Application to DHCD Submitted through CAMS

LENOWISCO Planning District Commission

VATI 2024 LENOWISCO Town of Wise Broadband Project

Application ID:	107412072023092326
Application Status:	Pending
Program Name:	Virginia Telecommunication Initiative 2024
Organization Name:	LENOWISCO Planning District Commission
Organization Address:	372 Technology Trail Lane Duffield, VA 24244
Profile Manager Name:	Duane Miller
Profile Manager Phone:	(276) 431-2206
Profile Manager Email:	dmiller@lenowisco.org

Project Name:	VATI 2024 LENOWISCO Town of Wise Broadband Project
Project Contact Name:	Duane Miller
Project Contact Phone:	(276) 431-2206
Project Contact Email:	dmiller@lenowisco.org
Project Location:	372 TECHNOLOGY TRAIL LN DUFFIELD, VA 24244-5330
Project Service Area:	Wise County, Wise Town

Total Requested Amount: $4,000,000.00

Required Annual Audit Status: Accepted

Application to DHCD Submitted through CAMS

LENOWISCO Planning District Commission

VATI 2024 LENOWISCO Town of Wise Broadband Project

Budget Information:

Cost/Activity Category	DHCD Request	Other Funding	Total
Telecommunications	**$4,000,000.00**	**$1,000,000.00**	**$5,000,000.00**
Administration	$60,000.00	$15,000.00	$75,000.00
Other: Engineering	$360,304.00	$90,076.00	$450,380.00
Other: Electronics	$1,221,600.00	$305,400.00	$1,527,000.00
Other: Outside Plant	$2,358,096.00	$589,524.00	$2,947,620.00
Total:	**$4,000,000.00**	**$1,000,000.00**	**$5,000,000.00**

Budget Narrative:

The Town of Wise Broadband Project will cost a total of $5,000,000.00. The request from DHCD is $4,000,000.00 with a match of $1,000,000.00 from the Co-Applicant, Scott County Telephone Cooperative.

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:

The proposed project is located in Wise County, Virginia. This project will be a Fiber-To-The-Premise (FTTP) project in the Town of Wise and will pass 2,045 consumers. SCTC has targeted this area in Wise County due to not having adequate broadband services as well as the county being economically depressed. The co-applicant projects a 60% take-rate of the 2,045 passings, which is 1,227 consumers. This is based on prior grant application percentages.

Wise County has a population of 36,130 which is approximately 102.8 people per square mile. The poverty level for the county is at 20.3%. Wise County has a median household income of $38,888 which is only 62% of the US median household income or 38% below the US median household income. Once this project is complete, the Town of Wise will have access to a fiber-to-premise network with robust broadband speeds which can be expanded to meet any future needs the region demands. Wise County has been ARC-designated distressed since FY2017.

SCTC will construct a Fiber-to-the-Premise (FTTP) project to deliver speeds from 100Mbps/100Mbps symmetrical up to 1Gbps/1Gpbs of symmetrical dedicated broadband service to each location, which is scalable to 10Gbps/10Gpbs. This will allow the constituents of the proposed project area to have a better quality of life. The most important aspect of this project will be providing adequate bandwidth for their children to attend school virtually, work from home/telework, and do doctor visits from home/telemedicine. Also, a robust and reliable fiber infrastructure will promote economic development by attracting business to our rural communities which will create jobs. This will allow us to shift from coal and farming as our primary economic generators to something that is technology-based and sustainable. The Economic Development Agencies are promoting southwestern Virginia as a Telework location due to the fiber assets and robust networks being constructed in the region. This broadband project will provide a robust, reliable, affordable Fiber Broadband network to meet the region's needs today, tomorrow, and into the future.

Attachment 1 - Project Area Map

2. List existing providers in the proposed project area and the speeds offered. Describe your outreach efforts to identify existing providers and how this information was compiled with source(s).

Answer:

Xfinity currently serves the Town of Wise - They claim to offer 1200/35 Mbps on their website, but they can not offer the speeds they claim.

Verizon Legacy provides telephone service to the Town of Wise. They also offer broadband service but do not have 100/20Mbps.

LENOWISCO's co-applicant, SCTC only leases the fiber network that Point Broadband uses in Wise County, therefore, SCTC knows Point Broadband has very few customers in the Town of Wise.

The co-applicant, SCTC had a survey conducted by RISI. (Attachment 20) The survey found that Xfinity could only deliver 100/20Mbps service to only 2.3% of the customers equating to 47 locations.

LENOWISCO/SCTC has successfully acquired four different grants, three from VATI and one from RUS/USDA in the LENOWISCO footprint. None of the four successful grant applications have been challenged by Xfinity. The reason for this is because they cannot deliver 100/20 Mbps on the entirety of their network.

The attached survey does not support Xfinity's claim on the speeds they can offer.

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.

Answer:

A map of the awarded areas around the proposed project area is attached. To the best of our knowledge, the proposed project area does not have any awarded funding within it.

See Attachment 2 - Documentation on Federal Funding Areas.

4. 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 100/20 Mbps and with less than 25% service overlap within the project area for wireless projects and 20% 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 3 – Documentation Unserved Area VATI Criteria.

Answer:

There is a total of 2,045 potential locations within the specified project area in the Town of Wise, VA.

To help determine proof that the proposed service area is unserved/underserved, SCTC hired RISI to conduct speed tests in the proposed service area and the surrounding region. The results of the speed tests have been attached. (See Attachment 20 - RISI Survey) VATI has put a preference on serving locations that do not have 25/3Mbps service. Based on RISI's survey, 35.6% cannot get 25/3Mbps service. This equates to over 728 locations that do not get 25/3Mbps service. The survey also found that Xfinity could only deliver 100/20Mbps service to only 2.3% of the customers equating to 47 locations. Xfinity is the only other provider in the Town of Wise.

LENOWISCO/SCTC has successfully acquired four different grants, three from VATI and one from RUS/USDA in the LENOWISCO footprint. None of the four successful grant applications have been challenged by Xfinity. Because they cannot deliver 100/20bps on the entirety of their network. Xfinity claims on its website that 1,200/35 Mbps is available, but the survey does not support this claim. The threshold for overlap is 20% equating to 409 locations. The 2.3% served overlap is considerably under the allowable 20% overlap. According to today's definition of Broadband at 100/20Mbps, 97.7% of these customers are unserved. Since our co-applicant, SCTC only leases the fiber network that Point Broadband uses in Wise County, therefore, SCTC knows Point Broadband has very few customers in the Town of Wise. Xfinity’s 2.3% number of customers having 100/20bps from the RISI survey was conducted primarily on Xfinity's footprint.

Verizon Legacy provides telephone service to the Town of Wise. They also offer broadband service but do not have 100/20Mbps.

Point Broadband leases its fiber network from the co-applicant, SCTC. The coverage of their service in the Town of Wise is insignificant.

See Attachment 20 - RISI Survey.

5. Total Passings: Provide the number of total serviceable units in the project area. Applicants are encouraged to prioritize areas lacking 25 Megabits per second download and 3 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 4 – Passings Form.

   a. Of the total number of VATI passings, provide the number of residential, business, non-residential, and community anchors in the proposed project area.

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

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

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

   e. Provide the number of passings in the project area that have 25/3 Mbps or less. Describe the methodology used for these projections. (up to 15 points)

Answer:

a. Total VATI Passings: 2,045 Residential 1,732, Businesses 237, Non-residential 10, Community Anchors 66.

b. RDOF Passings: Residential 0, Business 0, Non-residential 0, Community Anchors 0. The only RDOF passings are in Wise County under Point Broadband, but not in the Town of Wise.

c. Special Construction passings: 0 (In all grant-funded subsidized builds, SCTC does not charge additional or special construction costs to the customer and SCTC builds to all consumers that request service.

d. Special Construction Cost passings: 0 The Methodology for Special Construction passings - At 6 customers or less per mile in rural southwest Virginia, all locations are most likely special construction ie: high costs. If the DHCD funds this VATI application, SCTC would build, as always, to everyone without a special construction cost for the drop or the installation. With SCTC's approach, there are no Special Construction Costs in this project.

e. Number of 25/3Mbps or less passings: 732. The Methodology used to determine the consumers with less than 25/3Mbps was taken from a survey conducted by RISI and is included in Attachment 20. The survey determined 35.6% of locations do not have 25/3 Mbps in Wise County. That is over one-third of the households in the proposed service area.

See Attachment 4 - Passings Form

See Attachment 20 - RISI Survey

6. Describe if any blocks awarded in Rural Digital Opportunity Fund (RDOF) are included in the VATI application area. If 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 5 – RDOF Awarded Areas Form in VATI Area

Answer:

There are no RDOF-awarded areas within the project area.

Attachment 5 - RDOF Awarded Areas Form

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:

N/A

8. 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:

Scott County Telephone Cooperative's (SCTC's) network is configured as an actively switched Ethernet network. Active Ethernet is a relatively simpler protocol that uses less complexity and signaling overhead that can provide higher transmission speeds and greater throughput capacities. It allows a greater direct control of actual packet routing and traffic management that provides more granularity for grooming data flow and for analysis/troubleshooting when needed. The sultant customer and inter-carrier connections provide better interoperability and less signaling complexity. SCTC currently uses a combination of Ciena and Calix hardware to light their network. SCTC's current standard deployment gear can provide each end-user with up to 1Gbps of bandwidth. But, with alternate interface cards, speeds up to 10Gbps can be provided to the end-user without deploying special hardware.

In the proposed project, SCTC will be utilizing Calix's Passive Optical Network (PON) solution in preparation of 10Gbps becoming a standard service offering. PON technology allows the service provider to centralize access equipment and reduce turn-up time. With a PON solution, SCTC can offer higher service speeds while reducing the total number of network components needed, thus simplifying network design and lowering administrative overhead.

The SCTC regional network consists of redundantly ringed fiber pathways across the region, each with multiple fiber strands in each cable sheath. These individual strands are lit using Dense Wave Division Multiplexing (DWDM) technology that enables multiple transmission pathways within each fiber strand. Currently, SCTC only uses eight wavelengths to enable up to 80Gbps of throughput capacity strand but is currently in the process of expanding this to forty wavelengths. With this expansion, SCTC will be capable of transporting up to forty 100Gpbs connections.

SCTC uses redundant Juniper routers in its core to process all internet traffic. The routers currently have four 10Gbps-based connections to diverse Internet backbones and two 10gbs direct peering connections. The Internet backbone connections are contracted through GTT, Lumen, Hurricane Electric, Windstream, and Bright Ridge and terminate at diverse sites in our ringed network. Direct peering is established in Atlanta using Digital Realty and in Ashburn using Equinix. The routing of Internet-destined traffic across these seven pathways is managed dynamically using Border Gateway Routing Protocol (BGP).

See Attachment 19 - Detailed Technology for the Project

9. 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 100/20 Mbps. (up to 10 points)

Answer:

For this project, SCTC will offer the following rates: 100Mbps/down & 100Mbps/up @ $59.95/month, 300Mbps/down & 300Mbps/up @ $69.95/month, 500Mbps/down & 500Mbps/up @ $79.95/month and 1Gbps/down & 1Gbps/up @ $99.95/month.

- Leased wireless routers are available at an additional monthly fee of $5.00
- Whole home WiFi Extenders available for an additional $4.95/month per device
- No Contracts or Data Caps
- No Installation fee for initial install
- Higher bandwidth speeds from 1Gbps up to 10Gbps of dedicated bandwidth is scalable per location if requested.

SCTC currently offers the following Programs to its low-income consumers:

- Affordable Connectivity Program - $30.00 monthly discount
- Federal Communication Commission's Lifeline Program - $9.25 monthly discount

SCTC representatives will inform qualifying families of the up to $30 credit that the Affordable Connectivity Program provides by distributing flyers to the schools for students to take home to their parents.

Eligibility for the ACP program is done with NLAD/USAC, just like the Lifeline discount.

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 fits into a larger project to achieve universal broadband coverage due to serving the more unserved areas in LENOWISCO's footprint and beyond.

Powell Valley Electric Cooperative (PVEC), SCTC's partner, has pledged to build fiber to every unserved location and SCTC has agreed to light and manage it. Under the current contract, PVEC and SCTC will do a revenue share which pays back PVEC for any investment they make by SCTC. Until that investment is paid back, PVEC is waiving all pole rental and make-ready charges. Upon repayment of their investment, PVEC will begin charging pole rental fees and the revenue share will discontinue. PVEC will continue to provide customer service and maintenance within their footprint.

The LENOWISCO PDC, SCTC, and PVEC's goal is to have broadband to every location in the LENOWISCO Planning District's footprint. The successful implementation of two VATI grants and the ongoing third VATI grant has demonstrated that it is possible to accomplish this goal. Each entity is committed, so the remaining unserved areas of need will be completed with this project. Therefore, universal broadband coverage in LENOWISCO's footprint would be closer to being achieved with this grant funding and help to finish out the entire LENOWISCO footprint.

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 are encouraged to extensively discuss, where applicable, easements relating to railroad crossings, federally-owned lands and parks, partnerships with the Virginia Department of Transportation, and mobile home parks. 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 10 points)

Answer:

Planning and preliminary engineering for this project is complete. SCTC has an existing partnership with PVEC to provide broadband services to all PVEC customers. This partnership will include no make-readies and no pole rental fees for this project when located in PVEC's footprint. A revenue share agreement is in place for SCTC to pay PVEC for their investment through that revenue share. When PVEC is paid in full, SCTC will own the network. PVEC will start charging pole rental fees and make readies once SCTC pays off PVEC's investment. PVEC will build this project and purchase outside plant materials. SCTC will purchase materials to install the electronics in the network as well as at the customer premise and provide that installation. SCTC will obtain estimates from contractors and vendors to price check. Construction will primarily be aerial and installed on pre-existing poles. Minimal to no ground disturbance is expected and significantly decreases potential environmental impacts.

SCTC has completed planning and preliminary engineering for the Town of Wise. SCTC has existing Pole Attachment Agreements with Old Dominion Power & Appalachian Power Company. The relationship with Old Dominion Power allows SCTC to engineer and determine make-ready costs and use the portal on a system to enter the information and complete pole attachment permits. SCTC will bid the construction of this project and negotiate the best price with SCTC's existing electronics providers. SCTC will bid and purchase the materials with an emphasis on availability. SCTC's engineers will inspect all construction and installations to ensure quality and accuracy. Minimal to no ground disturbance will occur which significantly decreases potential environmental impacts.

LENOWISCO will administer the grant funds and assist in obtaining easements and permits from KU/ODP Kentucky Utilities/Old Dominion Power, if needed. SCTC will manage the construction of the project. SCTC has existing relationships with the applicable power companies involved in attaching to their poles.

(Pole Lease Agreement is included in Attachment 18 - Pole Lease Agreement).

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:

Yes, the LENOWISCO PDC has received three (3) VATI grants. The grants received are listed below.

VATI FY2020LP-001 LENOWISCO Regional Broadband Expansion Phase 1 - The project is complete and closed out.

VATI #2021-001 LENOWISCO US 58 Corridor Broadband Expansion Project - The Project is complete and closed out.

VATICPF/SFRF#2022-014 LENOWISCO District-Wide Broadband Project - Environmentals have been completed. The project is underway and in-home installations are currently being conducted.

13. Matching funds: Complete the funding sources table indicating the cash match and inkind 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 minimum20% match is required to be eligible for VATI, the private sector provider must provide10% 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. If applicants and co-applicants are seeking to include prior expended funds as matching funds, Attachment 11 must be completed. Label Attachments: Attachment 9 - Funding Sources Table; Attachment 10 – Documentation of Match Funding; Attachment 11 - Prior Expended Match Form

Answer:

The Project will cost: $5,000,000.00

SCTC's Private Match (20%): $1,000,000.00

VATI Funding (80%): $4,000,000.00

See Attachment 9 - Funding Sources Table

See Attachment 10 - Documentation of Match Funding

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

Answer:

The LENOWISCO PDC has an existing revenue-sharing agreement with Scott County Telephone Cooperative (SCTC). In 2012, SCTC purchased the LENOWISCO Network, LLC through its subsidiary company, Appalachian Broadband, LLC. SCTC is currently doing a revenue share of 2% of the gross revenue from that network with LENOWISCO. The funds from that revenue share are used for "seed money" to expand broadband service or economic development projects in the LENOWISCO Planning District footprint. Some of that seed money was used to purchase wireless equipment for 17 WiFi hotspots throughout the LENOWISCO footprint in 2019 to provide broadband for school-aged children without service. SCTC provided the installation and the bandwidth.

Due to this grant being phased from the last three VATI LENOWISCO grants, SCTC was and will continue to use some of the same cabinets to house some of the electronics and save a considerable amount of money whenever they can. This project is contiguous to some of SCTC's existing network which allows SCTC to have redundancy in the network which improves service reliability that will be beneficial for all consumers.

Due to SCTC's partnership with PVEC, no make-ready or pole attachment fees were charged on previous VATI Projects, which was a huge savings for SCTC. The partnership allowed fiber deployment on previous VATI projects to be expedited faster and more efficiently. The Co-Applicant, SCTC has existing pole attachment agreements with the areas outside of PVEC's footprint. SCTC's relationship with Old Dominion Power will also reduce costs and expedite this project. (See Attachment 18)

SCTC's partnership with PVEC has provided a great cost reduction for all of LENOWISCO's broadband projects. This partnership has constructed 147 miles of fiber backbone through much of this proposed project area in Lee County which equates to about $2.4 million. The construction of this backbone fiber will basically reduce this project cost by $2.4 million. So, it has reduced the cost per sub substantially as well.

Attachment 18- Pole Attachment Agreement with Kentucky Utilities d/b/a Old Dominion Power Company

15. Communications Plan: Describe efforts to keep the public informed of project progress and the broadband adoption plan.

    a. Explain how you plan on communicating the project status to stakeholders, including but not limited to County leadership, project areas residents, etc. (Up to 10 points)

    b. 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)

    c. 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:

Scott County Telephone Cooperative (SCTC) and LENOWISCO's management team will conduct quarterly conference calls and invite members from the Town of Wise to keep everyone informed on the project. Information contained in the monthly progress reports will be reviewed as well as the progress on the project. Each locality will utilize various social media and traditional communication channels to promote the project and service availability as the project is built out.

A Scott County Telephone Cooperative (SCTC) management team member (Bill Franklin, Roger Fraysier, or Matthew Hill) and a staff member from LENOWISCO will provide 1 or 2 presentations annually at town council meetings to provide project updates.

SCTC's Management Team (Bill Franklin, Roger Fraysier, or Matthew Hill) will keep the Town Manager and or Mayor up -to-date by calling them via telephone to update them on happenings within the project areas if they are unable to be on the quarterly meetings conference call.

Upon building in an area, yard signs will be placed in the area informing all potential customers that fiber is coming soon. The signs will provide a phone number to call for information. Before drops are installed, representatives from SCTC will go door-to-door distributing flyers. SCTC estimates a 60% take rate or 1,227 locations of the 2,045 locations passed based on previous broadband projects SCTC has constructed and completed.

Direct mailers will be sent out by SCTC to addresses in the area being built. SCTC will have customer service staff readily available to answer all inquiries.

SCTC will utilize its websites to keep the communities informed when fiber connectivity will be available in their area. With the Facebook social media platform being a strong marketing tool, a strong presence will be able to reach out to users within the project areas.

SCTC customer service representatives will inform qualifying families of the up to $30 credit that the Affordable Connectivity Program provides when customers call in to sign up for service. SCTC will also be distributing flyers to the schools for students to take home to their parents.

During project construction, SCTC will visit each passing and place a door hanger notification when service is expected to be available and all contact information for the customer for hook-up of their service.

Digital Literacy efforts will be conducted and planned upon the grant approval.

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.

Answer:

- Duane A. Miller, Executive Director of the LENOWISCO PDC with 26 years experience will co-oversee all aspects of the project.
- Rebecca Crockett, Director of Project Development of the LENOWISCO PDC with 15 years experience will oversee project management and grant administration for the project.
- William J. Franklin, SCTC C.E.O. with 29 years experience will oversee all aspects of the project.
- Roger Fraysier, SCTC Executive V.P. of Finance and Operations with 22 years experience will oversee the accounting functions of the project.
- Matthew Hill, SCTC C.O.O. with 29 years experience will oversee the engineering management, network management, and design functions of the project.
- Bridget Betcher, SCTC Accounting Consultant with 5 years experience will conduct accounting functions and upload the submission requests into the CAMS system for reimbursement.
- Melissa Jessee, SCTC Consultant with 33 years experience will conduct the monthly reporting requirements for the project.
- Cody Gray, SCTC Outside Plant Manager with 19 years experience will conduct outside plant management for the project.
- Josh Jones, SCTC I & R Supervisor with 17 years experience will conduct the marketing and data management for the project.

The LENOWISCO Planning District Commission and Scott County Telephone Cooperative (SCTC) have worked together for many years to better the communities, counties, and regions. LENOWISCO will assist Scott County Telephone Cooperative in obtaining permits, right-of-ways, easements or any other assistance needed for this project. LENOWISCO will oversee the management of the grant funds and document the monies to ensure they are dispersed properly.

Scott County Telephone Cooperative's (SCTC's) management team has had many years of experience managing and constructing broadband facilities. SCTC has completed 19 Fiber-to-the-Premise projects totaling approximately $120 million. SCTC will design, construct, manage, and maintain this project. SCTC will be responsible for 20% of the match on this project.

Powell Valley Electric Cooperative (PVEC) has completed several Fiber-to-the-Home projects for other providers totaling approximately $30 million. The existing partnership with LENOWISCO and SCTC along with SCTC's relationship with PVEC to extend Broadband to unserved areas in the region gain the efficiencies of scope and volume which allows all to combine resources to serve a much larger area. The partnerships are ideal for all constituents, whether it's a residential consumer or a business owner. It allows SCTC to offer more bandwidth at a lower price to improve the quality of life, to promote economic development, to improve education, and to improve health care through telemedicine in the region. That is, by example, the driving force behind Cooperatives.

SCTC has an agreement with PVEC that any projects done together, PVEC will construct the outside plant and SCTC will light it. PVEC will, in essence, provide the match for the outside plant construction, but when completed, this match will be repaid by SCTC through its current revenue-sharing agreement that SCTC has with PVEC. When PVEC is repaid from the revenue-sharing agreement, SCTC will own the network. PVEC begins charging pole rental, customer service fees, and maintenance fees. This partnership is a win/win for our communities, our region, and our state.

Attachment 14 - Letters of Support (Stakeholders/Locality)

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:

The proposed project cost of $5,000,000.00 with 80% VATI ($4,000,000.00) and 20% SCTC Match ($1,000,000.00) for the Town of Wise will help get closer to finalizing the initial FY2020, FY2021, and FY2022 VATI Projects and be closer to finishing the LENOWISCO Planning District's footprint.

Project costs include outside plant, CPE, make-ready, engineering, OLT equipment, and railroad crossing costs. All cost estimates are based on SCTC's prior projects. All other costs are procured, with the only exception of electronics. SCTC uses Calix electronic equipment to keep its network operable with SCTC's existing network.

Attachment 12 – Derivation of Costs

Attachment 13 - Documentation of Supporting Cost Estimates

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:

Total VATI Funding request - $4,000,000.00

Number of Serviceable Units - 2,045

19. **Commonwealth Priorities (Up to 50 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 100/20 mbps, include information regarding the internet service provider’s participation in the Affordable Connectivity Program

d. The co-applicant’s efforts to mitigate supply chain constraints, including labor shortages and order-to-delivery delays on telecommunications materials required to construct broadband networks.

e. The applicant’s and co-applicant’s efforts to promote broadband adoption, including, but not limited to: telehealth, smart farming, e-entrepreneurship, and distance learning.

Answer:

There are 237 businesses and 66 Community Anchors in this Town of Wise broadband project area. SCTC hopes to accomplish in Wise County what SCTC has in Scott County and soon to be completed in Lee County, 100% broadband coverage for all school-aged children. This project will pass 2,045 consumers in the the Town of Wise and give them the opportunity to have affordable, reliable, and robust broadband service. SCTC is already serving schools, medical facilities, and business throughout the region. SCTC has partnered with LENOWISCO, and the Virginia Coalfield Coalition to provide broadband service to over 70 cell sites in the region. SCTC manages and operates this network.

b. LENOWISCO and SCTC have a unique partnership and share a common interest in bettering their communities, counties, and region. SCTC's partnership with PVEC is ideal for all constituents because they share the same goal of offering a service to everyone at an affordable price. All parties involved strive to improve the quality of life and promote economic development within their communities, counties, and the entire region. We've seen first-hand the substantial impact that robust, reliable, and affordable high-speed internet can have on rural communities. The need for telecommuting and telemedicine increased significantly during the start of the pandemic, as well as the needs for students doing schoolwork at home were among the most dramatic. LENOWISCO and SCTC teamed up to provide 17 Wi-Fi hotspots for anyone to utilize throughout the region. SCTC extended the school network in Scot County to the homes of 167 school-aged children who did not have service due to their economic conditions. This allowed those students free access to the schools network. For the homes of all school-age children and teachers in Scott County, all accounts were upgraded to the next level of bandwidth at no charge. In Lee County, SCTC built network to over 600 locations without broadband service. Then SCTC gave a $10 discount to all locations which had school-aged children. There were still many more unserved rural areas that did not have the reliable broadband access.

c. Digital Equality efforts will be adopted to ensure low to moderate income households in the project areas will have affordable access to speeds above the 100/20Mbps threshold if this project is awarded. SCTC's 100/100Mbps service offering is only $59.95. Additionally, SCTC intends to add an affordable 2Gig/2Gig symmetrical and 10Gig/10Gig symmetrical offering for residential customers. SCTC has encouraged our customers to sign up for the ACP program which pays $30/month for their broadband customers. SCTC feels this program will continue into the future. This will be vital for region so all of our economically challenged constituents can afford a robust broadband connection for their children's education, family health care and provide for their entrepreneurism opportunities for self-advancement.

d. The co-applicant, SCTC has made the necessary efforts to mitigate supply chain constraints, including labor shortages and order-to-delivery delays on telecommunications materials required to construct broadband networks. SCTC has standing negotiations with their providers.

e. The Applicant's and Co-Applicant's efforts to promote broadband adoption will include: Conducting quarterly conference calls and invite a member from Wise county to keep everyone informed on the project. Information contained in the monthly progress reports will be reviewed as well the progress on the project. Each locality will utilize various social media and traditional communication channels to promote the project and service availability as the project is built-out.

20. **Additional Information**

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 14 – Letters of Support.

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 15 –Two most recent Form 477 submitted to the FCC or equivalent

b. Attachment 16 - Point and Polygon shapefiles, in.zip file form, showing proposed passings and project area

c. Attachment 17 - For wireless applicants: shapefiles, in .zip file form, indicating RSSI projections in the application area

d. Attachment 18 – XXXXXXX

e. Attachment 19 – XXXXXXX

f. Attachment 20 – XXXXXXX

Answer:

g. The co-applicants effort to mitigate costs and delays that may be associated with make-ready and other permitting requirements anticipated for network deployment.

The co-applicant, SCTC, currently has existing agreements with all the electrical providers. Pole attachment agreements will be conducted through ODP, which has changed its process for obtaining pole attachment agreements. ODP's new process makes it more difficult to obtain a pole attachment agreement. SCTC is currently in negotiations with them to better this process.

SCTC has no control over the railroad permits, but SCTC has been working with them to speed up the process.

(e-mailed to VATI@dhcd.virginia.gov)

Attachments:

Derivation of Cost/Project Budget (Use template provided)

Attachment12DerivationofCosts12142023115606.pdf

Application to DHCD Submitted through CAMS

LENOWISCO Planning District Commission

VATI 2024 LENOWISCO Town of Wise Broadband Project

Funding Sources Table (Use template provided)

Attachment9FundingSourcesTable127202332333.pdf

Passings Form (Use template provided)

Attachment4PassingsForm12182023111502.pdf

Documentation of RDOF awarded area in VATI project Area (Use template provided)

Attachment5RDOFAwardedAreasIncludedinVATIApplication1218202383424.pdf

Map(s) of project area, including proposed infrastructure

Attachment1ProjectAreaMap1272023123325.pdf

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

Attachment2DocumentationofFederalFundingArea12142023125057.pdf

Documentation that proposed project area is unserved based on VATI criteria

Attachment3DocumentationUnservedAreaVATICriteria12182023121929.pdf

Timeline/Project Management Plan

Attachment7TimelineProjectManagementPlan12182023102354.pdf

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

Attachment8MOUbetweenLENOWISCOSCTC1214202392314.pdf

Documentation of Supporting Cost Estimates

Attachment13DocumentationsSupportingProjectCosts12142023115332.pdf

Letters of Support

Attachment14LettersofSupport1219202383608.pdf

Two most recent Form 477 submitted to the FCC or equivalent

bAttachment15TwoMostRecentForm477s2127202343913.pdf

Application to DHCD Submitted through CAMS

LENOWISCO Planning District Commission

VATI 2024 LENOWISCO Town of Wise Broadband Project

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

cAttachment16PointandPolygonShapefiles127202331855.zip

Optional

dAttachment18PoleLeaseAgreement12112023104654.pdf

Optional

eAttachment19DetailedTechnologyoftheProject127202315417.pdf

Optional

fAttachment20RISISurvey12182023120819.pdf

Documentation of Match Funding

Attachment10DocumentationofMatchFunding12142023124343.pdf

Notes:

The LENOWISCO PDC and SCTC are poised to make a difference in the lives of the citizens of Wise County. The determination to serve locations in Wise County that do not currently have access to reliable, affordable, and robust high-speed broadband that supports future-proof technology is evidence of that commitment. We are building faster and connecting more customers than anyone ever before us. This project will speed this process by providing funding which will allow us to serve the harder to serve areas that are even more rural.

VATI 2024

Supplemental Application Question

Applicant: LENOWISCO, PDC

Project Name: FY2024 LENOWISCO Town of Wise Broadband Project

The question below is question e. from the Commonwealth Priorities section of the 2024 Virginia Telecommunication Initiative (VATI) Guidelines. Please answer the question using this form and email to VATI@dhcd.virginia.gov.

Commonwealth Priorities

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

e. The co-applicant's effort to mitigate costs and delays that may be associated with make-ready and other permitting requirements anticipated for network deployment.

e. The co-applicants effort to mitigate costs and delays that may be associated with make-ready and other permitting requirements anticipated for network deployment.

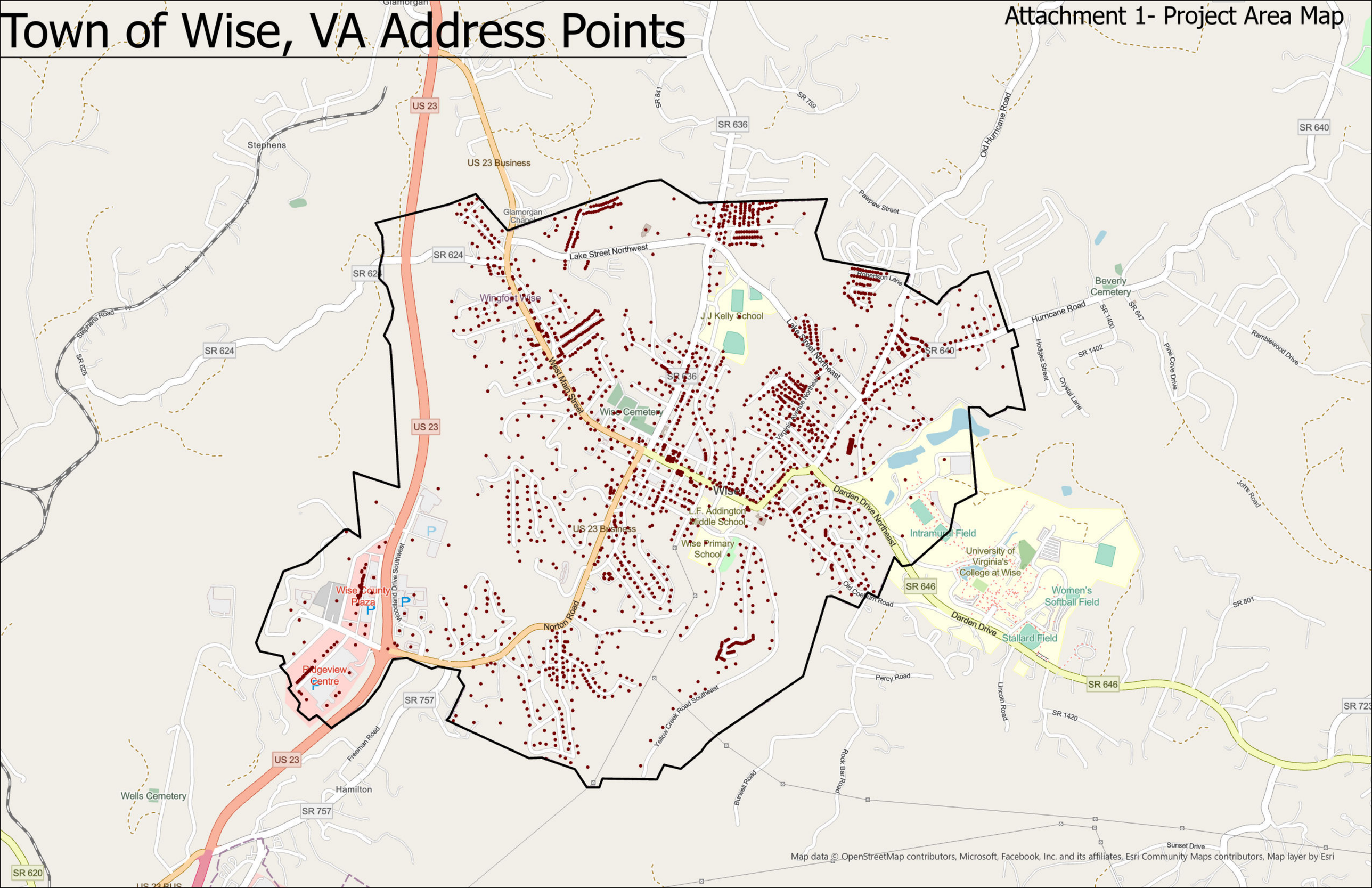
The co-applicant, SCTC, currently has existing agreements with all the electrical providers. Pole attachment agreements will be conducted through ODP, which has changed its process for obtaining pole attachment agreements. ODP's new process makes it more difficult to obtain a pole attachment agreement. SCTC is currently in negotiations with them to better this process.

SCTC has no control over the railroad permits, but SCTC has been working with them to speed up the process.

(This is in the grant application as well under number 20)

Town of Wise, VA Address Points

Attachment 1- Project Area Map



Legend

- NTIA Middle Mile
- Proposed Routes
- Existing Footprint
- Reconnect Areas
- Town of Wise VATI

Wise
Norton
Big Stone Gap
Pennington Gap
Coeburn
Jonesville
Pikeville
Hindman
Hazard
Whitesburg
Cumberland
Harlan
Pineville
Middlesboro
Rogersville
Bean Station
Morristown
Maynardville
Jefferson City
White Pine
Bulls Gap
Mosheim
Greeneville
Lick Creek
Nolichucky River
Cherokee Lake
Norris Lake
Holston River
Strawberry Plains
Johnson City
Jonesborough
Elizabethton
Erwin
Bristol
Kingsport
Abingdon
Mountain City
Boone
Elk Park
Banner Elk
Blowing Rock
Newland
Boone Lake
Watauga Lake
South Holston Lake
Mount Rogers National Recreation Area
Lebanon
Welch
Richlands

Attachment #3

Documentation Unserved Area – VATI Criteria

There is a total of 2,045 potential locations within the specified project area in the Town of Wise, VA.

To help to determine proof that the proposed service area is unserved/underserved, our co-applicant, SCTC hired RISI to conduct speed tests in the proposed service area and the surrounding region. The results of the speed tests have been attached. (See Attachment 20 - RISI Survey) VATI has put a preference on serving locations which do not have 25/3Mbps service. Based on RISI's survey, 35.6% cannot get 25/3Mbps service. This equates to over 728 locations that do not get 25/3Mbps service. The survey also found that Xfinity could only deliver 100/20Mbps service to only 2.3% of the customers equating to 47 locations.

LENOWISCO/SCTC have successfully acquired four different grants, three from VATI and one from RUS/USDA in the Lenowisco footprint. None of the four successful grant applications have been challenged by Xfinity because they cannot deliver 100/20bps on the entirety of their network.

Xfinity has on their website that 1,200/35Mbps is available but as you can see the survey does not support this claim. The threshold for overlap is 20% equating to 409 locations. The 2.3% served overlap is considerably under the allowable 20% overlap. According to today's definition of Broadband at 100/20Mbps, 97.7% of these customers are unserved. Since our co-applicant SCTC leases Point Broadband the network Point Broadband uses in Wise County, SCTC knows Point Broadband has very few customers in the Town of Wise. Xfinity's 2.3% number for customers having 100/20bps from the RISI survey was conducted primarily on Xfinity's footprint.

Verizon legacy serves telephone service to the Town of Wise. They also offer broadband service, but does not have 100/20Mbps.

Point Broadband leases their fiber network from the co-applicant, SCTC. The coverage of their service in the Town of Wise is insignificant.

See Attachment – 20 RISI Survey

2023 Virginia Telecommunication Initiative (VATI)
Passing Form

Type of Passings	Total Number of Passings in the Project Area [1]	Passings in the Project Area, without Special Construction Costs Required[2]	Passings with Special Construction Costs budgeted in the Application [3]	Number of Passings with Speeds at 25/3 or below in Project Area [4]
Residential	1,732			728
Businesses (non-home based)	237			0
Businesses (home-based)				0
Community Anchors	66			0
Non-residential	10			4
Total	2,045			732

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

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

[1] The total number of structures in the project area that can receive service. See definition of passing below for more detail.
[2] The number of structures in the project area that will not require special construction costs to provide service to. These passings fall within the broadband provider's standard service connection drop length and do not require nonstandard equipment or any additional fees above normal service connection fees required to provide broadband access to a premise.
[3] The number of structures in the project area with all construction costs budgeted in the application. These passings will not require any additional special construction costs beyond those budgeted for in the VATI application.
[4] The number of structures in the project area that do not have access to internet at speeds of at least 25 mbps download and 3 mbps 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.

2023 Virginia Telecommunication Initiative (VATI)
RDOF Passings Form

Type of Passings	Total Number of Passings in the Project Area that lie within Preliminarily Awarded RDOF Areas [1]
Residential	0
Businesses (non-home based)	0
Businesses (home-based)	0
Community Anchors	0
Non-residential	0
Total Number of RDOF Passings	0

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

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.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1		**LENOWISCO PDC**																Attachment 7			
2		**VATI FY2024 LENOWISCO Town of Wise Broadband Project**																			
3		***Project Timeline***																			
4	**Task**	**Resonsible Person**	**Responsible Enity**	**Mar-24**	**Apr-24**	**May-24**	**Jun-24**	**Jul-24**	**Aug-24**	**Sep-24**	**Oct-24**	**Nov-24**	**Dec-24**	**Jan-25**	**Feb-25**	**Mar-25**	**Apr-25**	**May-24**	**Jun-25**	**Jul-25**	**Aug-25**
5	Apply for Any Permits	Matt Hill/Metts Engineering	SCTC																		
6	Solicit Quotes for Materials & Electronics	Matt Hill/Metts Engineering	SCTC																		
7	Select Vendors for Materials & Electronics	Matt Hill/Metts Engineering	SCTC																		
8	Prepare Drawdown Reports Quarterly	Bridget Betcher/R. Crockett	SCTC/LENOWISCO																		
9	Construction	Matt Hill (Cody Gray/Bo Goodin)	SCTC/PVEC																		
10	Fiber Splicing and Testing	Matt Hill (Cody Gray/Bo Goodin)	SCTC/PVEC																		
11	Electronics Installation	Matt Hill (Josh Jones)	SCTC																		
12	Prepare Monthly Progress Reports/Accounting	Melissa Jessee/R. Crockett	SCTC/LENOWISCO																		
13	Marketing and Installations	Josh Jones	SCTC																		
14	Prepare Closeout Report	Melissa Jessee/R. Crockett	SCTC/LENOWISCO																		
15	Project Complete	Matt Hill (Cody Gray/Bo Goodin)	SCTC/PVEC																		
16																					
17		**Contract Begins: TBD**																			
18		**Contract Ends: 18 Months from Start Date**																			

VATI FY24 LENOWISCO Town of Wise Broadband Project

Project Management Plan

NAME	TITLE	YEARS OF EXPERIENCE	RESPONSIBILITIES
Duane A. Miller	Executive Director (LENOWISCO PDC)	26	Co-oversight of all aspects of the project
Rebecca Crockett	Director of Project Dev. (LENOWISCO PDC)	15	Project Management/Grant Administration of Project
William J. Franklin	C.E.O. (SCTC)	29	Oversight of all aspects of the project
Roger Fraysier	Executive VP of Finance and Operations (SCTC)	22	Operational and Accounting functions of the project
Matt Hill	C.O.O. (SCTC)	29	Engineering Management, Network Management & Design functions of the project
Bridget Betcher	Accounting Consultant	5	Accounting Functions for the Project. Upload Accounting information into CAMS
Melissa Jessee	Exec. Administrative Manager/Grants Adm.	33	Reporting requirements for the project
Cody Gray	Outside Plant Manager	19	Outside Plant Management
Josh Jones	I & R Supervisor	17	Marketing and Data Management

Memorandum of Understanding Between Scott County Telephone Cooperative and the LENOWISCO Planning District Commission

1. Whereas the LENOWISCO Planning District Commission (LENOWISCO) is authorized by Chapter 42 of title 15.2 of the Code of Virginia, 1950 as amended, to assist local government units in planning their development; and
2. Whereas, the Scott County Telephone Cooperative's (SCTC) mission includes providing regional telecommunication services, active community service and promoting economic development; and
3. Whereas, the Virginia Department of Housing and Community Development's (DHCD) Virginia Telecommunications Initiative (VATI) is established to provide financial assistance to supplement construction costs to extend service to areas that are presently unserved; and
4. Whereas, the VATI program requires a unit of government to serve as applicant, along with a private sector provider as a co-applicant; and
5. Whereas, LENOWISCO and SCTC actively support the same goals regarding regional broadband expansion.
6. Now therefore, Be it Resolved, that the LENOWISCO Planning District Commission and Scott County Telephone Cooperative's partnership consist of, but is not limited to, the following components:
    - SCTC will coordinate planning/technical staff and applicable consultants in gathering the information necessary to submit the identified projects and subsequent implementation if awarded.
    - LENOWISCO will provide grant administrative services and technical assistance with utilities, localities, public entities, etc. where applicable.
    - 5% of the total awarded amount will be held until the project is complete.
7. Be it further resolved, that, unless duly noted, the SCTC and/or applicable consultants are responsible for the creation and compilation of all necessary data or information required for the submission and implementation of any partnered project.

Accepted by Scott County Telephone Cooperative

William J. Franklin

WILLIAM J. FRANKLIN, Chief Executive Officer

12/13/23

Date

Accepted by the LENOWISCO Planning District Commission

DUANE A. MILLER, Executive Director

12/11/23

Date

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	$ 4,000,000.00	80%	REQUESTED
SCTC - Private	$ 1,000,000.00	20%	SECURED
	$		
	$		
	$		
	$		
	$		
TOTAL	**$ 5,000,000.00**	**100 %**	

SCTC
Connecting you.
Scott County Telephone Cooperative

Attachment 10

Documentation of Match Funding from Scott County Telephone Cooperative

I hereby certify that $1,000,000.00 in funds is available from Scott County Telephone Cooperative for the LENOWISCO Planning District Commission's 2024 Virginia Telecommunications Initiative (VATI) Grant Application thru the Virginia Department of Housing and Community Development (DHCD) for the LENOWISCO Town of Wise Broadband Project in Wise County, Virginia.

SCTC Match – Cash on Hand/Margins (Profit)/Line of Credit/Loan:
$ 1,000,000.00

William J. Franklin

William J. Franklin
Chief Executive Officer
Scott County Telephone Cooperative

12/13/2023
Date

BANK OF AMERICA

P.O. Box 15284
Wilmington, DE 19850

Customer service information

Customer service: 1.888.400.9009

bankofamerica.com

Bank of America, N.A.
P.O. Box 27025
Richmond, Virginia 23261-7025

SCOTT COUNTY TELEPHONE COOPERATIVE
GENERAL FUND
PO BOX 487
GATE CITY, VA 24251-0487

Please see the **Important Messages - Please Read** section of your statement for important details that could impact you.

Your Full Analysis Business Checking

for November 1, 2023 to November 30, 2023

Account number: [redacted] 7734

SCOTT COUNTY TELEPHONE COOPERATIVE GENERAL FUND

Account summary

Beginning balance on November 1, 2023	$739,185.22
Deposits and other credits	2,107,527.23
Withdrawals and other debits	-1,167,685.57
Checks	-1,134,695.56
Service fees	-32.95
Ending balance on November 30, 2023	**$544,298.37**

# of deposits/credits: 56

# of withdrawals/debits: 239

# of days in cycle: 30

Average ledger balance: $730,344.32

BANK OF AMERICA

P.O. Box 15284
Wilmington, DE 19850

Customer service information

Customer service: 1.888.400.9009

bankofamerica.com

Bank of America, N.A.
P.O. Box 27025
Richmond, Virginia 23261-7025

SCOTT COUNTY TELEPHONE COOPERATIVE
PATRONS CAPITAL CREDIT
PO BOX 487
GATE CITY, VA 24251-0487

Please see the **Important Messages - Please Read** section of your statement for important details that could impact you.

Your Full Analysis Business Checking

for November 1, 2023 to November 30, 2023

Account number: [redacted]1038

SCOTT COUNTY TELEPHONE COOPERATIVE PATRONS CAPITAL CREDIT

Account summary

Beginning balance on November 1, 2023	$17,499.44
Deposits and other credits	74,000.00
Withdrawals and other debits	-0.00
Checks	-55,302.50
Service fees	-0.00
Ending balance on November 30, 2023	**$36,196.94**

# of deposits/credits: 1

# of withdrawals/debits: 69

# of days in cycle: 30

Average ledger balance: $54,446.07

NEW PEOPLES BANK

PO Box 1810
Honaker, Virginia 24260

FDIC

November 2023

Primary Account: [redacted]63

Reporting Activity 11/01 - 11/30

Scan code or visit
www.newpeoples.bank
for maps, hours and contact info.

0
0

001270 0.6200 AV 0.498
SCOTT COUNTY TELEPHONE C0 0P
PO BOX 487
GATE CITY, VA 24251-0487

Contact Information:
New Peoples Bank - Gate City
663 E Jackson Street
Gate City, VA 24251

Phone: 276-386-9300
Telephone Banking: Press Option 1

As of November 1, 2023, all deposits and loan payments made through the ATM or via Mobile Banking will have same day credit during normal banking days if made by 6:00 PM.

BUSINESS CHOICE-EC ACCOUNT

Account: 20000063

Last Statement	Previous Balance	This Statement	Current Balance	Total Credits	Total Debits
10/31/23	87,325.85	11/30/23	144,989.27	744,774.62 (63)	687,111.20 (16)

Minimum Balance	78,483.93
Average Balance	164,406.58

TRANSACTIONS

Date	Description	Debits	Credits	Balance
10/31/23	Balance Last Statement			87,325.85
11/01/23	Stripe Transfer St-Q4s6c6n9u8x9		1,153.06	88,478.91
11/01/23	Scott County Tel Billpay Cust Payments		5,191.96	93,670.87
11/01/23	Merchant Bnkcd Deposit 267042023882		9,867.92	103,538.79
11/02/23	Stripe Transfer St-L0s1g1u2o3j0		188.31	103,727.10
11/02/23	Scott County Tel Billpay Cust Payments		3,012.14	106,739.24
11/02/23	Merchant Bnkcd Deposit 267042023882		39,104.98	145,844.22
11/02/23	Authnet Gateway Billing XXXXX7464	37.95		145,806.27
11/02/23	Cds Global Payments Paydq Fees	3,272.78		142,533.49
11/03/23	Stripe Transfer St-M8o5v4l6z5n6		207.38	142,740.87
11/03/23	Merchant Bnkcd Deposit 267042023882		16,247.30	158,988.17
11/03/23	Scott County Tel Billpay Cust Payments		25,323.94	184,312.11
11/03/23	Merchant Bnkcd Discount 267042023882	506.31		183,805.80
11/03/23	Merchant Bnkcd Fee 267042023882	685.42		183,120.38

Continued on Next Page

NEW PEOPLES BANK

PO Box 1810
Honaker, Virginia 24260

FDIC

November 2023

Primary Account: [redacted]99

Reporting Activity 11/01 - 11/30

Scan code or visit
www.newpeoples.bank
for maps, hours and contact info.

0
14

001274 0.7900 AV 0.498
MOUNTAINET TELEPHONE CO
PO BOX 488
GATE CITY, VA 24251-0488

Contact Information:
New Peoples Bank - Gate City
663 E Jackson Street
Gate City, VA 24251

Phone: 276-386-9300
Telephone Banking: Press Option 1

As of November 1, 2023, all deposits and loan payments made through the ATM or via Mobile Banking will have same day credit during normal banking days if made by 6:00 PM.

BUSINESS 500 ACCOUNT

Account: 110000990

Last Statement	Previous Balance	This Statement	Current Balance	Total Credits	Total Debits
10/31/23	86,286.18	11/30/23	57,244.82	323.45 (1)	29,364.81 (17)

Average Balance 72,891.13

TRANSACTIONS

Date	Description	Debits	Credits	Balance
10/31/23	Balance Last Statement			86,286.18
11/03/23	Check # 5650	1,200.00		85,086.18
11/06/23	Check # 5649	1,930.32		83,155.86
11/07/23	Iconectiv Iconectiv Icvtelxxxxx7904	300.10		82,855.76
11/13/23	Check # 5644	106.15		82,749.61
11/13/23	Check # 5645	186.45		82,563.16
11/13/23	Check # 5646	339.17		82,223.99
11/13/23	Check # 5647	48.74		82,175.25
11/13/23	Check # 5648	31.13		82,144.12
11/14/23	Check # 5651	65.16		82,078.96
11/15/23	Check # 5641	272.53		81,806.43
11/15/23	Check # 5642	173.46		81,632.97
11/15/23	Check # 5643	7,727.27		73,905.70
11/16/23	Check # 5640	1,200.00		72,705.70
11/21/23	VA Dept Taxation Tax Paymen *****1443	6,112.45		66,593.25

Continued on Next Page

NEW PEOPLES BANK

PO Box 1810
Honaker, Virginia 24260

FDIC

November 2023

Primary Account: [redacted]55

Reporting Activity 11/01 - 11/30

Scan code or visit
www.newpeoples.bank
for maps, hours and contact info.

0
16

001269 0.7900 AV 0.498
SCOTT TELECOM AND ELECTRONICS
PO BOX 487
GATE CITY, VA 24251-0487

Contact Information:
New Peoples Bank - Gate City
663 E Jackson Street
Gate City, VA 24251

Phone: 276-386-9300
Telephone Banking: Press Option 1

As of November 1, 2023, all deposits and loan payments made through the ATM or via Mobile Banking will have same day credit during normal banking days if made by 6:00 PM.

BUSINESS CHOICE-EC ACCOUNT

Account: 20000055

Last Statement	Previous Balance	This Statement	Current Balance	Total Credits	Total Debits
10/31/23	183,556.94	11/30/23	140,909.17	50,659.16 (3)	93,306.93 (18)

Minimum Balance	92,832.08
Average Balance	115,918.79

TRANSACTIONS

Date	Description	Debits	Credits	Balance
10/31/23	Balance Last Statement			183,556.94
11/01/23	Check # 24387	1,296.46		182,260.48
11/01/23	Check # 24388	1,526.28		180,734.20
11/01/23	Check # 24389	52,907.25		127,826.95
11/01/23	Check # 24394	1,125.97		126,700.98
11/02/23	Check # 24386	3,925.44		122,775.54
11/03/23	Check # 24395	626.72		122,148.82
11/06/23	Check # 24392	400.00		121,748.82
11/07/23	Check # 24391	148.20		121,600.62
11/08/23	Check # 24385	206.58		121,394.04
11/14/23	Check # 24393	150.00		121,244.04
11/14/23	Check # 24396	1,153.42		120,090.62
11/14/23	Check # 24397	150.00		119,940.62
11/14/23	Check # 24398	1,000.00		118,940.62

Continued on Next Page

EASTMAN CREDIT UNION
ECU BESIDE YOU

P.O. Box 1989
Kingsport, TN 37662
RETURN SERVICE REQUESTED

p 800.999.2328 | www.ecu.org

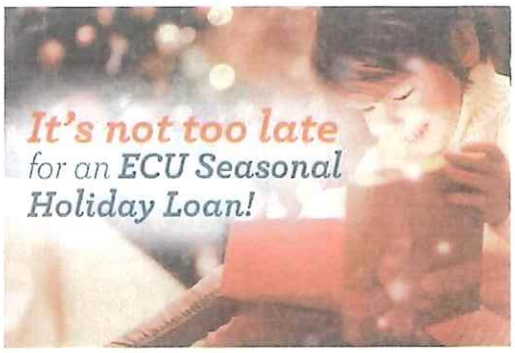
Member Number: [redacted]39
Statement Date: 11/30/23

REC'D DEC 11 2023

112153 1 AV 0.498 537521-112153-332

SW VA FIBER NETWORK LLC
PO BOX 487
GATE CITY VA 24251-0487

T-332



SUMMARY OF ACCOUNTS

ACCOUNTS	ACCOUNT NUMBER	BALANCE	YTD DIV
Business Primary Share	[redacted]749	58.48	5.13
Business Checking w/ Interest	[redacted]757	25,407.86	34.84
TOTAL ACCOUNTS		$25,466.34	$39.97

** YTD Dividends listed in the Summary of Accounts are for the accounts listed only. Accounts closed during this statement period are included on this statement and will not appear on future statements.

It's not too late to get started on your holiday shopping! Are you searching for extra cash to give holiday gifts to your loved ones? Make your holidays happier with an ECU Seasonal Holiday Loan! **Visit ecu.org to learn more.**

DETAIL OF TRANSACTIONS

Business Primary Share: [redacted]

Trans Date	Eff Date	Description	Deposit	Withdrawal	Balance
11-01		Starting Balance			58.47
11-30		Credit Dividend	0.01		58.48

The total number of days in this cycle 30
The amount of Dividends earned this cycle is $0.01
The Annual Percentage Yield Earned for this account is 0.21%

---------- Dividend Rate Summary ----------

Date	Rate
11-01-2023	0.300%

Are you tired of shuffling papers, storing files, and waiting for the mail to come to receive your account statement? Sign up for ECU Online Statements and receive your statement in the timeliest, most convenient, and secure way possible! **Visit www.ecu.org/onlinestatements to sign up today!**

BANK OF AMERICA

P.O. Box 15284
Wilmington, DE 19850

Customer service information

Customer service: 1.888.400.9009

bankofamerica.com

Bank of America, N.A.
P.O. Box 27025
Richmond, Virginia 23261-7025

SCOTT COUNTY TELEPHONE COOPERATIVE
PAYROLL ACCOUNT
PO BOX 487
GATE CITY, VA 24251-0487

Please see the **Important Messages - Please Read** section of your statement for important details that could impact you.

Your Full Analysis Business Checking - Small Business

for November 1, 2023 to November 30, 2023 Account number: [redacted]42

SCOTT COUNTY TELEPHONE COOPERATIVE PAYROLL ACCOUNT

Account summary

Beginning balance on November 1, 2023	$1,321.43
Deposits and other credits	222,256.99
Withdrawals and other debits	-222,256.99
Checks	-0.00
Service fees	-0.00
Ending balance on November 30, 2023	**$1,321.43**

# of deposits/credits: 2

# of withdrawals/debits: 4

# of days in cycle: 30

Average ledger balance: $1,489.43

BANK OF AMERICA

P.O. Box 15284
Wilmington, DE 19850

Customer service information

Customer service: 1.888.400.9009

bankofamerica.com

Bank of America, N.A.
P.O. Box 27025
Richmond, Virginia 23261-7025

SCOTT COUNTY TELEPHONE COOPERATIVE
PO BOX 487
GATE CITY, VA 24251-0487

Your Business Economy Checking

for November 1, 2023 to November 30, 2023

Account number: [redacted]109

SCOTT COUNTY TELEPHONE COOPERATIVE

Account summary

Beginning balance on November 1, 2023	$16,882.71
Deposits and other credits	0.00
Withdrawals and other debits	-7,964.49
Checks	-0.00
Service fees	-0.00
Ending balance on November 30, 2023	**$8,918.22**

# of deposits/credits: 0

# of withdrawals/debits: 4

# of deposited items: 0

# of days in cycle: 30

Average ledger balance: $12,591.19

NEW PEOPLES BANK

PO Box 1810
Honaker, Virginia 24260

FDIC

November 2023

Page: 1 of 1
Primary Account: [redacted]46

Reporting Activity 11/01 - 11/30

Scan code or visit
www.newpeoples.bank
for maps, hours and contact info.

0
0

001273 0.4500 AV 0.498
SCOTT COUNTY TELEPHONE C0 0P
VIRGINIA GRANT ACCOUNT
PO BOX 487
GATE CITY, VA 24251-0487

Contact Information:
New Peoples Bank - Gate City
663 E Jackson Street
Gate City, VA 24251

Phone: 276-386-9300
Telephone Banking: Press Option 1

If you're not comfortable walking in.... Log In.

If you feel uneasy about visiting our branches during the COVID-19 virus threat, why not bank from the comfort of your home, or anywhere for that matter... on your home computer, tablet, or mobile phone? Pay bills, deposit checks, transfer funds; all from the comfort of wherever you'd rather be. Download our mobile app or visit us online at newpeoples.bank

As of November 1, 2023, all deposits and loan payments made through the ATM or via Mobile Banking will have same day credit during normal banking days if made by 6:00 PM.

BUSINESS 500 ACCOUNT

Account: 110002946

Last Statement	Previous Balance	This Statement	Current Balance	Total Credits	Total Debits
10/31/23	986.67	11/30/23	986.67	0.00	0.00

Minimum Balance	986.67
Average Balance	986.67

TRANSACTIONS

Date	Description	Debits	Credits	Balance
10/31/23	Balance Last Statement			986.67
11/30/23	Balance This Statement			986.67

Total Days In Statement Period 11/01/23 Through 11/30/23: 30

NEW PEOPLES BANK

PO Box 1810
Honaker, Virginia 24260

FDIC

November 2023

Primary Account: [redacted]729

Reporting Activity 11/01 - 11/30

Scan code or visit
www.newpeoples.bank
for maps, hours and contact info.

0
20

001271 0.7900 AV 0.498
MOUNTAINET
PO BOX 487
GATE CITY, VA 24251-0487

Contact Information:
New Peoples Bank - Gate City
663 E Jackson Street
Gate City, VA 24251

Phone: 276-386-9300
Telephone Banking: Press Option 1

As of November 1, 2023, all deposits and loan payments made through the ATM or via Mobile Banking will have same day credit during normal banking days if made by 6:00 PM.

BUSINESS CHOICE-EC ACCOUNT

Account: 20003729

Last Statement	Previous Balance	This Statement	Current Balance	Total Credits	Total Debits
10/31/23	104,808.80	11/30/23	55,700.43	17,007.23 (9)	66,115.60 (22)

Minimum Balance	55,700.43
Average Balance	93,532.89

TRANSACTIONS

Date	Description	Debits	Credits	Balance
10/31/23	Balance Last Statement			104,808.80
11/02/23	Etsu Vendor Pmt Invoice E00018949		2,017.50	106,826.30
11/02/23	Check # 15205	2,275.00		104,551.30
11/03/23	XXXXXX2759 110123 #xxxxxx2759		950.00	105,501.30
11/06/23	Etsu Vendor Pmt Invoice E00018949		188.69	105,689.99
11/06/23	Check # 15204	485.59		105,204.40
11/06/23	Check # 15206	1,466.29		103,738.11
11/07/23	Northeast State Invoice 900011399		365.50	104,103.61
11/08/23	Bank Of Tennesse Banktel 5307		393.14	104,496.75
11/08/23	Earthlink Ap Payables Mounte02		3,251.43	107,748.18
11/09/23	Shenandoah Telec 589030 57499		1,199.98	108,948.16
11/10/23	Agc Automotive A Payment Agc002000019938		1,550.00	110,498.16
11/10/23	First Bk & Trust Inv Pmt		7,090.99	117,589.15
11/10/23	Check # 15207	700.00		116,889.15

Continued on Next Page

EASTMAN CREDIT UNION
ECU BESIDE YOU

P.O. Box 1989
Kingsport, TN 37662
RETURN SERVICE REQUESTED

p 800.999.2328 | www.ecu.org

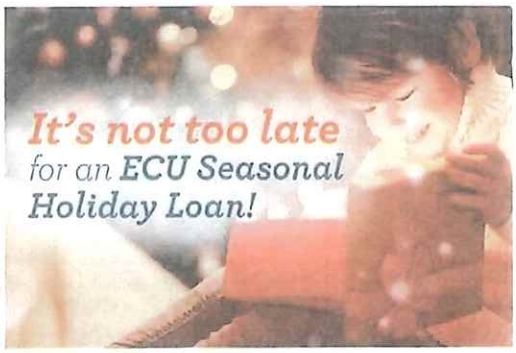
Member Number: [redacted]063
Statement Date: 11/30/23

REC'D DEC 11 2023

112156 2 AV 0.498 537535-112156-332

SCOTT COUNTY TELEPHONE COOPERATIVE
PO BOX 487
GATE CITY VA 24251-0487

T-332



SUMMARY OF ACCOUNTS

ACCOUNTS	ACCOUNT NUMBER	BALANCE	YTD DIV
Business Primary Share	XXXXXX[redacted]279	174,396.08	619.19
Business Checking w/ Interest	XXXXXX[redacted]694	28,054.94	250.29
Beside You Business Checking	XXXXXX[redacted]271	56,940.44	880.17
Business Checking w/ Interest	XXXXXX[redacted]868	3.74	2.74
Business Checking w/ Interest	XXXXXX[redacted]536	1.00	0.00
TOTAL ACCOUNTS		$259,396.20	$1,752.39

** YTD Dividends listed in the Summary of Accounts are for the accounts listed only. Accounts closed during this statement period are included on this statement and will not appear on future statements.

LOANS	ACCOUNT NUMBER	BALANCE	YTD INT
MBL-Auto/Pick-up/Van-New	[redacted]	54,900.00	0.00
MBL-Auto/Pick-up/Van-New	[redacted]	55,160.00	0.00
TOTAL LOANS		$110,060.00	$0.00

It's not too late to get started on your holiday shopping! Are you searching for extra cash to give holiday gifts to your loved ones? Make your holidays happier with an ECU Seasonal Holiday Loan! **Visit ecu.org to learn more.**

DETAIL OF TRANSACTIONS

Business Primary Shar[redacted]

Trans Date	Eff Date	Description	Deposit	Withdrawal	Balance
11-01		Starting Balance			174,353.09
11-01		Descriptive Deposit 117077950/Scott County Telephone/Loan Proceeds	54,900.00		229,253.09
11-01		Descriptive Withdrawal Offiicial Check -Toyota of Bristol		-54,900.00	174,353.09
11-28		Descriptive Deposit 117232067/Scott County Telephone/Loan Proceeds	55,160.00		229,513.09
11-28		Descriptive Withdrawal Official Check - Toyota Of Bristol		-55,160.00	174,353.09
11-30		Credit Dividend	42.99		174,396.08

The total number of days in this cycle 30

Want your statement earlier? View them online with e-statements! Sign-up today at www.ecu.org.

VATI FY2024 LENOWISCO Town of Wise Broadband Project

Income Statement Forecast

Scott County Telephone Cooperative, Inc. and Subsidiary

	Historical		Forecast Period					
	2021	2022	2023	2024	2025	2026	2027	2028
REVENUES								
Broadband, Voice and Video	$ 13,752,391	$ 17,060,724	$ 19,234,553	$ 20,274,625	$ 22,792,249	$ 25,309,873	$ 27,827,497	$ 30,345,121
Network Access Service Revenues	2,817,917	2,627,018	2,874,102	2,816,620	2,760,287	2,705,081	2,650,980	2,597,960
Long distance	2,437,100	2,168,254	2,189,937	2,211,836	2,233,954	2,256,294	2,278,857	2,301,645
Other Operating Revenues	1,501,787	1,832,305	1,995,000	2,590,000	3,638,333	4,601,667	5,565,000	5,620,650
Uncollectible Revenues	$ (28,417)	$ (72,119)	$ (90,977)	$ (93,706)	$ (96,517)	$ (99,413)	$ (102,395)	$ (105,467)
Total Revenues	20,480,778	23,616,182	26,202,615	27,799,374	31,328,306	34,773,502	38,219,938	40,759,909
EXPENSES								
Plant Specific	3,523,291	3,691,738	4,249,678	4,887,130	5,620,200	6,463,230	7,432,714	8,547,621
Plant Non-specific (excluding depreciation)	6,011,936	5,339,766	5,570,069	5,737,171	5,909,286	6,086,564	6,269,161	6,457,236
Depreciation & Amortization	3,344,203	4,328,528	4,653,013	5,292,606	6,348,023	7,630,106	8,848,440	9,457,606
Customer Operations	1,543,583	1,845,623	2,146,860	2,211,266	2,277,604	2,345,932	2,416,310	2,488,799
Corporate Operations	2,281,119	2,459,314	2,334,000	2,404,020	2,476,140	2,550,424	2,626,937	2,705,745
Total Expenses	16,704,132	17,664,969	18,953,620	20,532,193	22,631,253	25,076,257	27,593,562	29,657,008
Net Operating	3,776,646	5,951,213	7,248,994	7,267,182	8,697,053	9,697,246	10,626,376	11,102,901
Nonoperating Net Income	1,230,353	(219,429)	397,880	401,859	405,878	409,937	414,036	418,176
Interest Expense - Existing Debt	(1,042,566)	(1,905,048)	(1,965,350)	(1,833,543)	(1,574,322)	(1,315,185)	(1,056,132)	(797,159)
Interest Expense - RTFC			(222,984)	(769,610)	(800,793)	(658,497)	(512,497)	(413,971)
AFUDC	802,100	1,078,683	1,301,200	1,314,212	1,327,354	1,340,628	1,354,034	1,367,574
Income Taxes	763,609	(581,963)	1,082,320	1,093,143	1,104,075	1,115,115	1,126,267	1,137,529
Net Income (Loss)	**$ 4,002,924**	**$ 5,487,382**	**$ 5,677,421**	**$ 5,286,957**	**$ 6,951,096**	**$ 8,359,013**	**$ 9,699,551**	**$ 10,539,993**

See summary of significant forecast assumptions and accounting policies and accountant's report.

VATI FY2024 LENOWISCO Town of Wise Broadband Project

Balance Sheet Forecast

Scott County Telephone Cooperative, Inc. and Subsidiary

	Historical		Forecast Period					
	2021	2022	2023	2024	2025	2026	2027	2028
Cash	$ 2,858,104	$ 1,811,049	12,959,756	6,050,268	4,943,903	1,122,699	4,760,192	10,844,101
Certificates of Deposit	1,194,407	408,238	408,238	408,238	408,238	408,238	408,238	408,238
Accounts Receivable	1,264,639	756,579	982,282	1,013,731	1,139,612	1,265,494	1,391,375	1,517,256
Prepaid income taxes		602,350						
Materials & Supplies	2,134,356	4,595,605	4,553,019	4,780,670	5,019,704	5,270,689	5,534,224	5,810,935
Preapayments	301,484	311,588	433,527	433,527	433,527	433,527	433,527	433,527
Total Current Assets	7,752,990	8,485,409	19,336,823	12,686,435	11,944,985	8,500,648	12,527,556	19,014,057
Certificates of Deposit - Non-current		132,555	132,555	132,555	132,555	132,555	132,555	132,555
Marketable Equity Securities	883,022	1,509,817	1,660,799	1,909,919	2,196,406	2,525,867	2,904,747	3,340,459
Investment in Non-affiliated companies	1,248,449	1,248,449	1,248,449	1,248,449	1,248,449	1,248,449	1,248,449	1,248,449
Prepaid Pension	1,292,394	836,740	586,740	336,740	86,740			
Deferred Tax Asset				95,000	845,500	4,275,950	8,155,022	12,722,853
Cash surrender value of life insurance	5,918,612	5,393,661	5,501,534	5,611,565	5,723,796	5,838,272	5,955,038	6,074,138
Other Non-Current Assets	123,527	112,297	107,220	112,581	106,952	112,299	106,684	112,018
Total Non-Current Assets	9,466,004	9,233,519	9,237,297	9,446,808	10,340,398	14,133,393	18,502,495	23,630,473
Plant in Service	82,369,875	106,433,420	115,531,912	133,531,912	165,198,579	193,865,246	222,531,913	222,531,913
Plant Under Construction	32,122,707	29,701,146	30,610,876	29,110,876	27,610,876	26,610,876	19,110,876	16,610,876
Accumulated Depreciation and Amortization	(49,400,435)	(53,660,833)	(58,845,607)	(64,138,213)	(70,486,236)	(78,116,342)	(86,964,782)	(96,422,388)
Total Plant in Service, Net	65,092,147	82,473,733	87,297,182	98,504,575	122,323,219	142,359,780	154,678,008	142,720,401
Total Non-Current Assets	74,558,151	91,707,252	96,534,478	107,951,383	132,663,618	156,493,173	173,180,503	166,350,874
Total Assets	$ 82,311,141	$ 100,192,661	$ 115,871,301	$ 120,637,819	$ 144,608,603	$ 164,993,820	$ 185,708,059	$ 185,364,931

	2021	2022	2023	2024	2025	2026	2027	2028
Accounts Payable	$ 1,055,884	$ 1,769,172	$ 2,234,619	$ 2,484,619	$ 2,734,619	$ 2,984,619	$ 3,234,619	$ 3,484,619
Customer Deposits	55,504	57,674	76,175	76,175	76,175	76,175	76,175	76,175
RTFC - Line of Credit			6,000,000	5,000,000	6,000,000	5,000,000	4,000,000	3,000,000
Current Portion - RTFC			841,439	895,647	953,368	1,014,833	333,755	351,692
Current Portion - Existing Debt	680,000	506,000	417,000	420,000	402,000	393,573	390,000	385,000
Other Current Liabilities	961,524	771,039	204,145	204,145	204,145	204,145	204,145	204,145
			-	-	-	-	-	-
Total Current Liabilities	2,752,912	3,103,885	9,773,378	9,080,586	10,370,307	9,673,345	8,238,694	7,501,631
Deferred Grant Revenue	12,698,434	15,855,789	17,260,789	24,070,789	46,499,123	65,964,123	84,465,790	80,300,790
Deferred Income Taxes	375,900	324,000	255,200	255,200	255,200	255,200	255,200	255,200
Postemployment Benefits	9,476,228	8,968,905	8,968,905	8,968,905	8,968,905	8,968,905	8,968,905	8,968,905
Long Term Debt - RTFC, less current maturity		3,000,000	4,678,761	3,783,114	2,829,747	1,814,914	1,481,159	1,215,102
Long Term Debt - Capital lease	23,756,973	30,864,195	31,760,810	26,660,810	21,560,810	16,460,810	11,360,810	6,260,810
Long Term Debt, less current maturities	4,761,776	4,420,465	4,064,465	3,647,465	3,227,465	2,825,465	2,431,892	2,041,892
Total Non-Current Liabilities	51,069,311	63,433,354	66,988,930	67,386,283	83,341,250	96,289,417	108,963,756	99,042,699
Total Liabilities	53,822,223	66,537,239	76,762,308	76,466,869	93,711,557	105,962,762	117,202,450	106,544,330
Memberships	106,576	107,440	108,590	108,590	108,590	108,590	108,590	108,590
Accumulated other comprehensive income	(3,831,906)	(3,951,152)	(3,951,152)	(3,951,152)	(3,951,152)	(3,951,152)	(3,951,152)	(3,951,152)
Patronage Capital Credits	32,214,248	37,499,134	42,951,555	48,013,512	54,739,607	62,873,620	72,348,170	82,663,163
				-	-	-	-	-
			-	-	-	-	-	-
Total Equity	28,488,918	33,655,422	39,108,993	44,170,950	50,897,045	59,031,058	68,505,608	78,820,601
Total Liabilities and Equity	$ 82,311,141	$ 100,192,661	$ 115,871,301	$ 120,637,819	$ 144,608,603	$ 164,993,820	$ 185,708,059	$ 185,364,931

See summary of significant forecast assumptions and accounting policies and accountant's report.

VATI FY2024 LENOWISCO Town of Wise Broadband Project

Cash Flow Statement Forecast

Scott County Telephone Cooperative, Inc. and Subsidiary

	Historical		Forecast Period					
	2021	2022	2023	2024	2025	2026	2027	2028
Beginning Cash	$ 5,650,554	$ 2,858,104	$ 1,811,049	$ 12,959,756	$ 6,050,268	$ 4,943,903	$ 1,122,699	$ 4,760,192
CASH FLOWS FROM OPERATING ACTIVITIES								
Net Income (Loss)	4,002,924	5,487,382	5,677,421	5,286,957	6,951,096	8,359,013	9,699,551	10,539,993
Adjustments to Reconcile Net Income (Loss) to Net Cash From Operating Activities:								
Deduct: Amortized grant revenue	-	-	(595,000)	(1,190,000)	(2,238,333)	(3,201,667)	(4,165,000)	(4,165,000)
Add: Depreciation & Amortization	3,344,203	4,328,528	4,653,013	5,292,606	6,348,023	7,630,106	8,848,440	9,457,606
Changes in Assets and Liabilities:								
Accounts Receivable and Prepaid Assets	363,099	(104,394)	254,708	(31,449)	(125,881)	(125,881)	(125,881)	(125,881)
Materials & Supplies	(188,744)	(2,461,249)	42,586	(227,651)	(239,034)	(250,985)	(263,534)	(276,711)
Other Non-Current Assets			(102,796)	(115,392)	(106,602)	(119,824)	(111,150)	(124,435)
Accounts Payable	(1,979,120)	713,288	465,447	250,000	250,000	250,000	250,000	250,000
Customer Deposits	4,646	2,170	18,501	-	-	-	-	-
Other Current Liabilities	(364,095)	(190,485)	(566,894)	-	-	-	-	-
	-	-	-	-	-	-	-	-
Other Cash Flows from Operations	(668,434)	(222,815)	181,200	250,000	250,000	86,740	-	-
Net Cash From Operating Activities	**4,514,479**	**7,552,425**	**10,028,186**	**9,515,071**	**11,089,269**	**12,627,502**	**14,132,424**	**15,555,572**
CASH FLOWS FROM FINANCING ACTIVITIES								
Change in Memberships	2,340	864	1,150	-	-	-	-	-
Proceeds from VATI LENOWISCO Wise	-	-	-	4,000,000				
Proceeds from Federal Funds	5,173,314	3,157,355	2,000,000	4,000,000	24,666,667	22,666,667	22,666,667	-
Proceeds from Existing Debt	1,485,365	1,079,482	-	-	-	-	-	-
Proceeds from Debt - RTFC	-	3,000,000	3,000,000	-	-	-	-	-
Proceeds from RTFC - LOC			6,000,000	-	1,000,000		1,000,000	
Repayments of Existing Debt	(2,208,160)	(1,594,793)	(445,000)	(414,000)	(438,000)	(410,427)	(397,146)	(395,000)
Repayment of Debt - RTFC		-	(479,800)	(841,439)	(895,646)	(953,368)	(1,014,833)	(248,120)
Repayment of RTFC - LOC				(1,000,000)		(1,000,000)	(2,000,000)	(1,000,000)
Payments of Patronage Capital Credits	(192,398)	(202,496)	(225,000)	(225,000)	(225,000)	(225,000)	(225,000)	(225,000)
Change in Capital Lease - PVEC	16,325,419	7,107,222	896,615	(5,100,000)	(5,100,000)	(5,100,000)	(5,100,000)	(5,100,000)
Net Cash From Financing Activities	**20,585,880**	**12,547,634**	**10,747,965**	**419,561**	**19,008,021**	**14,977,872**	**14,929,688**	**(6,968,120)**
CASH FLOWS FROM INVESTING ACTIVITIES								
Capital Expenditures - Net of Retirements	(27,475,435)	(21,710,114)	(8,476,462)	(12,500,000)	(23,166,667)	(21,666,667)	(15,166,667)	2,500,000
VATI Grant Match - LENOWISCO Wise	-	-	-	(1,000,000)				
Federal Programs Match - capital portion	-	-	(1,000,000)	(3,000,000)	(7,000,000)	(6,000,000)	(6,000,000)	-
Change in Certificate of Deposits	(12,324)	653,614	-	-	-	-	-	-
Investment in Marketable Equity Securities	(343,933)	(626,795)	(150,982)	(249,120)	(286,488)	(329,461)	(378,880)	(435,712)
Investment in non-affilaited companies	-	-	-	-	-	-	-	-
Change in other investments	(61,117)	536,181						
Increase in Deferred Tax Asset				(95,000)	(750,500)	(3,430,450)	(3,879,072)	(4,567,831)
Net Cash From Investing Activities	**(27,892,809)**	**(21,147,114)**	**(9,627,444)**	**(16,844,120)**	**(31,203,655)**	**(31,426,578)**	**(25,424,619)**	**(2,503,543)**
Increase (Decrease) in Cash	**(2,792,450)**	**(1,047,055)**	**11,148,707**	**(6,909,488)**	**(1,106,365)**	**(3,821,204)**	**3,637,493**	**6,083,909**
Ending Cash	$ 2,858,104	$ 1,811,049	$ 12,959,756	$ 6,050,268	$ 4,943,903	$ 1,122,699	$ 4,760,192	$ 10,844,101

See summary of significant forecast assumptions and accounting policies and accountant's report.

SCOTT COUNTY TELEPHONE COOPERATIVE, INC. AND SUBSIDIARY
GATE CITY, VIRGINIA
VATI Application – Lenowisco FY2024 Town of Wise Broadband Project
SUMMARY OF SIGNIFICANT FORECAST
ASSUMPTIONS AND ACCOUNTING POLICIES

NOTE 1 - NATURE OF THE FORECASTS
Scott County Telephone Cooperative, Inc. and Subsidiary (the Cooperative) is located in Gate City, Virginia. The financial forecast presents the Cooperative's plans for operations for the next five years.

These financial forecasts present, to the best of management's knowledge and belief, the Cooperative's expected financial position, results of operations, and cash flows for the forecast periods. Accordingly, the forecasts reflect its judgment as of December 19, 2023, the date of these forecasts, of the expected conditions and its expected course of action. The assumptions disclosed herein are those that management believes are significant to the forecasts. There will usually be differences between the forecasted and actual results, because events and circumstances frequently do not occur as expected, and those differences may be material.

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES:
The following is a summary of significant accounting policies of Scott County Telephone Cooperative, Inc. and Subsidiary (the Cooperative):

Consolidation - The consolidated financial statements included the accounts of Scott County Telephone Cooperative, Inc. and its wholly owned subsidiary, SCTC Management Group, Inc. Scott Telecom and Electronics, Inc., Scott County Long Distance, Inc., MountaiNet, Inc., and Appalachian Broadband, LLC are wholly owned subsidiaries of SCTC Management Group, Inc. MountaiNet Telephone Cooperative, Inc. and MountaiNet Long Distance, Inc. are wholly owned subsidiaries of MountaiNet, Inc. SW VA Fiber Network, LLC is a wholly owned subsidiary of Appalachian Broadband, LLC. All material intercompany balances and transactions have been eliminated.

The Cooperative's principal line of business is providing local telephone service, long distance, security, telephone service, and cable and internet access services. The revenues reported on these statements of income reflect the relative importance of each type of service. The principal market for these telecommunications services are local residential and business customers residing in the exchange the Cooperative serves in Gate City, Virginia.

Revenue recognition - Compensation for interstate access services is received through tariffed access charges filed by the National Exchange Carrier Association (NECA) with the Federal Communications Commission (FCC) on behalf of the member companies. These access charges are billed by the Cooperative to the interstate interexchange carriers, and pooled with like revenues from all NECA member companies. The portion of the pooled access charge revenue received by the Cooperative is based upon its actual cost of providing interstate access service, plus a return on the investment dedicated to providing that service.

Compensation for Intrastate/IntraLATA access services (for toll traffic not carried by an interexchange carrier) is received under an IntraLATA Toll Originating Responsibility Plan (ITORP). Access charges, as filed with the Virginia State Corporation Commission, are billed to the originating local exchange carrier for terminating toll traffic, and retained by the Cooperative. Toll revenue is billed to the end user at the Cooperative's local tariffed rates, and is retained by the Cooperative. The Cooperative pays the other local exchange carrier for terminating the toll traffic.

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES: (continued)
Compensation for Intrastate/InterLATA service and Intrastate/IntraLATA service (for toll traffic carried by an interexchange carrier) is received through tariffed access charges as filed with the Virginia State Corporation Commission. These access charges are billed to the interexchange carriers carrying the traffic and retained by the Cooperative.

Compensation for long distance service is received through charges for providing usage of the local exchange network. Toll revenues are recognized when services are rendered.

Compensation for cable television and Internet access is received through monthly charges for providing cable television programming and Internet access to customers that subscribe to these services.

Taxes - The Cooperative collects communications taxes from its members on behalf of the State of Virginia. Revenue is presented net of taxes collected in the statements of income.

Income taxes - The Cooperative accounts for income taxes in accordance with the Income Taxes Topic of the FASB Accounting Standards Codification. This topic requires companies to record deferred tax liabilities or assets for the deferred tax consequences of all temporary differences. Deferred taxes are provided on the liability method whereby deferred tax assets are recognized for deductible temporary differences and operating loss and tax credit carry forwards, and deferred tax liabilities are recognized for taxable temporary differences. Temporary differences are the differences between reported amounts of assets and liabilities and their tax bases. Deferred tax assets are reduced by a valuation allowance, when, in the opinion of management, it is more likely than not that some portion or all of the deferred tax assets will not be realized. Deferred tax assets and liabilities are adjusted for the effects of changes in tax laws and rates on the date of enactment.

Inventories - The Cooperative's inventories are priced at cost. The Cooperative's inventory cost is determined by the average cost method.

Cash equivalents - The Cooperative considers all highly liquid investments with maturity of one year or less when purchased to be cash equivalents.

Accounts receivable - The Cooperative extends credit to its commercial and residential subscribers, the majority of whom reside in southwest Virginia. Accounts receivable are carried at original invoice amount less an estimate made for doubtful receivables based on a review of all outstanding amounts on a monthly basis. Management determines the allowance for doubtful accounts by identifying troubled accounts and by using historical experience applied to an aging of accounts.

Accounts receivable, which do not accrue interest, are written-off when deemed uncollectible. Recoveries of accounts receivable previously written-off are recorded when received.

SCOTT COUNTY TELEPHONE COOPERATIVE, INC. AND SUBSIDIARY
GATE CITY, VIRGINIA
VATI Application – Lenowisco FY2024 Town of Wise Broadband Project
SUMMARY OF SIGNIFICANT FORECAST
ASSUMPTIONS AND ACCOUNTING POLICIES

Depreciation - Depreciation is computed principally by the straight-line method. The estimated annual rates used to compute depreciation for financial reporting purposes are as stated below.

Property, plant, and equipment - Property, plant, and equipment in service and under construction are stated at cost. Listed below are the major classes of property, plant, and equipment.

	ESTIMATED ANNUAL DEPRECIATION RATES
Vehicles and other work equipment	10.00% - 12.86%
Buildings	2.86%
Furniture	6.33%
Leasehold improvements	2.86%
Central office and computer equipment	6.33% - 12.22%
Outside plant - pole, aerial, and buried	4.40% - 4.66%

NOTE 3 - NATURE OF OPERATIONS DURING THE FORECAST PERIOD:
Operating revenues and expenses - The following are significant assumptions for revenues and expenses:

General statement and historical reconciliation - The 2021 and 2022 revenues and expenses are based on actual, unaudited year-to-date balances. The 2023 revenues and expenses are based on annualized, unaudited balances from the year to date 2023 financials. Each financial statement line item was reviewed for any known and measurable items that could affect the amount. If any further adjustment was made, the assumption will be noted in the line items below. There are no gaps in between the historical period and the forecast period. The forecast period is December 31, 2023 through December 31, 2028.

Access line counts and projection assumptions - Existing access lines for the consolidated entity were gathered by service for 2021 and 2022. These categories were forecasted based on the historical trend for those years. The access lines for the new areas served are based on engineering data in the application, the total population, and the number of homes passed each quarter. SCTC projects to obtain a 60% take rate by the end of 2024 and will provide voice, and broadband services.

SCOTT COUNTY TELEPHONE COOPERATIVE, INC. AND SUBSIDIARY
GATE CITY, VIRGINIA
VATI Application – Lenowisco FY2024 Town of Wise Broadband Project
SUMMARY OF SIGNIFICANT FORECAST
ASSUMPTIONS AND ACCOUNTING POLICIES

NOTE 3 - NATURE OF OPERATIONS DURING THE FORECAST PERIOD: (continued)
Revenues:

	2023	2024	2025	2026	2027	2028
Voice	8,390	9,290	10,190	11,090	11,990	12,890
Broadband	17,739	21,339	24,939	28,539	32,139	35,739
Video	3,256	2,956	2,656	2,356	2,056	1,756
Security						
Total Connections	29,385	33,585	37,785	41,985	46,185	50,385

1. Local voice service – Historically and previous to 2021, Scott County Telephone Cooperative, Inc. (SCTC) has experienced a 1.% decrease in voice lines in its ILEC study area. However, SCTC has seen a 1.7 to 3.5% increase in basic revenue per year based on local rate increases and additions in its non-ILEC areas. SCTC forecasts an average 8.00% increase on revenue, which is attributed to the net gains for new areas such as Lee and Wise counties as well as 1,227 new premises passed in this application. These areas are vastly underserved and SCTC has shown tremendous success in recent years in new areas. Also, SCTC has been proactive in rolling out new services and new bundle pricing. It is forecasted that this rate increase will help offset some of the revenue loss due to access line decrease.

   Management forecasts a 10% take rate by the end of year one with an average bill of $70 per month. Customer passing's will be 1,227 for VATI FY2024 and an additional 10,964 with 100 in Scott County, 4962 in Lee County, and 5902 in Wise County from previous VATI applications. Broadband penetration will be 60% by the end of 2024 with, phone at 25% in Lee and Wise Counties and 100% in Scott County. This trend is expected to continue through 2028. Based on the access line forecast, SCTC forecasted local revenues based on average revenue per unit (ARPU). Local revenue is based on an average ARPU of $26.50 per month over the entire period 2021 to 2028. This price is inclusive of local service, features, and local bundles. The ARPU is based on an average historical and forecasted price.

SCOTT COUNTY TELEPHONE COOPERATIVE, INC. AND SUBSIDIARY
GATE CITY, VIRGINIA
VATI Application – Lenowisco FY2024 Town of Wise Broadband Project
SUMMARY OF SIGNIFICANT FORECAST
ASSUMPTIONS AND ACCOUNTING POLICIES

NOTE 3 - NATURE OF OPERATIONS DURING THE FORECAST PERIOD: (continued)

2. Broadband data service - Based on the access line forecast chart above, SCTC forecasted Data revenues based on an average ARPU of $70.00 per month. The ARPU is based on the average historical price. The increases are from new areas served by the recently closed BIP award, other grants, and increases in the study area. This forecast is based on the engineering, which shows approximately 1,227 for VATI FY2024 and previous VATI areas of 10,964 new homes passed. SCTC forecasts a 60% take rate by the end of 2024 for data service at an average price of $70.00 per month. The areas included in this grant and their line increases are included above.

3. Video service - Based on the customer count forecast chart above, SCTC forecasted Video revenues based on an average ARPU of $50.27 per month. This includes cable and video customers. The ARPU is based on an average historical and forecasted price. SCTC passes on content increases, including local channels as necessary. SCTC will provide new customers with data options and streaming capabilities.

4. Middle mile - SCTC has middle mile revenues from billings to other carriers for special and switched access. As the new plant is placed in service, new revenues will be derived from special access services from businesses including wireless companies purchasing access to towers from switched facilities. Based on current tariff rates and contracts this computes to approximately $33,500 per year on average. SCTC is in the process of completing negotiations with various cell companies for special access that covers ten cells sites for transports and maintenance.

5. Network access - Since 2019, access has remained relatively flat with only minor variations. SCTC maintains annual plant upgrades to its regulated rate base, which, in turn helps in maintaining revenues from federal sources. Following the most recent FCC order, SCTC is well below Universal Service Fund caps and has not experienced any decrease from regulatory rule changes. Since regulated expenses are stable over the forecast period, SCTC expects a relatively flat access revenue change. Overall, this revenue category decreases on average about 7.4% per year for 2021 through 2028. Overall MOU is declining but Connect America Funds (CAF) and NECA settlements are relatively flat. This trend of decreasing MOU will continue. Also, by FCC order, the CAF will decrease at 5% per year. NECA settlements make up the difference as SCTC's rate base is projected to increase after the stimulus project and new facilities are constructed throughout the forecast period and recognized in settlements.

6. Universal Service Fund (USF) - SCTC's study area cost per loop will increase each year as new plant and regulated expenses are incurred. Due to the potential impacts of the FCC regulatory changes, SCTC forecasts USF to decrease by an average of 1.62% from 2021 to 2028.

NOTE 3 - NATURE OF OPERATIONS DURING THE FORECAST PERIOD: (continued)

7. Toll service/long distance voice (Toll/LD) - Revenue is based on SCTC forecasted Toll/LD customer bill an average of $27.60 per month. The ARPU is based on an average historical price. SCTC expects an average decline of 1.0% per year

8. Installation revenues - The installation revenue is based on new customers and the rate depends on what type of package is selected. The forecast for new installed customers per year is based on management's forecast. The install revenue is forecasted to grow at a steady amount.

9. Uncollectible revenues - This line item has been calculated from the monthly open balance registers. Items over the 60 balance are considered for uncollectibility. As local revenues change, the amount of the uncollectible estimate does as well.

10. Other revenue - Other revenue is made up of security services, billing, collection, service charges, and AFUDC. Due to plant construction level and borrowings, this continues in 2023 and then new projects accelerate in 2024 through 2028 based on an average 12.5% increase each year based on historic trends.

Expenses:

1. Plant Specific - Backhaul/interconnection assumptions - These assumptions are based on the expense per customer per year. As the numbers of customers grow each year, the expense is expected to grow accordingly. Below is a description of each type of expense category relating to backhaul, IP, and video:

    a. The current cost for Plant Specific is $16.84 per customer per month. SCTC will need more capacity as new broadband and video customers are added and previous cost savings have been absorbed. The average cost over the period is projected to be $14.96 per customer per month. See the project description for the operational needs of the project.

    b. The current Plant Non-Specific cost is $34.65 per subscriber per month. There are 11,985 customers who have an Internet connection either for broadband or video. The average price per connection will decrease over time. The average cost over the period is projected to be $28.48 per subscriber per month.

NOTE 3 - NATURE OF OPERATIONS DURING THE FORECAST PERIOD: (continued)

c. Video content cost is $45.00 per video and cable customer per month with 4,662 customers at December 31, 2020. As the number of customers grows the total cost will increase. The average cost per customer per month is expected to be more than $55.00 due to pricing increases over time after 2023.

2. Plant Non-Specific - Network maintenance/monitoring - This is based on the payroll expense for the central office, cable, and wire, engineering, and general support departments. It is forecasted to increase by approximately 2.4% through 2028 for two reasons. First, as the fiber plant is deployed and the old copper plant removed, maintenance costs drop. Several temporary employees are expected to drop off the payroll in the forecast period. However, management plans to hire as many employees as possible in some of its non-regulated subsidiaries. Additionally, SCTC plans to hire three to five technicians to keep up with the new network beginning in 2024. Cost of living and raises account for the increase in 2023 through 2028.

3. Utilities expense - SCTC forecasts that power expenses will increase based on the need of the new network electronic equipment, which should increase modestly from 2023 to 2028.

4. Sales/marketing - SCTC forecasts a modest decline throughout the forecast period as new areas of service can be marketed through existing advertisement. Employee attrition is projected in 2023 and 2028 for retirements and consolidations.

5. Customer care - SCTC forecasts a growth for new hiring for the new areas. SCTC will be able to attend to the new service areas.

6. Corporate G&A - Management expects this and customer care expenses will increase by 7.7% each year based on normalized trends.

7. Property taxes - As a new plant is completed, property taxes will accrue on the plant in service. The taxes are expected to increase each year as a new plant is constructed. Taxes are approximately .45% of gross plant.

8. Depreciation - Depreciation is calculated based on historically approved depreciation rates times the plant in service balance. The average depreciable life is 20 years since the majority of the plant relates to cable and wire fiber facilities. Plant is forecasted to increase each year as SCTC completes its five year construction plan and maintains upgrades each year.

SCOTT COUNTY TELEPHONE COOPERATIVE, INC. AND SUBSIDIARY
GATE CITY, VIRGINIA
VATI Application – Lenowisco FY2024 Town of Wise Broadband Project
SUMMARY OF SIGNIFICANT FORECAST
ASSUMPTIONS AND ACCOUNTING POLICIES

NOTE 4 - BALANCE SHEET AND CASH FLOW STATEMENTS:
The balance sheet items other than the ones discussed above were forecasted using one or a combination of several techniques. Trends were used where feasible and then known and measureable items were taken into account. The following summarizes the significant assumptions impacting the balance sheet line items and cash flow statements:

1. General - The starting point of the forecasted balance sheet is based on the general ledger as of December 31, 2022. Then, any items that are known and measurable were applied to approximate the balance as of the end of each forecasted year. Any adjustments made are described in the assumptions below. SCTC is rate regulated under Part 32 and its Board of Directors.

2. Cash and forecasted cash flow statements - SCTC has historically enjoyed a strong cash balance as management balances leverage with plant investment. The balance will be used over time for plant upgrades.

3. Current assets - No significant changes are anticipated. This line item includes accounts receivables and inventory and will grow based on new customer growth.

4. Accounts receivable - SCTC forecasts that connection counts will increase based on historical trends, new services, and new areas. New revenues are from customers for broadband and video. Accounts receivable is approximately 4% of revenues. SCTC has very strong collection policies in place with most of its accounts receivable in the less than 60 days category.

5. Non-current assets - No significant changes are expected. This line item is based on investments in securities and affiliated subsidiaries, in compliance with, the equity method of recording investments.

6. Property, plant, and equipment - SCTC plans on building needed plant upgrades and continuing its five year construction plan process. Historically, SCTC has added, on average, approximately $1,000,000 to $14,000,000, using part cash flow and part leverage as needed. Most of the plant relates to fiber build outs in SCTC member areas. This is the main use of cash at SCTC. Plant is forecasted to grow considerably with VATI grants including this application. VATI FY 2024 is $5,000,000 total with a match of $1,000,000.

7. Current liabilities - No significant changes are expected for accounts payables, accrued liabilities, or SCTC's current debt structure. This line item is expected to decrease as SCTC pays its accounts payable down each year. SCTC pays invoices as they come in each week after proper review.

NOTE 4 - BALANCE SHEET AND CASH FLOW STATEMENTS: (continued)

8. Non-current liabilities - Significant changes are expected for SCTC's long-term debt structure and its deferred grant revenue. SCTC has over $9 million of debt and lines of credit available for the match as well as other needs. Deferred revenue will increase based on the grant awards from previous VATI grants as well as this application. Principal payments continue based on the amortization schedule.

9. Equity - No significant changes are expected. Additions to patronage capital come from net margins and no distributions are expected.

10. Capital stock - No significant change is expected nor forecasted.

11. Accumulated other comprehensive income - This amount represents the effects of ASC Topic 715-30 relating to pensions. This relatively new accounting standard requires companies to recognize in equity the impacts of initial transition costs when it adopted its new retirement plan. No significant change is expected.

12. Patronage capital credits - This amount is affected by income or loss. See the comments made for the statements of equity for other assumptions.

Cash Flow Statement:

1. General - The cash flow statement was prepared using the indirect method and is composed of an operating, investing, and financing section. No estimate of cash paid for interest was made. The preparation of the cash flow is based on the changes in the balance sheet and any non-cash items from the income statement, for example, depreciation. The underlying assumptions for the balance sheet and income statement drive the numbers on the cash flow; therefore, no detailed explanation is warranted here. Please review the assumptions for the other financial statements.

2. Operating - Cash flow from operations is impacted by net income, depreciation, current assets, and current liabilities. As net income increases over the forecast period so does the corresponding cash. This is a significant source of cash.

NOTE 4 - BALANCE SHEET AND CASH FLOW STATEMENTS: (continued)

3. Investing - Cash flow from investing activities is impacted primarily from the acquisition and construction of plant. SCTC forecasts plant construction based on the engineering in this grant application. This is the major use of cash. The capital investments will begin in 2024 and be completed in 2025. As far as other capital additions outside of the grant process, SCTC is in the process of constructing several new areas with a combination of loans, grants, and cash flow from operations. Most of the investment is for cable and wire facilities to fulfill its obligations under RUS current work plan, state of Virginia grants, and FCC directives for broadband. A major investment is the match for this and prior VATI grants. SCTC has already secured the cash and debt for the required amounts.

4. Financing - Cash flow from financing activities is impacted primarily by the borrowing and repayment of long-term debt. The principle payments are based on the projected amortization schedule of debt for this loan, as well as, existing debt. The proceeds or new borrowings are based on the FRS forms submitted to RUS as plant is constructed. This is a major source of cash.

   a. Sale of equity - None is forecasted.

   b. Proceeds from existing debt – Approximately $1 million is forecasted for the match for this grant.

   c. Repayments debt - The outstanding debt is from RUS and is paid back over a 16 year time period at an average rate of 4.78%.

   d. Payments of patronage capital credits - No payments of capital credits are forecasted.

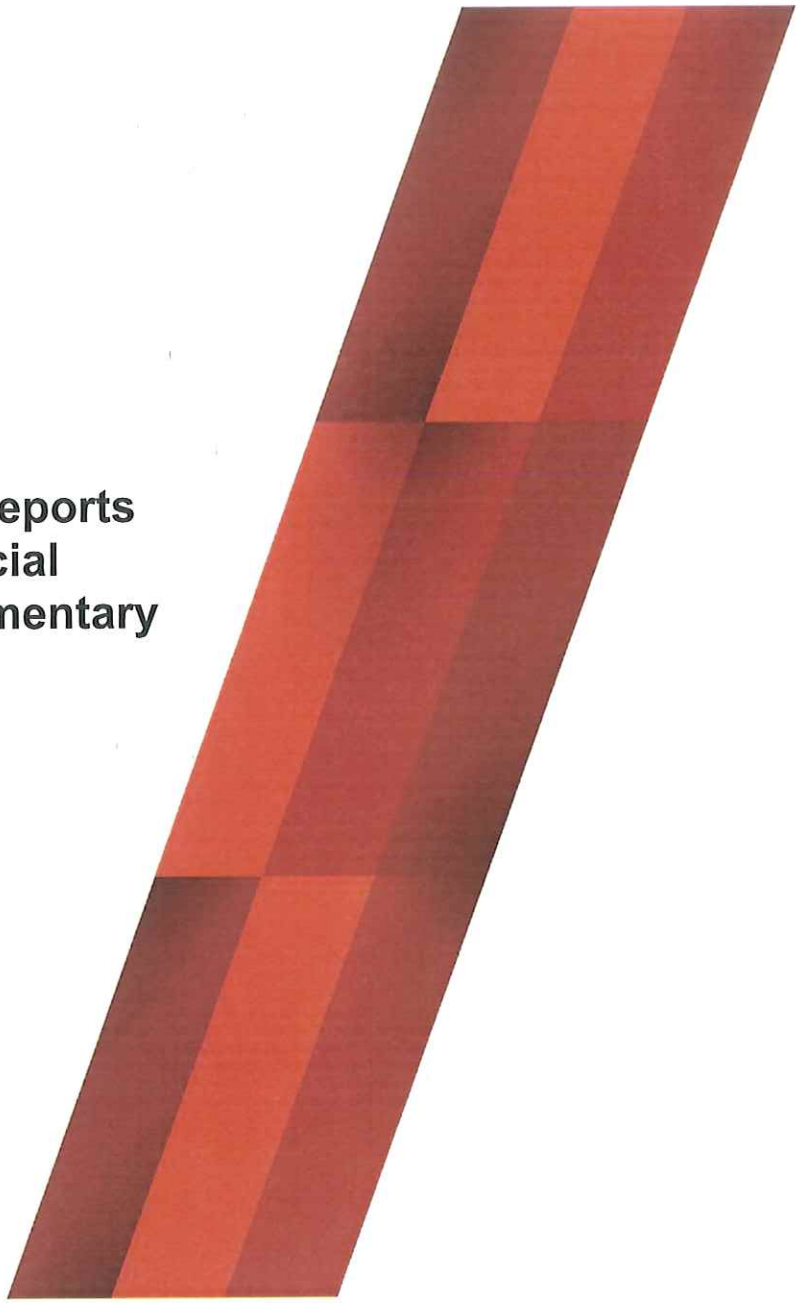
   e. Payments of dividends - No payments of dividends are forecasted.

5. Cash and cash equivalents at the end of the year - Management prefers to have a reasonable amount of cash that is secured in various banks and short-term investments. SCTC considers any investment with a maturity date of one year or less to be cash equivalent.

Scott County Telephone Cooperative, Inc.

Independent Auditor's Reports and Consolidated Financial Statements with Supplementary Information

December 31, 2022 and 2021



Scott County Telephone Cooperative, Inc.

December 31, 2022 and 2021

Contents

Independent Auditor's Report 1

Consolidated Financial Statements

Consolidated Balance Sheets 3

Consolidated Statements of Operations 5

Consolidated Statements of Comprehensive Income 6

Consolidated Statements of Changes in Members' Equity 7

Consolidated Statements of Cash Flows 8

Notes to Consolidated Financial Statements 9

Independent Auditor's Report on Supplementary Information 32

Supplementary Information

Consolidating Balance Sheet 33

Consolidating Statement of Operations 35

Report on Internal Control Over Financial Reporting and on Compliance and Other Matters Based on an Audit of the Consolidated Financial Statements Performed in Accordance with *Government Auditing Standards* Independent Auditor's Report 36

Schedule of Findings and Responses 38

Report on Compliance with Aspects of Contractual Agreements and Regulatory Requirements for Telecommunications Borrowers Independent Auditor's Report 39

FORVIS

1401 50th Street, Suite 350 / West Des Moines, IA 50266
P 515.223.0159 / F 515.223.5429
forvis.com

Independent Auditor's Report

Board of Directors
Scott County Telephone Cooperative, Inc. and Subsidiary
Gate City, Virginia

Report on the Audit of the Consolidated Financial Statements

Opinion

We have audited the consolidated financial statements of Scott County Telephone Cooperative, Inc. and subsidiary, which comprise the consolidated balance sheets as of December 31, 2022 and 2021, and the related consolidated statements of operations, comprehensive income, changes in members' equity and cash flows for the years then ended, and the related notes to the consolidated financial statements.

In our opinion, the accompanying consolidated financial statements referred to above present fairly, in all material respects, the financial position of Scott County Telephone Cooperative, Inc. and subsidiary, as of December 31, 2022 and 2021, and the results of their operations and their cash flows for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinion

We conducted our audits in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States (*Government Auditing Standards*). Our responsibilities under those standards are further described in the "Auditor's Responsibilities for the Audit of the Consolidated Financial Statements" section of our report. We are required to be independent of Scott County Telephone Cooperative, Inc. and subsidiary, and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management for the Consolidated Financial Statements

Management is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with accounting principles generally accepted in the United States of America, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about Scott County Telephone Cooperative, Inc. and subsidiary's ability to continue as a going concern for one year after the date that the consolidated financial statements are available to be issued.

Auditor's Responsibilities for the Audit of the Consolidated Financial Statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the consolidated financial statements.

In performing an audit in accordance with GAAS and *Government Auditing Standards*, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Scott County Telephone Cooperative, Inc. and subsidiary's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the consolidated financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the Scott County Telephone Cooperative, Inc. and subsidiary's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control-related matters that we identified during the audit.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated June 14, 2023, on our consideration of Scott County Telephone Cooperative, Inc. and subsidiary's internal control over financial reporting and our tests of its compliance with certain provisions of laws, regulations, contracts and grant agreements, and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering Scott County Telephone Cooperative, Inc. and subsidiary's internal control over financial reporting and compliance.

FORVIS, LLP

West Des Moines, Iowa
June 14, 2023

Scott County Telephone Cooperative, Inc.
Consolidated Balance Sheets
December 31, 2022 and 2021

Assets

	2022	2021
Current Assets		
Cash and cash equivalents	$ 1,811,049	$ 2,858,104
Certificates of deposit	408,238	1,194,407
Accounts receivable:		
Due from customers	7,241	60,990
Other	749,338	1,203,649
Prepaid income taxes	602,350	-
Materials and supplies	4,595,605	2,134,356
Prepayments	311,588	301,484
	8,485,409	7,752,990
Noncurrent Assets		
Certificates of deposit	132,555	-
Marketable equity securities	1,509,817	883,022
Other equity investments	1,248,449	1,248,449
Prepaid pension	836,740	1,292,394
Cash surrender value of life insurance	5,393,661	5,918,612
Other prepayments	112,297	123,527
	9,233,519	9,466,004
Property, Plant and Equipment		
Telecommunications plant in service	106,433,420	82,369,875
Less accumulated depreciation	53,660,833	49,400,435
	52,772,587	32,969,440
Plant under construction	29,701,146	32,122,707
	82,473,733	65,092,147
Total Assets	$ 100,192,661	$ 82,311,141

See Notes to Consolidated Financial Statements

Scott County Telephone Cooperative, Inc.
Consolidated Balance Sheets, continued
December 31, 2022 and 2021

Liabilities and Members' Equity

	2022	2021
Current Liabilities		
Current maturities of long-term debt	$ 506,000	$ 680,000
Accounts payable	1,769,172	1,055,884
Deferred grant revenue	341,527	161,497
Customer deposits	57,674	55,504
Accrued and other current liabilities	771,039	961,524
	3,445,412	2,914,409
Long-Term Debt, less current maturities	38,284,660	28,518,749
Noncurrent Liabilities		
Deferred income taxes	324,000	375,900
Deferred grant revenue	15,514,262	12,536,937
Postemployment benefits	8,968,905	9,476,228
	24,807,167	22,389,065
Members' Equity		
Memberships	107,440	106,576
Patronage capital	37,499,134	32,214,248
Accumulated other comprehensive loss	(3,951,152)	(3,831,906)
	33,655,422	28,488,918
Total Liabilities and Members' Equity	$ 100,192,661	$ 82,311,141

Scott County Telephone Cooperative, Inc.

Consolidated Statements of Operations

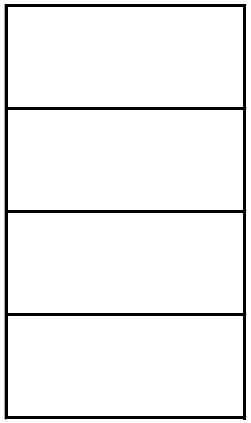
Years Ended December 31, 2022 and 2021

	2022	2021
Operating Revenues		
Local network services	$ 2,652,740	$ 2,510,266
Network access and long distance services	4,795,272	5,255,017
Video and internet services	14,407,984	11,242,125
Grant revenues	286,987	100,544
Miscellaneous	1,545,318	1,401,243
Uncollectibles	(72,119)	(28,417)
	23,616,182	20,480,778
Operating Expenses		
Plant specific expenses	3,691,738	3,523,291
Plant nonspecific expenses	5,339,766	6,011,936
Depreciation	4,328,528	3,344,203
Customer operations	1,845,623	1,543,583
Corporate operations	2,459,314	2,281,119
	17,664,969	16,704,132
Operating Margins	5,951,213	3,776,646
Other Income (Expenses)		
Investment income	10,915	33,754
Unrealized gain on equity securities	(368,787)	165,665
Interest expense	(1,905,048)	(1,042,566)
Allowance for funds used during construction	1,078,683	802,100
Gain on cash surrender insurance policies	311,443	163,778
Gain on Payroll Protection Program loan forgiveness	-	1,123,956
Other	(173,000)	(256,800)
	(1,045,794)	989,887
Margins Before Income Taxes	4,905,419	4,766,533
Income Tax Expense (Benefit)	(581,963)	763,609
Net Margins	$ 5,487,382	$ 4,002,924

See Notes to Consolidated Financial Statements

Product	Total	VATI	Non-VATI	Source of Estimate	Date
VATI 2024 LENOWISCO Town of Wise					

Product	Total	VATI	Non-VATI	Source of Estimate	Date
Administration	**$ 75,000**	**$ 60,000**	**$ 15,000**	**Matthew Hill/C.O.O.**	**12/11/2023**
Engineering	**$ 450,380**	**$ 360,304**	**$ 90,076**	**Matthew Hill/C.O.O.**	**12/11/2023**
Electronics	**$ 1,527,000**	**$ 1,221,600**	**$ 305,400**	**Matthew Hill/C.O.O.**	**12/11/2023**
Outside Plant	**$ 2,947,620**	**$ 2,358,096**	**$ 589,524**	**Matthew Hill/C.O.O.**	**12/11/2023**
Totals	**$ 5,000,000**	**$ 4,000,000**	**$ 1,000,000**		



Product	Total	VATI	Non-VATI	Source of Estimate	Date
VATI 2024 LENOWISCO Town					

Product	Total	VATI	Non-VATI	Source of Estimate	Date
Administration	**$ 75,000**	**$ 60,000**	**$ 15,000**	**Matthew Hill/C.O.O.**	**12/11/23**
Engineering	**$ 450,380**	**$ 360,304**	**$ 90,076**	**Matthew Hill/C.O.O.**	**12/11/23**
Electronics	**$ 1,527,000**	**$ 1,221,600**	**$ 305,400**	**Matthew Hill/C.O.O.**	**12/11/23**
Outside Plant	**$ 2,947,620**	**$ 2,358,096**	**$ 589,524**	**Matthew Hill/C.O.O.**	**12/11/23**
Totals	**$ 5,000,000**	**$ 4,000,000**	**$ 1,000,000**		

VATI FY2024 LENOWISCO Town of Wise Broadband Project Estimate **Attachment 13**

Wise PSFA 2045 Passings **2045 @ 60%=1,227 total Passings**

Asset Category	Asset Type	Description	Quantity	Unit	Unit Cost	Total Cost
Network and Acces Equipment	Routing Equipment	BGP Routing Equipment	3	Unit	$ 100,000.00	$ 300,000.00
Network and Acces Equipment	Access Equipment	OLT with Optics	1227	Unit	$ 125.00	$ 153,375.00
Network and Acces Equipment	Access Equipment	OLT Chassis	1227	Unit	$ 75.00	$ 92,025.00
Total Network and Acces Equipment						**$ 545,400.00**
Outside Plant	Engineering/Construction Mgmt/Project Mgmt	Engineering/Construction Mgmt/Project Mgmt	1	Unit	$ 450,380.00	$ 450,380.00
Outside Plant	Administration	LENOWISCO Administration	1	Unit	$ 75,000.00	$ 75,000.00
Outside Plant	Fiber Cable -Aerial	Fiber Cable Aerial	33	Route Miles	$ 20,000.00	$ 660,000.00
Outside Plant	Fiber -Buried Cable	Fiber -Buried Cable	2	Route Miles	$ 50,000.00	$ 100,000.00
Outside Plant	Drops	Customer Drops	1227	Unit	$ 800.00	$ 981,600.00
Outside Plant	Cabinets/Underground Vaults	Splitter Cabinets (PON)	8	Unit	$ 10,000.00	$ 80,000.00
Outside Plant	Make Readies KU/ODP, AEP	Pole Make Readies	1	Lump Sum	$ 515,000.00	$ 515,000.00
Outside Plant	Make Readies Railroad Crossings	Railroad Crossings	0	Lump Sum	$ 15,000.00	$ -
Outside Plant	Others (Specify)	Fiber Optic Enclosures	613	Unit	$ 600.00	$ 367,800.00
Outside Plant	Others (Specify)	Fiber Optic Splicing HO-1	4715	Unit	$ 28.00	$ 132,020.00
Total Outside Plant						**$ 3,361,800.00**
Buildings	Pre-Fab Huts	Pre Fab Telco Hut	1	Unit	$ 111,200.00	$ 111,200.00
Total Buildings						**$ 111,200.00**
Customer Premise Equipment	Inside Wiring	Inside Wiring,Nid, Cables	1227	Unit	$ 350.00	$ 429,450.00
Customer Premise Equipment	Others (Specify)	ONT- Installations and Provisioning	1227	Unit	$ 450.00	$ 552,150.00
Total Customer Premise Equipment						**$ 981,600.00**
Total						**$ 5,000,000.00**
					Per Sub	**$ 4,074.98**

*****NOTE - Cost estimates are based on the current VATI and RUS Projects.**

SENATE OF VIRGINIA

TODD E. PILLION
40TH SENATORIAL DISTRICT
ALL OF GRAYSON, LEE, SCOTT, AND WASHINGTON COUNTIES; ALL OF THE CITY OF BRISTOL; AND PART OF SMYTH, WISE, AND WYTHE COUNTIES

851 FRENCH MOORE JR. BOULEVARD, SUITE 178
ABINGDON, VIRGINIA 24210
(276) 220-1209

COMMITTEE ASSIGNMENTS:
EDUCATION AND HEALTH
GENERAL LAWS AND TECHNOLOGY
REHABILITATION AND SOCIAL SERVICES
TRANSPORTATION

December 12, 2023

Ms. Tamara Holmes, Ph.D.
Director, Office of Broadband
Virginia Department of Housing and Community Development
600 E Main Street, Suite 300
Richmond, VA 23219

RE: LENOWISCO Town of Wise Broadband Project

Dear Dr. Holmes:

I am writing in support of the LENOWISCO Planning District Commission's application for a Virginia Telecommunications Initiative (VATI) grant through the Virginia Department of Housing and Community Development (DHCD). This Town of Wise Broadband Project initiative, in cooperation with Scott County Telephone Cooperative (SCTC) will generate an immediate and self-sustaining benefit to southwest Virginia. I would like to offer my strong support of the project.

The goal is to construct a Fiber-to-the-Premises project that will provide a robust, reliable, and affordable broadband G-PON connection to support up to ten (10) gigabits of bandwidth to each customer premise. If approved, the availability of broadband services will enhance Wise County's ability to operate more efficiently and attract new businesses. This project will promote economic development, improve educational opportunities for all students, enhance telemedicine services, as well as improve the quality of life for each individual in the areas to be served. This VATI grant will be vital to the Region and will pass 2,045 total locations with an investment of $5M.

I feel all partners involved are dedicated to meeting the goals of the VATI Program in the vital deployment of broadband. I strongly support the application of the LENOWISCO Planning District and urge favorable consideration by the DHCD. Please feel free to contact me anytime with questions.

Thank you for your time and consideration of this much-needed project.

Sincerely,

Todd Pillion

H. MORGAN GRIFFITH
9TH DISTRICT, VIRGINIA

COMMITTEE ON
ENERGY & COMMERCE
SUBCOMMITTEES:
OVERSIGHT & INVESTIGATIONS
CHAIRMAN
ENERGY, CLIMATE & GRID SECURITY
HEALTH

COMMITTEE ON
HOUSE ADMINISTRATION
SUBCOMMITTEE:
OVERSIGHT

www.morgangriffith.house.gov

Congress of the United States
House of Representatives
Washington, DC 20515–4609

2202 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-3861 PHONE
(202) 225-0076 FAX

323 WEST MAIN STREET
ABINGDON, VA 24210
(276) 525-1405 PHONE
(276) 525-1444 FAX

17 WEST MAIN STREET
CHRISTIANSBURG, VA 24073
(540) 381-5671 PHONE
(540) 381-5675 FAX

December 18, 2023

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

Dear Dr. Holmes,

I am writing to express my interest in the grant application for the Virginia Telecommunications Initiative (VATI) grant through the Virginia Department of Housing and Community Development (DHCD) submitted by LENOWISCO Planning District Commission's application in Duffield VA.

In preparing this grant application, LENOWISCO Planning District Commission's application cited many factors contributing to the need for this funding in my congressional district. I ask that you give this application your most thoughtful and serious consideration. If there is any additional information that my office can provide, please contact Cody Mumpower at my Abingdon office at (276) 525-1405.

I would very much appreciate it if you would acknowledge receipt of this letter and keep me apprised of your action regarding this application when review is complete. You should respond to LENOWISCO Planning District Commission's application in care of my Abingdon office at (276) 525-1405 by phone or by mail to 323 W. Main Street, Abingdon, Virginia 24210.

Thank you for your time and attention to this matter. I look forward to hearing from you. I remain

Sincerely yours,

H. MORGAN GRIFFITH
Member of Congress

Town of Wise
501 West Main Street
P.O. Box 1100
Wise, Virginia 24293

(276) 328-6013
Fax (276) 328-2519
www.townofwise.net
E-mail: MGR@townofwise.org

OFFICE OF
TOWN MANAGER

December 12, 2023

Ms. Tamara Holmes, Ph.D.
Director, Office of Broadband
Virginia Department of Housing and Community Development
600 E Main Street, Suite 300
Richmond, VA 23219

RE: LENOWISCO Town of Wise Broadband Project

Dear Ms. Tamara:

I am writing in support of the LENOWISCO Planning District Commission's application for a Virginia Telecommunications Initiative (VATI) grant through the Virginia Department of Housing and Community Development (DHCD). This Town of Wise Broadband Project initiative, in cooperation with Scott County Telephone Cooperative (SCTC) will generate an immediate and self-sustaining benefit to southwest Virginia. I would like to offer my strong support of the project.

The goal is to construct a Fiber-to-the-Premises project that will provide a robust, reliable, and affordable broadband G-PON connection to support up to ten (10) gigabits of bandwidth to each customer premise. If approved, the availability of broadband services will enhance Wise County's ability to operate more efficiently and attract new businesses. This project will promote economic development, improve educational opportunities for all students, enhance telemedicine services, as well as improve the quality of life for each individual in the areas to be served. This VATI grant will be vital to the Region and will pass 2,045 total locations with an investment of $5M.

I feel all partners involved are dedicated to meeting the goals of the VATI Program in the vital deployment of broadband. I strongly support the application of the LENOWISCO Planning District and urge favorable consideration by the DHCD. Please feel free to contact me anytime with questions.

Thank you for your time and consideration of this much-needed project.

Sincerely,

Laura C Roberts

Laura C Roberts, Town Manager

Wise County Board of Supervisors

Office of the County Administrator

TELEPHONE (276) 328-2321
FAX (276) 328-9780

Michael W. Hatfield, P.E.

WISE COUNTY COURTHOUSE

P.O. BOX 570
WISE, VA 24293

December 12, 2023

Ms. Tamara Holmes, Ph.D.
Director, Office of Broadband
Virginia Department of Housing and Community Development
600 E Main Street, Suite 300
Richmond, VA 23219

RE: LENOWISCO Town of Wise Broadband Project

Dear Ms. Tamara:

I am writing in support of the LENOWISCO Planning District Commission's application for a Virginia Telecommunications Initiative (VATI) grant through the Virginia Department of Housing and Community Development (DHCD). This Town of Wise Broadband Project initiative, in cooperation with Scott County Telephone Cooperative (SCTC) will generate an immediate and self-sustaining benefit to southwest Virginia. I would like to offer my strong support of the project.

The goal is to construct a Fiber-to-the-Premises project that will provide a robust, reliable, and affordable broadband G-PON connection to support up to ten (10) gigabits of bandwidth to each customer premise. If approved, the availability of broadband services will enhance Wise County's ability to operate more efficiently and attract new businesses. This project will promote economic development, improve educational opportunities for all students, enhance telemedicine services, as well as improve the quality of life for each individual in the areas to be served. This VATI grant will be vital to the Region and will pass 2,045 total locations with an investment of $5M.

I feel all partners involved are dedicated to meeting the goals of the VATI Program in the vital deployment of broadband. I strongly support the application of the LENOWISCO Planning District and urge favorable consideration by the DHCD. Please feel free to contact me anytime with questions.

Thank you for your time and consideration of this much-needed project.

Sincerely,

Michael W. Hatfield, P.E.
County Administrator

MWH/bm

Wise County Industrial Development Authority
P.O. Box 570
Wise, Virginia 24293
Telephone: (276) 328-2321
Fax: (276) 328-9780

December 12, 2023

Ms. Tamara Holmes, Ph.D.
Director, Office of Broadband
Virginia Department of Housing and Community Development
600 E Main Street, Suite 300
Richmond, VA 23219

RE: LENOWISCO Town of Wise Broadband Project

Dear Ms. Tamara:

I am writing in support of the LENOWISCO Planning District Commission's application for a Virginia Telecommunications Initiative (VATI) grant through the Virginia Department of Housing and Community Development (DHCD). This Town of Wise Broadband Project initiative, in cooperation with Scott County Telephone Cooperative (SCTC) will generate an immediate and self-sustaining benefit to southwest Virginia. I would like to offer my strong support of the project.

The goal is to construct a Fiber-to-the-Premises project that will provide a robust, reliable, and affordable broadband G-PON connection to support up to ten (10) gigabits of bandwidth to each customer premise. If approved, the availability of broadband services will enhance Wise County's ability to operate more efficiently and attract new businesses. This project will promote economic development, improve educational opportunities for all students, enhance telemedicine services, as well as improve the quality of life for each individual in the areas to be served. This VATI grant will be vital to the Region and will pass 2,045 total locations with an investment of $5M.

I feel all partners involved are dedicated to meeting the goals of the VATI Program in the vital deployment of broadband. I strongly support the application of the LENOWISCO Planning District and urge favorable consideration by the DHCD. Please feel free to contact me anytime with questions.

Thank you for your time and consideration of this much-needed project.

Sincerely,

Brian Falin, Executive Director

OMB 3060-0816

Form 477 Filing Summary

FRN:	Data as of:	Operations:	Submission Status:	Last Updated:
0002069862	Jun 30, 2022	ILEC	Revised - Submitted	Aug 31, 2022 01:51 PM

Filer Identification

Section	Field	Response
Filer Information	Company Name	Scott County Telephone Cooperative
	Holding Company Name	Scott County Telephone Cooperative
	Filing Type	ILEC
	SAC ID	190248
	499 ID	804426
Data Contact Information	Data Contact Name	Roger Fraysier
	Data Contact Phone Number	(276) 452-7364
	Data Contact E-mail	rfraysier@sctc.org
Emergency Operations Contact Information	Emergency Operations Name	Roger Fraysier
	Emergency Operations Phone Number	(276) 452-7364
	Emergency Operations E-mail	rfraysier@sctc.org
Certifying Official Contact Information	Certifying Official Name	Roger Fraysier
	Certifying Official Phone Number	(276) 452-7364
	Certifying Official E-mail	rfraysier@sctc.org

Data Submitted

Form Section	File Name	Date & Time	Number of Rows
Fixed Broadband Deployment	SCTC FBD 2020.csv	Aug 29, 2022 11:05 AM	1,071
Fixed Broadband Subscription	SCT FBS 6.30.22.csv	Aug 30, 2022 05:39 PM	102
Fixed Voice Subscription	SCTC FVS 6.30.2022.csv	Aug 29, 2022 11:09 AM	13

Fixed Broadband Deployment

Census Block Counts by State, DBA Name and Technology

State	DBA Name	Technology	Blocks

State	DBA Name	Technology	Blocks
Tennessee	Scott County Telephone Cooperative, Inc.	Asymmetric xDSL	1
		Optical Carrier/Fiber to the End User	29
Virginia	Scott County Telephone Cooperative, Inc.	Asymmetric xDSL	513
		Optical Carrier/Fiber to the End User	528
Total			**1,071**

Fixed Broadband Subscription

Fixed Broadband Subscriptions by State, Technology and End User Type

			Subscriptions		
State	**Technology**	**Census Tracts**	**Consumer**	**Business/Govt.**	**Total**
Tennessee	Optical Carrier/Fiber to the End User	17	341	5	346
Virginia	Asymmetric xDSL	8	1,952	90	2,042
	Optical Carrier/Fiber to the End User	77	4,313	251	4,564
Total		**102**	**6,606**	**346**	**6,952**

Fixed Broadband Subscriptions by Bandwidths and End User Type

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
3.000	0.768	1,641	93	1,734
5.000	1.000	1,100	59	1,159
10.000	2.000	23	30	53
10.000	5.000	1	1	2
10.000	10.000	0	1	1
25.000	5.000	8	101	109
25.000	12.000	2,922	9	2,931
25.000	25.000	0	1	1
50.000	10.000	3	22	25
50.000	25.000	306	1	307
100.000	20.000	2	19	21
100.000	50.000	252	4	256
100.000	100.000	3	0	3
200.000	100.000	177	1	178
200.000	200.000	0	1	1

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
500.000	200.000	61	1	62
1,000.000	500.000	107	2	109
Total		**6,606**	**346**	**6,952**

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	3.000	0.768	1,101	57	1,158
	5.000	1.000	851	33	884
Optical Carrier/Fiber to the End User	3.000	0.768	540	36	576
	5.000	1.000	249	26	275
	10.000	2.000	23	30	53
	10.000	5.000	1	1	2
	10.000	10.000	0	1	1
	25.000	5.000	8	101	109
	25.000	12.000	2,922	9	2,931
	25.000	25.000	0	1	1
	50.000	10.000	3	22	25
	50.000	25.000	306	1	307
	100.000	20.000	2	19	21
	100.000	50.000	252	4	256
	100.000	100.000	3	0	3
	200.000	100.000	177	1	178
	200.000	200.000	0	1	1
	500.000	200.000	61	1	62
	1,000.000	500.000	107	2	109
Total			**6,606**	**346**	**6,952**

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
Tennessee	9	8	0	0

State	Total VGE Lines	Consumer VGE Lines	Total VoIP Subscriptions	Consumer VoIP Subscriptions
Virginia	3,792	3,305	23	11
Total	**3,801**	**3,313**	**23**	**11**

Fixed Voice Subscription (VGE Lines)

VGE Lines Provided to Unaffiliated Providers by State

State	Wholesale	UNE-L
Tennessee	0	0
Virginia	0	0
Total	**0**	**0**

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

		by Bundle		by Product Type			
				Consumer		Business/Govt.	
State	Total	Sold w/ Internet	Sold w/o Internet	& No PIC	& PIC	& No PIC	& PIC
Tennessee	9	9	0	8	0	1	0
Virginia	3,792	2,035	1,757	2,889	416	235	252
Total	**3,801**	**2,044**	**1,757**	**2,897**	**416**	**236**	**252**

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

		by Ownership			by Last-Mile Medium			
State	Total	Owned	UNE-L	Resale	FTTP	Coax	Fixed Wireless	Copper
Tennessee	9	9	0	0	0	0	0	9
Virginia	3,792	3,792	0	0	1,086	0	0	2,706
Total	**3,801**	**3,801**	**0**	**0**	**1,086**	**0**	**0**	**2,715**

Fixed Voice Subscription (iVoIP)

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

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

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

		by End User Type		by Bundle		by Last-Mile Medium			
State	Total	Consumer	Business/Govt.	Sold w/ Internet	Sold w/o Internet	FTTP	Coax	Fixed Wireless	Copper
Virginia	23	11	12	23	0	23	0	0	0

		by End User Type		by Bundle		by Last-Mile Medium			
State	Total	Consumer	Business/Govt.	Sold w/ Internet	Sold w/o Internet	FTTP	Coax	Fixed Wireless	Copper
Total	23	11	12	23	0	23	0	0	0

Reminder: Use 2010 Census geographies for data as of June 30, 2021 and before. Use 2020 Census geographies for data as of December 31, 2021 and after.

For help or assistance, please contact (877) 480-3201 or (717) 338-2834 (TTY) or you may submit an online e-support ticket.

Federal Communications Commission
45 L St NE, Washington, DC 20002
Phone: 1-888-225-5322
TTY: 1-888-835-5322
Videophone: 1-844-432-2275
Fax: 1-866-418-0232
Contact Us

Wireline

Offices

OMB 3060-0816

Form 477 Filing Summary

FRN:	Data as of:	Operations:	Submission Status:	Last Updated:
0002069862	Dec 31, 2021	ILEC	Revised - Submitted	Jun 1, 2022 02:52 PM

Filer Identification

Section	Field	Response
Filer Information	Company Name	Scott County Telephone Cooperative
	Holding Company Name	Scott County Telephone Cooperative
	Filing Type	ILEC
	SAC ID	190248
	499 ID	804426
Data Contact Information	Data Contact Name	Roger Fraysler
	Data Contact Phone Number	(276) 452-7364
	Data Contact E-mail	rfraysier@sctc.org
Emergency Operations Contact Information	Emergency Operations Name	Roger Fraysler
	Emergency Operations Phone Number	(276) 452-7364
	Emergency Operations E-mail	rfraysier@sctc.org
Certifying Official Contact Information	Certifying Official Name	Roger Fraysier
	Certifying Official Phone Number	(276) 452-7364
	Certifying Official E-mail	rfraysier@sctc.org

Data Submitted

Form Section	File Name	Date & Time	Number of Rows
Fixed Broadband Deployment	SCTC FBD (2020).csv	Jun 1, 2022 02:42 PM	1,071
Fixed Broadband Subscription	SCTC FBS 12.31.21Revised.csv	Jun 1, 2022 02:43 PM	151
Fixed Voice Subscription	SCTC FVS 12.31.21.csv	Jun 1, 2022 02:42 PM	18

Fixed Broadband Deployment

Census Block Counts by State, DBA Name and Technology

State	DBA Name	Technology	Blocks

State	DBA Name	Technology	Blocks
Tennessee	Scott County Telephone Cooperative, Inc.	Asymmetric xDSL	1
		Optical Carrier/Fiber to the End User	29
Virginia	Scott County Telephone Cooperative, Inc.	Asymmetric xDSL	513
		Optical Carrier/Fiber to the End User	528
Total			**1,071**

Fixed Broadband Subscription

Fixed Broadband Subscriptions by State, Technology and End User Type

			Subscriptions		
State	**Technology**	**Census Tracts**	**Consumer**	**Business/Govt.**	**Total**
Tennessee	Optical Carrier/Fiber to the End User	34	679	17	696
Virginia	Asymmetric xDSL	9	2,051	88	2,139
	Optical Carrier/Fiber to the End User	108	5,094	321	5,415
Total		**151**	**7,824**	**426**	**8,250**

Fixed Broadband Subscriptions by Bandwidths and End User Type

Downstream Bandwidth (in Mbps)	Upstream Bandwidth (in Mbps)	Consumer	Business/Govt.	Total
3.000	0.768	2,006	118	2,124
5.000	1.000	1,221	74	1,295
10.000	2.000	29	39	68
10.000	5.000	1	1	2
10.000	10.000	0	1	1
25.000	5.000	13	115	128
25.000	12.000	3,277	12	3,289
25.000	25.000	0	1	1
50.000	10.000	3	30	33
50.000	25.000	283	0	283
100.000	20.000	3	16	19
100.000	50.000	241	3	244
100.000	100.000	162	11	173
200.000	100.000	230	1	231
200.000	200.000	0	1	1

Downstream Bandwidth (In Mbps)	Upstream Bandwidth (In Mbps)	Consumer	Business/Govt.	Total
300.000	300.000	69	0	69
500.000	200.000	47	1	48
500.000	500.000	126	0	126
1,000.000	500.000	100	2	102
1,000.000	1,000.000	13	0	13
Total		**7,824**	**426**	**8,250**

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	3.000	0.768	1,161	57	1,218
	5.000	1.000	890	31	921
Optical Carrier/Fiber to the End User	3.000	0.768	845	61	906
	5.000	1.000	331	43	374
	10.000	2.000	29	39	68
	10.000	5.000	1	1	2
	10.000	10.000	0	1	1
	25.000	5.000	13	115	128
	25.000	12.000	3,277	12	3,289
	25.000	25.000	0	1	1
	50.000	10.000	3	30	33
	50.000	25.000	283	0	283
	100.000	20.000	3	16	19
	100.000	50.000	241	3	244
	100.000	100.000	162	11	173
	200.000	100.000	230	1	231
	200.000	200.000	0	1	1
	300.000	300.000	69	0	69
	500.000	200.000	47	1	48
	500.000	500.000	126	0	126
	1,000.000	500.000	100	2	102
	1,000.000	1,000.000	13	0	13
Total			**7,824**	**426**	**8,250**

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
Tennessee	57	57	0	0
Virginia	3,924	3,426	23	11
Total	**3,981**	**3,483**	**23**	**11**

Fixed Voice Subscription (VGE Lines)

VGE Lines Provided to Unaffiliated Providers by State

State	Wholesale	UNE-L
Tennessee	0	0
Virginia	0	0
Total	**0**	**0**

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

		by Bundle		by Product Type			
				Consumer		Business/Govt.	
State	Total	Sold w/ Internet	Sold w/o Internet	& No PIC	& PIC	& No PIC	& PIC
Tennessee	57	42	15	9	48	0	0
Virginia	3,924	2,110	1,814	2,997	429	241	257
Total	**3,981**	**2,152**	**1,829**	**3,006**	**477**	**241**	**257**

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

		by Ownership			by Last-Mile Medium			
State	Total	Owned	UNE-L	Resale	FTTP	Coax	Fixed Wireless	Copper
Tennessee	57	57	0	0	51	0	0	6
Virginia	3,924	3,924	0	0	1,130	0	0	2,794
Total	**3,981**	**3,981**	**0**	**0**	**1,181**	**0**	**0**	**2,800**

Fixed Voice Subscription (iVoIP)

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

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

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

		by End User Type		by Bundle		by Last-Mile Medium			
State	Total	Consumer	Business/Govt.	Sold w/ Internet	Sold w/o Internet	FTTP	Coax	Fixed Wireless	Copper
Virginia	23	11	12	23	0	23	0	0	0
Total	**23**	**11**	**12**	**23**	**0**	**23**	**0**	**0**	**0**

Reminder: Use 2010 Census geographies for data as of June 30, 2021 and before. Use 2020 Census geographies for data as of December 31, 2021 and after.

For help or assistance, please contact (877) 480-3201 or (717) 338-2834 (TTY) or you may submit an online e-support ticket.

Federal Communications Commission
45 L St NE, Washington, DC 20002
Phone: 1-888-225-5322
TTY: 1-888-835-5322
Videophone: 1-844-432-2275
Fax: 1-866-418-0232
Contact Us

Public Safety

Wireless

Wireline

Offices

broadband serviceable locations, and corrections to addresses, unit counts, building types, land use, and geographic coordinates.

For providers who already have Fabric licenses, CostQuest Associates (CostQuest) will provide, as the opening of the filing window approaches, access to the new Fabric data on a rolling basis.

Subscribership data. While FCC Form 477 filings are no longer required, providers must continue to file subscribership data in the BDC (also at http://bdc.fcc.gov). Providers must file subscribership data as of December 31, 2022.

You may find more information about:

- the BDC at https://www.fcc.gov/BroadbandData;
- navigating the BDC, including the BDC System User Guide and video tutorials, at https://www.fcc.gov/BroadbandData/Help;
- the categories of providers that must file subscription and availability data, at https://www.fcc.gov/BroadbandData/filers;
- how to access the Fabric and the CostQuest license agreement, by sending an e-mail to NBFsupport@costquest.com;
- the National Broadband Map by clicking here.

Because the BDC filing requirements are complex and time-consuming, we strongly recommend that you begin work on the BDC as soon as possible.

If you need assistance with the BDC or the Fabric, please contact us. We are available to assist you with the BDC filing process.

Submission Overview

SUBMISSION CERTIFIED

FRN: 0002069862 | Service Provider | Scott County Telephone Cooperative

Data as of June 30, 2023

Biannual Filing Window

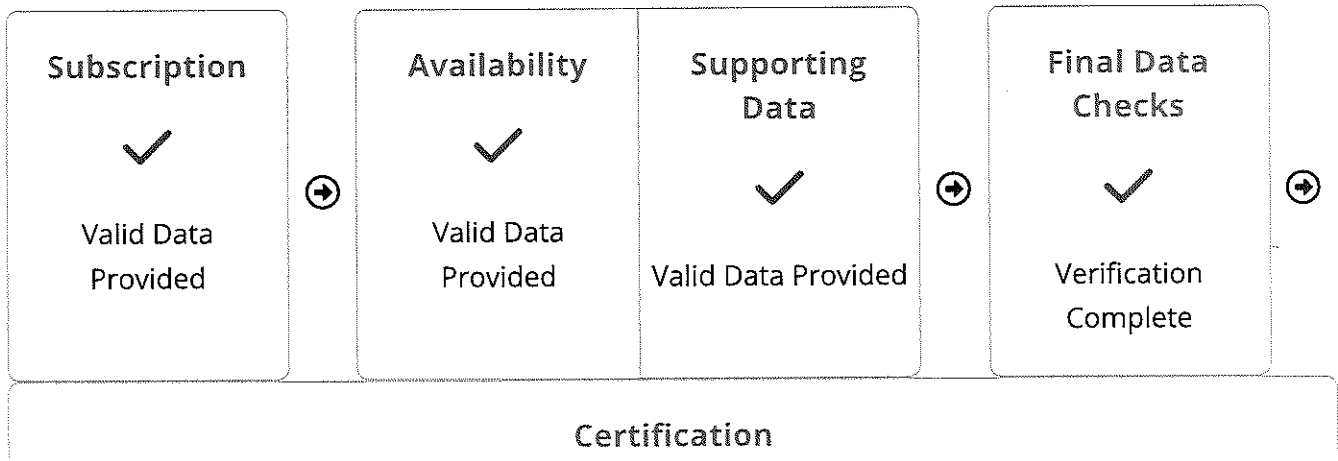
DATA AS-OF DATE	WINDOW OPEN	WINDOW STATUS
Jun 30, 2023	Jul 3, 2023	**CLOSED**
TODAY'S DATE	**WINDOW CLOSE**	**FILING STATUS**
Oct 19, 2023	Sep 15, 2023	Original - Certified

Fixed Data Requests

Fixed Challenges
0

Submission Steps

Decertify Submission



Submission Overview

SUBMISSION CERTIFIED

FRN: 0002069862 | Service Provider | Scott County Telephone Cooperative

Data as of June 30, 2023

Biannual Filing Window

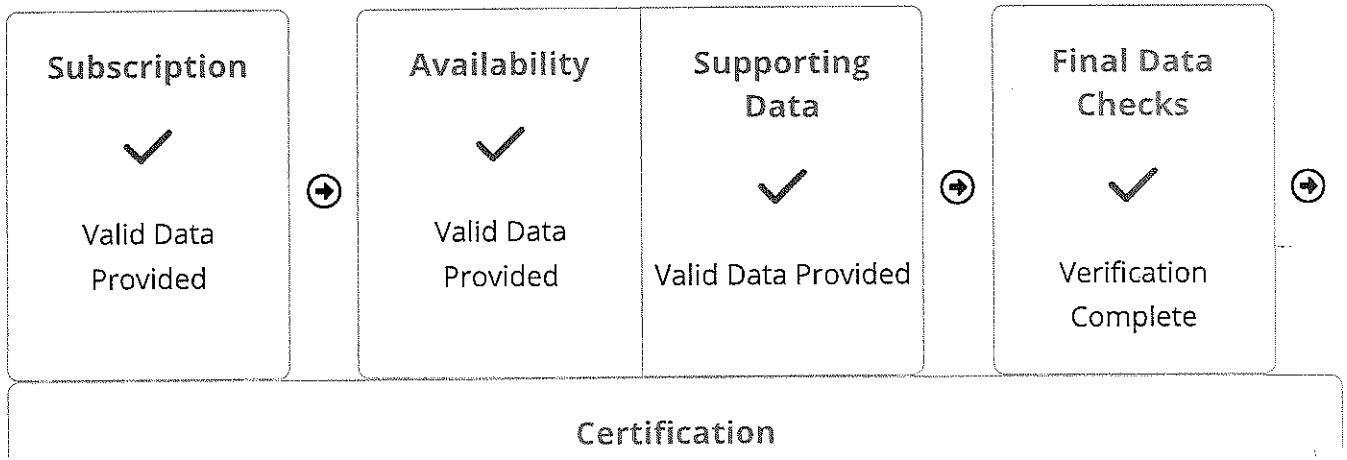
DATA AS-OF DATE	WINDOW OPEN	WINDOW STATUS
Jun 30, 2023	Jul 3, 2023	**CLOSED**
TODAY'S DATE	**WINDOW CLOSE**	**FILING STATUS**
Oct 19, 2023	Sep 15, 2023	Original - Certified

Fixed Data Requests

Fixed Challenges
0

Submission Steps

Decertify Submission



✓

Certified

Fixed Submission Data

	Subscription Data Files Currently Processing (0)	Availability Data Files Currently Processing (0)	
Service	**Subscribers**	**Locations**	**Supporting Data**
Fixed Broadband	7,296	7,863	✓ 2 of 2
Copper	2,029	2,591	✓ 1 of 1
Fiber to the Premises	5,267	5,272	✓ 1 of 1
Fixed Voice	5,877		
ILEC	5,877		

Amendment No. 1 to

Pole License Agreement

between

Kentucky Utilities Company
d/b/a Old Dominion Power Company

and

Scott Telecom and Electronics, Inc.

AMENDMENT NO. 1 TO POLE LICENSE AGREEMENT

This Amendment No. 1 to Pole License Agreement (hereinafter the "**Amendment**") is made as of July 31, 2023 (the "**Effective Date**"), by and between Kentucky Utilities Company d/b/a Old Dominion Power ("**ODP**"), a corporation organized under the laws of the Commonwealth of Kentucky, on the one hand, and Scott Telecom and Electronics, Inc. ("Scott Telecom") and Scott County Telephone Co-Operative ("Scott County Telephone") on the other hand, corporations organized under the laws of the Commonwealth of Virginia. ODP, Scott Telecom and Scott County Telephone may hereinafter be referred to individually as a "**Party**" or collectively as the "**Parties**."

RECITALS

ODP and Scott County Telephone are parties to an Attachment Agreement dated March 2, 1987 (the "Scott County Telephone Agreement") pursuant to which Scott County Telephone made and maintained approximately seven (7) Attachments to ODP Structures.

ODP and Scott Telecom are parties to a Pole License Agreement dated December 10, 2019 (the "Agreement") pursuant to which ODP granted Scott Telecom a non-exclusive license to affix and install Attachments to Structures (as such terms are defined in the Agreement) owned by ODP.

Scott Telecom, which is a wholly owned subsidiary of Scott County Telephone, obtained permits to make approximately 3,600 Attachments to ODP Structures pursuant to the Agreement. These Attachments, it was later discovered, are actually owned by Scott County Telephone.

The Parties acknowledge and agree that the designation of Scott Telecom as the counterparty and Licensee under the Agreement was due to a mistake or misunderstanding. The Parties further acknowledge and agree that Scott County Telephone, and not Scott Telecom, should have been the counterparty and Licensee under the Agreement.

The Parties thus desire to amend the Agreement to substitute Scott County Telephone, in place of Scott Telecom, as the counterparty and Licensee (and owner of the Attachments) under the Agreement. ODP and Scott County Telephone further desire to terminate the Scott County Telephone Agreement and for the approximately 7 Attachments made pursuant to the Scott Telephone Agreement to hereafter be governed by the Agreement.

As consideration for the license to make Attachments to Structures under the Agreement, the Agreement requires Licensee to pay ODP a License Fee (as defined in the Agreement) for each Attachment that Licensee affixes to and maintains upon ODP's Structures.

ODP desires to utilize fiber within certain areas of Scott County Telephone's existing and future network. The Parties desire to amend the Agreement to provide ODP with fiber rights in certain areas in exchange for a waiver of License Fees due under the Agreement.

Scott County Telephone has agreed to provide ODP an indefeasible and exclusive right to use four (4) strands of dark fiber throughout the Network (defined below), and ODP has agreed to

accept the aforementioned strands of dark fiber in lieu of the License Fees due under Section 17 of the Agreement.

The purpose of this Amendment is to: (1) revise the Agreement to incorporate the arrangement outlined above; (2) identify ODP's rights with respect to the Network; and (3) establish the process by which ODP identifies "tie-in" locations within the Network for purposes of exercising its rights.

AGREEMENT

NOW THEREFORE, having exchanged good and valid consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree to amend the Agreement as follows:

1. The Parties hereby agree that the above Recitals are correct and incorporated into this Amendment as if fully set forth herein. The Parties further agree that the terms and conditions of the Agreement shall continue to govern all Attachments that Scott County Telephone has or will in the future affix to Structures owned by ODP, except as otherwise set forth in this Amendment. To the extent any terms used herein are defined in the Agreement, such terms shall have the same meaning as used in the Agreement. Defined terms are capitalized in this Amendment.

2. ODP and Scott County Telephone agree to terminate the Scott County Telephone Agreement as of the Effective Date. ODP and Scott County Telephone further agree that the approximately 7 Attachments made under Scott County Telephone Agreement shall hereafter be governed by the Agreement, as amended by this Amendment.

3. The cover page of the Agreement shall be amended to reflect "Scott County Telephone Co-Operative" as the counterparty, rather than Scott Telecom.

4. The first paragraph of the Agreement shall be amended to reflect Scott County Telephone, rather than Scott Telecom, as the Licensee. Scott County Telephone shall be deemed as Licensee under the Agreement for all purposes.

5. Section 1 Definitions of the Agreement shall be amended to include the following definitions:

> "**Fiber Use Exhibit**" means the document, substantially in the form of Exhibit 1 to this Amendment, submitted by ODP to Scott County Telephone for purposes of identifying tie-in locations on the Network.
>
> "**ODP Strands**" shall have the meaning provided in Section 17 of this Agreement.
>
> "**Network**" means all fiber routes that Scott Country Telephone or Scott Telecom have installed or will in the future install that: (1) fall within ODP's Service Area; (2) connect portions of ODP's Service Area; or (3) connect ODP's Service Area to other points of presence relevant to ODP's business (*e.g.*, an ODP pole yard, service

center, substation or retail location). "**Network**" includes underground fiber as well as fiber attached to poles owned by third parties.

6. Section 8 Maintenance of Attachments; Vegetation Management; National Joint Utilities Notification System shall be renamed Maintenance of Attachments; Vegetation Management; National Joint Utilities Notification System; Maintenance of Network and shall be amended to include the following language as new subsections d. and e.:

d. Licensee shall notify ODP in accordance with the terms of this Section 8.d. when maintenance is to be performed on fiber that may affect ODP's use of ODP Strands. The required notification shall be given to ODP Telecom at Telecom@lge-ku.com.

i. Non-Emergency. Licensee shall give at least forty-eight (48) hours' notice to ODP before performing any non-emergency maintenance affecting ODP Strands.

ii. Emergency. Licensee shall give at least one (1) hour's notice to ODP before performing any emergency maintenance affecting ODP Strands, if giving such notice is reasonable under the emergency circumstances. If giving such notice is not reasonable under the emergency circumstances, Licensee shall give as much advance notice as is reasonable or notice as soon after performing such emergency maintenance as is practicable.

e. Licensee shall, at its own expense, maintain the Network, including the fiber strands licensed hereunder, in good working order, condition and repair (ordinary wear excepted) throughout the term of this Agreement.

7. Section 17 License Fees of the Agreement shall be stricken in its entirety and replaced with the following:

Consideration for License; Billing

a. Consideration for License. In consideration of the license granted to Licensee in Section 2 of this Agreement, in lieu of License Fees, Licensee hereby grant to ODP an indefeasible and exclusive right to use four (4) strands of dark fiber continuously along the Network (the "**ODP Strands**").

i. Licensee will retain ownership of Attachments, including the ODP Strands, and Licensee will therefore be responsible for all of the burdens associated with such ownership.

ii. Subject to the following restriction, the ODP Strands may be used for any lawful purpose. The ODP Strands may not be used, directly or indirectly, in whole or in part, by (or to service) any carrier (competitive access provider, local exchange carrier, inter-exchange carrier, internet service provider, etc.) that is not an Affiliate of ODP. Nor will such ODP Strands be directly connected to any non-Affiliate entity for the purpose of providing any telecommunications services other than energy management services and communications between affiliates. For purposes of clarification, ODP's use of the ODP Strands in connection with provision of electric service to a carrier shall not be considered use by such carrier.

iii. To make use of the ODP Strands, ODP shall, from time to time, designate its desired tie-in locations within the Network, in writing, by submittal of a Fiber Use Exhibit substantially in the form of Exhibit 1. The Parties shall cooperate in good faith to identify suitable tie-in locations. Each Fiber Use Exhibit shall be accompanied by the necessary diagrams, descriptions and maps, and any other information reasonably necessary for purposes of accommodating the desired tie-in. Upon execution by ODP, each Fiber Use Exhibit shall be incorporated as a Schedule to the Agreement.

iv. If the Network design does not include a splice case located within 2,500 linear feet of a tie-in location designated by ODP, Licensee shall install, or cause to be installed, a splice case at such tie-in location within ninety (90) days of receipt of a Fiber Use Exhibit. The entire cost of each splice case installation (including, but not limited to, materials and labor) shall be paid by Licensee. Licensee's failure to comply with this Section 17(a)(iv) shall be deemed a Licensee Event of Default under the Agreement.

v. For each splice case required under Section 17(a)(iv), the Parties shall develop a diagram indicating the specifications of the splice, the splice case and the fiber stub, and ODP shall include such diagram in its Fiber Use Exhibit.

vi. The Parties may, by mutual agreement, adopt operating practices as necessary to accommodate ODP's use of ODP Strands, so long as such operating practices do not conflict with the terms of this Amendment or the Agreement.

b. Billing. All invoices submitted by ODP under this Agreement are due when rendered. Any bill not paid in full within sixty (60) days of its issuance shall be assessed a late payment fee of three percent (3%) on the bill's current charges. If Licensee fails to pay all charges and fees owed to ODP under this Agreement and billed to Licensee within six (6) months of the bill's issuance, ODP may remove any or all of Licensee's Attachments.

8. Section 18 Unauthorized Attachments shall be stricken in its entirety and replaced with the following:

Unauthorized Attachments. If Licensee makes any Attachment that requires ODP approval and Licensee has not obtained such approval, Licensee shall pay liquidated damages in the amount of $25.00 for each Unauthorized Attachment to offset indirect administrative costs reasonably anticipated in connection with the Unauthorized Attachment. Licensee shall also submit to ODP an application for approval of the Unauthorized Attachment(s) within thirty (30) days of discovery. If Licensee fails to submit the required applications or fails to timely remit any necessary payments to ODP in connection with the application process (including, but not limited to, any make-ready fees necessary to accommodate the Unauthorized Attachments), ODP may remove any or all such Unauthorized Attachments at Licensee's sole risk and expense.

9. Section 32 Entire Agreement; Good Faith Negotiations shall be stricken in its entirety and replaced with the following:

Entire Agreement; Good Faith Negotiations. This Agreement, as amended by Amendment No. 1 to Pole License Agreement dated July 31 ___, 2023, constitutes the entire Agreement between ODP and Licensee regarding the Attachments, and all previous representations relative thereto, either written or oral, are hereby annulled and superseded, including, but not limited to, the license agreement between ODP and East Tennessee Management Company, dated February 19, 1990. No modifications of this Agreement shall be binding on ODP or Licensee unless they shall be in writing and signed by both Parties. Nothing contained in this Agreement shall be construed as having any effect in any future agreement or contemplated future agreement between the Parties. The Parties acknowledge that the terms and conditions set forth in this Agreement are fair, reasonable and just, and that they were agreed to voluntarily after extensive good faith negotiations at arm's length and contain concessions, valuable consideration, benefits and burdens for and from both Parties.

IN WITNESS WHEREOF, the Parties have caused this Amendment to be duly executed by their authorized officers as of the Effective Date.

KENTUCKY UTILITIES COMPANY d/b/a OLD DOMINION POWER COMPANY, a Kentucky corporation By: DocuSigned by: Daniel Hawk A686AB2C1BC440F... Dan Hawk Director, Distribution Systems Operations Date: 7/31/2023 | 3:10 PM EDT	SCOTT TELECOM AND ELECTRONICS, INC., a Virginia corporation By: William J. Franklin Name: William J. Franklin Title: Chief Executive Officer Date: 7/10/2023
	SCOTT COUNTY TELEPHONE CO-OPERATIVE, a Virginia corporation By: William J. Franklin Name: William J. Franklin Title: Chief Executive Officer Date: 7/10/2023

8-29-19

POLE LICENSE AGREEMENT

between

KENTUCKY UTILITIES COMPANY d/b/a

OLD DOMINION POWER COMPANY

and

SCOTT TELECOM AND ELECTRONICS

Table of Contents

AGREEMENT 1
1. Definitions 1
2. License. 4
3. Structures Subject to Agreement; Other Licensees. 4
4. Easements. 5
5. Approval for Attachments; Make-Ready Work 5
6. Construction and Maintenance Requirements and Specifications. 7
7. [RESERVED]. 9
8. Maintenance of Attachments; Vegetation Management; National Joint Utilities Notification System 9
9. Structure Inspection; Field Inspections 10
10. Interference or Hazard. 10
11. Rearrangement; Relocation of Structures; New Structures. 11
12. Licensee's Abandonment of Structures. 11
13. Maintenance and Operation of ODP's Structures 11
14. Indemnity; Limitation of Liability. 12
15. Default by Licensee. 13
16. Default by ODP 14
17. License Fees. 14
18. Unauthorized Attachments 14
19. Waivers. 15
20. Term and Termination. 15
21. Insurance. 16
22. Confidentiality and Publicity. 19
23. Binding Effect; Assignment 20
24. Performance Assurance. 20
25. Notice. 21
26. Force Majeure. 22
27. Accounting Standards. 22
28. Liens 22
29. Relationship of Parties and Independent Contractor Status 22
30. Execution. 23
31. Further Assurances 23

32. Entire Agreement; Good Faith Negotiations. 23
33. Governing Law; Venue. 23
34. Injunctive Relief. 23
35. Headings. 23
36. Dispute Resolution. 23

SCHEDULE 1 24

LICENSE AGREEMENT

This License Agreement (this "Agreement") is made as of the 10th day of December, 2019, ("Effective Date") by and between KENTUCKY UTILITIES COMPANY d/b/a OLD DOMINION POWER COMPANY, a corporation organized under the laws of the Commonwealth of Kentucky, having its principal office at 220 West Main Street, Louisville, Kentucky 40202 ("ODP" or "Company") and SCOTT TELECOM AND ELECTRONICS, a Virginia Corporation organized under the laws of the State of Virginia, having its principal place of business at 149 Woodland Street, Gate City, Virginia 24251 ("Licensee"), each a "Party" and together the "Parties."

RECITALS

ODP is an electric utility company providing services in the Commonwealth of Virginia. ODP owns and maintains certain Structures (as defined below) to support electric service conductors. Such Structures also are useful for supporting Cables (as defined below) used in the provision of communications services.

Licensee is either a cable television system or a telecommunications carrier as those terms are used in 47 U.S.C. §224 (the "Pole Attachments Act").

Licensee desires to install and operate Cables on the Structures in the Service Area as described below, and ODP desires to make Structures available to Licensee, subject to the terms and conditions set forth below.

AGREEMENT

NOW THEREFORE, in consideration of the promises and the mutual covenants herein, and for other good and valuable consideration, the receipt of which is hereby acknowledged, the Parties agree as follows:

1. Definitions. The following definitions shall apply for purposes of this Agreement. Capitalized terms used in this Agreement but not defined in this Section 1 shall have the meaning provided elsewhere in this Agreement. The meaning applied to all terms shall be equally applicable to both the singular and plural forms of the term defined.

   "Affiliate" means, with respect to any Person, any other Person controlling, controlled by or under common control with, such Person. For purposes of this definition, the term "control" of a Person means direct or indirect ownership of more than fifty percent (50%) of the outstanding voting stock of a corporate person or voting interest in a non-corporate Person.

   "Approved Contractor" means a contractor approved by ODP for a particular purpose.

   "Attachment" means the Cable and all associated appliances including without limitation any overlashed cable, small splice panels and vertical overhead to underground risers but excluding power supplies, equipment cabinets, meter bases and other equipment that

impedes accessibility or otherwise conflicts with ODP's electric design and construction standards. This term also excludes any wireless facilities, other than as expressly set forth herein.

"Business Day" shall mean any Monday through Friday during which ODP is open for regular business.

"Cable" means the fiber optic and/or coaxial cable, as well as any messenger wire or support strand.

"Communication Space" shall mean the area below the Communication Worker Safety Zone to the limit of allowable NESC clearance, department of transportation or other governmental requirements, and ODP's internal construction standards.

"Communication Worker Safety Zone" is defined by the NESC and ODP's internal construction standards as that space between the facilities located in the Electric Space and facilities located in the Communications Space. Except for limited exceptions such as brackets, conduits, or drip loops of luminaires, no electric supply or communication facilities shall be located in the Communication Worker Safety Zone.

"Contractor" means any Person employed or engaged by Licensee to perform work or render services under this Agreement upon or in the immediate vicinity of ODP's Structures or associated facilities other than Licensee and Licensee's employees.

"Credit Rating" means, with respect to any entity, the rating then assigned to such entity's unsecured, senior long-term debt obligations (not supported by third party credit enhancements) by Standard and Poor's Rating Group or its successor ("S&P"), or Moody's Investor Services, Inc. or its successor ("Moody's"), or if such entity does not have a rating for its senior unsecured long-term debt, then the rating then assigned to such entity as its "corporate credit rating" assigned by S&P, or the "long-term issuer rating" assigned by Moody's.

"Distribution Pole" means a utility pole supporting electric supply facilities, all of which operate at less than 69 kV.

"Electric Space" shall mean the space above the Communications Worker Safety Zone reserved for the installation of electric supply lines. Specific clearances and exceptions are contained in the NESC and ODP's internal construction standards.

"FCC" means the Federal Communications Commission.

"Federal Laws" means applicable federal statutes, case law, orders, rules and regulations, and administrative decisions.

"Letter(s) of Credit means one or more irrevocable, transferable standby letters of credit issued by a U.S. commercial bank or a foreign bank with a U.S. branch in a form acceptable

to the Company. Costs of a Letter of Credit shall be borne by the applicant for such Letter of Credit.

"Licensee Event of Default" shall have the meaning provided in Section 15 of this Agreement.

"License Fee" shall have the meaning provided in Section 17 of this Agreement.

"Make Ready Survey" means a survey, in the form prescribed by ODP from time to time, prepared by ODP, Licensee or an Approved Contractor describing in reasonable detail the make-ready engineering requirements, and such other information as ODP may hereafter require, for the installation of an Attachment or group of Attachments on a Structure or group of Structures.

"National Electrical Safety Code" or "NESC" shall refer to the publication of the Institute of Electrical and Electronic Engineers, as modified, amended, and/or supplemented from time to time.

"Performance Assurance" means collateral in the form of cash, surety bond, Letter(s) of Credit, or other security acceptable to the Company.

"Person" means a corporation, limited liability company, partnership, association, organization, joint venture, company, governmental body or individual.

"SCC" means the Virginia State Corporation Commission, Division of Public Utility Regulation.

"Service Area" means the geographic area within Virginia in which ODP provides electrical service, as such area is defined by the SCC and as such area may be modified, expanded, contracted and/or redefined by the SCC or any successor agency from time to time. ODP's current Service Area is described in Schedule 1, attached hereto.

"Service Drop" means a Cable, attached to a pole with a J-hook or other similar hardware, that connects the trunk line a customer's premises. No service cable may extend more than one span along the trunk line to the Service Drop.

"State Laws" means applicable state statutes, case law, orders, rules and regulations, administrative decisions, including but not limited to those of the SCC.

"Structure" means any pole normally used by ODP to support its electric conductors but does not include either (1) any Transmission Pole, or (2) any pole used solely for street or outdoor lighting purposes.

"Transmission Pole" means any utility pole supporting electric supply facilities designed to operate at 69 kV or greater.

2. License. Subject to the terms and conditions set forth herein, including payment of fees and consideration as may be set forth herein, as of the Effective Date, ODP hereby grants to Licensee and Licensee hereby accepts from ODP a non-exclusive license to affix and install Attachments on Structures located in the Service Area.

3. Structures Subject to Agreement; Other Licensees.

a. All Structures used pursuant to this Agreement shall be and remain the property of ODP regardless of the nature or amount of any payment by Licensee, and Licensee shall not, except as specifically provided herein, acquire any right, title or interest in or to any such Structures except as provided herein.

b. Except as specifically provided herein, Licensee's license is non-delegable, non-transferable and non-assignable, and any delegation, transfer, or assignment of any interest in such license without prior written consent of ODP shall be voidable at ODP's option.

c. Nothing herein shall be construed as affecting the rights or privileges previously conferred by ODP, by contract or otherwise, to others not party to this Agreement, to use any Structure covered by this Agreement. The license herein granted shall at all times be subject to such previously conferred privileges. Furthermore, nothing herein shall be construed as affecting the rights or privileges that may be conferred by ODP in the future, by contract or otherwise, to others not party to this Agreement, to use any Structure covered by this Agreement, and ODP shall have the right to extend such rights and privileges.

d. The existing telephone companies with whom ODP has joint use agreements generally are assigned to the lowest relative position on any given pole. Licensee generally should occupy the next available space above the highest existing attachment (not including any of ODP's facilities); but in no event shall Licensee place its attachments within the space allocated to the telephone company pursuant to the joint use agreement without permission from the telephone company. If such permission is granted to Licensee by the telephone company, and at some later date the party to which the space is allocated needs to utilize the space occupied by Licensee's Attachment, Licensee shall either (1) remove it Attachment or (2) pay ODP's cost to replace the pole or make other required modifications.

e. Unless otherwise expressly stated in this Agreement, no reference to Federal Laws or State Laws or to any government agency in this Agreement shall be interpreted as either Party's agreement or acquiescence to the applicability of such laws or the jurisdiction of such agency.

f. In the event ODP determines that ODP will cease use of a Structure and abandon or remove such Structure, ODP shall provide Licensee with a minimum of sixty (60) days' notice before such abandonment unless ODP is required to complete such abandonment in a shorter time period due to state or municipal requirements,

easement provisions or contractual obligations to third parties, in which case ODP shall provide as much notice as possible under the circumstances.

4. Easements.

a. Licensee shall secure any right-of-way, easement, license, franchise or permit from any Person which may be required for the construction or maintenance of Attachments by or for Licensee. ODP does not convey or guarantee any easements, rights-of-way or franchises for the construction or maintenance of said Attachments.

b. Upon written request by Licensee, ODP may provide to Licensee such non-private information as ODP may have regarding the name of the record landowners from which ODP obtained easements for Structures. Such information will be provided without representation or warranty of any kind as to its accuracy or completeness. ODP shall have no obligation to correct or supplement any information so provided.

c. In the event ODP provides assistance to Licensee in obtaining easements or other property rights, Licensee shall reimburse ODP's cost of providing such assistance within thirty (30) days of receipt of an invoice.

5. Approval for Attachments; Make-Ready Work.

a. Except as set forth in Sections 5.h. and 5.i. below, Licensee shall make no Attachment to any Structure without ODP's prior written approval as set forth in this Agreement.

b. Licensee shall make written application, in the form prescribed by ODP, for permission to install Attachments on any Structure. Each application shall include: (i) the number and location of all Structures for which license to attach is sought and the amount of space required thereon; (ii) the physical attributes of all proposed Attachments; (iii) a load bearing study for each Attachment, unless the Company finds such study is not necessary; (iv) the proposed start date for installation of the Attachments described in the application; (v) any issues then known to Licensee regarding space, engineering, access or other matters that might require resolution before installation of Attachments. Unless the Parties agree otherwise in writing, Licensee shall submit applications for no more than 300 Structures during any thirty (30) day period.

c. Within forty-five (45) days after receipt of a completed application (such completeness to be determined in ODP's sole discretion), ODP shall notify Licensee in writing whether ODP will permit the use by Licensee of the Structures sought to be licensed and any conditions imposed on the installation or use of Attachments. If ODP denies access to any Structures, ODP's notice shall explain the basis of the denial. This forty-five (45) day period shall be primarily for the purpose of performing a Make-Ready Survey and engineering analysis in connection with the proposed Attachments. Licensee shall be responsible for all

costs associated with the Make-Ready Survey and engineering analysis, and shall reimburse ODP upon presentation of an invoice for same.

d. If an application is approved, ODP shall provide Licensee a written estimate of the costs of any necessary ODP make-ready work (including but not limited to rearrangement of electric supply facilities and pole change out). Licensee shall indicate its approval of the make-ready estimate by submitting payment of the estimated amount within fifteen (15) days of receipt of the estimate. ODP will commence such work following receipt of payment of the invoice. If facilities of a third party are required to be rearranged or transferred, Licensee shall coordinate with the third party for such rearrangement or transfer and shall pay the costs related thereto.

e. Where a new Structure is erected (including the replacement of an existing Structure) solely to provide adequate capacity for Licensee's proposed Attachments, the actual cost of the new Structure, as well as related appurtenances, plus the cost of removal of the existing Structure, minus the salvage value of the removed Structure, if any, shall be included within the make-ready estimate. The new Structure shall be the property of ODP regardless of any payments by Licensee toward its cost, and Licensee shall acquire no right, title or interest in or to such Structure.

f. In the event ODP has failed to perform the Make-Ready Survey and engineering analysis within the forty-five (45) day period referenced in Section 5.c. above, Licensee may perform such work at Licensee's expense using Approved Contractors.

g. In the event ODP has failed to perform the ODP make-ready work within ninety (90) days of receipt of Licensee's payment of the make-ready estimate, Licensee may perform such work at Licensee's expense using an Approved Contractor, provided that ODP shall provide a refund of any unexpended make-ready fees to Licensee within ten (10) days of Licensee notifying ODP that Licensee has performed the work. In the event make-ready work is performed by Licensee as described above in this Section 5.g., Licensee shall notify ODP upon completion of such make-ready work, and ODP may, at Licensee's expense, perform an inspection of such work prior to the construction of Attachments.

h. Service Drops may be affixed and installed on a Structure without making written application if (1) it is affixed within six (6) inches of Licensee's existing Attachment, (2) it conforms to all ODP standards and all federal, state and local government laws, rules, regulations, ordinances, or other lawful directives applicable to construction and installation of Attachments, and (3) written notice of each such Service Drop is provided to ODP in the month following the month of its installation. A Service Drop shall be counted as an Attachment for purposes of billing and permitting if it (1) is attached to a pole without an existing Attachment, (2) extends more than one span along the trunk line (in which case each individual

pole to which such Service Drop is attached shall be treated as the site of an individual Attachment), or (3) is affixed to a pole at a point beyond six (6) inches of Licensee's existing Attachment.

i. Licensee shall provide fifteen (15) days' prior notice of any proposed overlash of an existing Attachment. The notice shall include: (i) the date of the proposed work; (ii) the exact route of the proposed overlash; (iii) the specifics of the fiber, coaxial or other cable to be overlashed to the existing Attachment; (iv) a pole loading analysis performed by a qualified contractor that demonstrates the proposed overlash will not create a violation or exacerbate an existing violation; and (v) any other information reasonably required by ODP from time to time. In the event make-ready work is necessary to accommodate Licensee's proposed overlash Licensee may not proceed with the overlash until such make-ready work is completed in the normal course as set forth in Sections 5.b. though 5.g. above.

j. Before deploying any strand-mounted wireless communications devices other than strand-mounted wi-fi access points, Licensee shall at least forty-five (45) days prior to planned deployment notify Company of the proposed deployment and provide sufficient information regarding the nature of the device to permit Company to assess the safety and loadbearing implications of the proposed deployment.

6. Construction and Maintenance Requirements and Specifications.

a. Design, construction, or installation practices for Attachments and Licensee's installation thereof shall be approved by ODP in writing before any construction or installation of Attachments.

b. All Attachments shall be constructed and installed in a manner reasonably satisfactory to ODP and so as not to interfere with the present or future use which ODP reasonably may desire to make of its Structures. At all times, Licensee shall maintain, operate and construct all Attachments in such manner as to insure that ODP has full and free access to all of its facilities. All Attachments shall, with respect to clearances and otherwise, conform to ODP's electric design and construction standards and applicable requirements of the NESC, the National Electrical Code, and all other applicable codes and laws. In the event of a conflict, the more stringent standard shall apply.

c. Licensee shall identify each of its Attachments with a tag, approved in advance by ODP, that includes Licensee's name, twenty-four (24) hour contact telephone number, and such other information as ODP may require. Licensee shall tag new Attachments at the time of construction. Any Attachments existing as of the date of this Agreement shall be tagged within one hundred and eighty (180) days of the date of this Agreement.

d. In the design, installation and maintenance of its Attachments, Licensee shall follow all ODP safety guidelines in addition to safety and design requirements promulgated by the United States Occupational Safety and Health Administration,

the Virginia Department of Labor, the SCC and any other regulatory body having jurisdiction over the work of constructing and installing the Attachments, all as may be changed from time to time. All work shall be performed in accordance with the applicable standards of the NESC and the National Electrical Code. Licensee shall take all necessary precautions, by the installation of protective equipment or other means, to protect all persons and property of all kinds against injury or damage caused by or occurring by reason of the construction, installation or existence of Attachments.

e. Licensee shall make immediate report to ODP of (i) any damage caused to property of ODP or others in the course of installing or maintaining Attachments and (ii) any failure by Licensee to meet the requirements set forth herein for assuring the safety of persons and property and compliance with laws and regulations of public authorities and standard-setting bodies.

f. Licensee shall complete installation of its Attachments within sixty (60) days of approval of any application or completion of make-ready work, whichever is later. Licensee shall notify ODP in writing upon completion of installation. ODP, at Licensee's expense, may conduct an inspection of such Attachments, and Licensee shall reimburse ODP within thirty (30) days of presentation of an invoice for such inspections.

g. ODP may monitor Licensee's construction and installation of Attachments. If the need for a monitor is caused by Licensee's failure to comply with the terms of this Agreement, applicable laws or regulations, Licensee shall be responsible for the actual cost(s) of any such monitoring within thirty (30) days of receipt of an invoice.

h. Licensee may use qualified contractors of its own choice to perform work below the Communication Worker Safety Zone. For any work in or above the Communication Worker Safety Zone (when expressly permitted by this Agreement), Licensee must use an Approved Contractor.

i. Licensee shall comply with all applicable Federal Laws, State Laws, and local laws, rules and regulations with respect to environmental practices undertaken pursuant to its performance of this Agreement. Licensee shall not bring, store or utilize any hazardous materials on any ODP site without the prior express written consent of ODP. To the extent reasonably practicable, Licensee shall restore any property altered pursuant to its performance under this Agreement to its condition existing immediately prior to Licensee's alteration. ODP shall have no obligation to correct or restore any property altered by Licensee and shall bear no responsibility for Licensee's compliance with applicable environmental regulations.

j. If Licensee has not installed Attachments in accordance with the design standards and terms of this Agreement, and ODP provides written notice to Licensee describing the defect, Licensee, at its own expense, shall make necessary adjustments within thirty (30) days. Subject to Section 10 below, if Licensee fails to make such adjustments within thirty (30) days, ODP, at its option, may make

such repairs or adjustments, and Licensee shall pay ODP for the actual cost thereof, plus liquidated damages in the amount of 50% of the actual cost, within thirty (30) days of receipt of an invoice.

l. Licensee at all times warrants compliance with all requirements set out in this Section 6, assumes the continuing responsibility for such compliance in the future and assumes all responsibility for any damage, fines or penalties resulting from any noncompliance. ODP undertakes no duty to require any specific action by Licensee and assumes no responsibility by requiring such compliance or by requiring Licensee to meet any specifications or to make any corrections, modifications, additions or deletions to any work or planned work by Licensee.

m. Within 15 days of completion of the installation, Licensee shall provide ODP with complete "as-built" drawings in a computer-generated electronic format (or such other format as is agreeable to ODP). No hand drawings satisfy this requirement. Such "as-built" drawings of Licensee's facilities shall be considered confidential and proprietary and subject to the provisions of Section 22 of this Agreement.

7. [RESERVED].

8. Maintenance of Attachments; Vegetation Management; National Joint Utilities Notification System.

a. At all times, Licensee shall, at its own expense, maintain Attachments in safe condition and in good repair, in a manner reasonably suitable to ODP and so as not to conflict with any use of ODP facilities (including Structures) by ODP or by any other Person using such facilities pursuant to any license or permit by ODP. Licensee shall also ensure that its Attachments are constructed in a manner so as to minimize aesthetic nuisance, and maintained in a manner so as to avoid unsightliness. Licensee agrees not to interfere with the working use of any other Person's property on such facilities or any such property, which may, from time to time, be placed on or near ODP's Structures and other facilities. Maintenance of the Attachments shall be performed only by qualified personnel as provided in Section 6.h. of this Agreement.

b. Licensee shall, at its own risk and expense, perform any tree trimming and/or vegetation management work necessary to keep its Attachments and Cables free from vegetation. In the event such work presents the risk of contact with energized electric facilities, Licensee shall so notify ODP and ODP will perform such work at Licensee's sole risk and expense.

c. The Parties recognize that improved coordination of activities under this Agreement is of mutual benefit to all parties, and that Licensee's and ODP's participation in the National Joint Utilities Notification System ("NJUNS"), a Web-based system developed for the purpose of improving the coordination of such activities, would improve their respective operations under this Agreement. Licensee will join NJUNS prior to making application for Attachment, or within

thirty (30) days of the execution of this Agreement (if it has not already), whichever is sooner, and, during the term of this Agreement or as long as Licensee has Attachments on ODP's poles, will actively participate by entering field information into the NJUNS system within the times required by the system. Should Licensee fail to actively participate in NJUNS and should such failure cause ODP to incur any expense or any liability to others, Licensee shall reimburse ODP its expense and indemnify and hold ODP harmless from any damages or liability arising out of such failure. ODP may, in its sole discretion, utilize a different web-based system for the purposes stated in this Section 8.c., but shall provide Licensee with at least sixty (60) days' notice of any such change.

9. Structure Inspection; Field Inspections.

a. ODP undertakes no duty to inspect or ensure the repair of any facilities or Structures. ODP may make periodic inspections, as conditions may warrant, for the purpose of determining compliance with this Agreement. Neither ODP's right to make inspections nor any inspection made by ODP shall relieve Licensee of any responsibility, obligation or liability assumed under this Agreement.

b. ODP may conduct a complete field inspection of its Structures at any time for the purpose of verifying the number, location and type of all Attachments of Licensee on ODP's Structures. ODP shall give Licensee at least thirty (30) days' notice of such inspection.

i. If the field inspection reveals that Licensee has more Attachments than shown in ODP's existing records, the additional Attachments shall be treated as Unauthorized Attachments pursuant to Section 18.

ii. Licensee shall reimburse ODP for the cost of such inspections (or a pro rata share of such inspections, if the facilities of other licensees are inspected at the same time).

10. Interference or Hazard. If ODP notifies Licensee in writing or orally with written confirmation that, in ODP's reasonable judgment, the Attachments or the condition of Attachments of Licensee on any Structures (i) interfere with the use of such Structures or the operation of ODP facilities or equipment, (ii) constitute a hazard to the service rendered by ODP or any other Persons licensed by ODP to use such Structures, (iii) cause a danger to employees of ODP or other persons, or (iv) fail to comply with applicable codes, specifications, laws or regulations, then Licensee shall, within a reasonable period, remove, rearrange, repair or change its Attachments as needed or as directed by ODP. In the case of any immediate hazard or danger, such period shall not exceed twenty-four (24) hours from receipt of such notice. In case of a hazardous condition or other emergency which in ODP's good faith and reasonable judgment requires ODP to immediately remove or relocate the Attachments of Licensee, ODP reserves the right, at Licensee's expense, without prior notice and with no liability therefor, to remove or relocate such Attachments as required (provided ODP shall provide Licensee with notice, which may be by telephone, of any such action as soon as reasonably possible thereafter).

11. Rearrangement; Relocation of Structures; New Structures.

a. If Licensee's desired Attachments can be accommodated on existing Structures of ODP only by rearranging facilities of ODP, or if because of Licensee's proposed Attachments it is necessary for ODP to rearrange or transfer its facilities on any facility not owned by it, Licensee shall reimburse ODP for the actual expense incurred in making such rearrangement.

b. Upon sixty (60) days prior written notice delivered to Licensee (except in emergency or dangerous situations, in which event ODP shall give only as much prior notice as practical under the circumstances), ODP shall have the right to replace, relocate, remove or abandon any Structure and to cause the alteration, relocation or removal of any Attachment, consistent with normal operating, maintenance and development procedures and prudent utility practices. ODP will bear all costs and expenses of any relocation of the Structures not attributable to or caused by Licensee or the Attachments, and Licensee will bear all costs and expenses of any relocation and removal of the Attachments and all costs and expenses attributable to or caused by Licensee or the Attachments. Licensee shall be solely responsible for, and hold ODP harmless from, any losses occasioned by the interruption of Licensee's business or operations.

c. In the event ODP determines that any space occupied by the Attachments is required in connection with the services provided by ODP or any of its Affiliates, ODP shall be entitled to direct, by written notice to Licensee, that such Attachments be removed from the Structures. Licensee agrees to complete such removal within sixty (60) days of ODP's request.

d. If Licensee fails to timely perform any work as instructed by ODP pursuant to this Section 11 or any other Section of this Agreement, ODP may either (i) perform such work at Licensee's sole risk and expense in which case Licensee shall pay ODP for the actual cost thereof, plus liquidated damages in the amount of 50% of the actual cost, within thirty (30) days of receipt of an invoice, or (ii) ODP may charge Licensee, as liquidated damages, $50 per Structure on which Licensee has failed to timely perform such work and an additional $50 per Structure for each thirty (30) day period until Licensee performs such work.

12. Licensee's Abandonment of Structures. Licensee may at any time abandon the use of a Structure hereunder by removing therefrom all of its Attachments and by giving written notice thereof to ODP. Licensee shall bear all cost of removal and any ODP costs incurred as a result of such removal within thirty (30) days of receipt of an invoice. ODP shall make no refund of any amount paid by Licensee for use of such Structure, nor shall any other obligation or liability of Licensee under this Agreement be affected by such abandonment.

13. Maintenance and Operation of ODP's Structures. ODP reserves to itself, its successors, Affiliates and assigns, the right to maintain Structures and other ODP property and to operate its business and maintain its property in such a manner as will, in its own judgment, best enable it to fulfill its own service requirements. ODP shall not be liable to Licensee

for any interference with the operation of Licensee's facilities, or loss of business arising in any manner out of the use of ODP's Structures or other property hereunder.

14. Indemnity; Limitation of Liability.

a. Indemnity.

i. Licensee agrees to protect, defend, indemnify and save harmless ODP, its Affiliates, their officers, directors, employees and representatives (each an "Indemnitee" hereunder) from and against all damage, loss, claim, demand, suit, liability, penalty or forfeiture of every kind and nature, including but not limited to costs and expenses of defending against the same, payment of any settlement or judgment therefor and reasonable attorney's fees that are incurred by Indemnitee, by reason of any claims arising from Licensee's activities under this Agreement, or from Licensee's presence on the premises of ODP, or from or in connection with the construction, installation, operation, maintenance, presence, replacement, enlargement, use or removal of any facility of Licensee attached to, or in the process of being attached to or removed from, any Structure of ODP by Licensee, its employees, agents, or other representatives, including but not limited to (a) claims alleging injuries or deaths to persons; (b) claims alleging damage to or destruction of property including loss of use thereof; (c) power or communications outage, interruption or degradation; (d) pollution, contamination of or other adverse effects on the environment; (e) violation of governmental laws, regulations or orders; or (f) rearrangement transfer or removal of any third party attachment on, from or to any Structure of ODP. The indemnity set forth in this section shall include indemnity for ODP's own negligence, but shall not include indemnity to the extent of ODP's gross negligence or willful misconduct.

ii. Licensee hereby expressly agrees to indemnify and save harmless ODP from any and all claims, including the expenses incurred by ODP to defend itself against such claims, resulting from or arising out of the failure of Licensee to secure any right of way, easement, license, franchise or permit as required in Section 4 above.

b. Limitation of Liability. IN NO EVENT SHALL ODP OR ANY OF ITS REPRESENTATIVES BE LIABLE UNDER THIS AGREEMENT TO LICENSEE FOR CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, PUNITIVE OR ENHANCED DAMAGES, LOST PROFITS OR REVENUES OR DIMINUTION IN VALUE, ARISING OUT OF, OR RELATING TO, OR IN CONNECTION WITH THIS AGREEMENT, REGARDLESS OF (A) WHETHER SUCH DAMAGES WERE FORESEEABLE, (B) WHETHER OR NOT ODP WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR (C) THE LEGAL OR EQUITABLE THEORY (CONTRACT, TORT OR OTHERWISE) UPON WHICH THE CLAIM IS

BASED.

15. Default by Licensee.

a. Each of the following shall constitute a Licensee Event of Default:

i. Failure by Licensee to pay any fee required, perform any material obligations undertaken or satisfy any warranty or representation made under this Agreement; and

ii. The occurrence of a sale, lease, license, mortgage, hypothecation, or other transfer of any kind, by instrument, judgment, operation of law or otherwise, of any interest in Attachments to any Person without the express written consent of ODP, which consent shall not be unreasonably conditioned, withheld or delayed; provided, however, that a contract for service to a customer of Licensee or the transfer of rights to use dark fiber within the Cable without a transfer of any interest in Attachments shall not alone constitute a transfer described in this paragraph.

b. If, within thirty (30) days after receipt of ODP's written notice of the occurrence of a Licensee Event of Default, Licensee has not cured the default so notified, ODP may take any or all of the following actions:

i. Terminate the license granted herein to the extent of Structures to which such default or non-compliance is applicable;

ii. Remove, relocate, or rearrange Attachments of Licensee to which such default or non-compliance relates, all at Licensee's expense;

iii. Decline to permit additional Attachments hereunder until such failure or default is cured;

iv. Terminate this Agreement, and recover from Licensee all costs and expenses incurred as a result of or reasonably related to the Licensee Event or Events of Default and the termination of this Agreement;

v. To the extent permitted by applicable laws, in the event that Licensee shall have terminated business operations and shall be unable or unwilling to remove substantially all Attachments from the property of ODP, assume ownership and control of all Attachments and all related equipment of Licensee attached to ODP's Structures; and

vi. Pursue any and all remedies that may be available in law and equity, including specific performance.

c. No liability shall be incurred by ODP upon its taking of any or all actions described in this Section 15 and Licensee shall be liable for all expense, including reasonable

attorney's fees and court costs incurred by ODP in pursuit of such remedies or as a result of the termination of this Agreement thereunder. The remedies provided herein are cumulative and in addition to any other remedies available to ODP under this Agreement or otherwise. No refund of any license fee will be due on account of termination.

16. Default by ODP. If ODP fails to comply with any provisions of this Agreement or defaults in the performance of any of its obligations under this Agreement and fails within thirty (30) calendar days, after written notice from Licensee, to cure the default (except that if such a failure is of a nature that cannot be reasonably cured within 30 days then ODP shall not be deemed in default hereunder and Licensee may not take any of the following actions so long as ODP commences good faith action to cure the default notified within such 30 day period and thereafter diligently pursues such action), then Licensee may terminate this Agreement and/or pursue any and all such remedies as may be available in law or in equity, including, without limitation, the remedy of specific performance. No liability shall be incurred by Licensee because of any or all such actions. The remedies provided herein are cumulative and in addition to any other remedies available to Licensee under this Agreement or otherwise.

17. License Fees.

a. All attachment charges for use of Structures will be billed semi-annually based upon the number of Licensee's Attachments reflected in ODP's records on December 1 and June 1. Payment of License Fees and other consideration provided in this Agreement shall not entitle Licensee to affix or install Attachments if other terms of this Agreement have not been met.

b. All invoices submitted by ODP under this Agreement are due when rendered. Any bill not paid in full within sixty (60) days of its issuance shall be assessed a late payment fee of 3 percent on the bill's current charges. If the Licensee fails to pay all charges and fees billed within six months of the bill's issuance, ODP may remove any or all of Licensee's Attachment's.

c. For all Attachments made under this Agreement, the annual License Fee shall be $6.97/year per each Attachment, subject to annual adjustment as set forth in Section 17.d. below.

d. The License Fee may be adjusted annually based upon on the preceding year's data in accordance with the FCC's pole attachment rate formulas.

18. Unauthorized Attachments. If Licensee makes any Attachment that requires ODP approval and Licensee has not obtained such approval, such Attachment shall be deemed an "Unauthorized Attachment" and shall be presumed to have been affixed to OPD's Structure(s) for five (5) years or since completion of the most recent field inspection (whichever is less). Licensee shall be liable for License Fees for this time period, and shall pay additional liquidated damages in the amount of $25.00 for each Unauthorized Attachment to offset indirect administrative costs reasonably anticipated in connection

with the Unauthorized Attachment. Licensee shall also submit to ODP an application for approval of the Unauthorized(s) Attachment within 30 days of discovery. If Licensee fails to submit the required applications or fails to timely remit any necessary payments to ODP in connection with the application process (including but not limited to any make-ready fees necessary to accommodate the Unauthorized Attachments), ODP may remove any or all such Unauthorized Attachments at Licensee's sole risk and expense.

19. Waivers. Failure by either Party to enforce or insist upon compliance with any of the terms or conditions of this Agreement shall not constitute a general waiver or relinquishment of any such terms or conditions, but the same shall be and remain at all times in full force and effect.

20. Term and Termination.

a. This Agreement shall become effective upon the Effective Date.

b. If not terminated in accordance with the provisions of this Section 20 or Sections 15 or 16 above or by mutual agreement of the Parties, this Agreement shall continue in effect for a term of five (5) years from the Effective Date, and shall thereafter automatically renew for successive one (1) year periods unless one Party gives the other Party written notice of termination at least sixty (60) days in advance of the next renewal date.

d. Upon termination of this Agreement, Licensee shall remove all Attachments from Structures and other ODP property within one hundred eighty (180) days. All costs of such removal shall be borne by Licensee. Licensee shall exercise precautions to avoid damage to all persons and to facilities of ODP and other parties in so removing Attachments and assumes all responsibility for any and all such damage caused by Licensee. If Licensee's Attachments and other property are not promptly removed upon termination of this Agreement, as herein provided, unless the time is extended by mutual agreement, ODP shall have the right to remove said Attachments without liability therefor, and Licensee shall pay ODP the cost of such removal within thirty (30) days of receipt of an invoice.

e. ODP may terminate this Agreement without liability to Licensee, upon giving sixty (60) days advance written notice to Licensee: (i) at such time as it is determined in the reasonable opinion of ODP's legal counsel that ODP's performance hereunder would be illegal under applicable law or regulation or under any order or ruling issued by the SCC, or any other federal, state or local agency having regulatory jurisdiction over ODP and same cannot be cured by ODP without unreasonable expense or without materially and substantially altering the terms and conditions of this Agreement; or (ii) if, in the reasonable opinion of ODP's legal counsel, termination is required to preserve ODP's rights under any franchise, right-of-way, permit, easement or other similar right which is material and substantial to ODP's business or operations. In the event of such termination, the Parties shall pay and perform obligations, which have arisen prior to the effective date of termination,

but shall not be obligated to pay and perform obligations, which arise after the effective date of termination.

21. Insurance.

a. For the entire duration of this Agreement (and thereafter until the completion of this Agreement, including but not limited to any period of time during which Licensee's Attachments remain on ODP's Structures) on a per occurrence basis with respect to this Agreement, Licensee shall, at its own expense, maintain and carry in full force and effect, and shall require any of its Contractors and subcontractors to maintain and carry in full force and effect, the following insurance:

i. Workers' Compensation and Employer's Liability Policy, which shall include:

(a) Workers' Compensation (Coverage A), with statutory limits, and in accordance with the laws of all states where the Attachments are located;
(b) Employer's Liability (Coverage B) with minimum limits of One Million Dollars ($1,000,000) Bodily Injury by Accident, each Accident, $1,000,000 Bodily Injury by Disease, each Employee;
(c) Thirty (30) Day Cancellation Endorsement; and
(d) Broad Form All States Endorsement.
(e) with respect to any personnel of Licensee or any Subcontractor who perform work to which the U.S. Longshore and Harbor Workers Compensation Act is applicable, U.S. Longshore and Harbor Workers Compensation Act coverage (required if workers of Licensee or Subcontractor are performing work that falls under such Act; and
(f) with respect to any personnel of Licensee or any Subcontractor who perform work on commercial vessels, Maritime Employers Liability (MEL) including Jones Act coverage (required at all times workers of the Licensee or Subcontractor are working on commercial vessels) any time during the period of this Agreement.

ii. Commercial General Liability Policy, which shall have minimum limits of One Million Dollars ($1,000,000) each occurrence; One Million Dollars ($1,000,000) Products/Completed Operations Aggregate each occurrence; One Million Dollars ($1,000,000) Personal and Advertising Injury each occurrence, in all cases subject to Two Million Dollars ($2,000,000) in the General Aggregate for all such claims, and including:

(a) Thirty (30) Day Cancellation Endorsement;
(b) Blanket Written Contractual Liability to the extent covered by the policy against liability assumed by Licensee under this Agreement;
(c) Insurance for liability arising out of blasting, collapse, and underground

damage (deletion of X, C, U exclusions);
(d) General Aggregate Limit – Per Project Endorsement (CG2503);
(e) Products/Completed Operations coverage shall be extended for five (5) years beyond the completion of all work;
(f) No exclusion for use of watercraft;
(g) Include Additional Insured Endorsement GC 2010 or CG2037, or its equivalent; and
(h) Sudden & accidental pollution liability.

iii. Commercial Automobile Liability Insurance covering the use of all owned, non-owned, and hired automobiles, with a bodily injury, including death, and property damage combined single minimum limit of One Million Dollars ($1,000,000) each occurrence.

iv. Umbrella/Excess Liability Insurance with minimum limits of Five Million Dollars ($5,000,000) per occurrence; Five Million Dollars ($5,000,000) aggregate, to apply to employer's liability, commercial general liability and automobile liability, including:

(a) Products/Completed Operations coverage shall be extended for five (5) years beyond the completion of all work.
(b) Must include "follow form" provisions including any required marine coverage.
(c) Total limits can be met by any combination of the underlying primary coverage with umbrella/excess policies.

v. If any fixed wing, rotor, or any aircraft will be used by Licensee in performing the work allowed or required under this Agreement, Aircraft Public Liability Insurance covering such aircraft whether owned, non-owned, leased, hired or assigned with a combined single minimum limit for bodily injury and property damage of Five Million Dollars ($5,000,000) including passenger liability coverage.

vi. If any Unmanned Aircraft Systems (UAS) will be used by Licensee in performing the work allowed or required under this Agreement, Drone Liability Insurance covering such aircraft whether owned, non-owned, leased, hired or assigned with a $1,000,000 per occurrence combined single limit for bodily injury, property damage and personal injury.

vii. With respect to any work with includes professional services that fall within a professional liability exclusion from the Commercial General Liability Policy provided under Section 21.a.ii above, Professional Liability Insurance with the following characteristics:

(a) Claims made basis;

(b) Shall remain in force continuously for three (3) years or an extended discovery period will be exercised for a period of three (3) years beginning from the time the work is completed;
(c) Include coverage for a pollution event resulting from the professional services; and
(d) If the work includes engineering or architectural services, the minimum limits shall be $3,000,000 per claim and $3,000,000 in the aggregate.

b. The above policies to be provided by Licensee shall be written by insurance companies which have an A.M. Best Rating of not less than "A-, VIII". These policies shall not be materially changed or canceled except with thirty (30) days written notice to ODP from Licensee and the insurance carrier. Evidence of coverage, notification of cancellation or other changes shall be mailed to: Attention: Manager, Supply Chain, LG&E and KU Services Company, P.O. Box 32020, Louisville, Kentucky 40232.

c. Except with regard to workers' compensation and professional liability, Licensee shall name ODP as additional insured on each of the above referenced policies. All policies will be primary/non-contributory in favor of ODP. Licensee shall waive any rights of subrogation against ODP and its insurance carriers.

d. For any of the foregoing policies that are issued on a claims made basis, after termination of this Agreement, Licensee shall maintain such policies in place (and/or provide comparable tail coverage) for at least five years after all of Licensee's obligations under this Agreement have been fulfilled. The retroactive date must be prior to the commencement of any work done on behalf of ODP.

e. ODP reserves the right to request and receive a summary of coverage of any of the above policies or endorsements; however, ODP shall not be obligated to review any of Licensee's certificates of insurance, insurance policies, or endorsements, or to advise Licensee of any deficiencies in such documents. Any receipt of such documents or their review by ODP shall not relieve Licensee from or be deemed a waiver of ODP's rights to insist on strict fulfillment of Licensee's obligations under this Agreement.

f. Licensee shall provide Certificates of Insurance to Company for each policy of insurance required above and evidence the items noted hereafter: (1) Each Certificate shall properly identify the certificate holder as Company; (2) Under no circumstances shall Licensee begin any work (or allow any Subcontractor to begin any work) prior to submitting Certificate(s) (evidencing the required insurance of the Licensee or Subcontractor, as applicable) acceptable to Company. Company retains the right to waive this requirement at its sole discretion; (3) Certificate shall evidence thirty (30) days prior notice of cancellation; (4) Certificate shall verify additional insured status on all coverage including the endorsements required by this Section 21; (5) Certificate shall verify Blanket Waiver of subrogation - All policies of insurance shall include waivers of subrogation against Company. Except

where not applicable by law; (6) Certificate shall verify Primary/Non-contributory wording in favor of Company; and (7) Certificate shall identify policies which are written on a Claims Made coverage form and state the retroactive date.

g. Licensee shall provide notice of any accidents or claims involving Licensee's Attachment or Licensee's work under this Agreement to ODP's Manager, Risk Management at LG&E and KU Services Company, P.O. Box 32030, Louisville, Kentucky 40232 and ODP's site authorized representative. Additionally, Licensee shall notify ODP of any threatened, pending or paid off claims to third parties, individually or in the aggregate, which from time to time may affect the coverage inuring to the benefit of ODP as hereinafter specified.

h. Each policy of insurance required to be maintained by Licensee under this Section 21 (except the Workers' Compensation and Employer's Liability Policy) shall cover all losses and claims of Licensee regardless of whether they arise directly or indirectly. Section 21 only represents minimum insurance requirements; it does not mitigate or reduce liability required by the indemnity provisions in this Agreement. Licensee is responsible for ensuring that its contractors' insurance meets the requirements of Section 21.

i. Licensee shall have insurance coverage in place at Licensee's expense prior to performing any work under this Agreement. ODP retains the right to refuse to allow the performance of such work in the absence of such coverage.

j. Policy limits shall not be deemed to be limit of Licensee's liability to ODP under this Agreement.

k. Self-Insured retentions are not acceptable without ODP's consent, except for the $10,000 maintenance retention on Umbrella coverage.

22. Confidentiality and Publicity. Each Party acknowledges that, in the course of the performance of this Agreement, it may have access to privileged and proprietary information claimed to be unique, secret and confidential and which constitutes the exclusive property or trade secrets of the other Party. This information may be presented in documents marked with a restrictive notice or otherwise tangibly designated as proprietary, or disclosed during oral discussions, at which time representatives of the disclosing Party will specify that the information is proprietary. Unless jointly agreed to in writing, neither Party shall knowingly disclose to third parties any proprietary information received from the other Party in connection with this Agreement, nor shall they disclose the terms of this Agreement to any other person or entity (other than to their respective Affiliates, directors, officers, employees, agents and contractors who have a need to know the same) unless required in order to prosecute or defend any claim in an action involving any of the Parties hereto, or unless required by any court, governmental agency or regulatory body having competent jurisdiction. In the case of disclosure for such prosecution or defense or as required by any such judicial or quasi-judicial body, the non-

disclosing Party shall be given sufficient notice so as to allow it to seek a protective order with respect to such disclosure. The Parties shall each protect proprietary information received from the other with the same degree of care that they would take to protect their own proprietary information, and each Party shall be responsible for ensuring that its directors, officers, employees, agents and contractors who have access to the confidential or proprietary information of the other, maintain the confidentiality of such information in accordance with this Section 22. However, the Parties shall have no obligation to keep confidential any information that is in or becomes part of the public domain through no fault of their own. No Party shall issue news releases, publicity statements or advertising which references the other Party, this Agreement, or any provision hereof, without first obtaining the prior written approval of the other Party; provided, that the foregoing restriction shall not prevent the disclosure by a Party of any proprietary information to the extent (i) in the opinion of that Party's legal counsel, such disclosure is required by any law, regulation or rule of any securities exchange; or (ii) such disclosure is made to a person or other entity that is itself bound to maintain the confidentiality of the same pursuant to a written confidentiality agreement with the disclosing Party consistent with the provisions in this Section 22. Notwithstanding the forgoing, ODP may disclose the existence and terms of this Agreement to federal, state and municipal bodies having jurisdiction over the operations of ODP. Further, nothing herein shall prevent ODP from disclosing information to others as necessary to facilitate the orderly administration of this Agreement.

23. Binding Effect; Assignment. All provisions of this Agreement shall inure to the benefit of and be binding upon each of the Parties hereto upon the Effective Date and upon their successors and assigns. Licensee shall not assign this Agreement or any of its rights or obligations hereunder without the prior written consent of ODP, which consent shall not be unreasonably withheld, conditioned or delayed.

24. Performance Assurance.

a. Licensee shall furnish Performance Assurance in the following amounts to guarantee the payment of any sums which may become due for attachment charges, inspections, or work performed by the Company under this Agreement, including the removal of attachments upon termination of the Agreement by any of its provisions:

Number of Attachments	Amount per Attachment	Maximum Total
1-5,000	$20/Attachment	$100,000
5,001-10,000	$10/Attachment	$150,000
10,001+	$5/Attachment	$1,000,000

The above-stated amounts are incremental. By way of example, 7,500 Attachments would require Performance Assurance in the amount of $125,000 ($20 per Attachment for the first 5000 Attachments; $10 per Attachment for the next 2,500 Attachments); 15,000 Attachments would require Performance Assurance in the amount of $175,000 ($20 per

Attachment for the first 5000 Attachments; $10 per Attachment the next 5,000 Attachments; and $5 per Attachment for the last 5,000 Attachments).

The amount of the Performance Assurance shall be calculated by the Company annually based on the Licensee's then-existing number of Attachments. Licensee shall provide the Performance Assurance within 30 days of its request by the Company.

In the event the Customer provides Performance Assurance in the form of a surety bond or Letter of Credit, each bond or Letter of Credit shall contain the provision that it shall not be terminated prior to six (6) months after Company's receipt of written notice of the desire of the bonding or insurance company, or bank, to terminate such bond or Letter of Credit. Company may waive this requirement if an acceptable replacement is received before the six (6) months has ended. Upon termination of such surety bond or Letter of Credit, Company shall request Licensee to immediately remove its Cables, Attachments and all other facilities from Company Structures. If Licensee should fail to complete the removal of all of its facilities from Company's Structures within thirty (30) days after receipt of such request, then Company may remove Licensee's facilities at Licensee's expense and without liability for any damage to Licensee's facilities.

Each surety bond shall be issued by an entity having a minimum A.M. Best rating of A- and each Letter of Credit shall be issued by an entity having a minimum Credit Rating of A- by S& P or A3 by Moody's at the time of issuance and at all times the relevant instrument is outstanding.

25. Notice. Any notice or request required by this Agreement shall be deemed properly given if sent overnight by nationally recognized overnight courier, sent by certified U.S. mail, return receipt requested, postage prepaid, or sent by telecopier, if number provided below, with confirmed receipt, to:

In the case of ODP:

Vice President, Electric Distribution
KENTUCKY UTILITIES COMPANY
d/b/a OLD DOMINION POWER COMPANY
220 W. Main Street
Louisville, KY 40202
Phone: (502) 627-4743
Fax: (502) 627-4165

With a copy to:

Office of the General Counsel
And Corporate Secretary
KENTUCKY UTILITIES COMPANY
d/b/a OLD DOMINION POWER COMPANY
220 W. Main Street

Louisville, KY 40202

In the case of Licensee:

Chief Executive Officer
SCOTT TELECOM AND ELECTRONICS
PO Box 489
149 Woodland Street
Gate City, VA 24251
Phone: (276) 452-9119
Fax: (276) 452-2448

With a copy to:

Whiteford Taylor Preston
Attn: Vernon E. Inge, Jr.
One James Center
901 E. Cary Street, Suite 500, Richmond, VA 23219

The designation of the person(s) to be notified, and his, her or their address(es) may be changed by ODP or Licensee at any time, or from time to time, by similar notice.

26. Force Majeure. In the event Licensee or ODP is delayed in or prevented from performing any of its respective obligations under this Agreement due to acts of God, war, riots, civil insurrection, acts of the public enemy, strikes, lockouts, acts of civil or military authority, government shutdown, fires, floods, earthquakes, fiber, cable or other material failures, shortages or unavailability, delay in delivery not resulting from the responsible Party's failure to timely place orders therefor, lack or delay in transportation, or failure of a third party to grant or recognize a right beyond the reasonable control of the Party delayed or due to any other causes beyond the reasonable control of the Party delayed, then such delay or nonperformance shall be excused.

27. Accounting Standards. In computing or estimating expenses, costs, or other charges to be paid or reimbursed by Licensee under this Agreement, ODP shall use the accounting principles, practices, and records commonly employed in its business and as permitted or required by State Law.

28. Liens. To the extent permitted by law, in the event any construction lien or other encumbrance shall be placed on the Attachments by the actions of Licensee or its Contractor, Licensee shall promptly, in accordance with applicable laws, discharge such lien or encumbrance without cost or expense to ODP, and Licensee hereby agrees to indemnify ODP for any and all actual damages that may be suffered or incurred by ODP in discharging or releasing said lien or encumbrance.

29. Relationship of Parties and Independent Contractor Status. Neither ODP nor Licensee shall be deemed to be a partner, agent or joint venturer with or of the other by reason of this

Agreement or the consummation of the transactions contemplated herein. ODP and Licensee shall perform their duties under this Agreement as independent contractors, and at their own risk. Neither ODP nor Licensee shall at any time hold itself out as being a partner, co-venturer or agent of the other.

30. Execution. This Agreement may be executed in multiple counterparts, each being deemed an original and all together being deemed the same document.

31. Further Assurances. Each Party shall execute such assignments, endorsements and other instruments and give such further assurances and perform such acts as are or may become necessary and appropriate to effectuate and carry out the provisions of this Agreement.

32. Entire Agreement; Good Faith Negotiations. This Agreement constitutes the entire Agreement between ODP and Licensee regarding the Attachments, and all previous representations relative thereto, either written or oral, are hereby annulled and superseded, including but not limited to the license agreement between ODP and East Tennessee Management Company, dated February 19, 1990. No modification of this Agreement shall be binding on ODP or Licensee unless it shall be in writing and signed by both Parties. Nothing contained in this Agreement shall be construed as having any effect in any future agreement or contemplated future agreement between the Parties. The parties acknowledge that the terms and conditions set forth in this Agreement are fair, reasonable and just, and that they were agreed to voluntarily after extensive good faith negotiations at arm's length and contain concessions, valuable consideration, benefits and burdens for and from both parties.

33. Governing Law; Venue. The laws of the Commonwealth of Kentucky, without regard to the conflict of laws provisions thereof, shall apply to this Agreement and to its interpretation. All legal proceedings to enforce this Agreement shall be brought only in a state or federal court in Jefferson County, Kentucky.

34. Injunctive Relief. Each Party acknowledges that the other party may not be adequately compensated by money damages in the event of a breach of any covenant or agreement contained herein and that the other Party may be entitled to specific performance of such covenants and agreements, or other injunctive relief, in accordance with applicable laws, in addition to all other remedies.

35. Headings. Paragraph headings are for the convenience of the Parties only and are not to be construed as part of the terms of this Agreement.

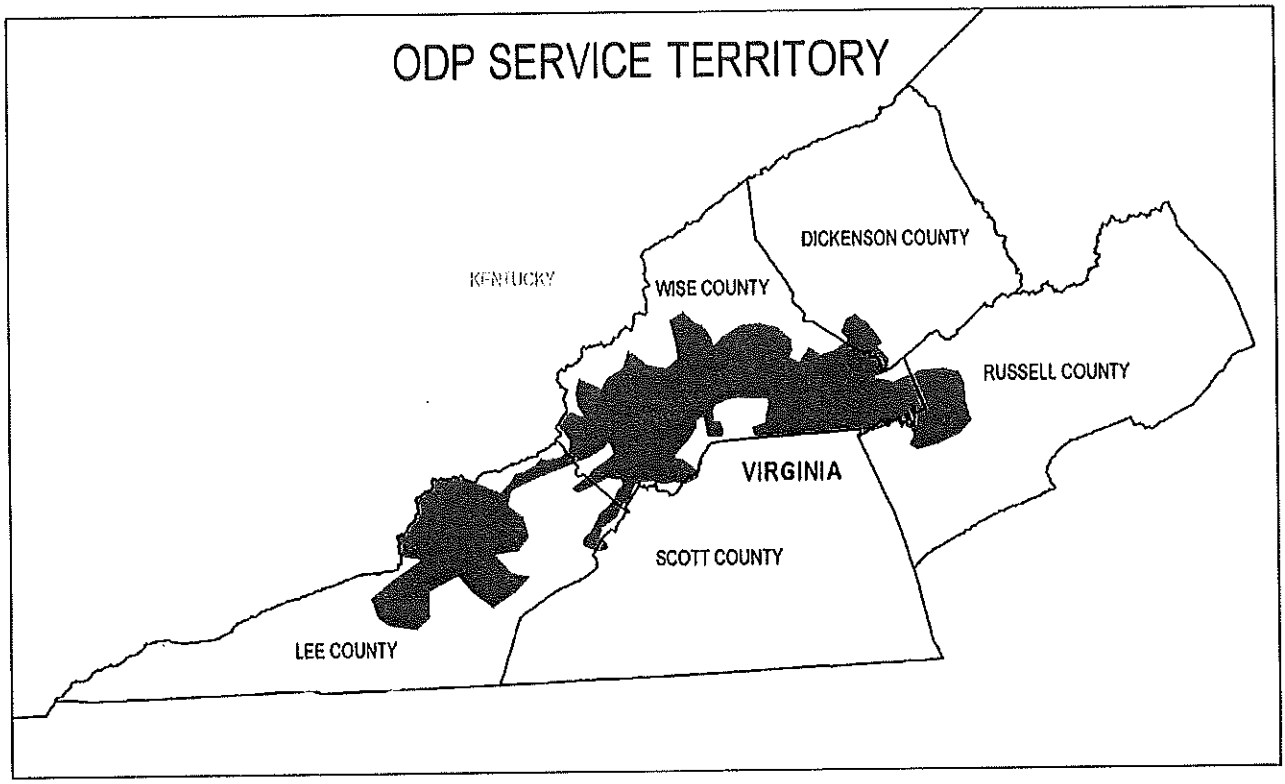
36. Dispute Resolution. In the event any dispute arises between the Parties under this Agreement, the Party seeking resolution of the dispute must submit written notice to the other describing the dispute and such Party's desire to resolve the dispute in accordance with the provisions of this Section 36. If the Parties are then unable to resolve such dispute in the normal course of business within fifteen (15) days after delivery of the written notice as provided herein, each of the Parties shall promptly, but in no event later than twenty (20) days after delivery of such written notice, appoint a designated representative who has authority to settle the dispute. The designated representatives shall meet as often as they

reasonably deem necessary in order to discuss the dispute and negotiate in good faith in an effort to resolve such dispute. The specific format for such discussions will be left to the discretion of the designated representatives; however, all reasonable requests for relevant non-privileged information made by one Party to the other Party shall be honored. If the Parties are unable to resolve issues related to the dispute within forty-five (45) days after the Parties' appointment of the designated representatives, then either Party may pursue its rights and remedies under law or equity without further delay. Each Party shall bear its own costs and expenses in seeking resolution of any dispute under this Agreement pursuant to this Section 36.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their authorized officers as of the Effective Date.

KENTUCKY UTILITIES COMPANY d/b/a OLD DOMINION POWER COMPANY	SCOTT TELECOM AND ELECTRONICS
By: Denise Simon	By: Roger Fraysier
Name: Denise Simon	Name: Roger Fraysier
Title: Director, Distribution Reliability, Analytics, and Administration	Title: Operations Manager
Date: 12/19/2019	Date: December 10, 2019

Schedule 1


ODP SERVICE TERRITORY
KENTUCKY
WISE COUNTY
DICKENSON COUNTY
RUSSELL COUNTY
VIRGINIA
SCOTT COUNTY
LEE COUNTY

Calix

Calix E7-2 Ethernet Service Access Platform

DESCRIPTION

What could unparalleled flexibility and network convergence mean to you?
The E7 is a highly extensible, standards-based Ethernet service access platform that offers service providers a modular chassis-based option to address the emerging bandwidth challenges of today's world. As next-generation Ethernet services gain momentum in the marketplace and begin to extend out from the metropolitan area networks, they will drive demand for versatile, cost-effective aggregation out at the network edge.
By adding the AXOS platform, the E7-2 is now even more of a disruptive and compelling enabler to next generation networks that connect the world. The Calix AXOS E7-2 Intelligent Modular System is a breakthrough evolutionary system that provides a transformational path to next generation networks, fiber technologies, and Software Defined Access. The E7-2 is the industry's benchmark for a modular, small form factor, environmentally hardened access solution for service providers. The AXOS E7-2 leads a rapidly expanding family of AXOES E-Series systems capable of supporting both centralized and decentralized network architectures that range from the data center edge, central office, or headend, to the remote cabinet, or MDU.

1035 North McDowell Petaluma, CA 94954 | T: 1 877 462 2549 | F: 1 707 283 3100 | www.calix.com

FUNCTIONAL DESCRIPTION

ETHERNET SERVICE ACCESS PLATFORM: Residential and business services are converging as more subscribers work from home offices and Internet "over the top" video services consume an increasing percentage of both enterprise and service provider network capacity. IP and Ethernet are the dominant network and transport protocols, and all services – voice, data, and video – are rapidly migrating to a packet-based architecture. High performance applications demand high performance solutions; the Calix E7-2 Ethernet Service Access Platform meets the demanding requirements of Ethernet services access networks.

The Calix E7 delivers a wide array of high performance applications, including 10GE Ethernet transport, delivery of high density residential triple play services over copper pairs (VDSL2/ADSL2+), GPON and point-to-point Ethernet, Metro Ethernet Forum (MEF) compliant business services, mobile backhaul, and protected GE aggregation of Calix E7, C7, B6 and E5 platforms.

HIGH DENSITY SUBSCRIBER ACCESS

With two cards per system, the E7-2 provides flexible, high density subscriber access options in a 1RU shelf:

- 96 VDSL2/ADSL2+ & POTS Combo (48 Overlay)
- 16 GPON and 8 GE ports (1024 ONTs)
- 48 point-to-point GE ports (48 ONTs)
- 8 XGS-PON/NG-PON2 ports

With Multi-dwelling unit (MDU) ONTs, the subscribers per 1RU system can exceed several thousand.

MODULAR CHASSIS ARCHITECTURE

The Calix E7-2 modular chassis enables a pay-as-you-grow architecture, combining the most advantageous attributes of a small form factor product with a large chassis-based system.

- 1RU design can expand from a single slot, for very low first install cost, to multiple chassis, to add subscriber growth yielding a near linear cost curve
- Twenty line cards are managed as a single chassis for operational efficiency
- Mix and match line cards in a common chassis – no common control equipment required
- Line cards can be added or replaced without uninstalling/installing power, alarms, or cables – reducing MTR from hours to minutes
- Subscribers are easily aggregated and network resources efficiently shared across protected trunk facilities
- Hardened 1RU system delivers GPON and Ethernet with 10GE transport from CO, cabinet or pole mount
- Resilient, hot-swappable line cards and fan tray

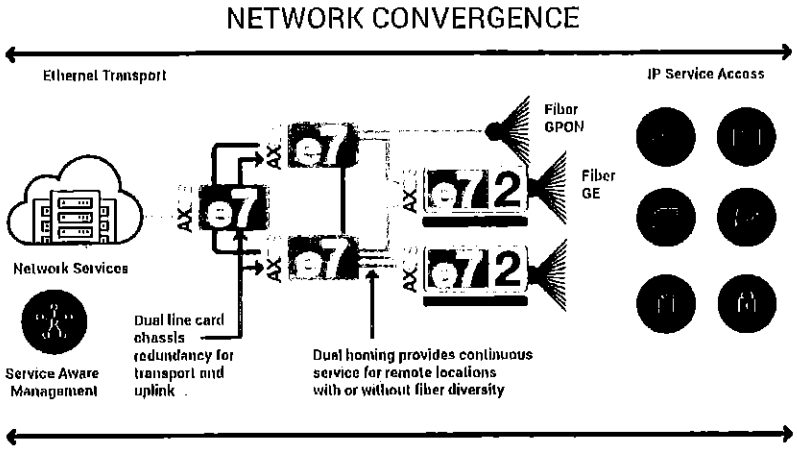
With the E7-2, service providers no longer need to decide between a single service product and a high growth chassis solution. E7-2 provides low first install cost, operational efficiency and near linear incremental cost per subscriber, enabling Calix customers to maximize their business return.

FULL SPECTRUM OF SERVICES

The E7 delivers a full spectrum of access services over GPON and Point-to-Point Ethernet using the family of Calix ONTs, including Single Family Unit (SFU), Small Business Unit (SBU), Multi-Dwelling Unit (MDU), and rack-mount models.

- IPTV – broadcast and Video on Demand (VoD)
- MEF compliant business services
- High-Speed Internet (HSI) access
- Voice – Native SIP/VoIP and TDM Gateway support
- T1 services
- CATV video: RF video overlay with RF return

Calix ONTs support auto sensing GPON and GE network interfaces, allowing service providers to manage service changes without subscriber onsite technical support.



DELIVERING "QUALITY OF EXPERIENCE"

The E7 provides per-subscriber and per-service hierarchical QoS to deliver uncompromised triple play and business services. A powerful collection of classification, policing, queuing and scheduling algorithms let operators manage per-subscriber and per-service traffic flows to maintain priority/delay/loss service differentiation within the E7 network.

SCALABLE IPTV SUPPORT

IPTV services are by far the most demanding in terms of quality, and user expectations are very high. The E7 supports industry standard IGMP snooping to identify and replicate multicast video sent between the set-top box and the video distribution network, providing efficient, scalable, high-quality IPTV distribution on both GPON and Ethernet interfaces.

INTEGRATED HIGH-CAPACITY AGGREGATION

The E7 is built on a core Layer 2 and Layer 3 switch capable of full-duplex, line rate forwarding at all frame sizes and traffic types across all interfaces. This capacity makes the E7 ideal for aggregation and transport of IP/Ethernet services across the access network. The E7 platform supports industry standard pluggable modules for all service and network interfaces, including ITU G.984 compliant GPON, Small Form-Factor Pluggable (SFP) Gigabit Ethernet, XFP 10GE ports, and SFP+ 10GE ports.

NETWORK RESILIENCY

The Calix E7 supports a flexible set of standards-based network topology protocols for use in aggregation, ring-based transport, and uplink applications.

- ITU G.8032 Ethernet Ring Protection Switching (ERPS)
- IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- IEEE 802.3ad/802.1AX Link Aggregation

SERVICE AWARE MANAGEMENT

The E7, along with the Calix Management System (CMS), allows operators to manage services while understanding their relationship to the network infrastructure. Service-oriented management includes rapid service provisioning, service templates and policies, and service assurance. Comprehensive network management tools let operators create physical and logical topology maps, engineer traffic flows, and manage network commissioning and software upgrades. Network inventory, alarm surveillance and PM collection are enabled by the E7 system. The E7 provides locally hosted Web GUI, CLI, and SNMP interfaces

[redacted]

BACKPLANE BANDWIDTH
100 Gbps between slots

SLOTS
2 universal line card slots
1 Fan Tray slot

DIMENSIONS (W x H x D)
17.5 x 1.7 x 11.45 inches
44.5 x 4.3 x 29.1 cm
Height is 1 RU

WEIGHT
5.9 lb (2.7 kg) E7 shelf
7.4 lb (3.4 kg) shelf with Fan Tray

OPERATING ENVIRONMENT
Temperature: -40 to +65° C (-40° F to +149° F)
Humidity: 10 to 95% (non-condensing)
Operating altitude: 10,000 ft (3,049 m)

STORAGE ENVIRONMENT
Temperature: -40 to +85° C (-40° F to +185° F)
Humidity: 5 to 95%

MANAGEMENT SUPPORT
Calix CMS network management
Calix CLI and Web GUI for local management interface
SNMP v2c and v3 performance and fault monitoring

MANAGEMENT INTERFACES
Ethernet 10/100 (RJ-45 connector on Calix E7-2 Fan Tray)
Ethernet 10/100 (RJ-45 connector on back of Calix E7-2)
RS-232 (RJ-11 connector on Calix E7-2 Fan Tray)

SYNCHRONIZATION
Synchronization is enabled by the E7-2 line cards as required
External reference timing
Built-in Stratum-3 clock
Hardware-ready to support Synchronous Ethernet

ALARM I/O INTERFACES
Wire wrap pin access on E7 back
User definable alarm inputs: 7; outputs: 1

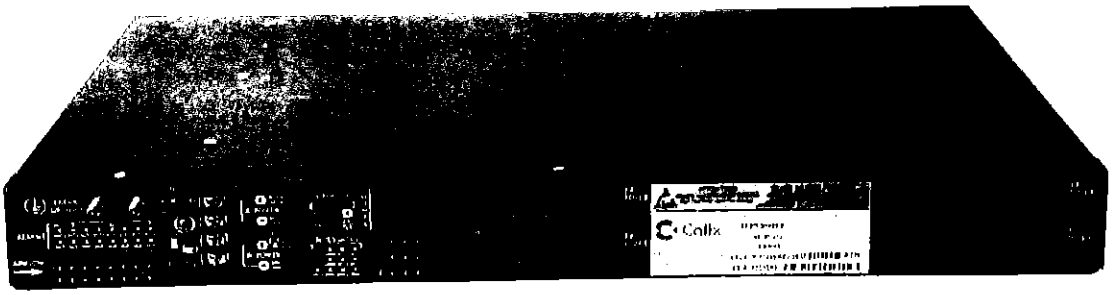
FIBER INTERFACES
All optical ports use pluggable optics (SFP, XFP, SFP+)
LC or SC connectors on modules

ANALOG/METALLIC INTERFACES
Two standard 25-pair RJ-21 connectors per slot

TIMING I/O INTERFACES
Access through wire wrap pins on the back of the Calix E7
BITS clock (sink and source)

STANDARDS COMPLIANCE
NEBS Level 3 compliance (GR-63-CORE, GR-1089-CORE, GR-3028)
UL 60950
FCC Part 15 Class A

POWER FEEDS
Integrated power management on Calix E7-2 line cards
Redundant −48/60 VDC battery feeds (A and B)
Input Range: -42.5VDC to -72VDC
Fuse: 7.5 Amps (A and B)



FAN TRAY ASSEMBLY (100-01451)

FANS
4 fans housed in fan tray
Resilient design maintains system cooling with one fan failure

MANAGEMENT INTERFACES
Ethernet 10/100 (RJ-45 connector)
RS-232 (RJ-11 connector)

SYSTEM INFORMATION
7-segment LCD display
System Controller (MGT) – GREEN

SHELF ALARM INDICATOR
Critical (CR) - RED
Major (MJ) - RED
Minor (MN) - AMBER
Alarm Cut-Off (ACO) button

POWER SPECIFICATIONS
Min Input Power:
22 Watts @ -48V
Max Input Power:
65 Watts @ -48V

MAINTENANCE
Field-replaceable air filter (not used in RT locations)
Hot-swappable fan tray assembly

FAN TRAY ASSEMBLY-2 (100-03590)

FANS
4 fans housed in fan tray
Resilient design maintains system cooling with one fan failure
Variable speed operation depending on operating temperature*

MANAGEMENT INTERFACES
Ethernet 10/100 (RJ-45 connector)
RS-232 (RJ-11 connector)

SYSTEM INFORMATION
7-segment LCD display
System Controller (MGT) – GREEN

SHELF ALARM INDICATOR
Critical (CR) - RED
Major (MJ) - RED
Minor (MN) - AMBER
Alarm Cut-Off (ACO) button

POWER SPECIFICATIONS
Min Input Power:
8.5 Watts @ -48V
Max Input Power:
48 Watts @ -48V

MAINTENANCE
Field-replaceable air filter (not used in RT locations)
Hot-swappable fan tray assembly

Calix

NOTES

For GPON OIM, 10GE XFP, 10GE SFP+ pluggable transceivers, Direct Attach cables, and all transceivers used in CSFP Option 2 sockets, only products purchased directly from Calix are supported. The use of GPON OIM, Active Ethernet CSFPs, 10GE XFP, 10GE SFP+ pluggable transceivers and Direct Attach cables not purchased directly from Calix is not supported and will void all product warranties covering the Calix equipment to which such third-party materials are connected.

- SFP modules may also be used in CSFP Option 2 sockets, and in SFP+ sockets at 1GE rate.
- Copper Direct Attach cables can operate in SFP, CSFP Option 2, and SFP+ sockets at 1GE, 2.5GE, and 10GE data rates as supported by the card type.

CALIX E7-2 ETHERNET SERVICE ACCESS PLATFORM

000-00372 ..... E7-2 Chassis with Fan Tray Assembly and Installation Kit

100-01451..... E7-2 Fan Tray Assembly

000-00228..... E7-2 Fan Tray Assembly Filter, Package of 10 units

100-03590..... E7-2 Fan Tray Assembly 2 (FTA2)*

000-00760..... E7-2 Fan Tray Assembly 2 (FTA2) Filter, Package of 10 units

* Variable speed operation under software control requires a minimum of E7 Release 2.2 software. In releases prior to 2.2, the FTA2 fan speeds are identical to the original FTA.

CALIX PLUGGABLE TRANSCEIVER MODULES

The E7-2 supports pluggable modules for all service and network interfaces. Refer to the Calix Optical Transceiver Modules Datasheet (#250-00191) for a complete list of modules and specifications.

CSFP Option 2..... 1GE optical dual-port Compact Small Form-factor Pluggable (CSFP) Option 2 modules

SFP ..... 1GE and 2.5GE optical and copper Small Form-factor Pluggable (SFP) modules

SFP+..... 10GE optical Enhanced Small Form-factor Pluggable (SFP+) modules

Direct Attach..... Multi-rate copper Small Form-factor Pluggable (SFP/SFP+) cables

XFP ..... 10GE optical Small Form-factor Pluggable (XFP) modules

GPON OIM..... 2.5Gbps GPON (Class B+ ODN with minimum 28dB link budget, up to 1:64 splits)

ER-GPON OIM ..... 2.5Gbps Extended Reach GPON (up to 58 km with 1:4 split)

CALIX MOUNT KIT

100-03382 ..... E7-2 ETSI Rack Mount Kit

Calix | AX

Calix E7-2 AXOS GPON-8 r2

DESCRIPTION

Looking to future-proof your next-generation GPON network in preparation for launching advanced services?

As North America's most widely deployed access system, the Calix AXOS E7-2 Intelligent Modular System is a breakthrough evolutionary system that provides a transformational path to next generation networks, fiber technologies, and Software Defined Access. The E7-2 is the industry's benchmark for a modular, small form factor, environmentally hardened access solution for service providers. By adding the AXOS platform, the E7-2 is now even more of a disruptive and compelling enabler to next generation networks that connect the world. The AXOS E7-2 leads a rapidly expanding family of AXOES E-Series systems capable of supporting both centralized and decentralized network architectures that range from the data center edge, central office, or headend, to the remote cabinet, or MDU.

1035 North McDowell Petaluma, CA 94954 | T: 1 877 462 2549 | F: 1 707 283 3100 | www.calix.com

FUNCTIONAL DESCRIPTION

GPON AND POINT-TO-POINT ETHERNET:
The Calix E7-2 AXOS GPON-8 r2 card provides multiservice capability over IP/Ethernet-based networks. Each GPON-8 r2 provides eight GPON OLT ports that subtend up to 128 ONTs each, for a card capacity of 1024 GPON ONTs, or 2048 per E7-2 1RU chassis. An additional four SFP/CSFP sockets per card can provide high-bandwidth, point-to-point Ethernet services to individual subscribers or be used to aggregate other Ethernet devices. The Calix E7-2 GPON-8 r2 card can co-exist with other Calix E7-2 AXOS line cards in a shelf.

KEY FEATURES AND CAPABILITIES

GPON-8 r2 card features and capabilities include:

- Based on ITU G.984 GPON family of standards—including G.988
- GPON: 2.488 Gbps downstream, 1.244 Gbps upstream
- GEM (Ethernet) based GPON
- Interoperable with Calix ONTs, including the GigaFamily
- Integrated 10GE and GE/2.5GE aggregation and transport
- Class B+ ODN, +28 dB link budget, up to 20 km at 32-way splits
- Class C+ ODN, +32 dB link budget with Forward Error Correction (FEC), up to 35 km at 32-way split, up to 60 km at 2-way split
- Hardened for central office and remote terminals

INTEGRATED HIGH-CAPACITY AGGREGATION

The E7-2 AXOS GPON-8 r2 card is built on a core Layer 2 and Layer 3 switch capable of full-duplex, line rate forwarding at all frame sizes and traffic types across all interfaces. Each GPON OLT port has a dedicated 2.5Gbps switch interface. Industry standard pluggable modules are used for all interfaces, including ITU G.984 compliant GPON, GE and 2.5GE optical SFP, 10GE XFP, and 10GE SFP+. The GPON-8r2 supports (4) CSFP (Compact SFP) modules that are mechanically compatible with the industry-ubiquitous SFP module. Each CSFP module supports two independent bidirectional transceivers (1490nm Tx / 1310nm Rx), each capable of operating at a 1 Gbps bi-directional rate. The SFP+ ports also support SFP modules and Direct Attach copper cables.

IP SERVICES DELIVERY

The Calix E7-2 AXOS GPON-8 r2 card delivers a full spectrum of IP access services over GPON and Point-to-Point Ethernet networks.

- Secure AES encryption on the PON
- IPTV – broadcast and Video on Demand (VoD)
- MEF compliant business services
- High-Speed Internet (HSI) access
- Voice – Native SIP/VoIP and TDM Gateway support
- T1 services
- CATV: 1550nm RF video overlay; 1610nmRF return

NETWORK RESILIENCY

All Calix E7-2 AXOS GPON-8 r2 cards support a flexible set of standards-based network topology protocols for use in aggregation, ring-based transport, and uplink.

- ITU G.8032 Ethernet Ring Protection Switching (ERPS)
- ITU G.8032v2 Ethernet Ring Protection Switching (ERPS)
- IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- IEEE 802.3ad/802.1AX Link Aggregation
- ITU G.983.5 – Type B Protection and enhanced survivability for GPON OLTs

MOBILE BACKHAUL

With integrated network synchronization, hierarchical QoS and support for T1 services, the E7-2 AXOS GPON-8 r2 card transport uncompromised mobile broadband traffic while also supporting triple play residential and MEF certified business services from a single platform. A powerful collection of classification, policing, and scheduling algorithms let operators manage per-subscriber and per-service traffic flows to maintain priority/delay/loss service differentiation within the E7 network.

SCALABLE IPTV SUPPORT

The E7 supports industry standard IGMP snooping to identify and replicate multicast video sent between the set-top box and the video distribution network, providing efficient, scalable, high-quality IPTV distribution on both GPON and Ethernet interfaces.

MINIMUM SYSTEM REQUIREMENTS

Calix AXOS Software Release 3.1.3

DIMENSIONS (W x H x L)

14 x 10.1 x 0.78 inches
35.6 x 25.7 x 2 cm

WEIGHT

2.08 lbs. (0.94 kg)

PORTS

8 GPON OLT ports
8 CSFP 1GE ports (4 CSFP sockets, also support SFP modules)
2 SFP+ ports supporting 10GE and GE optical modules
2 XFP ports supporting 10GE optical modules

PACKET SWITCHING CAPACITY

Wire speed forwarding across all Ethernet and GPON OLT ports
64,000 MAC addresses per system
9,000 byte jumbo frames
2,000 byte frames over GPON
4,096 VLANs
4,000 IGMP Multicast channels

QUALITY OF SERVICE

Service classification based on port, SVLAN-ID, CVLAN-ID, P-Bit
Port and flow-based policing to 1Mbps increments
8 CoS queues per port
Strict priority scheduling with minimum bandwidth guarantee
Congestion avoidance: Tail Drop

STANDARDS AND RFC SUPPORT

TR101 VLAN Service models
IEEE802.1ag Connectivity Fault Management (G.8032 support)
IEEE 802.1D Rapid Spanning Tree
IEEE 802.1p CoS Prioritization
IEEE 802.1 MAC Bridges
IEEE 802.1Q VLAN tagging
IEEE 802.1ad VLAN stacking (Q-in-Q) support
IEEE 802.1w RSTP
IEEE 802.3ad/802.1AX Link Aggregation
RFC 2236 IGMP v2
RFC 3376 IGMP v3
RFC 3046 DHCP Relay Agent Information Option ("Option 82")
RFC 4541 IGMP snooping
RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
ITU-T G.8032 Ethernet Ring Protection Switching (ERPS)/ Enhanced EAPS
ITU-T G.8032v2 Ethernet Ring Protection Switching (ERPS)
ITU-T G.984 GPON
ITU G.984.1 Type B Protection
Dynamic Bandwidth Assignment (DBA)
NIST Advanced Encryption Standard (AES)

SYNCHRONIZATION

Synchronization enabled by E7 line cards
External reference timing
Built-in Stratum-3 clock
Hardware-ready to support Synchronous Ethernet, IEEE 1588v2

COMPLIANCE

NEBS Level 3 compliance (GR-63-CORE, GR-1089-CORE, GR-3028)
UL 60950
FCC Part 15 Class A
CE Mark

POWER SPECIFICATIONS

GPON-8 r2 power/heat dissipation: 85 Watts (Maximum) 75 Watts (Typical)

OPERATING ENVIRONMENT

Temperature: -40° to +65° C (-40° F to +149° F)
Humidity: 10 to 95% (non-condensing)

STORAGE ENVIRONMENT

Temperature: -40° to +85° C (-40° F to +185° F)
Humidity: 5 to 95%

Calix | AX

NOTES

For AXOS GPON OIM, 10GE XFP, 10GE SFP+ pluggable transceivers and Direct Attach cables, and all transceivers used in CSFP Option 2 sockets only products purchased directly from Calix are supported. The use of GPON OIM, 10GE XFP, 10GE SFP+ pluggable transceivers and Direct Attach cables not purchased directly from Calix is not supported and will void all product warranties covering the Calix equipment to which such third-party materials are connected.

- Only AXOS GPON OIMs are supported by the E7-2 AXOS GPON-8 r2 card
- SFP modules may also be used in SFP+ sockets at 1GE rate.
- Copper Direct Attach cables can operate in SFP and SFP+ sockets at 1GE, 2.5GE, and 10GE data rates as supported by the card type.

CALIX ONTs

The E7-2 AXOS GPON-8 r2 card supports the Calix family of ONTs, including 700GX, 700GE, 836GE, and 800G GigaFamily. Calix ONTs support auto sensing GPON and GE network interfaces, allowing service providers to manage service changes without subscriber onsite technical support.

CALIX E7-2 AXOS LINE CARDS

100-04665..... E7-2 AXOS GPON-8 r2 (8x GPON OIM, 4x GE SFP, 2x 10GE SFP+, 2x 10GE XFP)

CALIX PLUGGABLE TRANSCEIVER MODULES

The E7-2 supports pluggable modules for all service and network interfaces. Refer to the Calix Optical Transceiver Modules Datasheet (#250-00191) for a complete list of modules and specifications.

SFP..... 1GE and 2.5GE optical and copper Small Form-factor Pluggable (SFP) modules

SFP+ ..... 10GE optical Enhanced Small Form-factor Pluggable (SFP+) modules

CSFP Option 2... 1GE optical dual-port Compact Small Form-factor Pluggable (CSFP) Option 2 modules

XFP..... 10GE optical Small Form-factor Pluggable (XFP) modules

Direct Attach..... Multi-rate copper Small Form-factor Pluggable (SFP/SFP+) cables

AXOS GPON

B+ OIM..... 2.5Gbps GPON (Class B+, 20km, C-Temp, AXOS) 2.5Gbps GPON (Class B+, 20km, I-Temp, AXOS)

AXOS GPON

C+ OIM..... 2.5Gbps GPON (Class C+, 60Km, I-Temp, AXOS)

PRODUCT DATASHEET

844G and 854G GigaCenters | ANSI

DESCRIPTION

The Calix 844G and 854G GigaCenters are next generation residential premises service delivery platforms that extend the access network into the home and act as a strategic location for control of the gigabit experience. Supporting broadband connectivity within the home and managing subscriber voice, data and video services, this intelligent, high-performance service platform integrates a 2.5 GPON optical interface with switching and routing functions that manage premises network traffic at speeds up to 1 Gbps. The GigaCenter service interfaces include: carrier class wireless networking with 802.11ac Wi-Fi and four Gigabit Ethernet (GE) ports for IPTV video and data services, two integrated voice lines supporting carrier grade VoIP and network-based TDM voice circuits, a USB port for home networking services, and an option for RF video.

GIGABIT SUBSCRIBER EXPERIENCE: The 844G and 854G GigaCenters are integrated access and gateway solutions that deliver advanced network management and software features to unleash the gigabit experience throughout a subscriber's home. The GigaCenter service delivery platform terminates a GPON fiber optic link at the subscriber's premises and provides carrier class Wi-Fi and Gigabit Ethernet interfaces for customer multi-media devices. The 844G and 854G GigaCenters enable residential subscribers to receive gigabit broadband data, IP video, and VoIP or TDM based voice on a single fiber. Using the latest 802.11ac 5GHz technology incorporating 4x4 multi-user multiple-input and multiple-output (MU-MIMO) and beamforming, the 844G and 854G GigaCenters allow service providers to extend the access network inside the home and establish a strategic location for the delivery and control of broadband services. A USB port is available for home networking with other Ethernet appliances. The GigaCenter family also includes the option of RF signaling for broadcast video services over existing Hybrid Fiber Coax (HFC) networks.

Calix engineered the 844G and 854G GigaCenters for optimal whole-home coverage with simultaneous dual-band 2.4GHz and 5GHz operation and dynamic beamforming at 5GHz. For maximum performance, the GigaCenter supports high-power 2x2 MIMO spatial diversity at 2.4GHz and 4x4 MU-MIMO at 5GHz. The 844G and 854G GigaCenters support the entire 5GHz band including DFS channels and can be provisioned to support 80MHz bandwidth at 5GHz. The GigaCenter solution delivers HD video and data throughout a subscriber's home with control and management of an increasingly video-rich and mobile broadband environment.

EASY TO INSTALL, ACTIVATE, AND MAINTAIN: With the 844G and 854G GigaCenters, Calix has redefined how to install and activate residential services at a subscriber's premises. Using the Calix Smart Activate feature and a phone or laptop, a field technician can install and apply the subscriber's service profile without special equipment or assistance from the central office. Calix also provides the innovative Compass software portfolio, including Consumer Connect, which allows the service provider to configure, activate and upgrade the GigaCenter quickly from a remote location using in-band management or TR-069. Extensive troubleshooting capabilities, remote software downloads, and easy-to-use service activation ensure that services are delivered and maintained without needless truck rolls and hardware upgrades. Employing GigaCenters allows service providers to reduce their operational expenses while effectively delivering the gigabit experience to their subscribers.

TRUE CARRIER GRADE VOICE SOLUTION: The 844G and 854G GigaCenters deliver a truly agile and responsive service platform with lifeline voice in the event of local AC power loss. A carrier grade 120-240 VAC, 50-60 Hz AC to 12 VDC Uninterruptible Power Supply (UPS) provides battery backup of voice services compliant to Telcordia GR-909. The 844G and 854G GigaCenters can monitor battery status, battery charge and battery life, and report results through the Calix Management System (CMS).

844G and 854G GigaCenters | ANSI

KEY ATTRIBUTES

- Standards-based Full Service Access Network (FSAN), ITU-T GPON compliant
- Home Gateway:
  - Layer 2 bridge and Layer 3 routing for High Speed Internet (HSI) data and IPTV video services
  - DHCP server options
  - DHCP (IPoE) and PPPoE network connections
  - Network Access Translation (NAT), public to private IP addressing
  - Configurable IP address schemes, subnets, static-IP addresses
  - DNS server
  - Bridge port assignment and data traffic mappings
  - Port forwarding
  - Firewall and security
  - Application and website filtering
  - Selectable forwarding and blocking policies
  - DMZ hosting
  - Parental controls, time of day usage
  - Denial of service
  - MAC filtering
  - Time/Zone support
  - Universal Plug-and-Play (UPnP)
- Wireless:
  - 2.4GHz and 5GHz, simultaneous dual-band
  - 5GHz 802.11ac certified, 802.11a/g/n compatible
  - 2.4GHz 802.11n certified, 802.11b/g compatible
  - WPA/WPA2
  - WPS push-button
  - WEP 64/128 bit encryption
  - Eight SSIDs per band with factory default SSIDs
  - MAC filtering
- Two voice lines:
  - FXS ports, ANSI
  - Carrier grade SIP, H.248, MGCP VoIP
  - TDM GR-303/TR-08 Mode II/GR-57, GR-08 (TR-08 Mode I) voice services
- Four Gigabit Ethernet (GE) interfaces:
  - Symmetrical 1 Gbps bandwidth for residential IPTV and data services
  - Multi-rate 10/100/1000 BaseT Ethernet, auto-negotiating
- USB port:
  - USB 2.0 - Type A configured as a host interface
- RF video bandwidth to 1 GHz for extended digital programming
- Supports multiple data service profiles
- Traffic management and Quality of Service (QOS):
  - 802.1Q VLANs
  - 802.1p service prioritization
  - Q-in-Q tagging
  - Multiple VLANs
  - Rate limiting
  - DiffServ
  - Pre-defined QOS on service type
- IPTV, IGMPv2, IGMPv3:
  - IGMP Snooping and Proxy
  - IGMP Fast Leaves
- Complete OAM&P support via Calix Management System (CMS)
- Gateway Management:
  - TR-069
  - Local Home Gateway GUI, access provisionable
  - Remote WAN side GUI access
  - Default username/password
  - Set-up persistence, factory reboot support
- Indoor mounting:
  - Wall and Structured Wiring Enclosure (SWE) mount with fiber management
  - Desktop mounting stand
- Optional voice lifeline service power source with in-home battery backup and alarm monitoring
- AC to 12 VDC power adapter available for non-lifeline services.

SPECIFICATIONS

844G and 854G GigaCenters | ANSI

DIMENSIONS

Width: 7.9 in (20.0 cm)
Height: 10.6 in (26.9 cm)
Depth: 1.8 in (4.6 cm)
Weight: 28 oz. (.8 kg)

PON CHARACTERISTICS

Max. split: 64 GPON
Max. reach: 58 km (36 miles) with C+/FEC
Maximum Optical Distribution Network (ODN) Attenuation:
GPON Class B+, 28 dB
GPON Class C+, 32 dB
1490 ± 10 nm optical receiver: –27.0 to –8.0 dBm
1310 ± 20 nm optical transmitter: 0.5 to 5.0 dBm

INTERFACES

Wireless: 2.4GHz 2x2 and 5Hz 4x4 internal antennas
Telephony: Two RJ-11 connectors
Data/IPTV: Four 10/100/1000 BaseT Ethernet ports, RJ-45 connectors
USB: USB 2.0 Type A
RF Video: F-connector, 75 Ohms
PON: Single 9/125 µm (single mode) fiber, SC/APC connector, minimum 50 dB return loss
Power: 8-pin connector

TELEPHONY

General: SIP, H.248, MGCP or TDM Gateway (GR-303, GR-57, TR-08 Mode I, TR-08 Mode II)
Number of lines: 2
RENs per line: 5 maximum
RENs per unit: 10 maximum
Drop length: Maximum 500 feet (152.4 m)
DS0 Output: 23.5 mA

DATA

Drop length: 328 feet (100 m) maximum using CAT5 cable
Auto MDI/MDIX crossover for 1000BASE-TX, 100BASE-TX, and 10BASE-T ports
Traffic Management and QOS: 802.11Q VLAN; 802.11p voice, video, data and management priorities; Q-In-Q tagging; Rate limiting

WIRELESS

2.4GHz 802.11 b/g/n
2x2 MIMO, high-power
5GHz 802.11 a/g/n/ac
4x4 MU-MIMO, implicit/explicit dynamic beamforming
2.4GHz and 5GHz simultaneous
8 SSIDs per band (2 SSID subscriber default)
Auto channel selecting and interference detection
WPS, WPS push button
Wireless Security: Wi-Fi protected access (WPA/WPA2) WEP, MAC address filtering
Wi-Fi multimedia (WMM)

VIDEO-ANALOG RF OUTPUT

Bandwidth: 54 to 550 MHz
Return loss: 10 dB minimum
Signal strength (with AGC range): 18 ± 2 dBmV
Flatness: ± 1.0 dB
Tilt: 1.0 dB ± 1.0 dB from 54 to 550 MHz

VIDEO-DIGITAL RF OUTPUT

Bandwidth: 550 to 1003 MHz
Return loss: 8 dB minimum
Signal strength (within AGC range): 12 ± 2 dBmV
Flatness: ± 1.5 dB
Tilt: 4.0 dB ± 1.0 dB from 550 to 1003 MHz
Modulation Error Ratio (MER: 33 dB)

VIDEO-DIGITAL RF INPUT

Optical Input (GPON)
Wavelength: 1555 ± 5 nm
Signal strength at 3.5% OMI (within AGC range):
–6.0 to 2.0 dBm

REMOTE MANAGEMENT

OAM&P via CMS
TR-069 remote management
TR-064 CPE management
TR-098 Internet Gateway Device Data Model

ENVIRONMENTAL

Operating temperature: Indoor ambient temperature, 0° to 40°C (32° to 104° F)
Operating/storage relative humidity: 8 to 95 % non-condensing
Altitude: –200 to 10,000 feet (–61 to 3,048 m) above sea level

CERTIFICATION AND COMPLIANCE

Emissions:
FCC Part 15 Class B, IC ICES-003 Class B
CISPR-22
Safety:
UL 60950 and UL 1697 approved
IEEE: 802.3, 802.3AB, 802.3U, 802.11p, 802.11Q
Wi-Fi Alliance Certified
802.11ac and 802.11n

USB-IF Compliance
USB 2.0

POWERING AND ALARMS

8-pin connector with 7-conductor power and alarm cable
Input voltage: 12 VDC (nominal), 10 VDC (min.), 15 VDC (max)
External Power Adapter: 12 VDC, 2.5 A
Residential battery backup source: UPS mounted at subscriber's residence
Battery backup time rated capacity: 8 hours based on Telcordia GR-909 calculation methods using recommended UPS.

844G and 854G GigaCenters | ANSI

Calix 844G and 854G GigaCenters

100-04011.....844G-1 GigaCenter, 2 POTS, 4 GE, Dual Wi-Fi, 1 USB -UPS Power Interface
100-04013.....854G-1 GigaCenter, 2 POTS, 4 GE, Dual Wi-Fi, 1 USB, 1 RF -UPS Power Interface

Calix 844G and 854G UPS and UPS Cords

100-04068.....Indoor UPS, 12V 7.2AH 36W, Black - AM Type B Grounded
100-03893.....Indoor UPS Power Cord, 7 pin UPS to 8 pin ONT Male, 1M Black
100-03894.....Indoor UPS Power Cord, 7 pin UPS to 8 pin ONT Male, 3M Black
100-03895.....Indoor UPS Power Cord, Un-terminated to 8 pin ONT Male, 6M Black

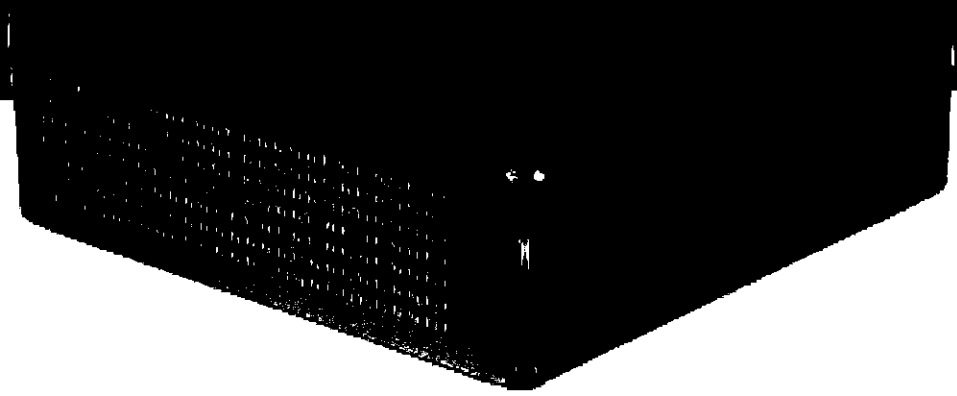
Calix | EX

GigaPoint® (GP1000X)

POWERED BY EX

DESCRIPTION

The Calix GP1000X GigaPoint® is a small form factor service delivery terminal that delivers broadband connectivity to the subscriber using the XGS-PON standard.
This high-performance terminal integrates a XGS-PON optical WAN interface that enables residential and symmetrical business network traffic at speeds up to 10 Gbps. The GP1000X GigaPoint includes one 10 Gigabit Ethernet (10 GE) port for IPTV video and data services.



10 GIGABIT SUBSCRIBER EXPERIENCE

The GP1000X GigaPoint is an integrated access device that delivers advanced network management and software features to enable the 10 Gigabit experience. The GP1000X GigaPoint terminates an XGS-PON fiber-optic link at the subscriber's premises and provides an industry-standard 100/1000/10G BASE-T interface for the customer premises equipment. The GP1000X GigaPoint enables residential subscribers to receive 10 Gigabit broadband data and IP video on a single fiber.

EASY TO INSTALL, ACTIVATE, AND MAINTAIN

With the GP1000X GigaPoint, Calix has redefined how to install and activate residential and business services at a subscriber's premises. Using the Calix Smart Activate feature and laptop, a field technician can install and apply the subscriber's service profile without special equipment or assistance from the central office. Employing the GP1000X GigaPoint allows service providers to reduce their operational expenses while effectively delivering the 10 Gigabit experience to their subscribers.

POWER OPTIONS

The GP1000X GigaPoint power options include a 120-240 V AC, 50-60 Hz to 12 V DC power adapter.

[redacted]

KEY ATTRIBUTES

- Standards-based Full Service Access Network (FSAN), XGS (G.9807.1) compliant
- One 10G BASE-T Gigabit Ethernet (GE) interface
  - Symmetrical 10 Gbps bandwidth for residential IPTV and data services
  - Multi-rate 100/1000/10G BASE-T Ethernet, auto-negotiating
- Supports multiple data service profiles
- Traffic management and Quality of Service (QoS):
  - 802.1Q VLANs
  - 802.1p service prioritization
  - Q-in-Q tagging
  - Multiple VLANs
  - Rate limiting
  - DiffServ
  - Pre-defined QoS on service type
- IPTV, IGMPv2, IGMPv3 ASM:
  - IGMP Snooping
  - IGMP Fast Leaves
- Complete Calix Smart Activation
- Indoor mounting options:
  - Wall mount
  - Desktop mount: horizontal or vertical
- AC to 12 V DC power adapter

Calix | EX

SPECIFICATIONS

DIMENSIONS

Height: 2.38 in (6.0 cm)

Width (square): 6.88 in (17.5 cm)

Height: 2.3 in (5.8 cm)

Weight: 20 oz (0.58 kg)

PON CHARACTERISTICS

Max. split*: 128 XGS-PON

Max. reach*: 20 km (12.4 miles), N1 Class

Maximum Optical Distribution Network (ODN) Attenuation: XGS, 29 dB

Optical receiver 1577nm: -28dBm

Optical transmitter 1270nm: +4 to +9 dBm

INTERFACES

Data/IPTV:

One 10G BASE-T 10G Ethernet port

PON: Single 9/125 µm (single mode) fiber, SC/APC connector, minimum 50 dB return loss

Power: 8-pin connector

DATA

Drop length: 180 feet (55m) maximum, using CAT6 cable; 328 feet (100m) maximum, using CAT6A or CAT7 cable

Auto MDI/MDIX crossover for 100/1000/10G BASE-T ports

IEEE 802.3an and IEEE802.3-2012

Traffic Management and QoS: 802.1Q VLAN, 802.1 video data and management priorities; Q-in-Q tagging; rate limiting

ACTIVATION MANAGEMENT

Calix Smart Activation

CERTIFICATION AND COMPLIANCE

Emissions:

FCC Part 15 Class B

CISPR-22

Safety:

UL 60950 and UL 1697 approved

IEEE: 802.3, 802.3AB, 802.3U, 802.11p, 802.11Q

ENVIRONMENTAL

Operating temperature:

Indoor ambient temperature,

0° to 40°C (32° to 104° F)

Relative humidity (non-condensing):

Operating/Storage: 5%-90%

Shipment/Storage: 5%-95%

POWERING AND ALARMS

8-pin connector

Input voltage: 12 V DC (nominal),

10 V DC (min), 21 V DC (maximum)

External Power Adapter: External Power Adapter: 12 V DC, 2.5 A

Maximum power consumption: 13.6 W

*Not necessarily simultaneously

ORDERING INFORMATION

Calix GP1000X GigaPoint

100-04647..... GP1000X 10G GigaPoint, 10 GE and 12 V DC US Power Adapter

100-04992..... GP1000X GigaPoint, 1 10GE – UPS Power Interface

100-04141 ..... Power Adapter CPA5 12 V 2.5 A – EU Type C w/ 8-pin connector

000-01057..... GP1000X GigaPoint, 1 10GE -UPS Power Interface and 12 V DC EU Power Adapter

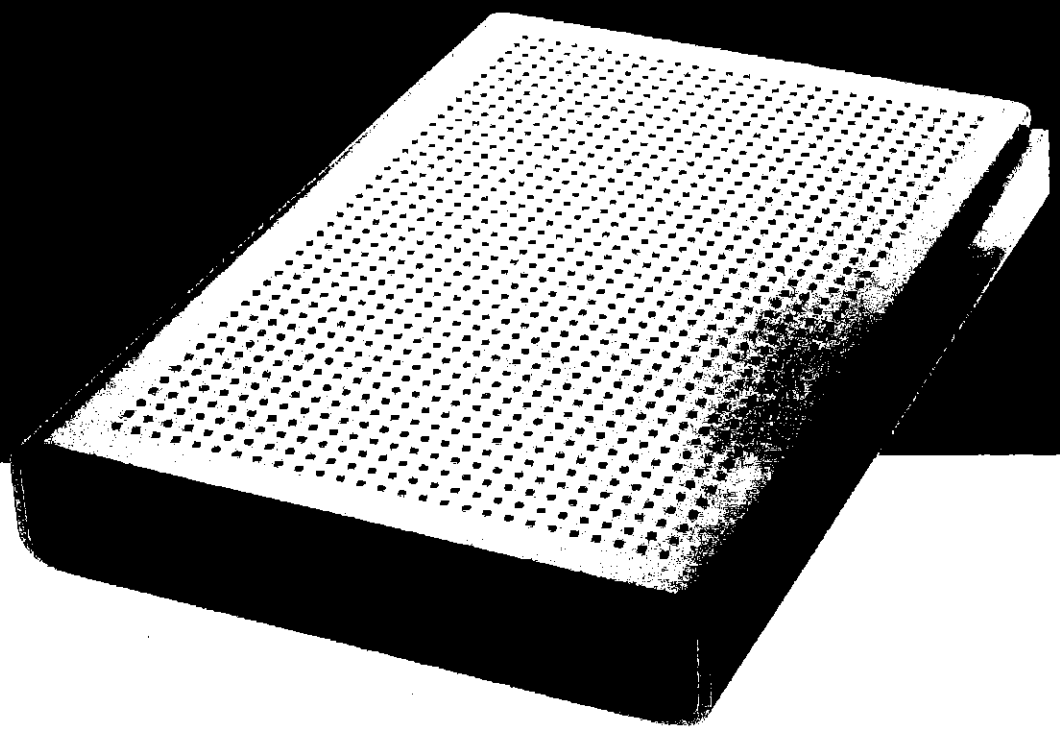
Calix | EX

GigaPro (GPR3000X)

POWERED BY EX

DESCRIPTION

The GPR3000X GigaPro business Ethernet services edge device delivers 10 Gigabit broadband connectivity using the XGS standard to the enterprise environment. This high-performance device delivers IP and Carrier Ethernet services in compliance with MEF CE 2.0. Flexible SFP+ XGS optical WAN interface assures traffic speeds up to 10 Gbps. The GPR3000X service interfaces include: one 10G SFP+ Ethernet port and two 10/100/1000 BASE-T Ethernet ports for business and data services.



10 GIGABIT BUSINESS EXPERIENCE

The Calix GPR3000X GigaPro delivers advanced network management and software features with MEF CE 2.0 E-LINE support. The GigaPro business Ethernet platform has an SFP+ optical WAN interface to terminate an XGS fiber-optic wavelength link at the business premises, providing one 10 Gigabit and two Gigabit Ethernet interfaces for customer multi-media devices. Both the 10 Gigabit and two Gigabit Ethernet interfaces have the flexibility to be configured for UNI or I-NNI applications. Multiple services of the same or different types can be multiplexed on the same Ethernet interface to create a multiservice, multi-subscriber demarcation. The GPR3000X enables business and enterprise subscribers to receive 10 gigabit broadband data on a single fiber.

ETHERNET SWITCHING

The GPR3000X GigaPro supports multiple EVCs per UNI with policing to provide CE 2.0-compliant multi-Class of Service (CoS) capabilities. You can apply bandwidth profiles on the GPR3000X on a per-CoS basis in an EVC. Each GPR3000X GigaPro can support up to 80 EVCs. Scheduling options include Strict Priority Queuing (SP) and Deficit Weighted Round Robin (DWRR). The Ethernet interfaces support 8 CoS egress queues with scheduling, marking of DEI based on classifiers, and minimum/maximum rate controls. The GPR3000X supports an MTU of 9,600 Bytes.

PERFORMANCE ASSURANCE

The Calix GPR3000X GigaPro is compliant with MEF CE 2.0 manageability requirements through support for IEEE 802.1ag and ITU Y.1731 standards. The GPR3000X also supports Service Activation Testing (SAT) based on ITU Y.1564, and MEF 48, where the GigaPro acts as reflector or load generator/collector for single ended measurements.

EASY TO INSTALL, ACTIVATE, AND MAINTAIN

The GPR3000X GigaPro supports zero-touch commissioning. A field technician can install without a configuration file, command line interface, special equipment, or central office assistance. Calix also provides the innovative Operations Cloud software portfolio that includes management via Activate and birth, allowing Calix to configure, activate, upgrade and meet MEF CE 2.0 compliance quickly from a remote location. Extensive troubleshooting capabilities and easy-to-use service activation ensure that broadband services are delivered and maintained without needless truck rolls and hardware upgrades.

CARRIER-GRADE BUSINESS ETHERNET SOLUTION

The GPR3000X GigaPro delivers a truly agile and responsive business Ethernet service platform with high availability. The GPR3000X supports carrier grade 120-240 V AC, 50-60 Hz AC to +12 V DC power adapter.

KEY ATTRIBUTES

- Standards-based Full Service Access Network (FSAN), XGS (G.9807.1) compliant
- Two Gigabit Ethernet (GE) interfaces:
  - Symmetrical 1 Gbps bandwidth for business services
  - Multi-rate 10/100/1000 BASE-T Ethernet, auto-negotiating
- SFP+ XGS uplink port
- One 10 GigaBit Etherent SFP+ interface
- Access, traffic management and Quality of Service (QoS):
  - 2r3c policing
  - 802.1Q VLANs
  - 802.1p service prioritization
  - Q-in-Q tagging
  - Multiple EVCs, Multiple VLANs
  - DiffServ
  - Pre-defined QoS on service type
  - Broadcast, Multicast and Destination Lookup Failure (DLF) Storm Control
- Network timing:
  - G.987.3 time of day (TOD) distribution
- Indoor mounting options:
  - Wall mount
  - 19" horizontal rack mounting in 1 RU with mounting bracket
  - Desktop mount: horizontal or vertical
- AC to +12 V DC power adapter

SPECIFICATIONS

DIMENSIONS

Height: 9.0 in (22.8 cm)

Width: 6.5 in (16.5 cm)

Depth: 1.66 in (4.2 cm)

Weight: 23 oz (0.7 kg)

PON CHARACTERISTICS

Max. split**: 128 GPON

Max. reach**: 20 km (12.4 miles), N1 Class

Maximum Optical Distribution Network (ODN) Attenuation: XGS, 29 dB

Optical receiver 1577nm: -28dBm

Optical transmitter 1270nm: +2.0 to +7 dBm

INTERFACES

Data/Business Ethernet:

Two 10/100/1000 BASE-T Ethernet port RJ 45 connectors

One SFP+ 10G Ethernet port

SFP+ XGS uplink port

PON: Single 9/125 µm (single mode) fiber, SC/APC connector, minimum 50 dB return loss

Power: 8-pin connector

DATA

Drop length: 328 feet (100 m) maximum, using CAT6 or CAT6A cable

Auto MDI/MDIX crossover for 10/100/1000 BASE-T ports

Traffic Management and QoS: 802.1Q VLAN, data and management priorities; Q-in-Q tagging; ingress port policing at LAN and WAN

STANDARDS SUPPORT

IEEE Bridging

IEEE 802.3 Ethernet

VLAN Cross-Connect – based on Outer, Outer and Inner VLAN tags

IEEE 802.1p Prioritization

IEEE 802.1Q VLAN tagging

IEEE 802.1ad VLAN stacking

(Q-in-Q) support

IEEE 802.1ag Connectivity Fault Management

Y.1731 OAM functions and mechanisms for Ethernet based networks

Y.1564 Ethernet service activation test methodology

MEF 6.1.1 – L2CP aspects Amendment to 6.1

MEF 10.3 Service Attributes

MEF 11/13/20 UNI type 1 and 2

MEF 23.1 Class of Service Phase 2 Implementation Agreement

MEF 30 Service OAM Fault Management Implementation Agreement

MEF 35 Service OAM Performance Monitoring Implementation Agreement

MEF 45 Multi-CEN L2CP

MEF 48 Service Activation Testing

MEF 49 Service Activation Testing Protocol and PDU Formats

CERTIFICATION AND COMPLIANCE

Emissions:

FCC Part 15 Class B

CISPR-22

Safety:

UL 60950 and UL 1697 approved

IEEE: 802.3, 802.3AB, 802.3U, 802.11p, 802.11Q

SPECIFICATIONS (... CONTINUED)

TIMING

ITU G.987.3 10-Gigabit-capable passive optical networks

SyncE SSM per ITU-T G.781 Synchronization Layer Function

ENVIRONMENTAL

Operating temperature:

Indoor ambient temperature,

0° to 40°C (32° to 104° F)

Relative humidity (non-condensing):

Operating/Storage: 5% to 90%

POWERING AND ALARMS

8-pin connector

Input voltage: 12 V DC (nominal),

10 V DC (min), 15 V DC (max)

External Power Adapter: External Power Adapter: 12 V DC, 2.5 A

QUALITY OF SERVICE

Classification based on Ethernet and IP header

Priority bit (Pbit) and DSCP mapping capability at the subscriber edge

Priority bit based CoS queuing: 8 queues per egress interface and 4 CoS queues per shaped service

MEF-compliant single level policing

Ingress Policing per service, per classified traffic

Egress Policing per service, per classified traffic

Color blind policers

Burst size

Weighted Random Early Detection (WRED) per queue

Advanced Scheduling options: Strict Priority, and Deficit Weighted Round Robin. A combination of these scheduling options can be used on an egress interface.

SERVICE ACTIVATION TESTING (SAT)

Support Generator/Collector for Two-Way SAT, frame delivery, SCT (cir, eir+cir, policing), SPT (cir)

Keeps up to 5 of the last test results which can be referenced via the " transaction_id", i.e tid (persists across reboot)

Supports both tagged (FL-PDU) and un-tagged (IPV4) subscriber test frames

Support testing multiple EVCs and CoS on a single interface simultaneously (up to 64 frame-sets) (only one active SAT test per interface)

Frame Delivery (unicast, multicast, and broadcast)

Bad frame testing supported, CVLAN preservation testing

Delay measurement for SCT (cir, cir+eir, policing), and SPT

Supports both fixed packet and emix profile testing for SCT/SPT (bandwidth profile testing and performance testing)

Supports testing DSCP/filtering setting for untagged frames

Supports blocking of EVC traffic from subscriber ports for both generator and reflector

Auto configure parameters from traffic management configuration system

Support Per EVC (up to 64 simultaneous) latching loopback interface

Supports packet lengths up to full ethernet frame sizes of 9,600+ bytes.

Supports auto-configuration required by SAT YANG model, as well as specific user-defined test settings such as:

- CIR/EIR
- CVID+CPBIT settings (auto-selects lowest values when un-specified)
- DSCP value to use (auto-selects lowest value when un-specified)

ETHERNET OAM

802.1ag & Y.1731

Supports CFM, SOAM and Maintenance End Points

Peer to Peer Delay Measurements

2-way Delay Measurement

Y.1564 based Service Activation Testing

Service Activation Testing: Multi-Gigabit Load generation, Multi-Gigabit Loop back

Interoperable with systems supporting 802.1ag and Y.1731

RFC2544 based Service Activation Testing

Continuity Check Message at 100 milliseconds interval

MANAGEMENT SUPPORT

Performance monitoring and statistics

Network Configuration Protocol (NETCONF)

MEF 31 YANG equivalent Service OAM Fault Management Definition of Managed Objects

MEF 38 YANG equivalent Service OAM Fault Management YANG Modules

PERFORMANCE MANAGEMENT

Internet Protocol Flow Information Export (IPFIX)

**Not necessarily simultaneously

Calix | EX

ORDERING INFORMATION

Calix GPR3000X GigaPro

000-01101	GPR3000X (100-04811) and XGS-PON SFP+ optical module 1270/1577nm, single fiber transceiver, I-Temp (100-04531)
100-04811	GPR3000X 10G GigaPro, 2 GE, 1 SFP+10GE, AM Power Adapter
100-04994	GPR3000X 10G GigaPro, 2 GE, 1 SFP+10GE, UPS Power Interface
100-05088	GPR3000X 19 inch rack mount bracket and accessories

Note: Calix believes the information in this publication to be accurate as of publication date, and is not responsible for error. Product Specifications are subject to change without notice.

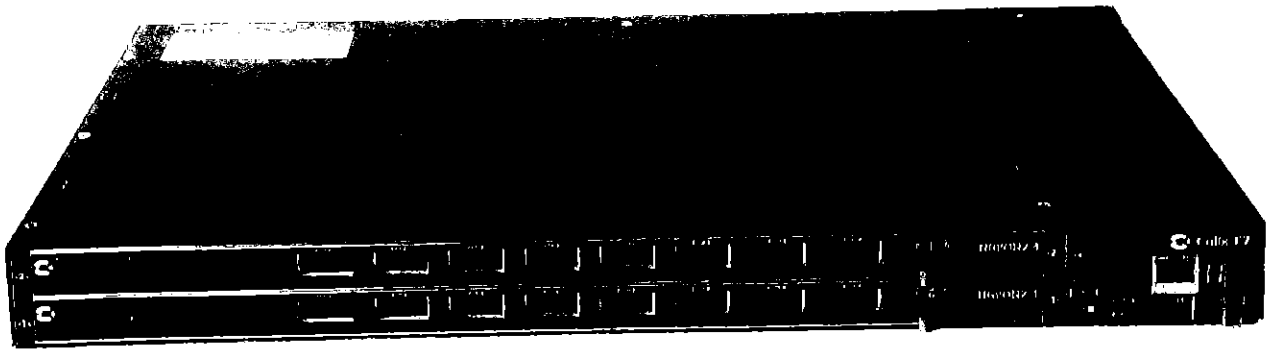
2777 Orchard Pkwy, San Jose, CA 95131 | T: 877 766 3500 | F: 1 707 283 3100 | www.calix.com
| 260-00379, Rev. 15 | 08/19

Calix | AX

Calix E7-2 A AXOS NGPON2-4

DESCRIPTION

Looking to future-proof your next-generation GPON network in preparation for launching advanced services?
As North America's most widely deployed access system, the Calix AXOS E7-2 Intelligent Modular System is a breakthrough evolutionary system that provides a transformational path to next generation networks, fiber technologies, and Software Defined Access. The E7-2 is the industry's benchmark for a modular, small form factor, environmentally hardened access solution for service providers. By adding the AXOS platform, the E7-2 is now even more of a disruptive and compelling enabler to next generation networks that connect the world. The AXOS E7-2 leads a rapidly expanding family of AXOES E-Series systems capable of supporting both centralized and decentralized network architectures that range from the data center edge, central office, or headend, to the remote cabinet, or MDU.



2777 Orchard Parkway, San Jose, CA 95134 | T: 1 408 514 3000 | F: 1 707 283 3100 | www.calix.com

FUNCTIONAL DESCRIPTION

10 GIGABIT PON:
The Calix AXOS E7-2 NGPON2-4 line card provides all the benefits of Calix AXOS while bringing both NG-PON2 and XGS- PON technology to the access network. Each card provides 4 XGS-PON or NG-PON2 OLT channel termination ports that subtend up to 128 ONTs each, for a capacity of 512 ONTs per card and 1024 ONTS per E7-2 1RU
chassis. Each port can be independently provisioned to support NG-PON2 or XGS-PON.

KEY FEATURES AND CAPABILITIES

The NGPON2-4 card features and capabilities include:

- Based on ITU G.989 NG-PON2 and XGS-PON family of standards
- 9.953 Gbps downstream, 9.953 Gbps upstream
- Supports up to 4 TWDM wavelengths (one per physical port, upgradeable to 8 wavelengths in future) and the XGS-PON wavelength
- Supports NG-PON2 wavelength mobility
- Leveraging OMCI and GEM (Ethernet) based provisioning model as GPON
- Interoperable with Calix Next Generation 10G PON Residential SFUs and MDUs as well as Business ONTs
- Class N1 +29 dB link budget, up to 1:128 splits
- Integrated 10GE aggregation and transport
- Hardened for central office and remote terminals

IP SERVICES DELIVERY

The Calix AXOS E7-2 NGPON2-4 line card delivers a full spectrum of IP access services over PON fiber networks.

- 4K IPTV – broadcast and Video on Demand (VoD)
- MEF CE 2.0 compliant business services
- Ultra-fast High-Speed Internet (HSI) access
- Voice – Native SIP/VoIP and TDM Gateway support

INTEGRATED HIGH-CAPACITY TRANSPORT

Built on a core Layer 2 and Layer 3 switch, the AXOS E7-2 NGPON2-4 line card is capable of full-duplex, line rate forwarding at all frame sizes and traffic types across all interfaces. Each PON port has a dedicated 10 Gbps switch interface. Four 10 GE XFP uplinks provide support for backhaul of all traffic.

NETWORK RESILIENCY

The Calix AXOS E7-2 NGPON2-4 line card supports a flexible set of standards- based network topology protocols for use in point to point or ring based transport.

- ITU G.8032v2 Ethernet Ring Protection Switching (ERPS)
- IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- IEEE 802.3ad/802.1AX Link Aggregation

MOBILE BACKHAUL & FRONTHAUL

With integrated network synchronization, Ethernet OAM and advanced timing capabilities, the AXOS E7-2 NGPON2-4 line card can be used to transport mobile front haul as well as backhaul traffic while also supporting triple play residential and MEF certified business services from a single platform.

UNIFIED ACCESS INFRASTRUCTURE

With advanced QoS and intelligent NG-PON2 card architecture, operators have a cost-effective way to start with XGS-PON for high density MDU residential services such as Gfast. Then, operators can seamlessly migrate to TWDM
optics and further monetize their investment by offering SLA-driven business and mobile hauling capabilities. The AXOS E7-2 NGPON2-4 line card will thus offer ultra-high bandwidth residential IPTV services, mobile and business services over a single unified access infrastructure.

MINIMUM SOFTWARE RELEASE

Calix E7 AXOS Release 3.0

DIMENSIONS (W x H x L)

14 x 10.1 x 0.78 inches
35.6 x 25.7 x 2 cm

WEIGHT

2 lbs. (1 Kg)

PORTS

4 XFP interfaces for 10G/10G, 10G/2.5G PON Access Links (4 TWDM channels per card)
4 XFP interfaces for 10GE network uplink

WAVELENGTH SUPPORT

XGS-PON: 1577nm Down, 1270 nm Up
NG-PON2: Up to 4 TWDM wavelengths: 1596-1599 Down, 1532-1535 Up [one wavelength pair per OLT port]

SPLIT RATIO*

XGS-PON: 1:128
NG-PON2: 1:128
(*Refer to Calix PPG for engineering design guidelines)

QUALITY OF SERVICE

Service classification based on port, SVLAN-ID, CVLAN-ID, p-bit
Strict priority and Weighted Round Robin (WRR) based scheduling with minimum bandwidth guarantees
Congestion avoidance: Tail Drop

STANDARDS AND RFC SUPPORT

ITU-T G.989.2 a1 NG-PON2
ITU-T XGS-PON
ITU-T G.8032v2 Ethernet Ring Protection Switching (ERPS)
TR-101 VLAN Service models
IEEE 802.1p CoS Prioritization IEEE 802.1 MAC Bridges
IEEE 802.1Q VLAN tagging
IEEE 802.1ad VLAN stacking (Q-in-Q)
support RFC 2236 IGMP v2 RFC 3376 IGMP v3
RFC 3810 MLDv2
RFC 3046 DHCP Relay Agent Information Option ("Option 82")
RFC 4541 IGMP Proxy
RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
Dynamic Bandwidth Allocation (DBA)
Advanced Encryption Standard (AES)
Forward Error Correction (FEC)

PACKET SWITCHING CAPACITY

9216 byte frames over NGPON2/ XGS-PON
4,096 VLANs per system
4,096 IGMP Multicast channels

SYNCHRONIZATION

Integrated Stratum-3 reference
Timing Options: BITs, Synch, 1588v2 (TC, OC, BC)

COMPLIANCE

NEBS Level 3 compliance (GR-63-CORE, GR-1089- CORE, GR-3028)
UL 60950
FCC Part 15 Class A CE Mark

POWER AND HEAT DISSIPATION

NGPON2-4 power consumption: 125 Watts (typical with optics)

OPERATING ENVIRONMENT

Temperature: -40° to +65° C (-40° F to +149° F)
Humidity: 10 to 95% (non- condensing)

STORAGE ENVIRONMENT

Temperature: -40° to +85° C (-40° F to +185° F)
Humidity: 5 to 95%

Calix | AX

NOTES

For XGS-PON XFP, NG-PON2 XFP, and 10GE XFP, only products purchased directly from Calix are supported. The use of XGS-PON XFP, NG-PON2 XFP, and 10GE XFP pluggable transceivers not purchased directly from Calix is not supported and will void all product warranties covering the Calix equipment to which such third-party materials are connected.

CALIX ONTs

The AXOS E7-2 NGPON2-4 line cards support operation with the Next Generation GigaFamily of ONTs using fixed (XGS- PON) and tunable TWDM wavelengths.

CALIX E7 LINE CARDS

100-04636..... E7-2 NGPON2-4 (4x XGS-PON/NG-PON2 XFP, 4x 10GE XFP)

CALIX PLUGGABLE TRANSCEIVER MODULES

The E7-2 supports pluggable modules for all service and network interfaces. Refer to the Calix Optical Transceiver Modules Datasheet (#250-00191) for a complete list of modules and specifications.

XFP.....10GE optical Small Form-factor Pluggable (XFP) modules

XGS-GPON XFP .....10Gbps XGS-PON optical Small Form-factor Pluggable (XFP) modules

NG-PON2 XFP .....10Gbps NG-PON2 optical Small Form-factor Pluggable (XFP) modules (CO use only)

AXOS®

Data Sheet

AX e7 2® XG801

Calix

Looking to future-proof your next-generation XGS-PON / GPON network in preparation for launching advanced broadband services? As North America's most widely deployed access system, the Calix AXOS E7-2 Intelligent Modular System is a breakthrough evolutionary system that provides a transformational path to next generation networks, fiber technologies, and Software Defined Access. The E7-2 is the industry's benchmark for a modular, small form factor, environmentally hardened access solution for communications service providers (CSPs). Powered by the AXOS platform, the E7-2 is now even more of a disruptive and compelling enabler to next generation networks that connects everyone and everything. The AXOS E7-2 leads a rapidly expanding family of Intelligent Access EDGE systems capable of supporting both centralized and decentralized network architectures that range from the data center edge, central office, or headend, to the remote cabinet, or MDU.

AX e7-2 XG801

Data Sheet

Functional Description

XGS-PON / GPON AND POINT-TO-POINT ETHERNET:

The Calix E7-2 AXOS XG801 card provides multi-service capability over IP/ Ethernetbased networks. Each XG801 provides eight selectable XGS-PON / GPON OLT ports that subtend up to 128 ONTs each, for a card capacity of 1,024 PON ONTs, or 2048 per E7-2 1RU chassis. An additional four 10GE SFP+ sockets per card can provide high-bandwidth, point-to-point Ethernet services to individual subscribers or be used to aggregate other Ethernet devices. Each port can be independently provisioned to support XGS-PON, GPON, or Ethernet connections. The Calix E7-2 XG801 card can co-exist with other Calix E7-2 AXOS line cards in a shelf.

KEY ATTRIBUTES

XG801 card features and capabilities include:

- Based on ITU G.989 XGS-PON family of standards
- XGS-PON: 9.953 Gbps downstream, 9.953 Gbps upstream
- GPON: 2.488 Gbps downstream, 1.244 Gbps upstream
- GEM (Ethernet) based GPON
- Interoperable with Calix ONTs, including GigaFamily and Calix Next Generation 10GPON Residential SFUs, MDUs, and Business ONTs
- Class N1 +29 dB link budget, up to 1:128splits
- Class N2 +31 dB link budget, up to 1:128splits
- Class B+ ODN, +28 dB link budget, up to 20 km at 32-way splits
- Class C+ ODN, +32 dB link budget with Forward Error Correction (FEC), up to 35km at 32-way split,up to 60 km at 2-way split
- Integrated 100GE and 10GE aggregation and transport
- Hardened for central office and remote terminals

INTEGRATED HIGH-CAPACITY AGGREGATION

The E7-2 AXOS XG801 card is built on a core Layer 2 and Layer 3 switch capable of full-duplex, line rate forwarding at all frame sizes and traffic types across all interfaces. Each XGS-PON OLT port has a dedicated 10Gbps switch interface. Industry standard pluggable modules are used for all interfaces, including ITU G.989 XGS-PON and G.984 compliant GPON, GE, 10GE SFP+, and QSFP-DD 100GE. The XG801 supports (2) QSFPDD sockets supporting QSFP28 100GE optical modules and QSFP-DD Point-to-Point and Point-to-Multipoint Direct Attach cables. The XG801 also provides (4) SFP+ modules that are mechanically compatible with the industry-ubiquitous SFP module. Each SFP+ interface supports 10GE/1GE modules as well as Direct Attach copper cables.

IP SERVICES DELIVERY

The Calix E7-2 AXOS XG801 card delivers a full spectrum of IP access services over XGSPON, GPON and Point-to-Point Ethernet networks.

- Secure AES encryption on the PON
- IPTV – broadcast and Video on Demand (VoD)

- MEF compliant business services
- High-Speed Internet (HSI) access
- Voice – Native SIP/VoIP and TDM Gateway support
- T1 services
- CATV: 1550nm RF video overlay; 1610nmRF return

NETWORK RESILIENCY

All Calix E7-2 AXOS XG801 cards support a flexible set of standards-based network topology protocols for use in aggregation, ring-based transport, and uplink.

- ITU G.8032 Ethernet Ring Protection Switching (ERPS)
- ITU G.8032v2 Ethernet Ring Protection Switching (ERPS)
- IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- IEEE 802.3ad/802.1AX Link Aggregation
- ITU G.983.5 - Type B Protection and enhanced survivability for XGS-PON and GPON OLTs

MOBILE BACKHAUL

With integrated network synchronization, hierarchical QoS and support for T1 services, the E7-2 AXOS XG801 card enables transport of uncompromised mobile broadband traffic while also supporting triple play residential and MEF certified business services from a single platform. A powerful collection of classification, policing, and scheduling algorithms let CSPs manage per-subscriber and per-service traffic flows to maintain priority/delay/loss service differentiation within the E7 network.

SCALABLE IPTV SUPPORT

The E7 supports industry standard IGMP snooping to identify and replicate multicast video sent between the set-top box and the video distribution network, thus providing efficient, scalable, high-quality IPTV distribution on both GPON and Ethernet interfaces.

AX e7 2 XG801

Data Sheet

SPECIFICATIONS

Minimum System Requirements

- Calix AXOS Software Release 21.2

Dimensions (W x H x L)

- Height: 14 in (35.6 cm)
- Width: 10.1 in (25.7 cm)
- Depth: 0.78 in (2 cm)
- Weight: 2.08 lbs (0.94 kg)

Ports

- 8 SFP ports supporting selectable
- XGS-PON / GPON optical modules
- 4 SFP+ ports supporting 10GE,
- 2.5GE, and GE optical modules
- 2 QSFP-DD ports supporting
- 40GE/100GE optical modules

Packet Switching Capacity

- Wire speed forwarding across all
- Ethernet and XGS-PON / GPON
- OLT ports
- 64,000 MAC addresses per system
- 9,000 byte jumbo frames
- 2,000 byte frames over GPON
- 4,096 VLANs
- 4,000 IGMP Multicast channels

Quality of Service

- Service classification based on port, SVLAN-ID, CVLAN-ID, P-Bit
- Port and flow-based policing to 1Mbps increments
- 8 CoS queues per port
- Strict priority scheduling with minimum bandwidth guarantee
- Congestion avoidance: Tail Drop

Standards and RFC Support

- TR101 VLAN Service models
- IEEE802.1ag Connectivity Fault
- Management (G.8032 support)
- IEEE 802.1D Rapid Spanning Tree
- IEEE 802.1p CoS Prioritization
- IEEE 802.1 MAC Bridges
- IEEE 802.1Q VLAN tagging
- IEEE 802.1ad VLAN stacking (Q-in-Q) support
- IEEE 802.1w RSTPIEEE 802.3ad/802.1AX
- Link Aggregation
- RFC 2236 IGMP v2
- RFC 3376 IGMP v3
- RFC 3046 DHCP Relay Agent Information Option ("Option 82")
- RFC 4541 IGMP snooping
- RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
- ITU-T G.8032 Ethernet Ring Protection Switching (ERPS)/ Enhanced EAPS
- ITU-T G.8032v2 Ethernet Ring Protection Switching (ERPS)
- ITU-T G.989 XGS-PON
- ITU-T G.984 GPON
- ITU G.984.1 Type B Protection
- Dynamic Bandwidth Assignment (DBA)
- NIST Advanced Encryption Standard (AES)

Synchronization

- Synchronization enabled by E7 line cards
- External reference timing
- Built-in Stratum-3 clock
- Hardware-ready to support Synchronous Ethernet, IEEE 1588v2

Compliance

- NEBS Level 3 compliance (GR-63-CORE, GR-1089- CORE, GR-3028)
- UL 62368 FCC Part 15 Class A
- CE Mark

Operating Environment

- Temperature: -40° to +65° C (-40° F to +149° F)
- Humidity: 10 to 95% (noncondensing)

Storage Environment

- Temperature: -40° to +85° C (-40° F to +185° F)
- Humidity: 5 to 95%

Notes: For AXOS XGS-PON OIM and GPON OIM transceivers purchased directly from Calix are supported. The use of OIM pluggable transceivers not purchased directly from Calix is not supported and will void all product warranties covering the Calix equipment to which such third-party materials are connected.

- Only AXOS XGS-PON and GPON OIMs are supported by the E7-2 AXOS XG801 card
- SFP modules may also be used in SFP+ sockets at 1GE rate.
- 100GE optical modules used in QSFP-DD sockets may be provisioned to operate at either 100Gbps or 40Gbps rates.
- Copper Direct Attach cables can operate in SFP and SFP+ sockets at 1GE and 10GE data rates as supported by the card type.
- Copper Direct Attach cables can operate in QSFP-DD sockets at 100GE and 10GE data rates as supported by the card type.

Calix ONTs

The E7-2 AXOS XG801 card supports the Calix family of ONTs, including 700GX, 700GE, 836GE, as well as the 800G GigaFamily. 10G PON ONTs are also supported, including the GP1000X, GP1100X, GH3200X, and GPR3000X ONTs.

Calix ONTs support auto sensing GPON and GE network interfaces, allowing service providers to manage service changes without subscriber onsite technical support.

Calix E7-2 AXOS Line Cards

100-05529..... E7-2 AXOS XG801 (8x XGS-PON/GPON OIM, 4x 10GE SFP+, 2x 100GE QSFP-DD)

Calix Pluggable Tranceiver Modules

The E7-2 supports pluggable modules for all service and network interfaces.

Refer to the Calix Optical Transceiver Modules Datasheet (#250-00191) for a complete list of modules and specifications.

SFP..... 1GE and 2.5GE optical and copper Small Form-factor Pluggable (SFP) modules

SFP+..... 10GE optical Enhanced Small Form-factor Pluggable (SFP+) modules

Direct Attach..... Multi-rate copper Small Form-factor Pluggable (SFP/SFP+) cables

AXOS XGS-PON / GPON

B+ OIM..... 2.5Gbps GPON (Class B+, 20km, C-Temp, AXOS) 2.5Gbps GPON (Class B+, 20km, I-Temp, AXOS)AXOS GPON

C+ OIM..... 2.5Gbps GPON (Class C+, 60Km, I-Temp, AXOS)

N1 OIM.....10Gbps XGS-PON (Class N1, 20km, I-Temp, AXOS)

N2 OIM.....10Gbps XGS-PON (Class N2, 20km, I-Temp, AXOS)

Note: Calix believes the information in this publication to be accurate as of publication date, and is not responsible for error. Product Specifications are subject to change without notice.

REVENUE EDGE

Data Sheet

Giga

BLAST u6.1

Calix

The Calix GigaSpire® BLAST® u6.1 (GS4220E) is a new generation smart home system that extends the access network into the home and acts as a strategic location for control of the ultimate Wi-Fi experience. Besides supporting broadband connectivity of data and video services, this intelligent, high-performance system offers the latest 802.11ax 'Wi-Fi 6' technology. The GigaSpire BLAST u6.1 provides switching and routing functions that support multi-Gigabit throughput for IPTV video and data services.

MULTI-GIGABIT SUBSCRIBER EXPERIENCE

The GigaSpire BLAST u6.1 is a premium smart home system that delivers the latest 'Wi-Fi 6' certified technology (802.11ax). The GigaSpire BLAST u6.1 uses a 1 Gigabit Ethernet link at the subscriber's premises to provide carrier-class Wi-Fi and four (4) Gigabit Ethernet interfaces for customer multi-media devices. The GigaSpire BLAST u6.1 enables residential subscribers to receive Gigabit broadband data, Internet Protocol (IP) video, and voice

(POTS) services. Using the latest 802.11ax technology in both the 2.4 and 5 GHz radios, the GigaSpire BLAST u6.1 incorporates 6x6 streams of Wi-Fi delivery (2x2 @ 2.4 GHz and 4x4 @ 5 GHz). In addition, with multi-user multiple-input and multiple-output (MU-MIMO) and beamforming, the GigaSpire BLAST u6.1 allows service providers to extend the access network inside the home and establish a strategic location for the delivery and control of broadband services.

With Wi-Fi being the de facto wireless data communication technology of choice for consumers, Calix engineered the GigaSpire BLAST u6.1 for optimal whole-home coverage with simultaneous dual-band 2.4 GHz and 5 GHz operation and dynamic beamforming at 5 GHz. Leveraging the latest Wi-Fi 6 features, the GigaSpire BLAST u6.1 provides longer range, higher efficiency and less interference compared to earlier generations of Wi-Fi technology. The GigaSpire BLAST u6.1 also supports the entire 5 GHz band, including Dynamic Frequency Selection (DFS) channels and can be provisioned to support 160 MHz channel bandwidth at 5 GHz. The GigaSpire BLAST u6.1 easily delivers HD and UHD (ultra-HD) video and data throughout a subscriber's home in an increasingly video-rich and mobile broadband environment.

Ensuring consumers can have ultra-fast Wi-Fi throughout their premises, the GigaSpire BLAST u6.1 provides the latest generation of redundant mesh via the Calix Mesh

BLAST u4m (GM1028) (please see the GM1028 data sheet for more information). With the GigaSpire BLAST u6.1 as the hub, and the BLAST u4m as the satellite extenders, consumers can truly gain the whole home/smart home experience. For even higher mesh performance, GigaSpire BLAST u6.1 can also be a mesh unit. This means that two GigaSpire BLAST u6.1 systems can connect to each other with one being the residential gateway and the other being the satellite.

EASY TO INSTALL, ACTIVATE, AND MAINTAIN

With the GigaSpire BLAST u6.1, Calix has redefined how to install and activate residential services at a subscriber's premises. Using the Command**IQ**® mobile app and a phone

or laptop, a field technician can install and apply the subscriber's service profile without special equipment or assistance from the central office. Calix also provides the innovative Calix Support Cloud (CSC), which allows the service provider to configure, activate

and upgrade the GigaSpire BLAST u6.1 quickly from a remote location using in-band management or TR-069. Extensive troubleshooting capabilities, remote software downloads, and easy-to-use service activation features ensure that services are delivered and maintained without needless truck rolls and hardware upgrades. Employing GigaSpire BLAST u6.1 systems allows service providers to reduce their operational expenses while effectively delivering the Gigabit experience to their subscribers.

CALIX EXPERIENCE INNOVATION PLATFORM

All GigaSpire BLAST systems are powered by the Calix Innovation Experience Platform.

This container-based platform allows service providers to quickly change and adapt their services to embrace new technologies and offer new, value-added services. This approach can generate recurring revenue and increase subscriber satisfaction.

KEY ATTRIBUTES

Home Gateaway:

- Layer 2 bridge and Layer 3 routing for High Speed Internet (HSI) data and IPTV video services
- DHCP server options
- DHCP (IPoE) and PPPoE network connections
- Network Access Translation (NAT), public to private IP addressing
- Configurable IP address schemes, subnets, static-IP addresses
- DNS server
- Bridge port assignment and data traffic mappings
- Port forwarding
- Firewall and security
- Application and website filtering
- Selectable forwarding and blocking policies
- DMZ hosting
- Parental controls, time of day usage
- Denial of service (DoS) protection
- MAC filtering
- Time/Zone support
- Universal Plug-and-Play (UPnP)

Wi-Fi:

- 2.4 GHz and 5 GHz, simultaneous dual-band
- 5 GHz 802.11ax (Wi-Fi 6) certified, 802.11a/n/ac compatible
- 6x6 streams (2x2 @ 2.4 GHz and 4x4 @ 5 GHz)
- 2.4 GHz 802.11ax (Wi-Fi 6) certified, 802.11b/g/ac compatible
- WPA/WPA2/WPA3; WEP 64/128 bit encryption
- PuF (Physical Unclonable Functions)
- WPS push-button
- 4x4 DL/UL MU-MIMO with beamforming (5 GHz radio)
- 2x2 DL/UL MU-MIMO with beamforming (2.4 GHz radio)
- 1024 QAM; OFDMA; BSS Coloring
- DCM (Dual Carrier Modulation)
- TWT (Target Wake Time) for IoT clients

Wi-Fi Redundant Mesh:

- Self Managed: self configuration, Air time fairness
- Dynamic Mesh: load balancing, band/node steering; interference management
- Self Healing: backhaul failover; diagnostics; events

1 Gigabit Ethernet (GE) WAN interface:

- Multi-rate 100/1000/2500 BASE-T Ethernet, auto-negotiating

Gigabit Ethernet (GE) LAN interfaces:

- Four (4) ports of multi-rate 10/100/1000 BASE-T Ethernet, auto-negotiating for residential IPTV and data services

Two voice lines:

- Carrier grade SIP, H.248 (aka Megaco) and MGCP[1]

USB port:

- USB 2.0 - Type A host interface

Supports multiple data service profiles

Traffic management and Quality of Service (QoS):

- 802.1Q VLANs
- 802.1p service prioritization
- Q-in-Q tagging
- Multiple VLANs
- DiffServ
- Pre-defined QoS on service type
- LAG of GE ports
- MAP-T

IPTV, IGMPv2, future support of IGMPv3:

- IGMP Snooping and Proxy
- IGMP Fast Leaves

Gateway Management:

- CSC (Calix Support Cloud)
- TR-069
- Local Home Gateway GUI, access provisionable
- Remote WAN side GUI access
- Default username/password

AC to 12 V DV power adapter

[1] Currently supporting MetaSwitch and Ribbon softswitches

SPECIFICATIONS

Dimensions

- Width: 4.75 in (12.1 cm)
- Height: 8.5 in (21.6 cm)
- Depth: 4.75 in (12.1 cm)
- Weight: 36 oz (1.02 kg)

WAN Interface

- Interface: One 2.5 Gigabit-Ethernet Port, RJ-45 connector

Interfaces

- Wireless: 2.4 GHz 2x2 and 5 GHz 4x4 internal antennas
- LAN Data/IPTV: Four (4) 10/100/1000 BASE-T Ethernet port, RJ 45 connectors
- WAN: One (1) 10/100/1000/2500
- USB: USB 3.0 Type A
- Voice: Two ports supporting carrier grade SIP, H.248 (aka Megaco) and MGCP
- Power: Single pin and 8-pin

Data

- Drop length: 328 feet (100 m) max using CAT5 cable for GigE
- Auto MDI/MDIX crossover for 1000BASE-TX, 100BASE-TX
- Traffic Management and QoS: 802.11Q VLAN; 802.11p voice, video, data and management priorities; Q-in-Q tagging

Wireless

- 2.4 GHz 802.11 b/g/n/ac/ax
- 5 GHz 802.11 a/n/ac/ax
- 4x4 DL/UL MU-MIMO, implicit/ explicit high-power, dynamic beamforming (5 GHz radio)
- 2x2 DL/UL MU-MIMO implicit/ explicit high-power, dynamic beamforming (2.4 GHz radio)
- 2.4 GHz and 5 GHz simultaneous
- DCM, TWT, extended GI
- Auto channel selecting and interference detection
- WPS, WPS push button
- Wi-Fi multimedia (WMM)
- Supports up to 250 wireless clients

Remote Management

- TR-069 remote management
- TR-098 Internet Gateway Device Data Model

Environmental

- Operating temperature: Indoor ambient temperature, 0° to 40°C (32° to 104° F)
- Operating and storage relative humidity: 10 to 90 % and 5 to 95% non-condensing respectively

Certification and Compliance

- Emissions: FCC Part 15 Class B IC ICES-003 Class B CISPR-22
- Safety: UL 60950 and UL 1697 approved
- IEEE: 802.3, 802.3AB, 802.3U, 802.11p, 802.11Q
- Wi-Fi Alliance Certified 802.11ax

- USB-IF Compliance USB 2.0

Powering and Alarms

- Single pin and 8-pin
- Input voltage: 12 V DC (nominal)
- External Power Adapter: 12 V DC, 3A

Ookla-based Performance Testing

- Subscribers can run an Ookla-based performance test from within the Calix CommandIQ® mobile app
- Symmetrical speed test results in excess of 2 Gbps are possible with the GigaSpire BLAST u6.1 system (owing to the 1 GigE WAN port)

ORDERING INFORMATION

Calix GS4220E GigaSpire BLAST u6.1

000-01175..... GS4220E GigaSpire BLAST u6.1, 1 GE WAN, 4 GE LAN, 2 POTS, Dual Wi-Fi – AM Power Adapter

Calix GS4220E GigaSpire BLAST u6.1 Power Adapter

100-05484..... GigaSpire BLAST u6.1/u6.2 (GS4220E/GS4227E) Power Adapter, 12 V, 3 A – AM Type A

Optional Mounting Bracket

100-05467..... GS4227E/GS4220E Mounting Bracket — Quantity 10

Optional Uninterruptible Power Supply (UPS)

100-04068..... Indoor UPS (8 hour support), Wall Mount or Desktop, 12 V, 7.2 AH, 36 W, Black - AM, Type B, Grounded

100-05345..... Indoor UPS (24 hour support), Wall Mount or Desktop, 12 V, 20AH, 75W, Audible Alarm, Regulated Output R3 Production

UPS Power Adapters

100-03893..... Indoor UPS Power cord, 7-pin UPS to 8-pin ONT Male, 1m, black

100-03894..... Indoor UPS Power cord, 7-pin UPS to 8-pin ONT Male, 3m, black

100-03895..... Indoor UPS Power cord, Unterminated to 8-pin ONT Male, 6m, black

Removeable Branding Plate

100-05522..... Blank, removable branding plate. Contact your sales representative to order branding plates that can be customized with your company logo

Note: Calix believes the information in this publication to be accurate as of publication date, and is not responsible for error. Product Specifications are subject to change without notice.

REVENUE EDGE

Data Sheet

Giga

BLAST u6x

Calix

The Calix GigaSpire® u6x (GS4227) is a new generation smart home system that integrates optical network termination (ONT) and residential gateway functionality into a single system*. It supports virtually any passive optical network (PON) and Ethernet technology, while providing the ultimate Wi-Fi experience. Besides supporting broadband connectivity of data and video services, this intelligent, high-performance system offers the latest 802.11ax 'Wi-Fi 6' technology. The GigaSpire BLAST u6x provides switching and routing functions that support multi-Gigabit throughput for IPTV video and data services.

Note: A white form factor is also available, called the GS4227W.

MULTI-GIGABIT SUBSCRIBER EXPERIENCE

The GigaSpire BLAST u6x is a premium smart home integrated system that delivers the latest Wi-Fi 6 certified technology (802.11ax). The GigaSpire BLAST u6x uses an SFP+ cage supporting a 10 Gigabit link* at the subscriber's premises to provide carrier-class WAN, including GPON and XGS PON, as well as 1 and 10 Gigabit Ethernet (both copper and Active Ethernet) options. On the LAN side, Wi-Fi and four (4) Gigabit Ethernet interfaces are available for customer multi-media devices.

The GigaSpire BLAST u6x enables residential subscribers to receive Gigabit broadband data, Internet Protocol (IP) video, and voice (POTS) services. Using the latest 802.11ax technology in both the 2.4 and 5 GHz radios, the GigaSpire BLAST u6x incorporates 6x6 streams of Wi-Fi delivery (2x2 @ 2.4 GHz and 4x4 @ 5 GHz). In addition, with multi-user multiple-input and multiple-output (MU-MIMO) and beamforming, the GigaSpire BLAST u6x allows service providers to extend the access network inside the home and establish a strategic location for the delivery and control of broadband services. With Wi-Fi being the de facto wireless data communication technology of choice for consumers, Calix engineered the GigaSpire BLAST u6x for optimal whole-home coverage with simultaneous dual-band 2.4 GHz and 5 GHz operation and dynamic beamforming in both spectrums.

Leveraging the latest Wi-Fi 6 features, the GigaSpire BLAST u6x provides longer range, higher efficiency, and less interference compared to earlier generations of Wi-Fi technology. The GigaSpire BLAST u6x also supports the entire 5 GHz band, including Dynamic Frequency Selection (DFS) channels and can be provisioned to support 160 MHz channel bandwidth at 5 GHz. The GigaSpire BLAST u6x easily delivers HD and UHD (ultra-HD) video and data throughout a subscriber's home in an increasingly video-rich and mobile broadband environment. Ensuring consumers can have ultra-fast Wi-Fi throughout their premises, the GigaSpire BLAST u6x provides the latest generation of redundant Wi-Fi 6 mesh via the Calix GigaSpire Mesh GigaSpire BLAST u4m (please see the GM1028 data sheet for more information). With the GigaSpire BLAST u6x as the hub, and the Mesh GigaSpire BLAST u4m as the satellite extenders, consumers can truly gain the whole home/smart home experience. For even higher mesh performance, an additional GigaSpire BLAST u6 system, such as the GigaSpire BLAST u6.1, can also be deployed as a mesh unit. This means that two GigaSpire BLAST u6 systems can connect to each other with one being the residential gateway and the other being the mesh.

EASY TO INSTALL, ACTIVATE, AND MAINTAIN

With the GigaSpire BLAST u6x integrated system, Calix has redefined how to install and activate residential services at a subscriber's premises. Using CommandIQ® and a phone or laptop, a field technician can install and apply the subscriber's service profile without special equipment or assistance from the central office. Calix also provides the innovative Calix Support Cloud (CSC), which allows the service provider to configure, activate and upgrade the GigaSpire BLAST u6x quickly from a remote location using in-band management, TR-069, or ONT Management Control Interface (OMCI).

Extensive troubleshooting capabilities, remote software downloads, and easy-to-use service activation features ensure that services are delivered and maintained without needless truck rolls and hardware upgrades. Deploying GigaSpire BLAST u6x systems allows service providers to reduce their operational expenses while effectively delivering

Note: XGS PON technology, although referred to as "10 Gig PON" is limited to a maximum symmetrical throughput of approximately 8.5 Gbps, owing to various overhead limitations and network conditions.

the Gigabit experience to their subscribers. If a PON module is being used, PON configuration and management is done via the OMCI protocol.

CALIX EXPERIENCE INNOVATION PLATFORM

All GigaSpire BLAST systems are powered by the Calix Innovation Experience Platform.

This container-based platform allows service providers to quickly change and adapt their services to embrace new technologies and offer new, value-added services. This approach can generate recurring revenue and increase subscriber satisfaction.

KEY ATTRIBUTES

Home Gateaway:

- Layer 2 bridge and Layer 3 routing for High Speed Internet (HSI) data and IPTV video services
- DHCP server options
- DHCP (IPoE) and PPPoE network connections
- Network Access Translation (NAT), public to private IP addressing
- Configurable IP address schemes, subnets, static-IP addresses
- DNS server
- Bridge port assignment and data traffic mappings
- Port forwarding
- Firewall and security
- Application and website filtering
- Selectable forwarding and blocking policies
- DMZ hosting
- Parental controls, time of day usage
- Denial of service (DoS) protection
- MAC filtering
- Time/Zone support
- Universal Plug-and-Play (UPnP)

Wi-Fi:

- 2.4 GHz and 5 GHz, simultaneous dual-band
- 5 GHz 802.11ax (Wi-Fi 6) certified, 802.11a/n/ac compatible
- 6x6 streams (2x2 @ 2.4 GHz and 4x4 @ 5 GHz)
- 2.4 GHz 802.11ax (Wi-Fi 6) certified, 802.11b/g/ac compatible
- WPA/WPA2/WPA3; WEP 64/128 bit encryption
- PuF (Physical Unclonable Functions)
- WPS push-button
- 4x4 DL/UL MU-MIMO with beamforming
- 1024 QAM; OFDMA; BSS Coloring
- DCM (Dual Carrier Modulation)
- TWT (Target Wake Time) for IoT clients

Wi-Fi Redundant Mesh:

- Self Managed: self configuration, Air time fairness
- Dynamic Mesh: load balancing, band/node steering; interference management
- Self Healing: backhaul failover; diagnostics; events

SFP + interface:

- Full 10 Gigabit bandwidth
- Supporting several SFP WAN modules, including: GPON, 1 Gigabit Ethernet (copper) and 10 Gigabit Ethernet (copper), XGS (future release), 1G and 10G Active Ethernet (future release)

Gigabit Ethernet (GE) LAN interfaces:

- Four (4) ports of multi-rate 10/100/1000 BASE-T Ethernet, auto-negotiating for residential IPTV and data services

Two voice lines:

- Carrier grade SIP, H.248 (aka Megaco) and MGCP[1]

USB port:

- USB 2.0 - Type A host interface

Supports multiple data service profiles

Traffic management and Quality of Service (QoS):

- 802.1Q VLANs
- 802.1p service prioritization
- Q-in-Q tagging
- Multiple VLANs
- DiffServ
- Pre-defined QoS on service type
- LAG of GE ports
- MAP-T

IPTV, IGMPv2, future support of IGMPv3:

- IGMP Snooping and Proxy
- IGMP Fast Leaves

Gateway Management:

- CSC (Calix Support Cloud)
- TR-069
- Local Home Gateway GUI, access provisionable
- Remote WAN side GUI access
- Default username/password

AC to 12 V DV power adapter

Optional UPS power unit available

[1] Currently supporting MetaSwitch and Ribbon softswitches

SPECIFICATIONS

Dimensions

- Width: 4.9 in (12.2 cm)
- Height: 9.9 in (25.2 cm)
- Depth: 4.9 in (12.2 cm)
- Weight: 41 oz (1.16 kg)

WAN Interface

- Interface: SFP+ cage (with options for GPON, 1 GBT, 10 GBT, XGS, and Active Ethernet)

Interfaces

- Wireless: 2.4 GHz 2x2 and 5 GHz 4x4 internal antennas
- LAN Data/IPTV: Four (4) 10/100/1000 BASE-T Ethernet port, RJ 45 connectors
- WAN: SFP+ cage
- USB: USB 2.0 Type A
- Voice: Two ports supporting Metaswitch; C15; C20 SIP; H.248 and MGCP
- Power: Single pin and 8-pin

Data

- Drop length: 328 feet (100 m) max using CAT5 cable for GigE
- Auto MDI/MDIX crossover for 1000BASE-TX, 100BASE-TX
- 10GBT: 110 feet (30m) CAT6e/7 cable
- Traffic Management and QoS: 802.11Q VLAN; 802.11p voice, video, data and management priorities; Q-in-Q tagging

Wireless

- 2.4 GHz 802.11 b/g/n/ac/ax
- 2x2 UL/DL MU-MIMO
- 5 GHz 802.11 a/n/ac/ax
- 4x4 DL/UL MU-MIMO, implicit/ explicit high-power, dynamic beamforming (5 GHz radio)
- 2x2 DL/UL MU-MIMO implicit/ explicit high-power, dynamic beamforming (2.4 GHz radio)
- 2.4 GHz and 5 GHz simultaneous
- DCM, TWT, extended GI
- Auto channel selecting and interference detection
- WPS, WPS push button
- Wi-Fi multimedia (WMM)

Remote Management

- TR-069 remote management
- TR-098 Internet Gateway Device Data Model

Environmental

- Operating temperature: Indoor ambient temperature, 0° to 40°C (32° to 104° F)
- Operating and storage relative humidity: 10 to 90 % and 5 to 95% non-condensing respectively

Certification and Compliance

- Emissions: FCC Part 15 Class B IC ICES-003 Class B CISPR-22
- Safety: UL 60950 and UL 1697 approved
- IEEE: 802.3, 802.3AB, 802.3U, 802.11p, 802.11Q
- Wi-Fi Alliance Certified 802.11ax

- USB-IF Compliance USB 2.0

Powering and Alarms

- Single pin and 8-pin
- Input voltage: 12 V DC (nominal)
- External Power Adapter: 12 V DC, 3A
- Optional UPS power unit available

Ookla-based Performance Testing

- Subscribers can run an Ookla-based performance test from within the Calix CommandIQ® mobile app
- Symmetrical speed test results in excess of 2 Gbps are possible with the GigaSpire BLAST u6x system (when a 10 GigE or GPON SFP module is activated)

ORDERING INFORMATION

Calix GS4227 GigaSpire BLAST u6x

100-05603..... GS4227 GigaSpire BLAST u6x , SFP+, 4 GE LAN, 2 POTS, Dual Wi-Fi – AM Power Adapter

Calix GS4227 GigaSpire BLAST u6x Bundles

000-01201..... GS4227 GigaSpire BLAST u6x , SFP+, 4 GE LAN, 2 POTS, Dual Wi-Fi – AM Power Adapter (with GPON SFP module)

000-01202..... GS4227 GigaSpire BLAST u6x , SFP+, 4 GE LAN, 2 POTS, Dual Wi-Fi – AM Power Adapter (with XGS SFP module; future release)

000-01207..... GS4227 GigaSpire BLAST u6x , SFP+, 4 GE LAN, 2 POTS, Dual Wi-Fi – AM Power Adapter (with Active Ethernet SFP module; future release)

Calix GS4227 GigaSpire BLAST u6x SFP Modules

100-05609..... GPON ONT SFP module

100-05656..... 1GE SFP, UTP Copper, RJ-45, 100m, I-Temp

100-05622..... 10GE SFP+, UTP Copper, RJ-45, 100m, I-Temp

100-05610..... XGS ONT SFP+ module (future release)

100-05620..... 1 Gigabit Active Ethernet SFP module (future release)

100-05721..... 10GE BIDI SFP+, Single Mode single fiber Upstream transceiver, 20Km, 1330nm, SC/APC, I-Temp (future release)

Calix GS4227 GigaSpire BLAST u6x Power Adapter

100-05484..... GigaSpire BLAST u6.1/u6.2/u6x (GS4220E/GS4227E/GS4227) Power Adapter, 12 V, 3 A – AM Type A

Optional Mounting Bracket

100-05467..... GS4227E/GS4220E Mounting Bracket — Quantity 10

Optional Uninterruptible Power Supply (UPS)

100-04068..... Indoor UPS (8 hour support), Wall Mount or Desktop, 12 V, 7.2 AH, 36 W, Black – AM, Type B, Grounded

100-05345..... Indoor UPS (24 hour support), Wall Mount or Desktop, 12 V, 20 AH, 75 W, Audible Alarm, Regulated Output R3 Production

ORDERING INFORMATION

UPS Power Adapters

100-03893..... Indoor UPS Power cord, 7-pin UPS to 8-pin ONT Male, 1m, black

100-03894..... Indoor UPS Power cord, 7-pin UPS to 8-pin ONT Male, 3m, black

100-03895..... Indoor UPS Power cord, Unterminated to 8-pin ONT Male, 6m, black

Removeable Branding Plate

100-05522..... Blank, removable branding plate. Contact your sales representative to order branding plates that can be customized with your company logo

Note: Calix believes the information in this publication to be accurate as of publication date, and is not responsible for error. Product Specifications are subject to change without notice.

Calix

Data Sheet

803G GigaPoint® (Version 1)

The Calix 803G GigaPoint® is an indoor, 2.5 Gbps GPON small form factor service delivery terminal that provides broadband connectivity to the subscriber. This high-performance terminal features one Gigabit Ethernet (GE) interface delivering IPTV video and data services, and voice line supporting carrier grade VoIP and network-based TDM voice circuits. Connecting a Calix GigaCenter (844E) to the LAN port of the 803G allows for the delivery of a sensational Wi-Fi experience to your subscribers. Decoupling the broadband demarcation from the premises system provides more flexibility and reduces costs. The 803G GigaPoint is designed for the industry-leading Calix E-Series fiber access GPON optical line terminals (OLTs).

EASY TO INSTALL, ACTIVATE, AND MAINTAIN

With the 803G GigaPoint, Calix has redefined how to install and activate residential services at a subscriber's premises. Using the Calix Smart Activate feature and a phone or laptop, a field technician can install and apply the subscriber's service profile without special equipment or assistance from the central office. Calix also provides an innovative software portfolio, including management via CMS and Calix Support Cloud (CSC) enabling the service provider to configure, activate and upgrade the GigaPoint using in-band management.

Extensive troubleshooting capabilities, remote software downloads, and easy-to-use service activation ensures that services are delivered and maintained without needless truck rolls and hardware upgrades. Employing the 803G GigaPoint allows service providers to reduce their operational expenses while effectively delivering the Gigabit experience to their subscribers.

Calix 803G GigaPoint® (Version 1) Data Sheet

KEY ATTRIBUTES

Standards-based Full Service Access Network (FSAN), ITU-T GPON compliant

One Gigabit Ethernet (GE) interface

- Symmetrical 1 Gbps bandwidth for residential IPTV and data services
- Multi-rate 10/100/1000 BASE-T Ethernet, auto-negotiating

One voice line

- FXS ports, ANSI or ETSI
- Carrier grade SIP, H.248, MGCP VoIP
- TDM GR-303/TR-08 Mode II/ GR-57, GR-08 (TR-08 Mode I) voice services

Supports multiple data service profiles

Traffic management and Quality of Service (QoS)

- 802.1Q VLANs
- 802.1p service prioritization
- Q-in-Q tagging
- Multiple VLANs
- Rate limiting
- DiffServ
- Pre-defined QoS on service type

IPTV, IGMPv2, IGMPv3

- IGMP Snooping and Proxy
- IGMP Fast Leaves

Complete OAM&P support via Calix Management System (CMS)

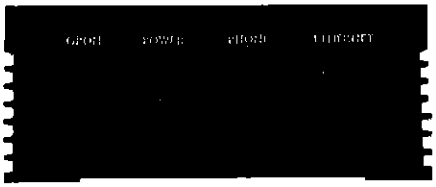
Calix Support Cloud (CSC)

Indoor mounting options

- Wall Mount or Structured Wiring Enclosure (SWE) mount with fiber management
- Desktop mount: horizontal or vertical

AC to 12 V DC power adapter available for non-lifeline services

Optional uninterruptible power supply (UPS) for voice lifeline service power



SPECIFICATIONS

Dimensions

- Width: 3.0 in (7.6 cm)
- Height: 4.0 in (10.2 cm)
- Depth: 1.25 in (3.2 cm)
- Weight: 4 oz (0.1 kg)

PON Characteristics

- Max. split: 64 GPON
- Max. reach: 58 km (36 miles) with C+/FEC
- Maximum Optical Distribution Network (ODN) Attenuation: GPON Class B+, 28 dB GPON Class C+, 32 dB
- 1490 ± 10 nm optical receiver: -27.0 to -8.0 dBm (Class B+); -30.0 to -8.0 dBm (Class C+ with FEC)
- 1310 ± 20 nm optical transmitter: 0.5 to 5.0 dBm

Interfaces

- Data/IPTV: One 10/100/1000 BASE-T: Ethernet port, RJ-45 connector
- Telephony: One RJ-11 connector
- PON: Single 9/125 µm (single mode) fiber, SC/APC connector, minimum 50 dB return loss
- Power: 2-pin connector

Telephony

- General: SIP, H.248, MGCP or TDM Gateway (GR-303, GR-57, TR-08 Mode I, TR-08 Mode II)
- Number of lines: 1
- RENs: 5 maximum
- Drop length: Maximum 500 feet (152.4 m)
- DS0 Output: 23.5 mA
- Ring Voltage: 56–84 V AC

Data

- Drop length: 328 feet (100 m) maximum, using CAT6 or CAT6A cable
- Auto MDI/MDIX crossover for 1000BASE-TX, 100BASE-TX, and 10BASE-T ports
- Traffic Management and QoS: 802.1Q VLAN; 802.1p Video, Data and Management Priorities; Q-in-Q tagging; Per-Port Rate Shaping; Rate Limiting

Environmental

- Operating temperature: Indoor ambient temperature, 0° to 40°C (32° to 104° F)
- Relative humidity (non-condensing): Operating/Storage: 8% to 90%

Certification and Compliance

- Emissions: FCC Part 15 Class B, IC ICES-003 Class B, CISPR-22
- Safety: UL 60950 and UL 1697 approved
- IEEE: 802.3, 802.3AB, 802.3U, 802.11p, 802.11Q

Powering and Alarms

- 2-pin connector
- Input voltage: 12 V DC (nominal), 10 V DC (min), 15 V DC (max)
- External Power Adapter: 12 V DC, 1.5 A
- Typical Power: 3.5 W, Peak Power: 7 W
- Battery backup time rated capacity: 8 hours based on Telcordia GR-909 calculation methods using recommended UPS. Contact Calix for recommended UPS.

ORDERING INFORMATION

Calix 803G GigaPoint

100-04255.....803G GigaPoint, 1 GE, 1 POTS

Calix 803G Power Adapters

100-04323.....Power Adapter CPA3 12V 1.5Amp – AM Type A

100-04324.....Power Adapter CPA3 12V 1.5Amp – EU Type C

100-04037.....Power Adapter CPA5 12V 2.5Amp – UK Type G

100-04038.....Power Adapter CPA5 12V 2.5Amp – AU/NZ Type I

100-04039.....Power Adapter CPA5 12V 2.5Amp – AR Type I

Calix 803G Packages with Power Adapter

000-00951.....803G GigaPoint, 1 POTS, 1 GE – AM Type A Power Adapter

000-00952.....803G GigaPoint, 1 POTS, 1 GE – EU Type C Power Adapter

000-00953.....803G GigaPoint, 1 POTS, 1 GE – UK Type G Power Adapter

000-00954.....803G GigaPoint, 1 POTS, 1 GE – AU/NZ Type I Power Adapter

000-00955.....803G GigaPoint, 1 POTS, 1 GE – AR Type I Power Adapter

Note: Calix believes the information in this publication to be accurate as of publication date, and is not responsible for error. Product Specifications are subject to change without notice.

Scott County Telephone Cooperative

Community Speed Test Results

Mar 7, 2022

Key Findings 2

Overview and Process 2

Data Analysis 3

Section A: Two County Summary (Wise and Lee Counties) 4

Section B: Individual Town Summaries 7

I. Key Findings

- Far fewer than 10% of speed test respondents in the proposed service areas are able to access the USDA speed threshold of 100Mbps download / 20Mbps upload
    - Out of the 424 valid speed tests (those who successfully tested upload and download speeds) taken in the proposed service areas, only 5.5% of respondents registered speeds of 100Mbps / 20Mbps
- Across the region, there are significant numbers of people who do not subscribe to the internet; suggesting that the true percentage of people who can't get 100/20Mbps speeds is likely greater
    - Of the 69 respondents who do not subscribe to home internet, and disclosed why not, 68% said it was due to a lack of good internet options at their home
- The vast majority of speed test respondents subscribed to Comcast/Xfinity; looking at these tests alone, it is clear Comcast/Xfinity subscribers do not receive adequate speeds
    - Only 2.3% of Comcast/Xfinity subscriber registered speeds of at least 100Mbps/20Mbps
- Poor internet speeds were not a product of lack of purchasing higher speed packages from the consumer; they were a product of poor internet performance.
    - Over 90% of tests from customers that purchased speeds of 100/100, 100/20, and 200/200, failed to achieve their purchased speeds, and failed by significant margins.
    - For example, the median download speeds for customers who purchased 100/100Mbps and 100/20Mbps packages was 50Mbs and 56Mbps, respectively.

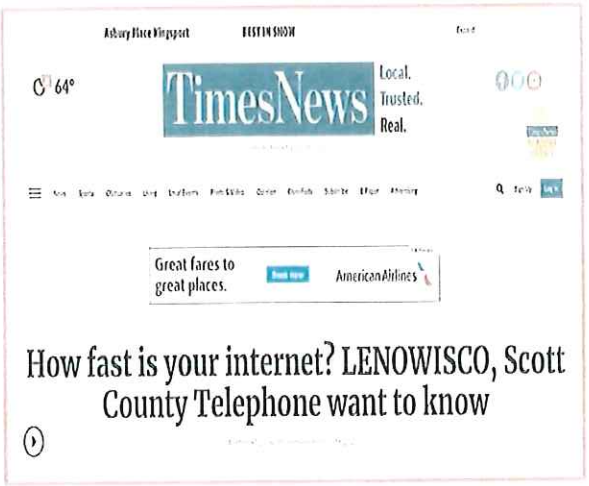
II. Overview and Process

In January of 2022, Scott County Telephone Cooperative (SCTC) launched the **Wise and Lee County Community Speed Test and Broadband Survey.** The speed test was created using

technology created by Measurement Labs (M-Lab) – a national leading collector and researcher of speed test data.

This community speed test was completed through the partnership and help of local elected officials, community leaders, teachers, and volunteers, who all described a need for good, reliable broadband coverage across both counties. Data from the speed test was collected through a variety of strategies, including:

- Speed test placed on the Lenowisco Planning District Commission website
- Door-to-door canvassing throughout every town in the proposed service area
- Distributed mail program via USPS EveryDoor Mail Program
- Mass communication methods (email lists, blog posts, community pages, etc.)
- Online outreach via social media (Facebook, Twitter, Instagram, etc.)
- Earned media (local radio, newspapers, and TV stations)
- Relational organizing household to household



The community speed test allowed SCTC to determine whether the current internet service providers deliver to residents the set speed standards (100 Mbps / 20 Mbps) for broadband internet access as defined by the USDA's Reconnect Service Eligibility Requirements. Specifically, the test and survey sought to understand:

- The speeds experienced by residents in Wise County and Lee County
- Where there was and was not service in the proposed service area
- How the speeds experienced by residents compared to the advertised speeds by providers

III. Data Analysis

There were **424 speed tests** collected within Wise and Lee counties. Out of the total responses, **355** individual and valid responses (e.g., they registered a valid upload and download speed) were received within the proposed service area. The remaining **70** responses came from service areas within Wise and Lee Counties, or were from people who reported not having service (and so did not take the speed test).

The tests from just outside the proposed service areas are **not** used in the analysis of speeds experienced in the service areas, and are **not** used in the town by town summary. When those tests were made on networks shared by respondents in the proposed service areas (i.e., Comcast/Xfinity), they were included in the analysis to demonstrate the capacity of those networks.

Section A: Two County Summary (Wise and Lee Counties)

Of the **424 total speed tests** across both counties in the proposed service areas, only **5.7%** *(24 responses out of 424 total)* of tests reached speeds of 100Mbps/20Mbps, and **64.4%** *(273 of respondents out of the 424 total)* of respondents reached speeds of 25Mpbs/3Mbps or greater: thus, 151 of the respondents couldn't reach 25Mbps/3 Mbps or **35.6%**. This suggests that the two county region as a whole has lots of unserved and underserved areas. Thus **94.3%** get less than 100Mbps/20Mbps and **35.6%** get less than 25Mbps/3Mbps

REGION-WIDE	**Upload Test Result**			
Download Test Result	< 3 Mbps	> 3 Mbps but < 20 Mbps	> 20 Mbps	*Total*
< 25 Mbps	86 (20.3%)	43 (10.1%)	2 (0.47%)	*131 (30.9%)*
> 25 Mbps but < 100 Mbps	12 (2.8%)	121 (28.5%)	31 (7.3%)	*164 (38.7%)*
> 100 Mbps	8 (1.9%)	97 (22.9%)	**24 (5.7%)**	*129 (30.4%)*
Total	*106 (25%)*	*261 (61.6%)*	*57 (13.4%)*	*424 (100%)*

Clearly, it is unsurprising that some types of internet – for example, satellite internet or DSL – are not meeting the speed thresholds the USDA has established for eligibility. Those residents with access to cable and fiber based broadband services should, in theory, experience higher speeds.

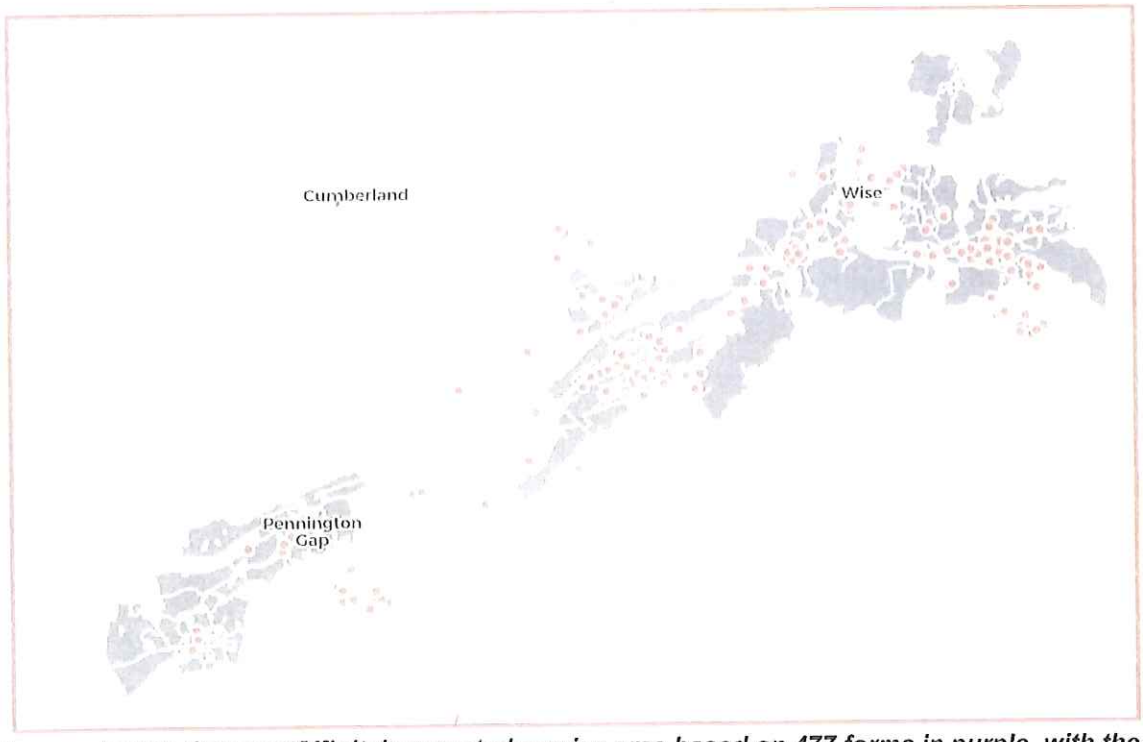
Out of the 424 total unique tests completed:

- 219, or 52%, of respondents subscribed to Comcast's cable product
- 48, or 11%, of respondents subscribed to Point Broadband's fiber product
- 157, or 37%, of respondents had satellite service, DSL service, were unsure of their provider, or chose "Other"

Comcast/Xfinity – From the community speed test analysis, we conclude Comcast is clearly not delivering adequate speeds as only 2.3% of their subscribed customers from the data can reach 100Mbps/20Mbps.

Comcast/Xfinity	Upload Test Result			
Download Test Result	< 3 Mbps	> 3 Mbps but < 20 Mbps	> 20 Mbps	*Total*
< 25 Mbps	11 (5.0%)	14 (6.4%)	0 (0.0%)	*25 (11.4%)*
> 25 Mbps but < 100 Mbps	4 (1.8%)	81 (37.0%)	4 (1.8%)	*89 (40.6%)*
> 100 Mbps	8 (3.7%)	92 (42.0%)	**5 (2.3%)**	*105 (47.9%)*
Total	*23 (10.5%)*	*187 (85.4%)*	*9 (4.1%)*	*219 (100.0%)*

While no other provider operating in the proposed service area reached the speed threshold of 100Mbps/20Mbps, SCTC focused on Comcast/Xfinity for this report because they were the most reported internet provider utilized by residents in the proposed service area. According to SCTC's Community Speed Test data, the primary provider of wired broadband speeds – Comcast/Xfinity – is not delivering the speeds of 100Mbps/20Mbps and not delivering speeds remotely close to what consumers are purchasing.



This map depicts Comcast/Xfinity's reported service area based on 477 forms in purple, with the red dots representing speed test respondents who reported having Comcast/Xfinity service.

Purchased Speeds vs Experienced Speeds:

In addition, the data collected makes clear that the lack of 100/20Mbps coverage in the area was **not** due to subscribers simply not purchasing speed packages of that caliber, but rather due to the speed packages by providers, especially Comcast/Xfinity, not providing the speeds customers purchased.

The following shows the most commonly purchased speed packages at or above 25/3Mbps, and the percentage of tests that did not meet the purchased speeds.

Purchased Speeds	# of Tests	Mean Download Speed (Mbps)	Median Download Speed (Mbps)	Mean Upload Speed (Mbps)	Median Upload Speed (Mbps)	% tests that didn't meet purchased download speed	% tests that didn't meet purchased upload speeds	% tests that didn't meet one or the other (either upload or download speed)
100/100 Mbps	14	53.00	50.00	30.60	11.47	85.71%	92.86%	92.86%
100/20 Mbps	30	79.23	56.24	15.03	9.06	73.33%	90.00%	93.33%
200/200 Mbps	16	186.40	211.25	34.13	9.88	43.75%	93.75%	93.75%
25/3 Mbps	24	14.10	13.60	7.54	2.37	75.00%	58.33%	75.00%

Over 90% of tests from customers that purchased speeds of 100/100, 100/20, and 200/200, failed to meet the purchased speeds, and often failed by significant margins. For example, the median download speeds for people who purchased 100/100Mbps and 100/20Mbps was 50Mbps and 56Mbps, respectively.

Non-Broadband Subscribers:

69 respondents reported not subscribing to home broadband. Of those respondents who also disclosed *why* they did not subscribe, **62%** of them said they do not subscribe because there is *no good home internet option available* at their address, and **19%** cited affordability issues.

Taken together, it is clear that despite the FCC's data indicating a majority of both Wise and Lee counties are fully served, the region's internet reality is not adequate to meet the needs of residents – especially those in these specific communities who need high speed internet access for work, school, and telehealth – which is why the region is in desperate need of a robust internet service provider to build to the last mile.

Quotes from residents:

Many respondents expressed great hope that SCTC could bring better broadband to the region. The following are a selection of quotes provided via the survey:

Rural Innovation Strategies Inc.

Proposal: Data Collection for SCTC's USDA Reconnect Application

Jan 3, 2022

The following includes information about us, our experience, and how we propose to complete the work, a potential timeline, and cost. We look forward to discussing at your earliest convenience.

About us

Rural Innovation Strategies, Inc. (RISI) is dedicated to helping rural areas find renewed prosperity by growing entrepreneurship, digital economy jobs, skills training, and helping communities plan and develop fiber to the home plans. As an action tank, RISI participates both in the design and implementation of on the ground programming, but also intensive research, policy, and planning efforts enabled by our data science and GIS team.

Our experience

To date, we have worked with 30+ rural communities across digital economic development and broadband implementation efforts in over 20 states. Our broadband experience spans feasibility assessments, business plan development, mapping and data analysis, statewide planning, policy recommendations, and funding strategies.

Proposed Support

Scott County Telephone Company (SCTC) is applying for a USDA Reconnect Grant that would include servicing Wise County and Lee County in Virginia. In order to apply to serve the entire counties, SCTC must prove that over 90% of residents lack 100/20 Mbps service.

We propose an organized effort to collect accurate broadband coverage data by conducting a speed test, advertising the speed test through targeted mailers, and hiring a local organizer to reach a wide variety of homes in the county to take the speed test, to ensure a diverse response rate.

Rural
Innovation
Strategies Inc.

I. Conduct a speed test and survey

RISI will develop a user-friendly speed test and accompanying survey, which SCTC will host on their website, for residents to take and help determine what speeds are available throughout both counties. This speed test is meant to establish a baseline of what speed and quality of internet service is available in both counties and where improved service would be desired by residents. The survey is also meant to help gauge likely adoption and even collect pre-subscription commitments if possible.

II. Hire a local organizer to ensure broad response rates

To ensure the speed test receives a substantial number of responses in a short amount of time, RISI will hire an organizer from the area to go door-to-door, ask residents to take the speed test, and answer questions as to why participation in this particular speed test is vital. The organizer will be in charge of targeted outreach to larger populations within the counties: churches, teachers, and county officials. The organizer will also lead digital engagement, and be responsible for posting the speed test in relevant Facebook groups, email lists, and other social media.

RISI staff have substantial experience managing rural organizers and field campaigns, and contacts in Lee and Wise Counties from prior engagements who can help us identify an organizer quickly. Introductory and exploratory conversations with potential local organizers are ongoing.

III. Design and deploy two (2) mailers for delivery

Our Communications Team will design a mailer advertising the speed test through both a QR code and shortened URL link. We will utilize the USPS Every Door Direct Mail Service, which allows us to target neighborhoods and a Postal Service carrier delivers the mailer to every address while delivering the day's mail. If possible, notice should also be sent in SCTC monthly phone bills.

IV. Leverage existing public speed test data

RISI's GIS team will use data from MLabs, a national, crowd-sourced speed test provider, to augment the SCTC speed test, if possible. Mlabs data provides an incomplete view of the county at the moment; data work must be done to determine if the data can be interpreted in a favorable way to solidify the case that the county is

90% unserved. However, if possible, this data will provide additional proof that the majority of the county is unserved.

Timeline

The RISI Team can begin this project with an internal kickoff meeting on January 10th and complete the project by February 14, a six-week time frame shown below.

	Hours By Week					
Week	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**
Scope Items	1/10/22	1/17/22	1/24/22	1/31/22	2/7/22	2/14/22
Speed Test + Survey	2	15	8			
Analyzer Mlabs Data	2	5	5			
Design and Send Mailer (2x)	2	10	10	10		
Coordinate Digital Engagement	2	12	10	10	10	10
Hire and Manage Local Organizer	12	15	10	10	10	10
Map + Analyze Results			5	12	15	20