appalachian Power may result in cost effectively bringing fiber to some of these 1,491 remaining unserved homes, and thereby further reduce the initial Phase 2 estimate of 45 new Fixed Wireless smalls.

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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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 in the County, the Shentel RF Engineering team's extensive design work generated by the County's RFP, Site Development team, and relationships, this project is in a very favorable state of development. Specifically, unserved homes are identified, the network design is in place to cover these unserved homes, the County has completed an RFP and signed the MOU (see Attachment 8 – MOU), existing tower assets are identified, and site locations without existing towers have been reviewed.

Local Presence As the incumbent Cable Television (CATV) provider in Wythe County, Shentel will leverage its fiber assets, Broadband backbone, local knowledge, employee base, and regional offices. Our offices in Wytheville and Radford have over 26 employees inclusive of a regional dispatch center, a regional warehouse, and a technician training center. Beyond Shentel's CATV network consisting of 135 route miles of coax, Shentel has an additional 82 route miles of fiber in the County. As an example, Shentel currently provides fiber services to 20 businesses in the commercial footprint, including the Wythe County Public Library. This embedded Shentel fiber network helps address one of the biggest risks and cost drivers in developing Fixed Wireless networks – bringing fiber connectivity to rural new cell sites.

For information on "Network Readiness," please see attached pdf labeled as "AA-VATI Wythe Application Narrative"

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:

Wythe County has not been a direct recipient of VATI Grants. However, Wythe County is a member of the Mount Rogers Planning District Commission. The Mount Rogers Planning District Commission was awarded a VATI grant in January 2021 to serve the southwestern quadrant of Wythe County in partnership with Point Broadband offering a fiber-to-the-home project. The project is in the deployment phase of implementation. However, please note, Shentel's proposed project has very little overlap (if any) with the prior Mount Rogers Planning District Commission & Point Broadband VATI grant.

13. 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:

Please see Attachment 9 - Funding Sources Table and Attachment 10 – Documentation of Match Funding. In summary, this project is in compliance for VATI (40%), Applicant / County (30%) and Co-Applicant / Shentel (30%) as follows:

For graph, please see attached pdf labeled as "AA-VATI Wythe Application Narrative"

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

---

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 Leverage

The County permitting office will fast track all permitting submissions and will create a protocol to facilitate this process to ensure success with County procedures. The goal will be to avoid lengthy processing delays and significantly improve speed to market.

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## Co-Applicant Leverage

Shentel will provide leverage in several different forms to support this project. Shentel has a local office location and customer support center located in Wytheville, 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 County area. 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. This will both reduce costs and increase deployment speed (e.g., local CATV and fiber plant, existing PoP in Wytheville to ensure high quality services by linking this network to Shentel's existing fiber network with redundant Tier 1 Internet peering points located in Ashburn, VA and Atlanta, GA, etc.), further decreasing costs and increasing deployment speed.

## Partnering

Shentel has signed a Non-Disclosure Agreement ("NDA") and has had several meetings with the local power company, Appalachian Power (a/k/a "American Electric Power", "AEP") regarding possible "middle mile" fiber collaborations. A successful collaboration with Appalachian Power will result in more cost effectively bringing fiber to some of these proposed thirteen Fixed Wireless cell sites. Once the project is approved and Shentel starts designing fiber connectivity to the thirteen Fixed Wireless cell sites, Shentel will then work with Appalachian Power to determine if we can partner to realize additional cost savings, speed to market, or other efficiencies.

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:**

Shentel believes 50% to 70% of the homes passed will subscribe to internet service within 5 years of availability. We have seen similar take rates in unserved areas with our current offerings. Customers want reliability and local customer support - we are a network built with carrier-grade equipment, licensed spectrum, local people, and a strong brand in

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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Wythe County given our existing commercial fiber and cable television (CATV) businesses.

Shentel/Beam plans to promote customer take rate through an integrated marketing plan that utilizes multiple reinforcing tactics that are deployed well before & after a new coverage area goes “live”. Our marketing plan utilizes public relations (“PR”), mass media, social media, digital advertising, direct mail, email, printed collateral and merchandising pieces. All of these tactics are reinforced by a robust website, a dedicated customer service team and Sales & Marketing representatives on the ground, in market.

Shentel hopes that you will please spend some time on the extensive web site Shentel has developed to support our Beam Fixed Wireless customer inquiries: [www.lwantBeam.com](http://www.lwantBeam.com) . You may enter in the following address if you would like to see a demonstration of the online ordering process: 3030 Legion Way Broadway VA, 22815 (please go no farther than the credit check request). Lastly, this is a recent testimonial from one of our current Beam customers: <https://vimeo.com/595252288/1305cc439f>

A summary of our Beam Marketing and Engagement plan is as follows:

- **30 - 60 days prior to launch:** Public relations 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 advertising 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 advertising messaging. We target mobile phones, tablets, laptops & traditional desktop computers within the coverage area. All digital ads link to our 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.

Please see Attachment 19 - Marketing & Citizen Engagement Plan for more specific examples of Beam Fixed Wireless creative material.

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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- 1. 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.**

The Wythe-Grayson Regional Public Library offers formal and informal instruction in digital literacy along with access to the computers necessary to educate the community on digital literacy. Further, Wytheville Community College and HOPE, the local community action agency, offer similar digital literacy outreach. Additionally, the County GIS and Shentel will map and advertise the Beam Fixed Wireless build progress. These maps will be used publicly to explain to citizens and businesses what Broadband services are available to them. Please see Attachment 11 – Letters of Support for more color on the community enthusiasm for this project.

For those County residents who have economic challenges with affording Broadband:

1. Shentel is a certified ETC carrier. As an ETC carrier, Shentel is able to offer a \$10 lifeline discount to eligible homes.
2. Shentel is participating in the Emergency Broadband Benefit (EBB) Program to bring affordable Internet to eligible households. EBB would apply to Beam Fixed Wireless customers. The discount is up to \$50.00 per month applied against monthly recurring charges for eligible Internet services. Households are eligible if at least one of the following criteria is met:
  1. Household income is 135% or less than the Federal Poverty Guidelines;
  2. A household member participates in one of the following federal assistance programs: Supplemental Nutrition Assistance Program (SNAP), Medicaid, Supplemental Security Income (SSI), Federal Public Housing Assistance (FPHA), Veterans Pension and Survivors Benefit, Tribal Programs (and live on federally-recognized Tribal lands);
  3. A household is approved for the free or reduced price school breakfast/lunch program, including through the USDA Community Eligibility Provision;
  4. Household experienced substantial documented loss of income since February 29, 2020 with a total household income in 2020 below \$99,000 for single filers and \$198,000 for joint filers;
  5. A household member received a federal Pell grant in the current award year
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:**

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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## Project Management Plan

As described in the table at the end of this section, Shentel has a highly qualified team of RF Engineering, Wireless Site Acquisition, Core Network Engineering, and Wireless Construction employees. These employees are the same people who helped develop and manage:

1. Shentel's 2000-cell site mobility wireless network. This 2000-site mobility network (Sprint-branded) was sold to T-Mobile in July, 2021 for \$1.9 Billion),
2. Shentel's 220-site tower portfolio. Shentel still owns and manages this tower portfolio.
3. Shentel's 47 Beam Fixed Wireless macro cell sites. Shentel is actively developing 18 additional cell sites for activation in 4Q 2021. Therefore, we will end 2021 with approximately 66 Beam Fixed Wireless cell sites. Per Attachment 17 Cell Site Equipment Infrastructure, each of these cell sites make use the latest advances in wireless technology (e.g., carrier aggregation, multi-user MIMO, beam steering, etc.) to make the most efficient and robust use of Shentel's spectrum, and to gracefully evolve from 4G LTE Advanced to 5G.

Please see Attachment 11 – Letters of Support related to community enthusiasm for this project.

## Prior Grant Experience

Shentel has an extensive background in successfully winning and executing on local, state, and federal grants. Shentel has a team of employees dedicated to working with jurisdictions on grant applications and partnerships. This team is led by Chris Kyle, Vice President Industry Affairs and Regulatory. Two recent awards specific to Beam Fixed Wireless include:

- Albemarle County, VA – In August 2020 following an RFP process, Albemarle County Broadband awarded approximately \$700,000 in grant money for Shentel to develop six new Beam Fixed Wireless macro cell sites to address Albemarle County's unserved constituents. Shentel exceeded expectations in both speed to market and customer satisfaction. All six cell sites were completed by November, 2020. Notably, two of the six cell sites were completed in October, 2020 – just two months following the RFP award. Albemarle County had a strong need to address the unserved during the COVID pandemic, and they were very pleased we were able to execute well ahead of plan.
- RDOF (Rural Digital Opportunity Fund) – In December 2020, Shentel participated in FCC Auction 904 and successfully won rights to develop Beam Fixed Wireless cell sites in eight counties (seven in Virginia and one in West Virginia) to provide Broadband to approximately 8,642 unserved households. Total federal subsidy payable to Shentel will be approximately \$5 million.

For graph, please see attached pdf labeled as "AA-VATI Wythe Application Narrative"



# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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## 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:

Shentel will be responsible for funding the following related to the thirteen new Fixed Wireless cell sites:

- 30% of the initial network capital cost for the thirteen new cell sites (with the remaining 70% of initial network capital cost being paid by the County and VATI)
- 100% of the annual network support expense
- 100% of the spectrum cost
- 100% of the customer premise cost to connect
- 100% of the customer care expense

Please see Attachment 12 – Derivation of Costs and Attachment 13 - Documentation of Supporting Cost Estimates.

With respect to Attachment 13 - Documentation of Supporting Cost Estimates, Shentel provide a detailed budget based on historical average cost per cell site. Shentel then included supporting invoices, quotes and other information generally supporting most of the averaged costs depicted in the budget.

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:
- a. Total VATI funding request
  - b. Number of serviceable units (up to 125 points)

### Answer:

The total VATI funding request is \$1,415,290.

The total number of serviceable units will be 2,037.

The total VATI cost per serviceable unit (home passed) is \$695

More detailed information is listed below:

For graph, please see attached pdf labeled as "AA-VATI Wythe Application Narrative"

19.

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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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:

Per Attachment 5 – Passings, Shentel has identified 210 businesses, 29 community anchors, and 20 no-residential passings included in the project area.

Per Attachment 11 Letters of Support, the lack of Broadband in this rural County is negatively impacting education, economic development, healthcare and public safety. Notably: (i) the local Wytheville schools and the Wytheville Community College have really struggled during the pandemic with students and teachers lacking broadband, (ii) the general serving areas of the County Fire departments in Barren Springs and Ivanhoe lack reliable Broadband, and (iii) local realtors complain frequently that they lose home sales because buyers cannot get Internet access, or because they would have inadequate access through insufficient mediums such as satellite and DSL.

### 1. **Unique partnerships involved in the proposed project. Examples include electric utilities, universities, and federal/state agencies.**

Shentel has signed a Non-Disclosure Agreement (“NDA”) and has had several meetings with the local power company, Appalachian Power (a/k/a “American Electric Power”, “AEP”) regarding possible “middle mile” fiber collaborations. A successful collaboration with Appalachian Power will result in more cost effectively bringing fiber to some of these proposed thirteen Fixed Wireless cell sites. Once the project is approved and Shentel starts designing fiber connectivity to the thirteen Fixed Wireless cell sites, Shentel will then work with Appalachian Power to determine if we can partner to realize additional cost savings, speed to market, or other efficiencies.

### 2. **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.** For those County residents who have economic challenges with affording Broadband:

1. Shentel is a certified ETC carrier. As an ETC carrier, Shentel is able to offer a \$10 lifeline discount to eligible homes.
2. Shentel is participating in the Emergency Broadband Benefit (EBB) Program to bring affordable Internet to eligible households. EBB would apply to Beam Fixed Wireless

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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customers. The discount is up to \$50.00 per month applied against monthly recurring charges for eligible Internet services. Households are eligible if at least one of the following criteria is met:

1. Household income is 135% or less than the Federal Poverty Guidelines;
2. A household member participates in one of the following federal assistance programs: Supplemental Nutrition Assistance Program (SNAP), Medicaid, Supplemental Security Income (SSI), Federal Public Housing Assistance (FPHA), Veterans Pension and Survivors Benefit, Tribal Programs (and live on federally-recognized Tribal lands);
3. A household is approved for the free or reduced price school breakfast/lunch program, including through the USDA Community Eligibility Provision;
4. Household experienced substantial documented loss of income since February 29, 2020 with a total household income in 2020 below \$99,000 for single filers and \$198,000 for joint filers;
5. A household member received a federal Pell grant in the current award year.

## 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:

As noted previously in this application, Shentel has included the following four additional attachments:

- Attachment 17 – Cell Site Equipment Infrastructure
- Attachment 18 – Customer Premise Equipment (CPE)
- Attachment 19 - Marketing & Citizen Engagement Plan
- Attachment 20 – Targeted Cell Site Locations and Desig

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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## Attachments:

Map(s) of project area, including proposed infrastructure

ATTACHMENT1WytheProjectAreaMap9142021110547.pdf

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

ATTACHMENT2WytheDocumentationofFederalFunding9142021110608.pdf

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

ATTACHMENT3WytheDOCUMENTATIONOFRDOFAWARDEDAREAINCLUDEDINVATIAPPLICATION9142021110630.pdf

Documentation that proposed project area is unserved based on VATI criteria

ATTACHMENT4WytheDocumentationUnservedAreaVATICriteria9142021110656.pdf

Passings Form (Use template provided)

ATTACHMENT5WythePassingsForm9142021110722.pdf

Propagation Map if Wireless Project

ATTACHMENT6WythePropagationMapv29142021110836.pdf

Timeline/Project Management Plan

ATTACHMENT7WytheTimelineProjectMgmtPlanv29142021110927.pdf

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

Attachment8MOUWythev29142021111003.pdf

Funding Sources Table (Use template provided)

ATTACHMENT9WytheFundingSourcesTable9142021111029.pdf

Documentation of Match Funding

Attachment10DocumentationofMatchFundingWythev29142021111054.pdf

Letters of Support

ATTACHMENT11WytheLettersofSupport9142021111154.pdf

# Application to DHCD Submitted through CAMS

County of Wythe

Wythe County Fixed Wireless Broadband

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Derivation of Cost/Project Budget (Use template provided)

ATTACHMENT12WytheDerivationofCosts9142021111241.pdf

Documentation of Supporting Cost Estimates

1316914202121253.pdf

Two most recent Form 477 submitted to the FCC or equivalent

Attachment14WytheTwomostrecentForm477submittedtoFCCv29142021111420.pdf

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

ATTACHMENT15WytheCountyPointandPolygonShapeFiles9142021111516.zip

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

1316914202121302.pdf

Optional

ATTACHMENT17189142021120324.pdf

Optional

ATTACHMENT19WytheMarketingandCitizenEngagementPlan9142021120344.pdf

Optional

ATTACHMENT20TARGETEDCELLSITELOCATIONSDESIGN9142021120352.pdf

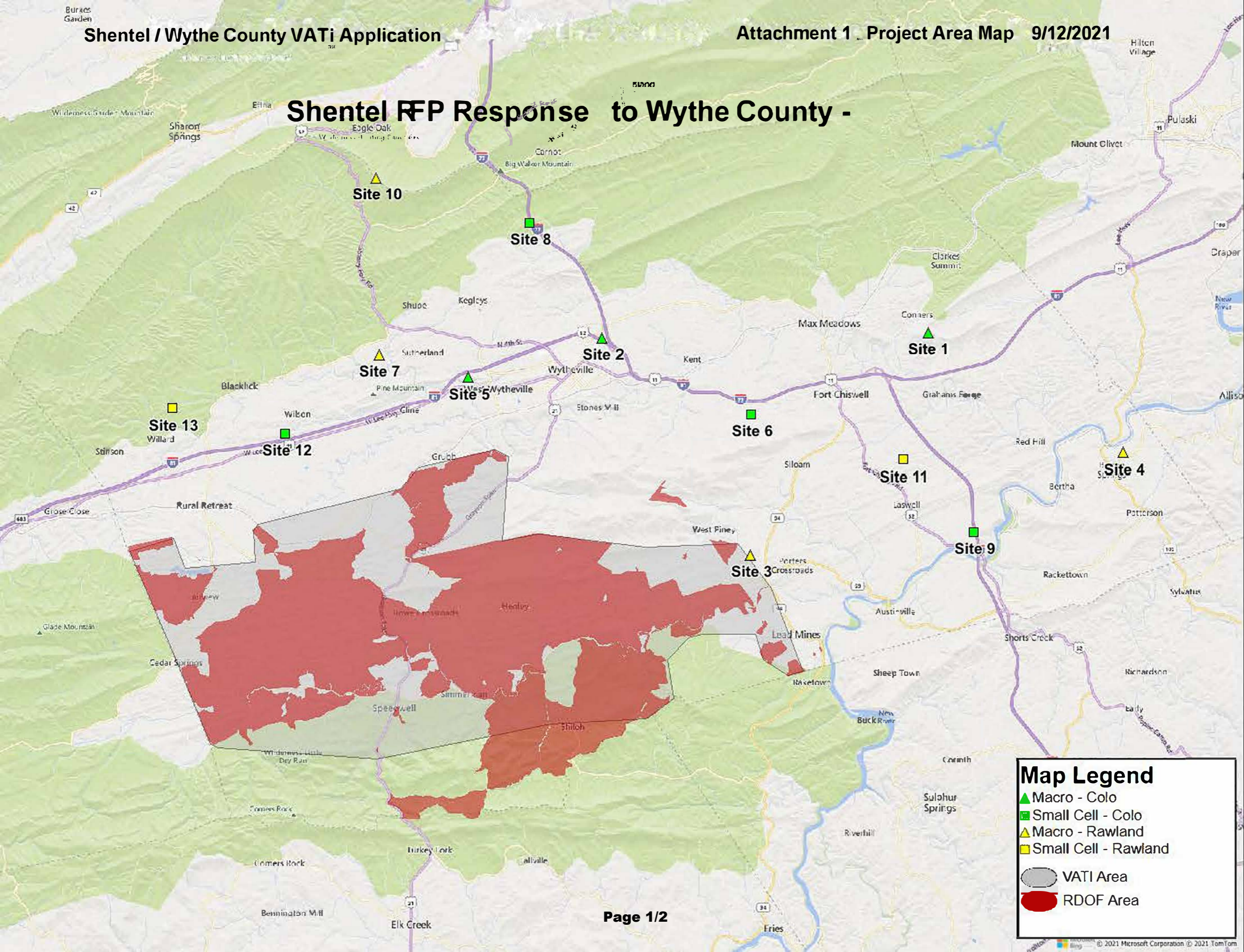
Optional

AAVATIWytheApplicationNarrative9142021120403.pdf

## Notes:

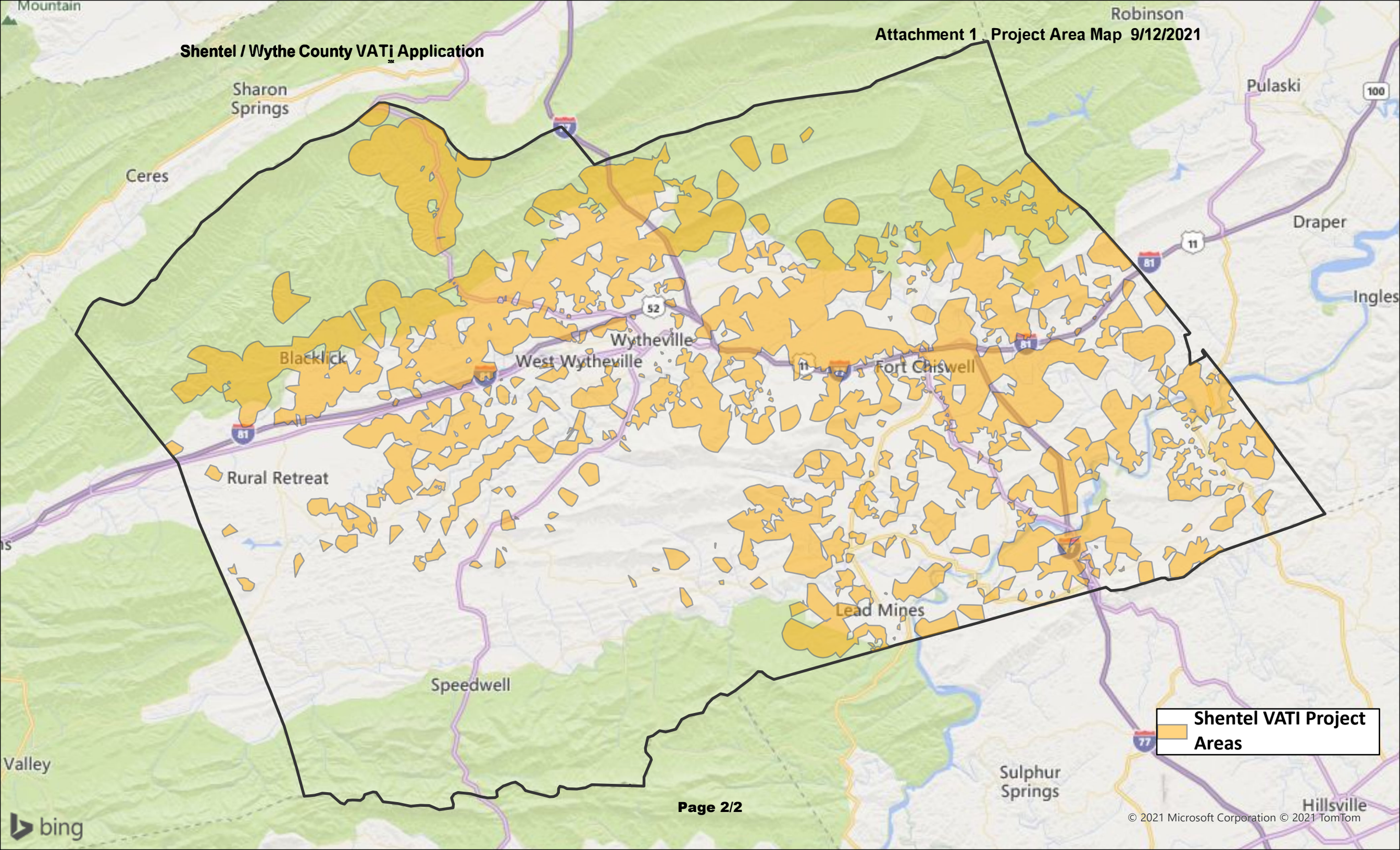
Under the "Attachment" file number 13, "Documentation of supporting Cost Estimates" and 16, " For wireless applicants: shapefiles in .zip file form, indicating RSSI projections in the application" will be emailed to you from Shentel. They are doing so, because they are FOIA records.

# Shentel RFP Response to Wythe County -



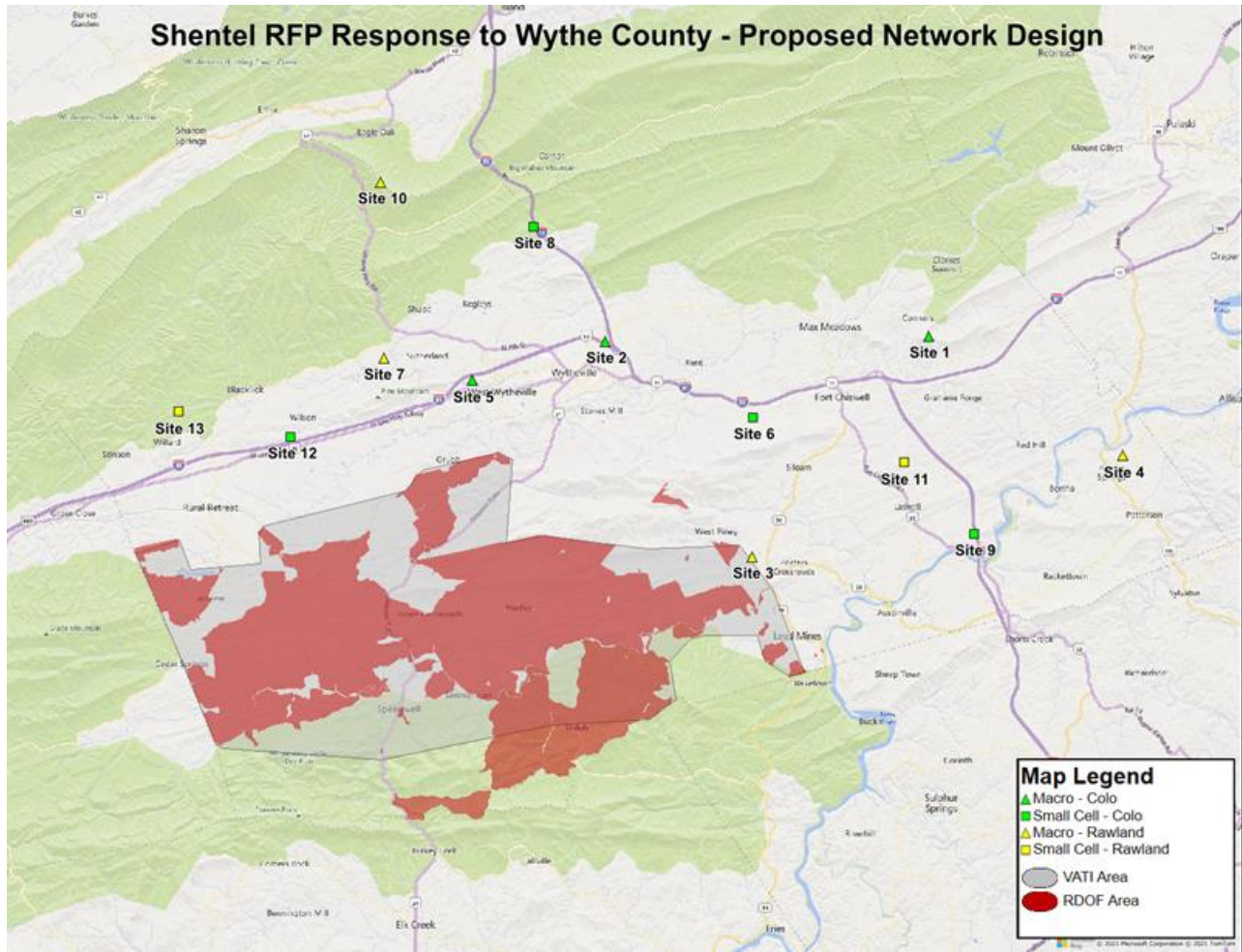
### Map Legend

- ▲ Macro - Colo
- Small Cell - Colo
- ▲ Macro - Rawland
- Small Cell - Rawland
- VATI Area
- RDOF Area



Shentel VATi Project Areas

**ATTACHMENT 2 – DOCUMENTATION OF FEDERAL FUNDING**



Shentel does not believe that its proposed project will overlap and therefore will not conflict.



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

Not applicable to this project.

## **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 Shentel's Fixed Wireless 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 reasonably minimize overlap throughout the life of this project. As the high-level design is refined and planned out in detail, there may be opportunities to improve the accuracy of Shentel's design. Specific cell sites will be determined based on existing search rings, and there may be some limited 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. 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 consider mitigation where previously unidentified overlap comes to light, and remaining below the allowable VATI overlap threshold.

## ATTACHMENT 5 – PASSINGS FORM

### 2022 Virginia Telecommunication Initiative (VATI) Passing Form

Type of Passings	Total Number of Passings in the Project Area <sup>1</sup>	Passings in the Project Area, without Special Construction Costs Required <sup>2</sup>	Passings with Special Construction Costs budgeted in the Application <sup>3</sup>	Number of Passings with Speeds at 10/1 or below in Project Area <sup>4</sup>
Residential	1,778	1,778	0	937
Businesses (non-home based)	210	210	0	0
Businesses (home-based)	0	0	0	0
Community Anchors	29	29	0	0
Non-residential	20	20	0	0
<b>Total</b>	<b>2,037</b>	<b>2,037</b>	<b>0</b>	<b>937</b>

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.

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

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> 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.

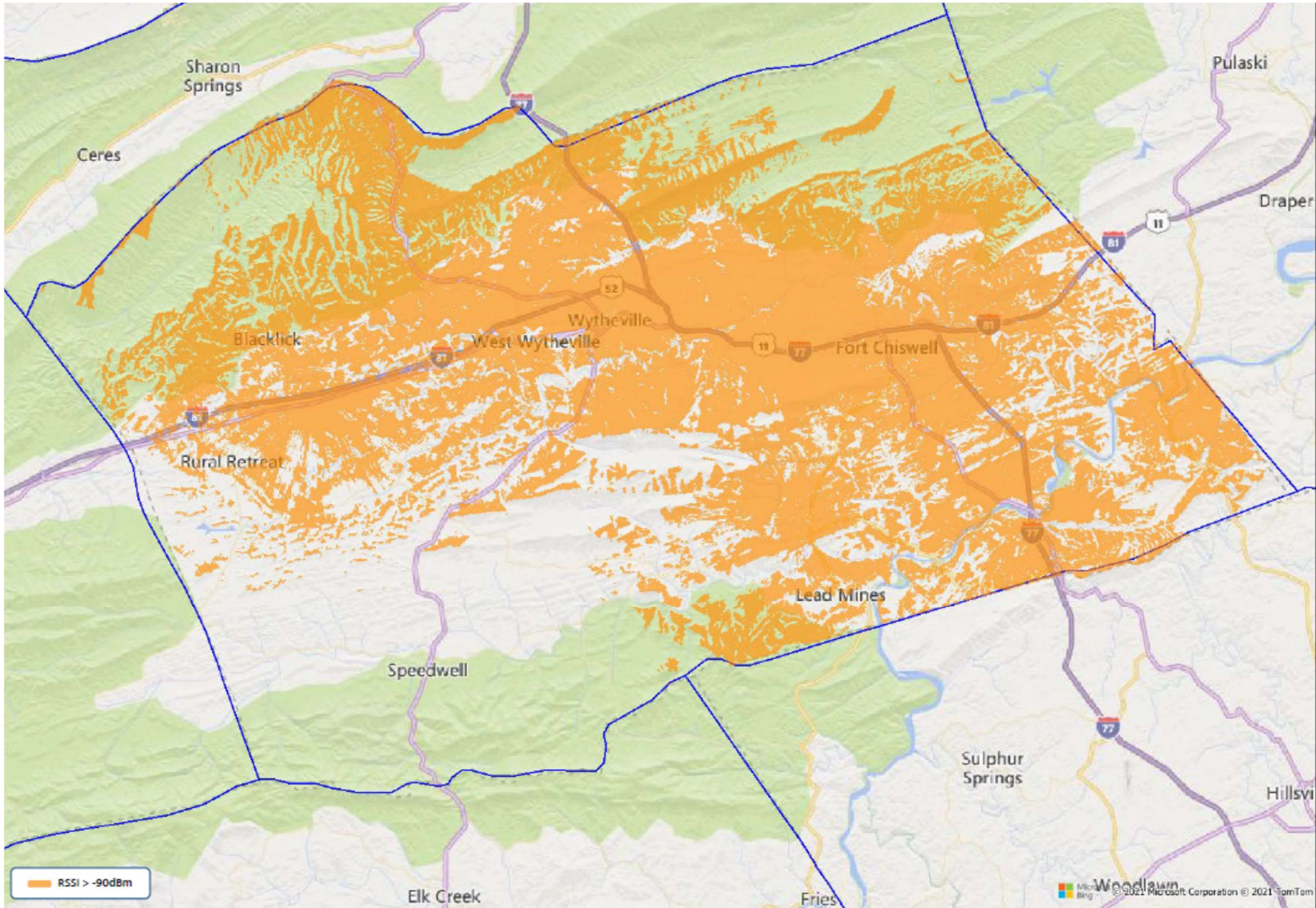
### Definitions

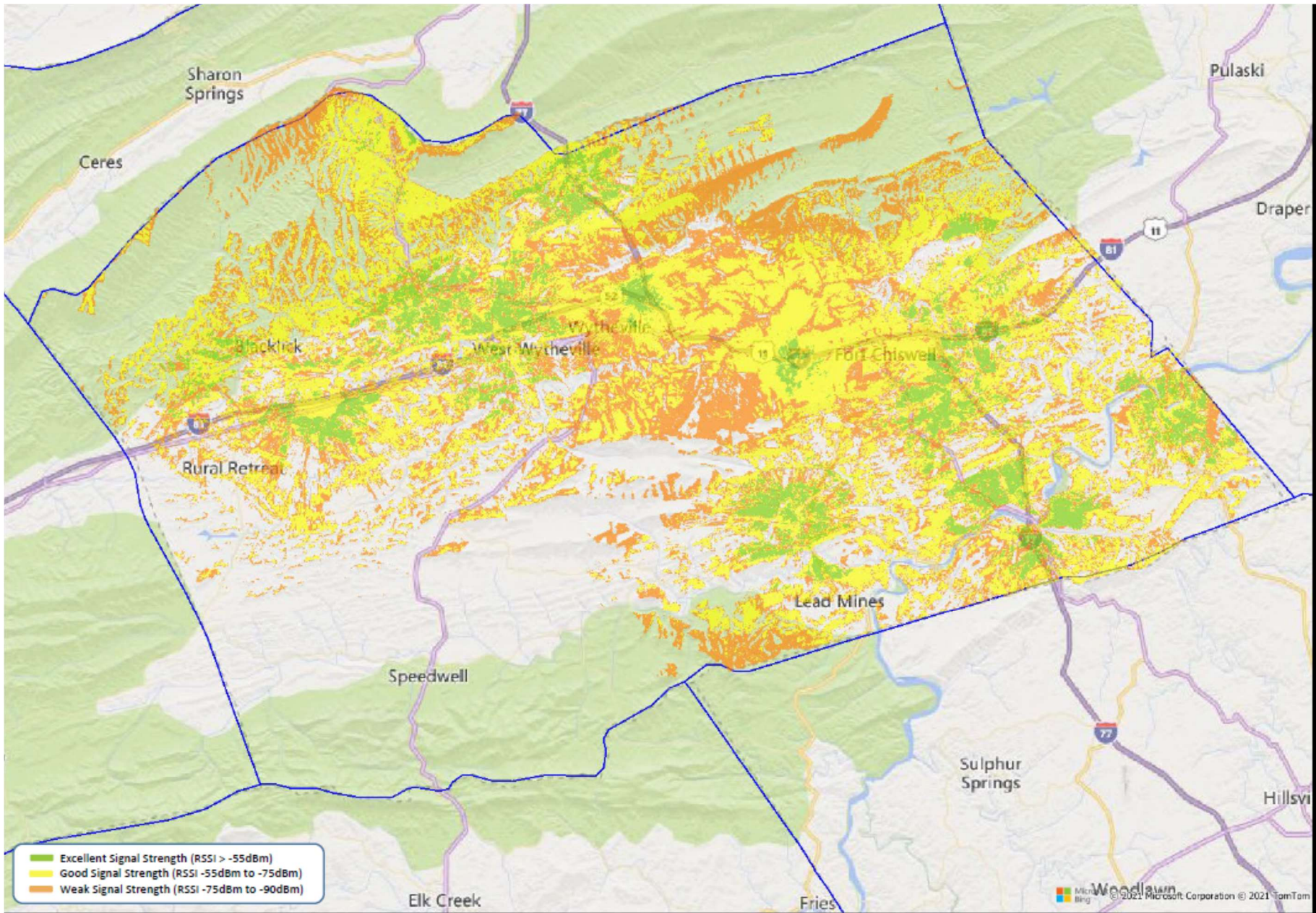
**Passing** – any structure that can receive service. Multi-unit structures may be counted as more than 1 passing, provided individual connections and account are planned at that structure.

**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.







Design Engineering – Phased

- Prediction modelling of specific site candidates using InfoVista Planet platform
- Targeted coverage review/analysis
- Site configuration – macro vs. small cell
- Prediction and analysis of home counts

Search Ring Release – Phased

- Creation of designated search ring area for Site Acquisition team

Site Acquisition – Phased

- Property Acquisition
- Prediction modelling using InfoVista 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 to construction issued
- Materials and equipment order finalized

Construction – Phased

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

Customer Installation Commencement – Phased



- Release of addresses to sales database
- 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.

**MEMORANDUM OF UNDERSTANDING  
BETWEEN WYTHE COUNTY 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 9<sup>th</sup> day of September, 2021 by and between Wythe County, a political subdivision of the Commonwealth of Virginia and Shenandoah Cable Television, LLC, hereinafter referred to as “Shentel,” for the purpose of creating a partnership to prepare and submit an application for grant funding through the 2021 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 Wythe County, Virginia.

Wythe County recognizes that in order to attain and maintain a high-quality level of broadband service to the citizens of Wythe 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**

Wythe County 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 Fixed Wireless broadband service to the unserved areas of the County by extending their existing network. The application for funding anticipates coverage to be made available to approximately 2,037 of the estimated 3,528 currently unserved/underserved homes in the County. Please note, while there is some small amount of overlap, the aforementioned 3,528 unserved/underserved home count does not generally include unserved or underserved homes located within the portion of the County awarded federal funds associated with the Rural Development Opportunity Fund (RDOF), nor does it include underserved homes located within the portion of the County awarded state funds associated with prior VATI awards.

Wythe County and Shentel agree to provide the necessary funding to construct the universal broadband project, if it is the best option to provide broadband to the most Wythe County citizens, to deliver Internet service to the homes/businesses in these areas by providing minimum average Internet speeds ranging from 25 Mbps downlink / 3 Mbps uplink and up to 100 Mbps downlink / 20 Mbps uplink. The total project cost will be \$3.8 million.

To obtain necessary project funding, the County agrees to complete a grant funding application, with assistance from Shentel, through the DHCD 2022 VATI Funding Program requesting no less than \$1.25 million (33%) to be allocated to the above project on or before September 14, 2021. The County agrees to commit up to \$1.25 million (33%) in local funding, primarily through use of ARPA funding, should this Shentel option be the best option to serve the most Wythe County citizens. Shentel agrees to provide the remaining project funding to complete the above projects.

Both parties confirm that a detailed agreement may be executed if funding is approved to outline all the obligations of the County 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 should Shentel be the best option to serve the most Wythe County citizens.

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

**FOR WYTHE COUNTY:**

Approved as to Form:

By: [Signature]  
Scot Farthing  
County Attorney  
WYTHE COUNTY, VIRGINIA

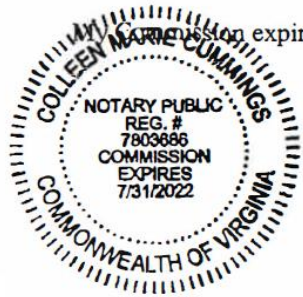
By: [Signature]  
Stephen D. Bear  
County Administrator

STATE OF VIRGINIA  
COUNTY OF WYTHE, to wit:

The foregoing instrument was acknowledged before me this 9<sup>th</sup> day of September, 2021  
by Stephen Bear, on behalf of the Wythe County.

Registration #: 7803686 Commission expires: 7/31/22

[Signature] Notary Public



**FOR SHENTEL:**

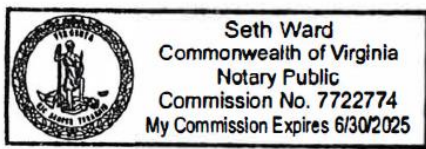
By: [Signature]  
Christopher S. Kyle  
Vice President Industry Affairs and Regulatory

STATE OF VIRGINIA  
COUNTY OF WYTHE, to wit:

The foregoing instrument was acknowledged before me this 10<sup>th</sup> day of September, 2021  
by Christopher S. Kyle, Vice President Shenandoah Cable Television, LLC.

Registration #: 7722774 My Commission expires: 6/30/2025

[Signature] Notary Public



**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	\$ 1,415,290	40%	Pending
SHENTEL	\$ 1,061,467	30%	SECURED
WYTHE COUNTY	\$ 1,061,467	30%	SECURED
	\$		
	\$		
	\$		
	\$		
<b>TOTAL</b>	<b>\$ 3,538,225</b>	<b>100 %</b>	



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.



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	\$ 2.54	\$ 1.12	\$ 0.94
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	\$ 2.53	\$ 1.12	\$ 0.93
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

**ATTACHMENT 11 – LETTERS OF SUPPORT**

Please see the following letters of support for the Shentel and Wythe County VATI application



## WYTHEVILLE COMMUNITY COLLEGE

1000 East Main Street • Wytheville, VA 24382

Phone: (276) 223-4848 • Fax: (276) 223-4770 • EMAIL – [dsprinkle@wcc.vccs.edu](mailto:dsprinkle@wcc.vccs.edu)  
[www.wcc.vccs.edu](http://www.wcc.vccs.edu)

### Office of the President

September 13, 2021

To Whom It May Concern,

On behalf of Wytheville Community College (WCC) I am writing in support of Wythe County's Virginia telecommunications Initiative (VATI) grant application.

As the sole institution and primary provider of higher education in Wythe County, WCC is acutely aware of the importance of increasing broadband access to the area. Having to move essentially all course delivery online due to the pandemic has highlighted the challenges that already existed. Both students and employees of the college have faced challenges due to lack of broadband access. These same limitations pose challenges for business and entrepreneurial opportunities as well.

In the age of information technology, it is a difficult reality to accept that the college and schools serving Wythe County have to create "hot spots" in our parking lots in order for some students to access the internet. Through initiatives such as VATI, however, Wythe County students and their families can have the same access to broadband as those in more urban and affluent regions of Virginia.

In today's economy, having increased access to broadband will provide expanded opportunities for those who live in our area, but whose work requires or can be enhanced by having broadband internet service. Having broadband access is essential to meet the educational needs of our students, and to the economic viability of our county.

I wholeheartedly endorse Wythe County's participation in the VATI grant, with confidence that it will benefit students, families, businesses and our economy. If I can provide any additional information, please do not hesitate to contact me at [dsprinkle@wcc.vccs.edu](mailto:dsprinkle@wcc.vccs.edu).

Sincerely,

Dean E. Sprinkle, Ph.D.  
President





WYTHEVILLE • WYTHE • BLAND  
CHAMBER OF COMMERCE

150 E. Monroe St., Wytheville, VA 24382  
276.223.3365 / f: 276.223.3412

[chamber@wytheville.org](mailto:chamber@wytheville.org) / [wwwchamber.com](http://wwwchamber.com)

## 2021 Board Members

Brett McCleary – Chairman  
Dr. Dean Sprinkle – Vice Chairman  
Tim Pennington – Treasurer  
Barb Sewell – Secretary  
Grant Barraclough  
Cameron Burton  
PJ Catron  
Matthew Clarke  
Jeremy Farley  
Dr. Scott Jefferies  
Steve Lester  
Paul Lindamood  
Sam Sweeney  
Mike Thomas  
Steve Willis

## Staff

Jennifer Atwell, IOM  
Executive Director

September 13, 2021

Matthew C. Hankins, Assistant County Administrator  
County of Wythe  
340 South Sixth Street  
Wytheville, VA 24382

RE: Wythe County 2021 VATI Application

To Whom It May Concern:

On behalf of the Wytheville-Wythe-Bland Chamber of Commerce Board of Directors, please accept this letter of support and recommendation for Wythe County's pending VATI application to work with a private sector broadband provider to expand broadband access in Wythe County.

A significant portion of Wythe County residents lack access to broadband due to the topography of the area along with a lower population density. Expanded broadband will significantly enhance our quality of life in many areas such as economic development, telemedicine, public safety, and educational opportunities.

The Wytheville-Wythe-Bland Chamber of Commerce is committed to promoting a favorable business climate for our members and communities in addition to partnering with other like organizations to make Wythe and Bland Counties a welcoming place to live, work, and play. We certainly appreciate your favorable consideration to the VATI application for Wythe County.

Sincerely,

*Jennifer W. Atwell*

Jennifer W. Atwell, IOM  
Executive Director

**ATTACHMENT 12 - Derivation of Costs**

Product	Total 100%	VATI 40%	Non-VATI 60%	Source of Estimate	Date
Site Acquisition	\$ 416,200	\$ 166,480	\$ 249,720	Shentel - please see Attachment 13 for supporting documentation	9/12/2021
Construction	\$ 1,952,643	\$ 781,057	\$ 1,171,586	Shentel - please see Attachment 13 for supporting documentation	9/12/2021
Cell Site Electronics	\$ 1,011,845	\$ 404,738	\$ 607,107	Shentel - please see Attachment 13 for supporting documentation	9/12/2021
Backhaul - Fiber and Microwave	\$ 157,537	\$ 63,015	\$ 94,522	Shentel - please see Attachment 13 for supporting documentation	9/12/2021
	\$ -	\$ -	\$ -		
<b>PROJECT TOTAL</b>	<b>\$ 3,538,225</b>	<b>\$ 1,415,290</b>	<b>\$ 2,122,935</b>		
	<b>100%</b>	<b>40%</b>	<b>60%</b>		

**ATTACHMENT 14 – TWO MOST RECENT FORM 477 SUBMITTED TO FCC**

(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
<b>Filer Information</b>	Company Name	Shentel
	Holding Company Name	Shenandoah Telecommunications Company
	SAC ID	
	499 ID	
<b>Data Contact Information</b>	Data Contact Name	Christina Price
	Data Contact Phone Number	(540) 984-5350
	Data Contact E-mail	christina.price@emp.shentel.com
<b>Emergency Operations Contact Information</b>	Emergency Operations Name	Shentel NOC
	Emergency Operations Phone Number	(540) 984-5531
	Emergency Operations E-mail	shentel-noc@shentel.net
<b>Certifying Official Contact Information</b>	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
<b>Kentucky</b>	Shentel	Cable Modem – DOCSIS 3.1	369
		Optical Carrier/Fiber to the End User	238
<b>Maryland</b>	Shentel	Cable Modem – DOCSIS 3.1	578
		Optical Carrier/Fiber to the End User	784
<b>Pennsylvania</b>	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
<b>Total</b>			<b>40195</b>

## 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
<b>Total</b>		<b>2625</b>	<b>94175</b>	<b>10232</b>	<b>104407</b>

### 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
<b>Total</b>		<b>94175</b>	<b>10232</b>	<b>104407</b>

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

Technology	Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business / Govt	Total
<b>Cable Modem</b>	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
<b>Optical Carrier/Fiber to the End User</b>	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
<b>Terrestrial Fixed Wireless</b>	25.000	3.000	28	0	28
	50.000	5.000	50	0	50
	100.000	10.000	2	0	2
<b>Total</b>			<b>94175</b>	<b>10232</b>	<b>104407</b>

## 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
<b>Total</b>	<b>0</b>	<b>0</b>	<b>31587</b>	<b>17687</b>

**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
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>

**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
<b>Total</b>	<b>31587</b>	<b>17687</b>	<b>13900</b>	<b>21627</b>	<b>9960</b>	<b>1378</b>	<b>30209</b>	<b>0</b>	<b>0</b>

# 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
-------	----------	------------	--------

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
<b>Total</b>			<b>45,616</b>

## 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
<b>Total</b>		<b>2,953</b>	<b>99,081</b>	<b>12,564</b>	<b>111,645</b>

### Fixed Broadband Subscriptions by Bandwidths and End User Type

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
--------------------------------	------------------------------	----------	----------------	-------

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
<b>Total</b>		<b>99,081</b>	<b>12,564</b>	<b>111,645</b>

### 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
<b>Total</b>			<b>99,081</b>	<b>12,564</b>	<b>111,645</b>

## 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
<b>Total</b>	<b>0</b>	<b>0</b>	<b>33,295</b>	<b>17,742</b>

## 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
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>

### 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
<b>Total</b>	<b>33,295</b>	<b>17,742</b>	<b>15,553</b>	<b>26,997</b>	<b>6,298</b>	<b>3,663</b>	<b>29,632</b>	<b>0</b>	<b>0</b>

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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
<b>Filer Information</b>	Company Name	Shenandoah Telephone Company
	Holding Company Name	Shenandoah Telecommunications Company
	SAC ID	190250, 197251
	499 ID	802200
<b>Data Contact Information</b>	Data Contact Name	Danielle Brooks
	Data Contact Phone Number	(540) 984-5389
	Data Contact E-mail	danielle.brooks@emp.shentel.com
<b>Emergency Operations Contact Information</b>	Emergency Operations Name	Harris Duncan
	Emergency Operations Phone Number	(540) 984-5838
	Emergency Operations E-mail	Harris.Duncan@emp.shentel.com
<b>Certifying Official Contact Information</b>	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
<b>Total</b>			<b>4997</b>

**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
<b>Total</b>		<b>160</b>	<b>6811</b>	<b>582</b>	<b>7393</b>

**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
<b>Total</b>		<b>6811</b>	<b>582</b>	<b>7393</b>

#### 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
<b>Total</b>			<b>6811</b>	<b>582</b>	<b>7393</b>

**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
<b>Total</b>	<b>12070</b>	<b>8749</b>	<b>0</b>	<b>0</b>

**Fixed Voice  
Subscription  
(VGE Lines)**

**VGE Lines Provided to Unaffiliated Providers by State**

State	Wholesale	UNE-L
Virginia	0	0
<b>Total</b>	<b>0</b>	<b>0</b>

**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
<b>Total</b>	<b>12070</b>	<b>4473</b>	<b>7597</b>	<b>1656</b>	<b>7093</b>	<b>628</b>	<b>2693</b>

**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
<b>Total</b>	<b>12070</b>	<b>12070</b>	<b>0</b>	<b>0</b>	<b>1753</b>	<b>0</b>	<b>0</b>	<b>10317</b>

# 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
<b>Total</b>			<b>5,016</b>

## 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
<b>Total</b>		<b>158</b>	<b>6,628</b>	<b>564</b>	<b>7,192</b>

### 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
<b>Total</b>		<b>6,628</b>	<b>564</b>	<b>7,192</b>

### 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
<b>Total</b>			<b>6,628</b>	<b>564</b>	<b>7,192</b>

## 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
<b>Total</b>	<b>11,659</b>	<b>8,468</b>	<b>0</b>	<b>0</b>

## Fixed Voice Subscription (VGE Lines)

### VGE Lines Provided to Unaffiliated Providers by State

State	Wholesale	UNE-L
Virginia	0	0
<b>Total</b>	<b>0</b>	<b>0</b>

### 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
<b>Total</b>	<b>11,659</b>	<b>4,158</b>	<b>7,501</b>	<b>1,580</b>	<b>6,888</b>	<b>596</b>	<b>2,595</b>

### 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
<b>Total</b>	<b>11,659</b>	<b>11,659</b>	<b>0</b>	<b>0</b>	<b>1,839</b>	<b>0</b>	<b>0</b>	<b>9,820</b>

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**ATTACHMENT 17 – CELL SITE EQUIPMENT INFRASTRUCTURE**Macro Cell Site Infrastructure

- 4G LTE Advanced Base Station / eNodeB (Ericsson 6160) – this ground based equipment cabinet is carrier-grade and standards based. This is the same equipment that Tier 1 national wireless mobility carriers use in their network (e.g., T-Mobile, AT&T, etc.). Further, this Ericsson eNodeB supports 5G technology with simple card upgrades.
- Multi-user MIMO Antennas (Ericsson Air 6488) – this tower-top equipment is carrier-grade and standards based. These smart antennas are the very latest technology to allow for the most efficient use of radio spectrum resources (e.g., multi-user MIMO, carrier aggregation, beam forming, LTE transmission mode 8, etc.). Specifically, Shentel will be deploying the most advanced technology to ensure maximum coverage, maximum capacity, and maximum reliability. This is the same equipment that Tier 1 national wireless mobility carriers use in their network (e.g., T-Mobile, AT&T, etc.). Importantly, these 64Tx64R multi-user MIMO smart antennas support 5G technology with no additional tower climb required – simple software configuration changes. Please see picture and additional technical information below.
- Cell Site Router (Nokia 7705 Service Aggregation Router) - this ground based equipment is carriergrade and standards based. It is the same equipment that T-Mobile uses in their national wireless mobility network. The router can support up to 10G of throughput traffic connecting each cell site to Shentel’s geo-redundant Evolved Packet Cores (EPC’s).

Small Cell Site Infrastructure

- 4G LTE Advanced Small Cell Base Station / eNodeB (Nokia FW2QQF) – this self-contained unit is carrier-grade and standards based. This is the same equipment that national wireless mobility carriers use in their network (e.g., T-Mobile, AT&T, etc.). Please see picture and additional technical information below.
- Omni High-Gain Antenna (Alpha Wireless AW3825)
- Cell Site Router (Nokia 7705 Service Aggregation Router) - this ground-based equipment is carrier-grade and standards based. It is the same equipment that Sprint and Shentel use in their national wireless mobility network. The router can support up to 10G of throughput traffic connecting each cell site to Shentel’s EPC’s.

Multi-user MIMO Antennas (Ericsson Air 6488)

# AIR 6488 B48

Regional Connect 

- Advanced Antenna System (AAS)
- 64TX/64RX with 128 AE
- Up to 16W
- EIRP 47 dBm (per beam)
- Support up to 100 MHz IBW & OBW
- Support LTE, NR prepared
- Max total carrier BW is 100MHz for NR, or 60MHz for LTE
- 3 x 10 Gbps eCPRI
- Weight: 45.5 kg (100 lb)
- Size (H x W x D): 810 x 400 x 200 mm (~32 x 16 x 8 inches)
- -48 VDC (3-wire or 2-wire)
- -40 °C to +55 °C



Small Cell Base Station / eNodeB (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

## ATTACHMENT 18 – CUSTOMER PREMISE EQUIPMENT (CPE)

### Customer Premise Equipment (CPE)

At the customer premise location, Shentel will professionally install a directional exterior antenna (“Outdoor Modem”), and up to two interior WIFI units. The Outdoor Modem will be approximately 12” x 12” and will be typically mounted near the eave of the customer’s roof.

The Outdoor Modems are manufactured by Seowon Intech, a South Korean company. These Outdoor Modems 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 devices 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.

#### **Eero WIFI Router**



#### **Outdoor Modem (exterior antenna)**



**ATTACHMENT 20 – TARGETED CELL SITE LOCATIONS & DESIGN**

Site Number	Latitude	Longitude	Antenna Radiation Center (feet AGL)	Site Type	Collocation on Existing Tower?	Requires New Tower Build?	New Tower Owned by County?	RF Engineering Design
Site 1	36.965689	-80.898786	125	Macro Cell	Yes	No	No	4-Sector MuMIMO
Site 2	36.963547	-81.068975	125	Macro Cell	Yes	No	No	4-Sector MuMIMO
Site 3	36.873315	-80.991783	250	Macro Cell	No	Yes	Yes	4-Sector MuMIMO
Site 4	36.915662	-80.796981	250	Macro Cell	No	Yes	Yes	4-Sector MuMIMO
Site 5	36.947252	-81.138541	225	Macro Cell	Yes	No	No	4-Sector MuMIMO
Site 6	36.931717	-80.991257	239	Small Cell	Yes	No	No	Small Cell
Site 7	36.956691	-81.185128	250	Macro Cell	No	Yes	Yes	4-Sector MuMIMO
Site 8	37.011642	-81.10656	247	Small Cell	Yes	No	No	Small Cell
Site 9	36.882824	-80.875024	246	Small Cell	Yes	No	No	Small Cell
Site 10	37.030273	-81.186612	250	Macro Cell	No	Yes	Yes	4-Sector MuMIMO
Site 11	36.912696	-80.911732	120	Small Cell	No	Yes	Yes	Small Cell
Site 12	36.92359	-81.233894	247	Small Cell	Yes	No	No	Small Cell
Site 13	36.934123	-81.292893	120	Small Cell	No	Yes	Yes	Small Cell



# Marketing & Citizen Engagement Plan



# Marketing & Citizen Engagement Plan

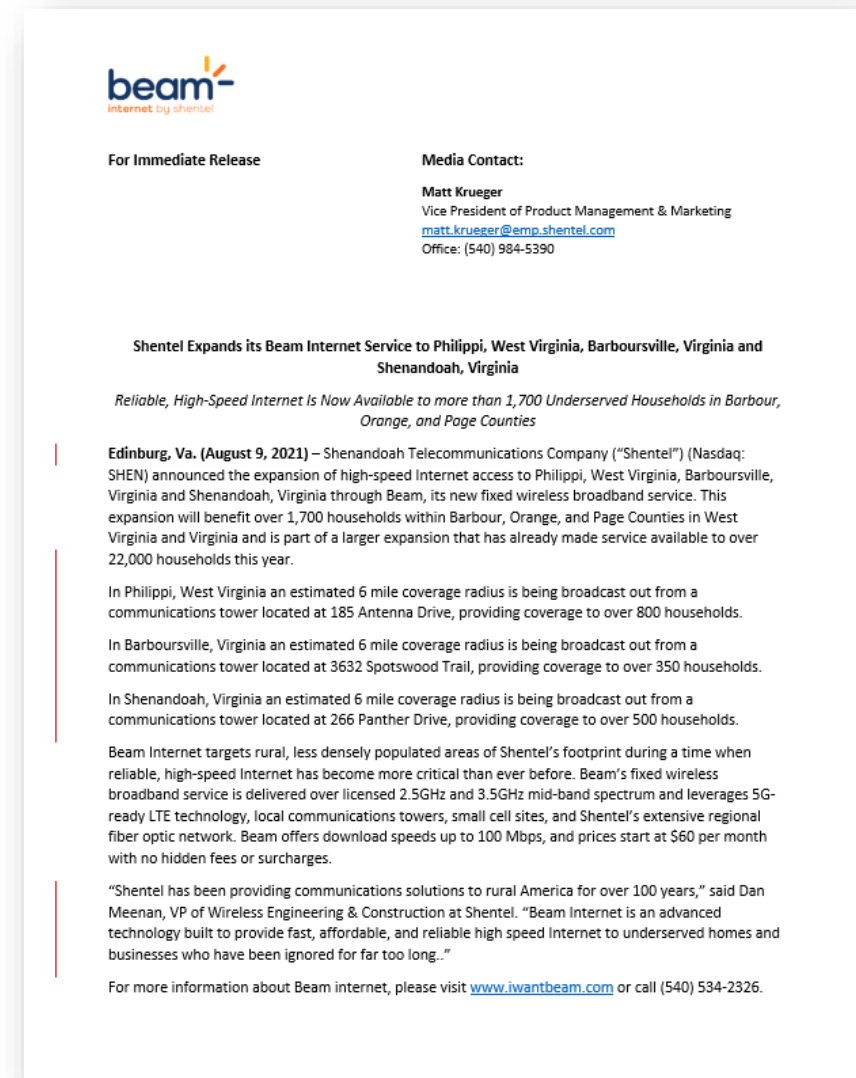
## Timeline

- **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

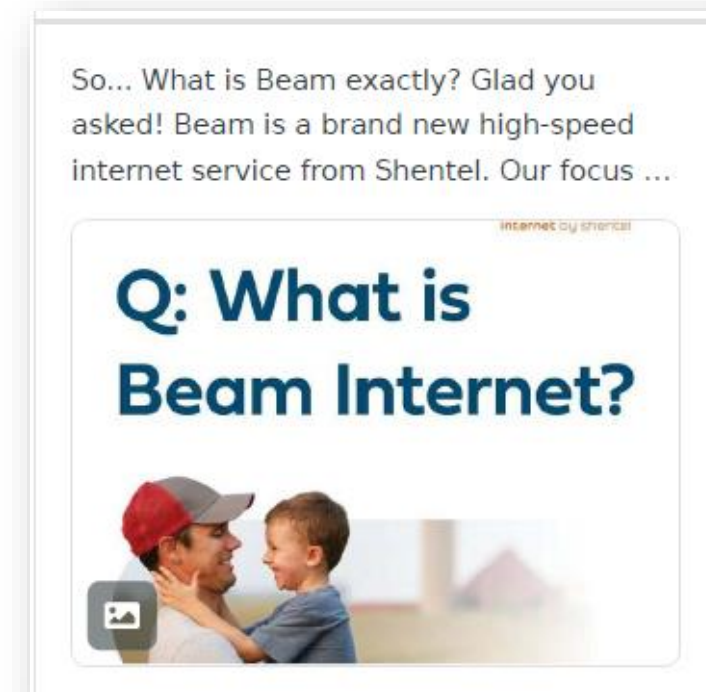
- **Coming Soon Digital Ads**
- Geo-targeted to zip codes/neighborhoods that will be getting Beam.
- Learn more button linked to the Beam website for more information. User can check for serviceability and pre-register.



# 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](http://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**

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

**beam-**  
internet by shentel

**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.

# 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.

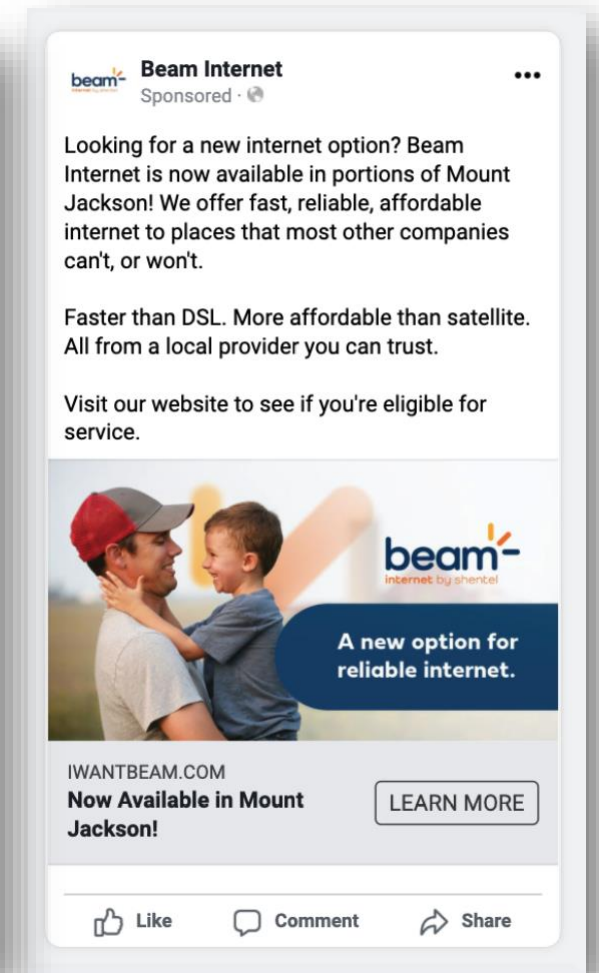
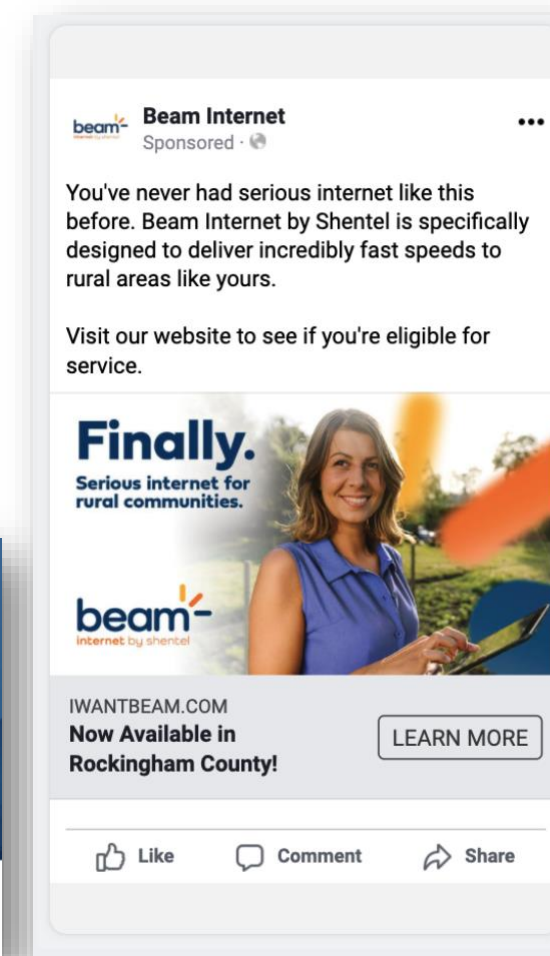
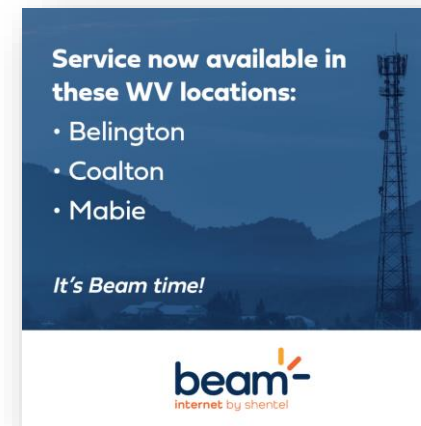




# Marketing & Citizen Engagement Plan

At launch

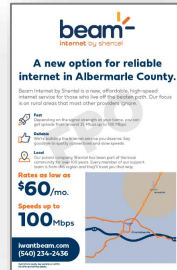
- **Social Media**
- Post on the Beam Facebook and Instagram pages as well as paid advertising through Facebook.
- Posts would provide more details regarding benefits and availability.
- Posts can link to the Beam website, where local addresses can be checked for serviceability and pre-registration.



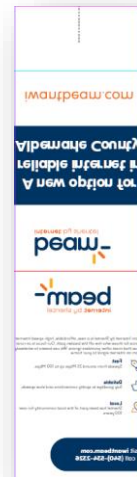
# Marketing & Citizen Engagement Plan

At launch

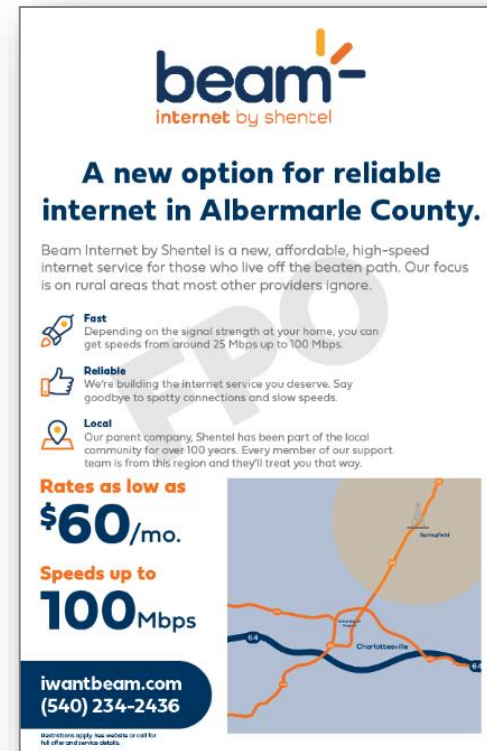
- **Local Marketing**
- Visit local businesses and common gathering places to introduce them to Beam and ask for permission to leave local marketing materials:
  - Flyers
  - Table Tents
  - Small Posters
  - Yard Signs



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



- Table Tent for restaurants and local business countertops



- 11"x17" Customizable Poster

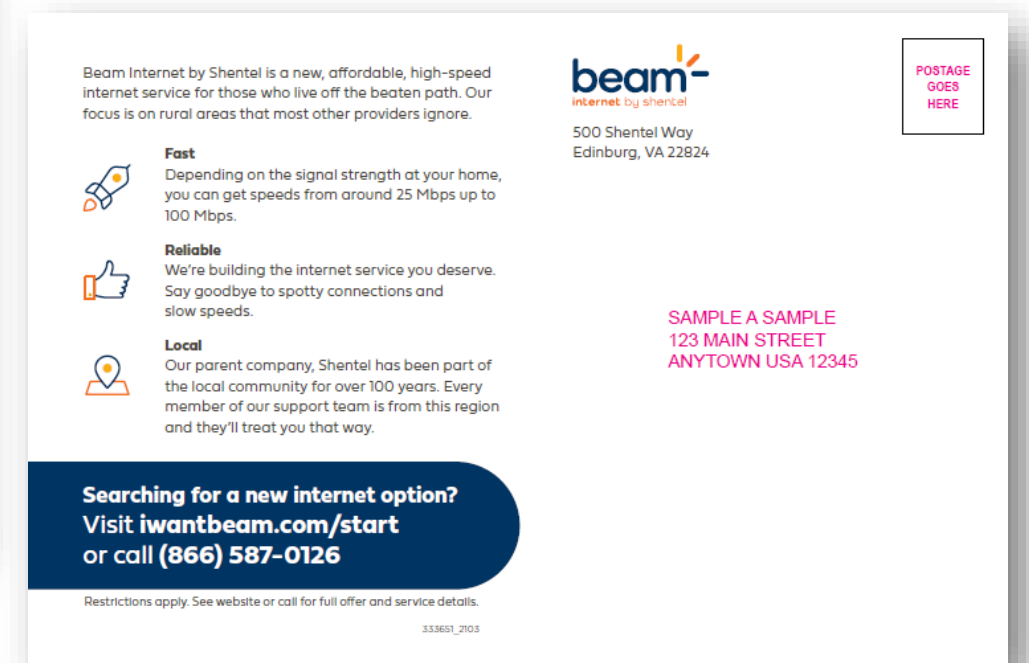
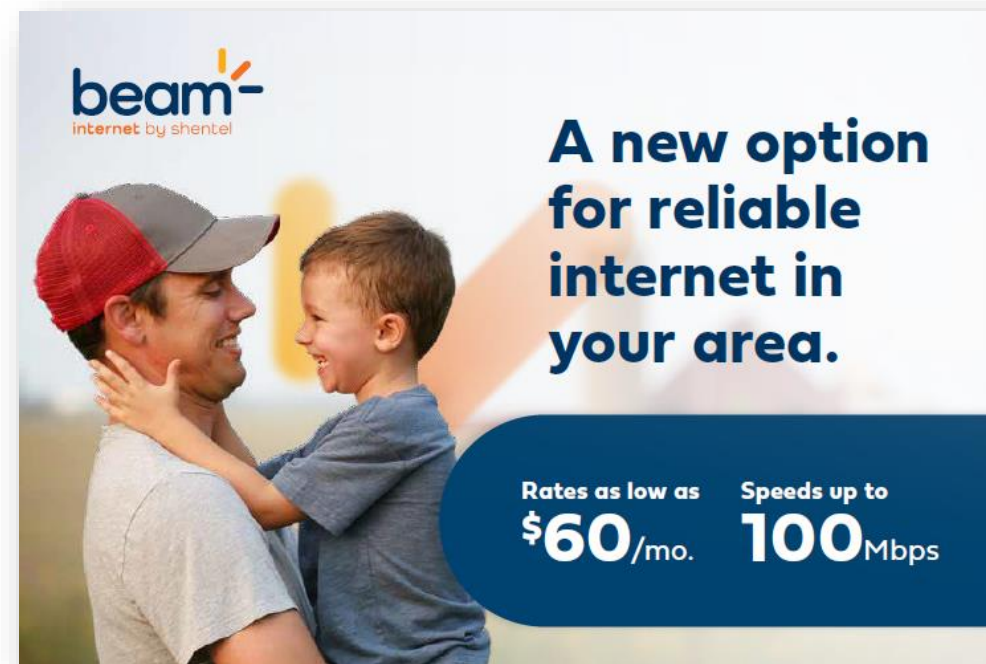


- 24"x48" Yard Stake Signs

# 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

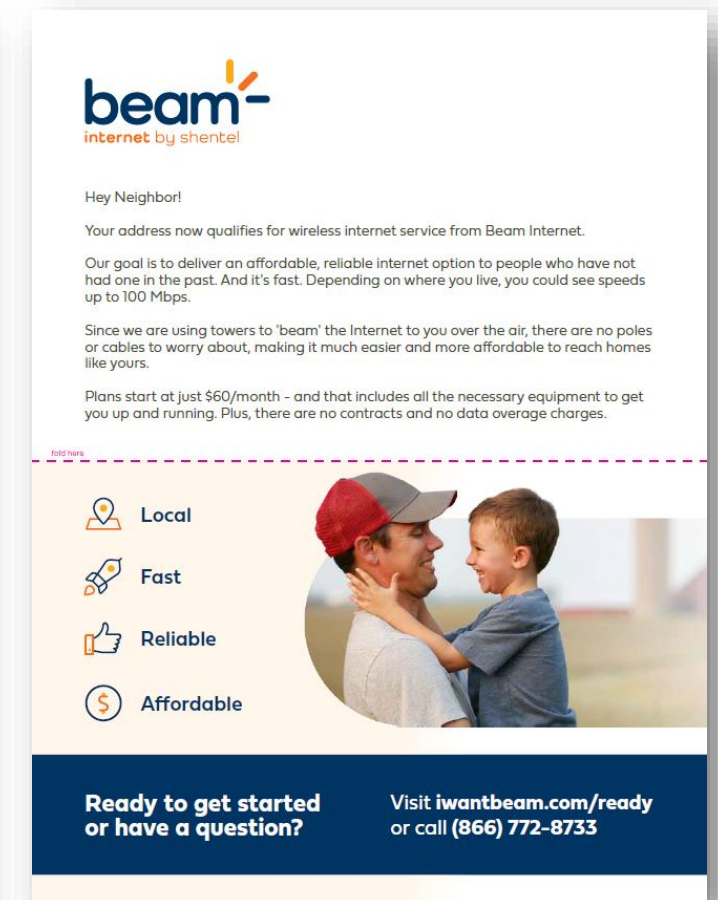
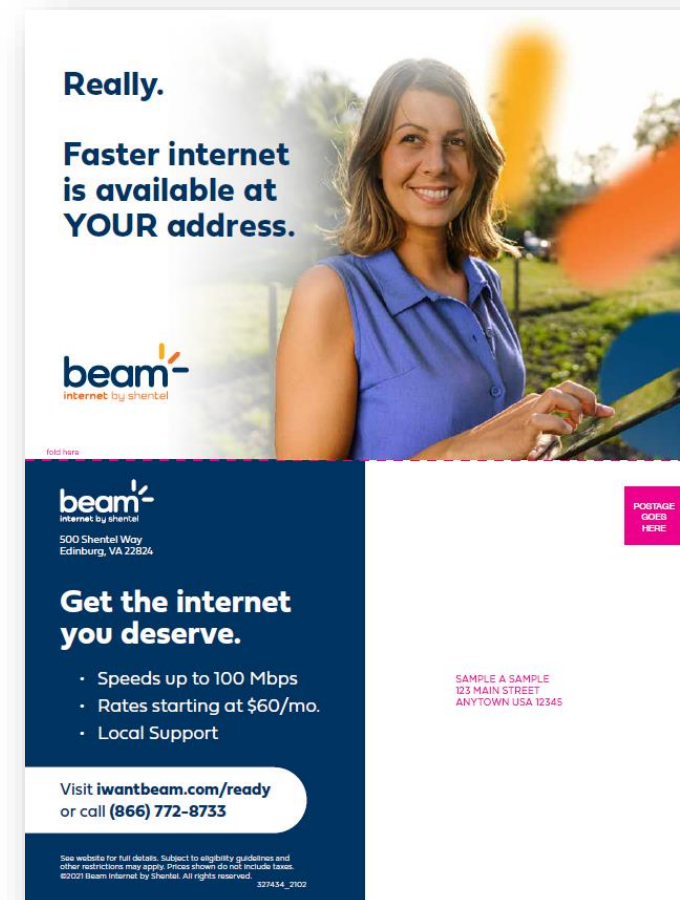
- **Yard Stake**
- Placed in the homeowner's yard after service installation is complete.
- Promotes Beam to both the neighbors & all local traffic.
- Homeowner approval required.



# 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.



# 2022 Virginia Telecommunication Initiative (VATI) Program Guidelines and Criteria



**Erik C. Johnston**  
Director

**Tamarah Holmes, Ph.D.**  
Director, Office of Broadband

**Applicant: Wythe County, VA**

Applicant Contact:

Matt Hankins  
Assistant County Administrator  
Email: [mchankins@wytheco.org](mailto:mchankins@wytheco.org)

**Co-Applicant: Shenandoah Cable Television, LLC (“Shentel”)**

Co-Applicant Contact:

Bryan Byrd  
Regulatory & Industry Affairs  
Email: [Bryan.Byrd@emp.shentel.com](mailto:Bryan.Byrd@emp.shentel.com)

## Application Questions

### Project Description and Need (85 points)

- 1. 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.**

#### Introduction

The Applicant, Wythe County, has collaborated with the Co-Applicant, Shenandoah Cable Television, LLC (“Shentel”), to submit this VATI application. Shentel is a regional and diversified communications company, with corporate headquarters in Edinburg, VA. Shentel has 119 years of experience providing advanced telecommunications services, including cable television (CATV), Broadband Internet, local phone, and mobile phone service. Shentel is a publicly traded company (NASDAQ: SHEN). The company serves Broadband Internet customers in the states of Maryland, Virginia, West Virginia, Pennsylvania and Kentucky. Shentel has remarkable breadth and depth of experience as a full-service Broadband provider, continuing to successfully grow, expand, and adapt in the rapidly changing telecommunications space. Shentel’s long history of providing advanced communication services to rural America makes Shentel uniquely qualified for this project. Shentel has prided itself on cost-effectively building advanced, reliable, and scalable communications services in rural America. The Shentel plan includes highly experienced leadership, competitive bidding, local insight, advanced engineering platforms, efficient supply chain management, local and motivated workforce, and public accounting oversight. As evidenced by both Shentel’s Vision Statement and Shentel’s Mission Statement below, Shentel has learned over the last 119 years that building networks correctly the first time results in higher network reliability and greater customer satisfaction. Shentel may not always be the lowest cost option, but Shentel believes that rural customers deserve carrier grade reliability.

- Shentel Vision Statement – *“Shentel will ensure that rural communities have access to the same level of telecommunication services as those found anywhere else in the U.S.”*
- Shentel Mission Statement – *“Shentel is committed to enriching the lives of the customers we serve with the highest quality telecommunication services by making major investments in technology, using innovative thinking and delivering high quality local customer service that makes using technology easy.”*

Notably, Shentel has twice been named to “Forbes Most Trustworthy Companies in America” and Shentel was named the 2017 Cablefax Independent Cable Operator of the Year.

#### Background

In April 2021, Shentel responded to a Wythe County Request for Proposal (“Wythe County Broadband Partnership Solicitation”). The goal of the Request for Proposal was to provide Broadband to as many of the unserved County residents in the most efficient means, given the County’s lack of home density and rugged terrain. In June 2021, the Wythe County Board of Supervisors authorized County Staff to negotiate a contract

with Shentel. While that contract is pending, Wythe County and Shentel agreed to collaborate on a VATI application as part of this project. Wythe County subsequently submitted the required 2022 Virginia Telecommunications Initiative Application Notice to Virginia Department of Housing & Community Development, effective July 26, 2021.

### Project Area

The project area is anywhere the County had unserved homes which are (i) not part of another VATI grant and which have no federally funded coverage commitment, and (ii) such homes had sufficient density to support either a Fixed Wireless macro cell or a Fixed Wireless small cell. The unserved area was determined through a collaborative, multi-stage approach drawing on many different sources of data to identify all existing unserved homes without a federally funded coverage commitment, or a previous VATI award commitment. Local knowledge, historical service requests, surveys, FCC Form 477 data, and internal engineering estimates were used to estimate all unserved addresses.

### Project Overview

Shentel will develop thirteen (13) new Beam Fixed Wireless cell sites in the County that will cover 2,037 unserved County households. These thirteen sites are depicted on Attachment 1 – Project Area Map. Please note, per the paragraph labelled “Defining Homes Passed and Wireless Risk” later in this proposal (see response to question 9), Shentel believes this is a highly conservative estimate of the unserved County homes that will be covered by Shentel’s thirteen proposed new Beam Fixed Wireless cell sites.

These targeted 2,037 unserved households will chose from three rate plans offering the following speeds:

- 25 Mbps downlink, and 3 Mbps uplink.
- 50 Mbps downlink, and 5 Mbps uplink.
- 100 Mbps downlink, and 20 Mbps uplink.

Primarily due to the lack of home density, Shentel’s design includes 7 macro cell sites and 6 small cell sites to achieve the required 2,037 homes passed. Specifically, in areas that lack sufficient unserved density to support the comparably higher costs of macro cell sites, Shentel will surgically deploy small cell sites. The mix of cell site types (e.g., small cell versus macro cell, collocation vs. new tower, etc.) is also depicted on Attachment 1 – Project Area Map. For more detailed technical information on Shentel’s proposed 13 new Fixed Wireless cell sites and customer premise equipment, please see these additional attachments:

- Attachment 6 – Propagation Map Wireless Project
- Attachment 17 – Cell Site Equipment Infrastructure
- Attachment 18 – Customer Premise Equipment (CPE)
- Attachment 20 – Targeted Cell Site Locations and Design

Shentel will take a hybrid approach to infrastructure ownership. Specifically, where efficiencies can be gained by attaching to existing vertical assets that are owned either by the County or a private company, Shentel will pursue that course via tower lease, and attach Shentel-owned equipment to the third-party



tower (“Collocation(s)”). Shentel contemplates seven (7) likely Collocation leases in this proposal. By contrast, where Collocation opportunities are not possible, Shentel will fully develop new towers on behalf of the County, which expects to utilize them for both Broadband deployment and E911 public safety radio communications. Shentel contemplates six (6) new towers being required in this proposal. After Shentel develops these six (6) new towers, the County will take title to them. This flexible approach will maximize the coverage area while minimizing costs and limiting the need for new towers in the County.

**2. 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).**

To gather the following data regarding existing providers in Wythe County, Shentel used FCC Form 477 data, existing provider web sites, independent web sites, records of prior State and Federal grant awards, local Broadband Commission records, and local knowledge from our embedded base of Shentel CATV employees. Shentel was unable to confirm the exact service area of the two Fixed Wireless operators (in yellow).

Existing Providers in Wythe County	Upload Speeds	DL Speeds	Details	Comments
CenturyLink	100 Mbps	940 Mbps	Internet Plans: 3 Speed Range: 100-940mbp	Connection: DSL and Fiber Installation: Tech Install fee of up to \$125. Self install if available Price Range: \$50-\$65 Contracts: None
Lingo Networks	1 Mbps	100 Mbps	Internet Plans: 4 Speed Range: 10-100mbp	Connection: Fixed Wireless Installation: Complimentary Price Range \$49.95-\$79.95 Contracts: 2 year required
Shentel	50 Mbps	1000 Mbps	Internet Plans: 4 Speed Range: 50-1000Mbps	Connection: Cable Installation: Includes Installation Price Range: \$50-\$200
GigaBeam Networks	3 Mbps	50 Mbps	Internet Plans: 3 Speed Range: 10-50Mbps	Connection: Fixed Wireless Installation: Includes install and wifi router Price Range \$45-\$85 Contracts: 1 year required
Point Broadband	1000 Mbps	1000 Mbps	Internet Plans: 4 Speed Range: 100-1000Mbps	Connection: Fiber Installation: Free Installation Price Range \$55.95-\$115.95 Contracts: none required
Citizens	10 Mbps	100 Mbps	Internet Plans: 3 Speed Range: 10-100Mbps	Connection: Cable Price Range: \$39.95-\$79.95 Contracts: 1 year required

**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. Label Map: Attachment 2 – Documentation on Federal Funding Area.**

Shentel’s analysis shows that its proposed project will not materially overlap and will therefore not conflict.

Please see Attachment 2 – Documentation on Federal Funding Area.

Given the universal nature of this project and the extensive federal grant funding that has already been awarded across the country, there are naturally areas adjacent to this project area with federal grant program awards. As noted in question 1, the goal of this project is to work towards functional universal coverage in keeping with the Virginia Governor's goal. Therefore, some unserved locations which are in close proximity to areas which have received federal funding are included in this project. Per the VATI guidelines, we did not consider satellite awards as overlap. These Federal Awards are shown in Attachment 2 – Documentation of Federal Funding and were removed from the project area.

- 4. Describe if any blocks awarded in Rural Digital Opportunity Fund (RDOF) to the VATI co-applicant are included in the VATI application area. If awarded RDOF areas 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**

This is not applicable to this project. Please see Attachment 3 – RDOF Awarded Areas Form in VATI Area. There are no RDOF funded blocks awarded to Shentel included in this VATI application. As noted in our response to question 3, we identified all RDOF awarded locations and removed them from our analysis.

- 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.**

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. Due to the fact that the unserved areas are estimates in some cases, and 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 is carried out, Shentel has some limited 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.

Please see Attachment 4 – Documentation of Unserved Area VATI Criteria

- 6. 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.**

Please see Attachment 5 – Passings Form. In summary, this project will provide Broadband to 2,037 total net passings. Please note, per the paragraph labelled “Defining Homes Passed and Wireless Risk” later in this proposal (see response to question 9), Shentel believes 2,037 net passings is a conservative estimate of the unserved County homes that will be covered by Shentel’s 13 proposed new Beam Fixed Wireless cell sites.

- 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)**

Please see Attachment 5 – Passings Form. In summary, 210 business, 29 community anchor, and 20 non-residential are included in the project.

- 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.**

Part b is not applicable to the project

- 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.**

Part c is not applicable to the project - none of the 2,037 home passings will require special construction costs.

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

There are an estimated 937 County homes in the project area that have speeds of 10 mbps down and 1 mbps up or less. This estimate is based off of FCC Form 477 data for DSL providers. As already discussed, without detailed information it is impossible to accurately predict competing Fixed Wireless coverage.

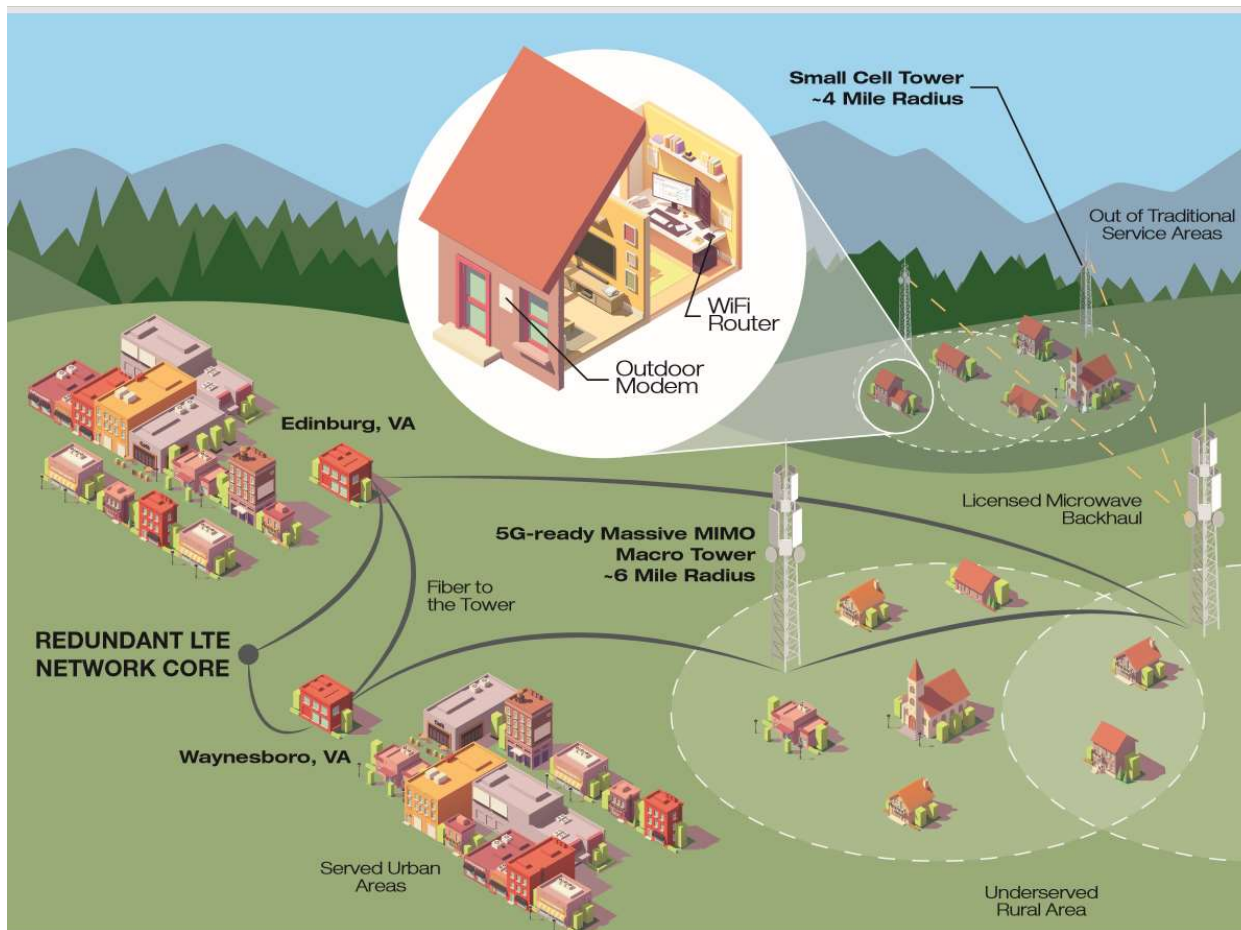
**7. For wireless projects only: Please explain the ownership of the proposed wireless infrastructure. Please describe if the private co-applicant will own or lease the radio mast, tower, or other vertical structure onto which the wireless infrastructure will be installed.**

Shentel will take a hybrid approach to infrastructure ownership. Specifically, where efficiencies can be gained by attaching to existing vertical assets that are owned either by the County or a private company, Shentel will pursue that course via tower lease and attach Shentel-owned equipment to the third-party tower (“Collocation(s)”). Shentel contemplates seven (7) likely Collocation leases in this proposal. All equipment proposed to be attached to these Collocation sites as part of this project will continue to be owned and managed by Shentel.

By contrast, where Collocation opportunities are not possible, Shentel will fully develop new towers on behalf of the County. Shentel contemplates six (6) new towers being required in this project. After Shentel develops these six new towers, the County will take title to the new towers and manage them going forward. Shentel will then have a long-term lease with the County to use these six new towers for Fixed Wireless at mutually agreeable lease rates given the collaboration on this project.

**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)**

As part of the customer installation process, Shentel will professionally install a directional exterior antenna (Outdoor Modem), and up to two interior Wi-Fi units connected via Ethernet cabling. The Outdoor Modem will be approximately 12” x 12” and will be typically mounted near the eave of the customer’s roof. Please see the following schematic description of our network.



- Shentel will provide the following rate plans for its Beam Fixed Wireless service:
    - \$60.00 monthly - up to 25 Mbps downlink, and up to 3 Mbps uplink.
    - \$80.00 monthly - up to 50 Mbps downlink, and up to 5 Mbps uplink.
    - \$160.00 monthly - up to 100 Mbps downlink, and up to 20 Mbps uplink.
  - The aforementioned service fees include up to two in-home Amazon Eero Wi-Fi routers with no additional charges.
  - CPE Equipment will be owned and supported by Shentel post-installation.
  - Beam does not require service contracts. All services are month to month.
  - \$99.00 – professional home installation performed by Shentel Technician.
- More technical information can be found on Attachment 18 - Customer Premise Equipment (CPE).

The Shentel network supports the aforementioned speeds via a shared fixed wireless medium. However, please note the following capacity efficiencies offered by the Shentel Fixed Wireless network:

- Shentel will build a network that leverages dedicated licensed spectrum to ensure maximum capacity and reliability. Shentel has licensed spectrum in the County and will dedicate a full 60 MHz of 3.5 GHz CBRS spectrum. Shentel firmly believes that its priority right to use this vast amount of robust spectrum

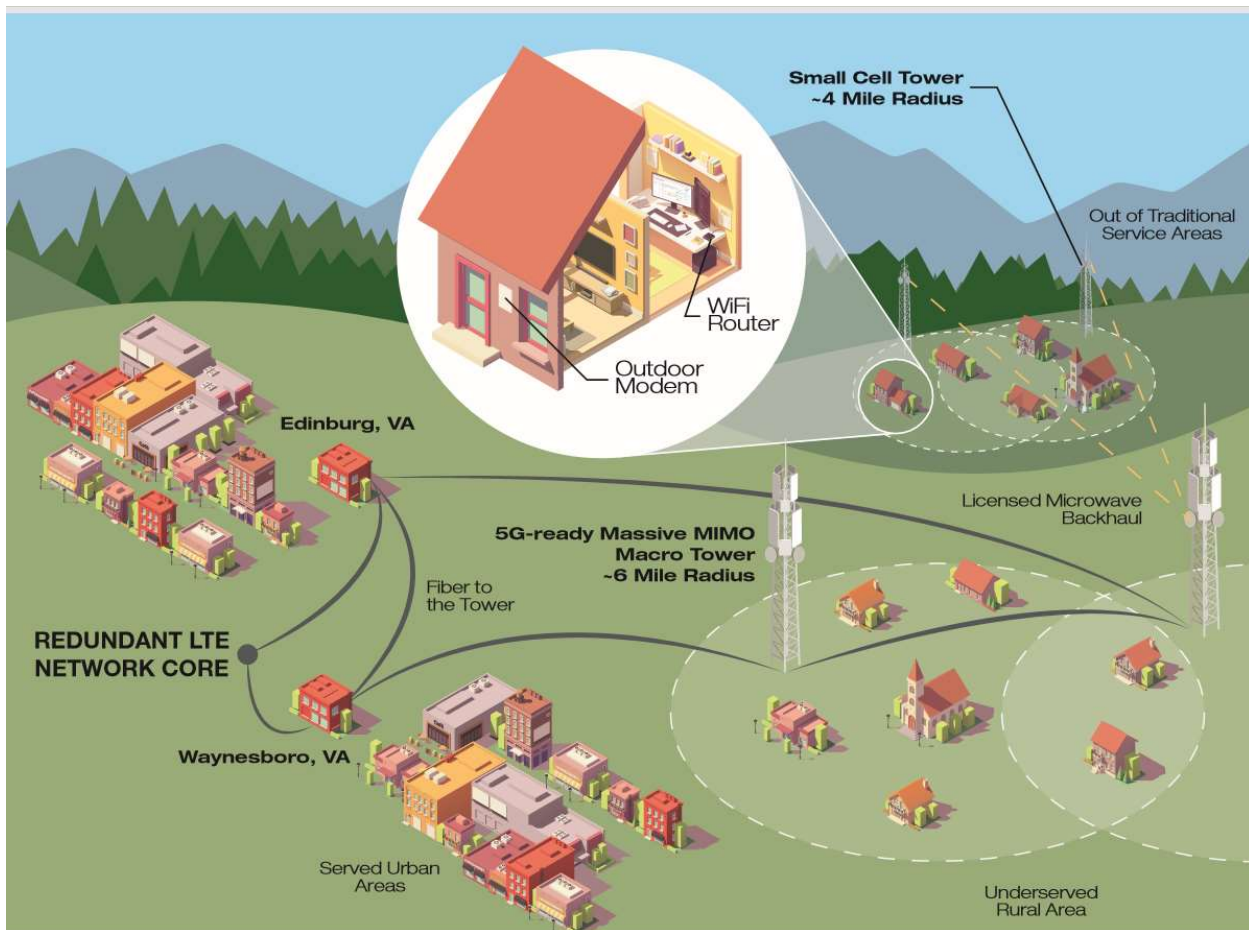
is a key differentiator from other Fixed Wireless providers.

- Shentel’s Fixed Wireless network uses 4G LTE Advanced technology leveraging the 3GPP standard. Shentel will be deploying the most advanced wireless technology to ensure maximum coverage, maximum capacity, and maximum reliability. Further, this 4G LTE network will be constructed to gracefully evolve to support 5G technology in the near future. As an example, Shentel will be deploying the Ericsson Air 6488 – this tower-top equipment is carrier-grade, standards based, and upgradeable to 5G without equipment replacement. These smart antennas are the very latest technology to allow for the most efficient use of radio spectrum resources (e.g., multi-user MIMO, carrier aggregation, beam forming, LTE Transmission Mode 8, etc.). This is the same equipment that national wireless mobility carriers use in their networks (e.g., Sprint, T-Mobile, AT&T, etc.). More technical information can be found on Attachment 17 – Cell Site Equipment Infrastructure.
- Shentel CPE –The Outdoor Modems (customer premise antennas) are manufactured by Seowon Intech, a South Korean company. The Outdoor Modem’s comply with the 3GPP 4G LTE Advanced standard, and feature a 15 dBi high gain antenna resulting in an EIRP of 39 dBm. These LTE Category 15 Outdoor Modems support the very latest in customer premise equipment advances (e.g., 4x4 MIMO, 4-carrier aggregation, 256 QAM, Transmission Mode 8, etc.). More technical information can be found on Attachment 18 - Customer Premise Equipment (CPE).

**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.**

Shentel will develop thirteen (13) new Beam Fixed Wireless cell sites in the County. In addition to the detail below, please see the following attachments:

- Attachment 1 – Project Area Map
- Attachment 6 – Propagation Map Wireless Project
- Attachment 17 – Cell Site Equipment Infrastructure
- Attachment 18 – Customer Premise Equipment (CPE)
- Attachment 20 – Targeted Cell Site Locations and Design
- The following high-level schematic description of our network



### Advanced RF Engineering - Targeting the Unserved

Shentel cell site 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 downlink 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

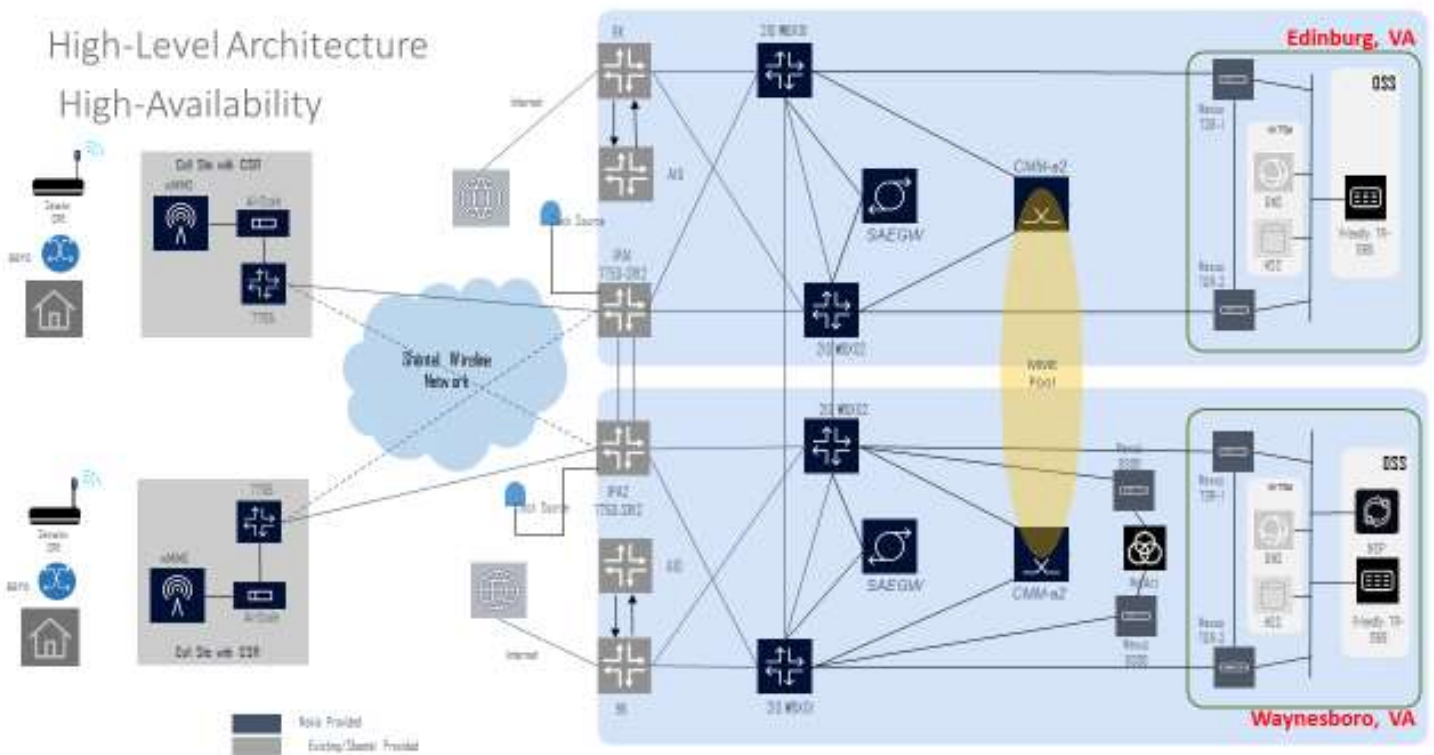
It is important to note that Wireless Networks differ from a traditional fiber or coaxial cable networks (a/k/a “Wireline Networks”). While comparably more costly to build, Wireline Networks rarely have “serviceability risk” with respect to targeted households – if a carrier plans to build to a household, they can usually always get service to the household. By contrast, Wireless Networks are comparably less costly to build and have a 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. Because of this serviceability risk, Shentel has taken a conservative position in designating serviceable homes in this proposal. As an example, while our prediction model showed that 2,546 unserved homes will be covered by these thirteen proposed Fixed Wireless cell sites, Shentel has assumed that only 80% (2,037) of the unserved homes will actually be successfully covered by Fixed Wireless. Further, Shentel has only counted those 2,546 gross unserved homes within the project area that our prediction model indicated would receive a minimum of 13 SINR and -115 dBm RSRP. These minimum signal levels are more conservative than VATI’s guidelines to ensure a better customer experience and maximize network performance. Additionally, Shentel used drive-test data from our existing Beam Fixed Wireless cell sites to further optimize the Shentel propagation model – this allows Shentel to better account for foliage and other obstacles that can affect the signal levels.

These thirteen new cell sites will leverage Shentel’s existing Shentel assets as follows:

- Wytheville County Fiber – Shentel enjoys over 82 route miles of fiber in the County to support fiber connectivity to the proposed new cell sites. This embedded Shentel fiber network helps address one of the biggest risks and cost drivers in developing Fixed Wireless networks – bringing fiber connectivity to rural new cell sites.
- Broadband Backbone – Shentel is a leading ISP in the Mid-Atlantic region. Shentel’s Beam Fixed Wireless network leverages this high-capacity and high-reliability network to provide Broadband to our customers. Shentel will also be able to leverage its existing Point of Presence (PoP) in Wytheville, VA, 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 Internet peering points located in Ashburn, VA and Atlanta, GA.
- Wytheville County Regional Operational Office – Shentel will leverage its local regional dispatch center, regional warehouse, and a technician training center to install and support new Beam Fixed Wireless customers.
- Staffing - Shentel is actively building new macro cell sites in close proximity to Wythe County. As described later in the application, Shentel has an extensive and highly experienced RF Engineering and Site Development team already in place – this same team helped develop the 2000+ Sprint mobility cell sites that Shentel sold to T-Mobile for \$1.9 Billion in July, 2021.



- Customer Care - Shentel supports direct customer service. Shentel owns and manages five (5) Customer Support Contact Centers. They are located in Waynesboro, VA; Rustburg, VA; Lynchburg, VA; Edinburg, VA, and Weston, WV. These Customer Contact Centers work together to provide 24/7 support for residential Beam customers. Customer Service call center is staffed from Monday – Friday 8am to 8pm, Saturday 9am – 5pm. Customer Technical Support is staffed 24/7.
- Two geo-redundant Evolved Packet Cores (EPC's) 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 support 4G LTE via the 3GPP standard, and these EPC's can gracefully scale to 5G with a simple software upgrade when capacity or customer needs require. Please see a depiction of Shentel's EPC topology as follows:



RAN Capacity, Scalability & Performance

Shentel has invested in a network that leverages licensed spectrum to ensure maximum capacity and reliability. Shentel has licensed spectrum in the County and can dedicate a full 60 MHz of 3.5 GHz CBRS spectrum. Specifically, Shentel has priority access to use 40 MHz of this licensed spectrum in Wythe County, and coupled with 20 MHz of Generally Authorized Access channels, Shentel can deploy a full 60 MHz of 3.5 GHz CBRS spectrum to these thirteen 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.

Shentel's Fixed Wireless network uses 4G LTE Advanced technology leveraging the 3GPP standard. As depicted on Attachment 17 – Cell Site Equipment Infrastructure and Attachment 18 – Customer Premise Equipment (CPE), Shentel will be deploying the most advanced wireless technology to ensure maximum coverage, maximum capacity, scalability and maximum reliability. Further, this 4G LTE network will be constructed to gracefully scale to support 5G technology in the near future to meet either capacity or use case needs. As an example, Shentel will be deploying the Ericsson Air 6488 – this tower-top equipment is carrier-grade, standards based, and can be gracefully upgraded to support 5G without tower-top equipment replacement. These smart antennas are the very latest technology to allow for the most efficient use of radio spectrum resources (e.g., multi-user MIMO, carrier aggregation, beam forming, LTE transmission mode 8, etc.). This is the same equipment that national wireless mobility carriers use in their network (e.g., Sprint, T-Mobile, AT&T, etc.). Shentel firmly believes that its long history of building quality networks by investing in carrier-grade equipment is also a key differentiator from other Fixed Wireless providers. In summary:

- The 4G LTE Advanced RAN equipment and CPE are both capable of 3-carrier aggregation in the downlink (60 MHz channel) and 2-carrier aggregation in the uplink (40 MHz channel). Carrier aggregation is both contiguous and non-contiguous.
- With carrier aggregation of 60 MHz of licensed spectrum in the downlink and 40 MHz of licensed spectrum in the uplink, the network is capable of delivering more than 300 Mbps downlink and 40 Mbps uplink to a single user.
- 64T64R Multi User MIMO (“MuMIMO” or “mMIMO”) with beamforming allows the forming of up to 8 orthogonal (spatially diverse) user groups with each user group receiving LTE Transmission Mode 8 in a single 65-degree tower sector, creating a theoretical downlink capacity gain of 8x for a total downlink capacity of 2.4 Gbps (8 x 300 Mbps) on a 60 MHz channel. Real-world limits are always less than theoretical limits. In practice, 3 to 4 orthogonal user groups are formed, resulting in 3x to 4x capacity gains and a real-world sector capacity of up to 1.2 Gbps per sector. Typically, each macro cell site will have four sectors resulting in up to 4.8 Gbps of capacity per macro cell site.
- Current latency is in the 30-50ms range and declining as 5G standards evolve.
- The RAN is generally upgradeable to 5G standards without replacing tower-top equipment, which will enable future real-world capacity that is closer to the theoretical limit.
- Shentel uses currently measurable performance (not theoretical performance) for capacity planning. This highly conservative approach helps ensure that network capacity will exceed demand.
- As evidenced by both our Vision Statement and our Mission Statement below, Shentel has learned over the last 119 years that building networks correctly the first time results in higher network reliability, greater customer satisfaction, and low customer churn. Shentel may not always be the lowest cost option, but Shentel believes that rural customers deserve carrier grade reliability. As a testament to our confidence and subsequently managing quality network, Shentel does not require its customers to sign service contracts.
  - Shentel Vision Statement – *“Shentel will ensure that rural communities have access to the same level*

*of telecommunication services as those found anywhere else in the U.S.”*

- Shentel Mission Statement – *“Shentel is committed to enriching the lives of the customers we serve with the highest quality telecommunication services by making major investments in technology, using innovative thinking and delivering high quality local customer service that makes using technology easy.*

**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)**

This project does not initially achieve universal broadband coverage. However, in conjunction with the prior Point Broadband VATI award and RDOF award winners, this application will provide significant improvement in the County’s digital divide. In aggregate, this proposed Shentel project (2,037 homes passed), plus the pending Point Broadband VATI and RDOF areas (2,152 homes passed), will reach an estimated 4,189 of the remaining 5,680 unserved homes (74%). Unfortunately, there will still be an estimated 1,491 homes remaining in the County without access Broadband. These homes represent the most difficult to reach homes in the County, situated in areas that Fixed Wireless service will have trouble reaching.

While this application (service area) will not achieve full universal coverage, the County and Shentel have a Phase 2 engineering design that would reach the remaining 1,491 unserved homes. Shentel will continue to explore Phase 2 options with the County to expand coverage to the remaining unserved homes in 2023, subject to obtaining additional subsidy.

Unfortunately, the extremely rugged terrain, foliage, and lack of home density, Shentel estimates the Phase 2 will take an additional 45 new Fixed Wireless small cells to cover these remaining unserved homes. However, this Phase 2 design is based on the following assumption constraints, which will likely change for the better in the near future:

- The current 4G LTE standard – for example, 5G and even 6G may improve RF propagation limitations of cell site equipment and customer premise equipment.
- The use of 3.5 GHz CBRS spectrum – for example, low band spectrum may become available in the future and thereby significantly improve propagation for the proposed Fixed Wireless cell sites.
- The FCC’s requirement to limit power in the 3.5 GHz CBRS band - This FCC power limitation is being questioned by at least one Tier 1 Wireless Carrier (AT&T), and a normalization of power levels for this spectrum band would definitely improve coverage for both these proposed 13 new Fixed Wireless cell sites in this application, as well as the contemplated Phase 2 cell sites.

Additionally, Shentel has also signed a Non-Disclosure Agreement (“NDA”) and has had several meetings with the local power company, Appalachian Power (a/k/a “American Electric Power”, “AEP”) regarding possible “middle mile” fiber collaborations. A successful collaboration with Appalachian Power may result in cost effectively bringing fiber to some of these 1,491 remaining unserved homes, and thereby further reduce the initial Phase 2 estimate of 45 new Fixed Wireless smalls.

**Project Readiness (40 points)**

- 11. 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)**

Based on Shentel's existing assets in the County, the Shentel RF Engineering team's extensive design work generated by the County's RFP, Site Development team, and relationships, this project is in a very favorable state of development. Specifically, unserved homes are identified, the network design is in place to cover these unserved homes, the County has completed an RFP and signed the MOU (see Attachment 8 – MOU), existing tower assets are identified, and site locations without existing towers have been reviewed.

**Local Presence**

As the incumbent Cable Television (CATV) provider in Wythe County, Shentel will leverage its fiber assets, Broadband backbone, local knowledge, employee base, and regional offices. Our offices in Wytheville and Radford have over 26 employees inclusive of a regional dispatch center, a regional warehouse, and a technician training center. Beyond Shentel's CATV network consisting of 135 route miles of coax, Shentel has an additional 82 route miles of fiber in the County. As an example, Shentel currently provides fiber services to 20 businesses in the commercial footprint, including the Wythe County Public Library. This embedded Shentel fiber network helps address one of the biggest risks and cost drivers in developing Fixed Wireless networks – bringing fiber connectivity to rural new cell sites.

**Network Ready**

Shentel's Beam Fixed Wireless network is 100% ready now to handle this project. As described on Attachment 7 – Timeline Project Management Plan, Shentel anticipates the first customers to be installed within 7 months for these reasons:

- RF Engineering Network Design – Shentel's highly experienced RF Engineering team has already identified the unserved homes and completed a 13-site network design. Once the project is approved, search rings for the 13-sites will be immediately issued to Shentel's highly experienced Site Development team (see below) to finalize the site candidates already identified. RF Engineering will review actual site candidates provided by the Site Development team and approve candidates if they reconcile and support the completed network design. Once a candidate is approved by RF Engineering, Site Development will develop the site. While Shentel has activated new cell sites within 3 months,

typical development timelines are 6-14 months. These 13 sites will be a top priority in Shentel's 2022 Fixed Wireless capital plan.

- Core Infrastructure - In early 2020, Shentel successfully developed a geo-redundant 4G LTE Evolved Packet Core. This geo-redundant core is upgradeable to support 5G with a comparably simple software upgrade. The core is ready now and does not need any capacity added to support these new cell sites. Since 2020, Shentel has developed and activated 47 new macro cell sites (primarily in rural Virginia counties) that leverage this high availability and standards-based Evolved Packet Core.
- Spectrum – In 2020, Shentel 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 Wythe County, VA, as well as 73 other counties across rural parts of Virginia, West Virginia, Maryland and Pennsylvania. Shentel has priority access to use 40 MHz of this licensed spectrum in Wythe County, MD. Coupled with 20 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.
- Mobilization & Staffing – In 2021, Shentel currently operates 47 Fixed Wireless macro cell sites, and is actively building an additional 18 new macro cell sites to be completed by December, 2021. All of these cell sites support 4G LTE Advanced, and can scale to support 5G without changing tower equipment. Importantly, many of these new 2021 cell sites are in close proximity to Wythe County. Further, as described later in the application, Shentel has a highly experienced Wireless Site Development team already in place – this same team helped develop the 2000+ Sprint mobility cell sites that Shentel sold to T-Mobile for \$1.9 Billion in July, 2021.
- Broadband Backbone – Shentel is a leading ISP in the mid-Atlantic region. Our Beam Fixed Wireless network leverages this high-capacity and high-reliability network to provide Broadband to our customers. Shentel will also be able to leverage its existing PoP in Wytheville, 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 Internet peering points located in Ashburn, VA and Atlanta, GA.
- Wytheville County Regional Operational Office – Shentel will leverage its local regional dispatch center, regional warehouse, and a technician training center to install and support new Beam Fixed Wireless customers.
- Customer Care - Shentel supports direct customer service. Shentel owns and manages five (5) Customer Support Contact Centers. They are located in Waynesboro, VA; Rustburg, VA; Lynchburg, VA; Edinburg, VA, and Weston, WV. These Customer Contact Centers work together to provide 24/7 support for residential Beam customers. Customer Service call center is staffed from Monday – Friday 8am to 8pm, Saturday 9am – 5pm. Customer Technical Support is staffed 24/7.
- Financial Strength - Per Attachment 10 - Documentation of Match Funding, Shentel is a publically traded company (NASDAQ: SHEN) with a highly favorable balance sheet and highly favorable cash position. Once this proposed project is approved, Shentel will expeditiously purchase materials and re-deploy existing staffing.
- Shentel is a regional and diversified communications company, with corporate headquarters in Edinburg,

VA. Shentel has over 119 years of experience providing advanced telecommunications services including cable television (CATV), Broadband Internet, local phone, and mobile phone service. Shentel is a publicly traded company (NASDAQ: SHEN). The company serves Broadband Internet customers in the states of Maryland, Virginia, West Virginia, Pennsylvania and Kentucky. Shentel has remarkable breadth and depth of experience as a full-service Broadband provider, continuing to successfully grow, expand, and adapt in the rapidly changing telecommunication space.

- Our long history of providing advanced communications services to rural America makes Shentel uniquely qualified for this project. Shentel has prided itself on cost-effectively building advanced, reliable, and scalable communications services in rural America. The Shentel plan includes highly experienced leadership, competitive bidding, local insight, advanced engineering platforms, efficient supply chain management, local and motivated workforce, and public accounting oversight.

Please see Attachment 7 – Timeline Project Management Plan and Attachment 8 – MOU between Shentel and Wythe County for additional information regarding typical timelines, performance milestones, and the contractual commitment between the County and Shentel.

**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.**

Wythe County has not been a direct recipient of VATI Grants. However, Wythe County is a member of the Mount Rogers Planning District Commission. The Mount Rogers Planning District Commission was awarded a VATI grant in January 2021 to serve the southwestern quadrant of Wythe County in partnership with Point Broadband offering a fiber-to-the-home project. The project is in the deployment phase of implementation. However, please note, Shentel's proposed project has very little overlap (if any) with the prior Mount Rogers Planning District Commission & Point Broadband VATI grant.

**13. 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;**

Please see Attachment 9 - Funding Sources Table and Attachment 10 – Documentation of Match Funding. In summary, this project is in compliance for VATI (40%), Applicant / County (30%) and Co-Applicant / Shentel (30%) as follows:

<b>Project Costs</b>	
<b>Total Project Cost</b>	<b>\$ 3,538,225</b>
Total Consolidated Cost Per Home Passed	\$ 1,737
Proposed Shentel Contribution	\$ 1,061,467
% Proposed Shentel Contribution	30%
Proposed Shentel Cost Per Home Passed	\$ 521
Proposed County Contribution	\$ 1,061,467
% Proposed County Contribution	30%
Proposed County Cost Per Home Passed	\$ 521
Proposed VATI Contribution	\$ 1,415,290
% Proposed VATI Contribution	40%
Proposed VATI Cost Per Home Passed	\$ 695

**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)**

Applicant Leverage

The County permitting office will fast track all permitting submissions and will create a protocol to facilitate this process to ensure success with County procedures. The goal will be to avoid lengthy processing delays and significantly improve speed to market.

Co-Applicant Leverage

Shentel will provide leverage in several different forms to support this project. Shentel has a local office location and customer support center located in Wytheville, 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 County area. 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. This will both reduce costs and increase deployment speed (e.g., local CATV and fiber plant, existing PoP in Wytheville to ensure high quality services by linking this network to Shentel's existing fiber network with redundant Tier 1 Internet peering points located in Ashburn, VA and Atlanta, GA, etc.), further decreasing costs and increasing deployment speed.

Partnering

Shentel has signed a Non-Disclosure Agreement (“NDA”) and has had several meetings with the local power company, Appalachian Power (a/k/a “American Electric Power”, “AEP”) regarding possible “middle mile” fiber collaborations. A successful collaboration with Appalachian Power will result in more cost effectively bringing fiber to some of these proposed thirteen Fixed Wireless cell sites. Once the project is approved and Shentel starts designing fiber connectivity to the thirteen Fixed Wireless cell sites, Shentel will then work with Appalachian Power to determine if we can partner to realize additional cost savings, speed to market, or other efficiencies.

**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)**

Shentel believes 50% to 70% of the homes passed will subscribe to internet service within 5 years of availability. We have seen similar take rates in unserved areas with our current offerings. Customers want reliability and local customer support - we are a network built with carrier-grade equipment, licensed spectrum, local people, and a strong brand in Wythe County given our existing commercial fiber and cable television (CATV) businesses.

Shentel/Beam plans to promote customer take rate through an integrated marketing plan that utilizes multiple reinforcing tactics that are deployed well before & after a new coverage area goes “live”. Our marketing plan utilizes public relations (“PR”), mass media, social media, digital advertising, direct mail, email, printed collateral and merchandising pieces. All of these tactics are reinforced by a robust website, a dedicated customer service team and Sales & Marketing representatives on the ground, in market.

Shentel hopes that you will please spend some time on the extensive web site Shentel has developed to support our Beam Fixed Wireless customer inquiries: [www.IwantBeam.com](http://www.IwantBeam.com) . You may enter in the following address if you would like to see a demonstration of the online ordering process: 3030 Legion Way Broadway VA, 22815 (please go no farther than the credit check request). Lastly, this is a recent testimonial from one of our current Beam customers: <https://vimeo.com/595252288/1305cc439f>

A summary of our Beam Marketing and Engagement plan is as follows:

- **30 - 60 days prior to launch:** Public relations 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 advertising 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 advertising messaging. We target mobile phones, tablets, laptops & traditional desktop computers within the coverage area. All digital ads link to our 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.

Please see Attachment 19 - Marketing & Citizen Engagement Plan for more specific examples of Beam Fixed Wireless creative material.

**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.**

The Wythe-Grayson Regional Public Library offers formal and informal instruction in digital literacy along with access to the computers necessary to educate the community on digital literacy. Further, Wytheville Community College and HOPE, the local community action agency, offer similar digital literacy outreach. Additionally, the County GIS and Shentel will map and advertise the Beam Fixed Wireless build progress. These maps will be used publicly to explain to citizens and businesses what Broadband services are available to them. Please see Attachment 11 – Letters of Support for more color on the community enthusiasm for this project.

For those County residents who have economic challenges with affording Broadband:

- a. Shentel is a certified ETC carrier. As an ETC carrier, Shentel is able to offer a \$10 lifeline discount to eligible homes.
- b. Shentel is participating in the Emergency Broadband Benefit (EBB) Program to bring affordable Internet to eligible households. EBB would apply to Beam Fixed Wireless customers. The discount is up to \$50.00 per month applied against monthly recurring charges for eligible Internet services.

Households are eligible if at least one of the following criteria is met:

- a. Household income is 135% or less than the Federal Poverty Guidelines;
- b. A household member participates in one of the following federal assistance programs: Supplemental Nutrition Assistance Program (SNAP), Medicaid, Supplemental Security Income (SSI), Federal Public Housing Assistance (FPHA), Veterans Pension and Survivors Benefit, Tribal Programs (and live on federally-recognized Tribal lands);
- c. A household is approved for the free or reduced price school breakfast/lunch program, including through the USDA Community Eligibility Provision;
- d. Household experienced substantial documented loss of income since February 29, 2020 with a total household income in 2020 below \$99,000 for single filers and \$198,000 for joint filers;
- e. A household member received a federal Pell grant in the current award year

**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.**

Project Management Plan

As described in the table at the end of this section, Shentel has a highly qualified team of RF Engineering, Wireless Site Acquisition, Core Network Engineering, and Wireless Construction employees. These employees are the same people who helped develop and manage:

1. Shentel's 2000-cell site mobility wireless network. This 2000-site mobility network (Sprint-branded) was sold to T-Mobile in July, 2021 for \$1.9 Billion),
2. Shentel's 220-site tower portfolio. Shentel still owns and manages this tower portfolio.
3. Shentel's 47 Beam Fixed Wireless macro cell sites. Shentel is actively developing 18 additional cell sites for activation in 4Q 2021. Therefore, we will end 2021 with approximately 66 Beam Fixed Wireless cell sites. Per Attachment 17 Cell Site Equipment Infrastructure, each of these cell sites make use the latest advances in wireless technology (e.g., carrier aggregation, multi-user MIMO, beam steering, etc.) to make the most efficient and robust use of Shentel's spectrum, and to gracefully evolve from 4G LTE Advanced to 5G.

Please see Attachment 11 – Letters of Support related to community enthusiasm for this project.

Prior Grant Experience

Shentel has an extensive background in successfully winning and executing on local, state, and federal grants. Shentel has a team of employees dedicated to working with jurisdictions on grant applications and partnerships. This team is led by Chris Kyle, Vice President Industry Affairs and Regulatory. Two recent awards specific to Beam Fixed Wireless include:

- Albemarle County, VA – In August 2020 following an RFP process, Albemarle County Broadband awarded approximately \$700,000 in grant money for Shentel to develop six new Beam Fixed Wireless macro cell sites to address Albemarle County's unserved constituents. Shentel exceeded expectations in both speed to market and customer satisfaction. All six cell sites were completed by November, 2020. Notably, two of the six cell sites were completed in October, 2020 – just two months following the RFP award. Albemarle County had a strong need to address the unserved during the COVID pandemic, and they were very pleased we were able to execute well ahead of plan.
- RDOF (Rural Digital Opportunity Fund) – In December 2020, Shentel participated in FCC Auction 904 and successfully won rights to develop Beam Fixed Wireless cell sites in eight counties (seven in Virginia and one in West Virginia) to provide Broadband to approximately 8,642 unserved households. Total federal subsidy payable to Shentel will be approximately \$5 million.

Employee	Title	Role	Qualifications
<b>Dan Meenan</b>	Vice President Wireless Engineering & Construction, Fixed Wireless Network	Executive oversight of the Fixed Wireless deployment and support	Executive with over twenty years of diverse telecommunications management experience inclusive of wireless mobility networks, fixed wireless networks, and cable television.
<b>Paul Lopez</b>	Director of RF Engineering	Responsible for all RF Engineering related to Fixed Wireless deployment and support	Director of RF Engineering, currently managing a wireless CDMA-EVDO-LTE network of approximately 2,000 cell sites in seven states. Throughout his career has designed and optimized more than 2,000 cell sites and managed more than 7,000.
<b>Bill Gilliam</b>	Director of Broadband Operations	Responsible for all customer installation and support for both Fiber to the Home and Fixed Wireless	Industry leader with over 20 years of diverse telecommunications management experience. Former Vice President and General Manager for Time Warner Cable and Bright House Networks in Central Florida. Responsible for the upgrade, launch, and ongoing operations of the company's Broadband service networks across Virginia, West Virginia, Maryland, Pennsylvania and Kentucky.
<b>Jessica Wilmer</b>	Site Acquisition Manager	Responsible for pre-construction deployment of Fixed Wireless cell sites	20 years of wireless telecommunications industry real estate acquisition and site development experience. Currently manage a wireless mobility network comprised of approximately 2,000 cell sites in seven states. In her career, has developed over 500 new cell sites. Former Zoning Administrator in Augusta County. Extensive experience with Zoning and Planning, the Wireless industry, and governmental affairs.
<b>Brad Bays</b>	Construction Manager	Responsible for construction deployment of Fixed Wireless cell sites	Currently managing a wireless mobility network comprised of approximately 2,000 cell sites in seven states. In my career have built, and managed 6,000 wireless sites since 1999.

### **Project Budget and Cost Appropriateness (135 points)**

**17. 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)**

Shentel will be responsible for funding the following related to the thirteen new Fixed Wireless cell sites:

- 30% of the initial network capital cost for the thirteen new cell sites (with the remaining 70% of initial network capital cost being paid by the County and VATI)
- 100% of the annual network support expense
- 100% of the spectrum cost
- 100% of the customer premise cost to connect
- 100% of the customer care expense

Please see Attachment 12 – Derivation of Costs and Attachment 13 - Documentation of Supporting Cost Estimates.

With respect to Attachment 13 - Documentation of Supporting Cost Estimates, Shentel provide a detailed budget based on historical average cost per cell site. Shentel then included supporting invoices, quotes and other information generally supporting most of the averaged costs depicted in the budget.

**18. The cost benefit index comprises 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:**

- a. **Total VATI funding request**
- b. **Number of serviceable units**
  - i. **(up to 125 points)**

The total VATI funding request is \$1,415,290.

The total number of serviceable units will be 2,037.

The total VATI cost per serviceable unit (home passed) is \$695

More detailed information is listed below:

<b>Homes Passed</b>		
<b>Homes Passed Calculation</b>		
Estimated Gross Underserved Homes in County		5,680
Less County Homes in RDOF & VATI Areas		(2,152)
Net Remaining Underserved Homes		3,528
Gross Homes Covered by the Shentel Project		2,546
Less Wireless Risk (20% safety margin)		(509)
<b>Total Proposed Homes Covered by Shentel</b>		<b>2,037</b>
% of Underserved Homes Covered by Shentel		58%
<b>Cost Benefit Index</b>		
<b>Project Costs</b>		
<b>Total Project Cost</b>		<b>\$ 3,538,225</b>
Total Consolidated Cost Per Home Passed		\$ 1,737
Proposed Shentel Contribution		\$ 1,061,467
% Proposed Shentel Contribution		30%
Proposed Shentel Cost Per Home Passed		\$ 521
Proposed County Contribution		\$ 1,061,467
% Proposed County Contribution		30%
Proposed County Cost Per Home Passed		\$ 521
Proposed VATI Contribution		\$ 1,415,290
% Proposed VATI Contribution		40%
Proposed VATI Cost Per Home Passed		\$ 695

### Commonwealth Priorities (40 points)

**19. 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.**

Per Attachment 5 – Passings, Shentel has identified 210 businesses, 29 community anchors, and 20 non-residential passings included in the project area.

Per Attachment 11 Letters of Support, the lack of Broadband in this rural County is negatively impacting education, economic development, healthcare and public safety. Notably: (i) the local Wytheville schools and the Wytheville Community College have really struggled during the pandemic with students and teachers lacking broadband, (ii) the general serving areas of the County Fire departments in Barren Springs and Ivanhoe lack reliable Broadband, and (iii) local realtors complain frequently that they lose home sales because buyers cannot get Internet access, or because they would have inadequate access through insufficient mediums such as satellite and DSL.

**b. Unique partnerships involved in the proposed project. Examples include electric utilities, universities, and federal/state agencies.**

Shentel has signed a Non-Disclosure Agreement (“NDA”) and has had several meetings with the local power company, Appalachian Power (a/k/a “American Electric Power”, “AEP”) regarding possible “middle mile” fiber collaborations. A successful collaboration with Appalachian Power will result in more cost effectively bringing fiber to some of these proposed thirteen Fixed Wireless cell sites. Once the project is approved and Shentel starts designing fiber connectivity to the thirteen Fixed Wireless cell sites, Shentel will then work with Appalachian Power to determine if we can partner to realize additional cost savings, speed to market, or other efficiencies.

**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 25/3mbps.**

For those County residents who have economic challenges with affording Broadband:

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- 2) Shentel is participating in the Emergency Broadband Benefit (EBB) Program to bring affordable Internet to eligible households. EBB would apply to Beam Fixed Wireless customers. The discount is up to \$50.00 per month applied against monthly recurring charges for eligible Internet services. Households are eligible if at least one of the following criteria is met:
  - a) Household income is 135% or less than the Federal Poverty Guidelines;
  - b) A household member participates in one of the following federal assistance programs: Supplemental Nutrition Assistance Program (SNAP), Medicaid, Supplemental Security Income (SSI), Federal Public Housing Assistance (FPHA), Veterans Pension and Survivors Benefit, Tribal Programs (and live on federally-recognized Tribal lands);
  - c) A household is approved for the free or reduced price school breakfast/lunch program, including through the USDA Community Eligibility Provision;
  - d) Household experienced substantial documented loss of income since February 29, 2020 with a total household income in 2020 below \$99,000 for single filers and \$198,000 for joint filers;
  - e) A household member received a federal Pell grant in the current award year.

## **Additional Information**

### **20. Provide any other information that the applicant desires to include. Applicants are limited to four additional attachments.**

As noted previously in this application, Shentel has included the following four additional attachments:

- Attachment 17 – Cell Site Equipment Infrastructure
- Attachment 18 – Customer Premise Equipment (CPE)
- Attachment 19 - Marketing & Citizen Engagement Plan
- Attachment 20 – Targeted Cell Site Locations and Design

