



SKY FM

SOUTHEASTERN KENTUCKY FINAL MILE FIVE COUNTY BROADBAND PLAN

NOVEMBER 21, 2016

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October 28, 2016

Dear Friends,

I want to commend the leaders of southeastern Kentucky for this insightful and important plan to expand high-speed and high capacity broadband in the mountains. We have lost more than 11,000 coal mining jobs in our region since 2009 and a high-speed, high-capacity broadband network is key to diversifying our economy and revitalizing our communities.

Now, more than ever before, we need partners working hand in hand to coordinate resources and invest in innovative opportunities that will create jobs and improve the quality of life for future generations. I want to thank local leaders, private industry representatives, educators, health-care providers, technology experts, and community members who have worked together on this plan. It clearly provides the next steps needed to advance our goals for broadband improvements throughout southern and eastern Kentucky.

Improving access to broadband is one of our top priorities. SOAR (Shaping our Appalachian Region) unified our communities and identified important resources to accomplish goals, like project planning for the last mile. KentuckyWired, our statewide broadband initiative is underway and will soon connect every county in the state, opening the door for global competition and new innovative opportunities.

Finally, I applaud Lonnie Lawson and the Center for Rural Development for leading the southern and eastern Kentucky portion of the KentuckyWired project, along with the Kentucky Communications Network Authority (KCNA). Together, we are reimagining and shaping the future of our Appalachian region, and I truly believe our best days are ahead of us.

I look forward to lending my continued support to efforts that expand high-speed broadband across southern and eastern Kentucky, so our students and families in every county have access to the best opportunities available.

Sincerely,

A handwritten signature in blue ink that reads "Harold Rogers".

Hal Rogers
Member of Congress



TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	02
2	OVERVIEW OF FIBER IN KENTUCKY	
	• FIBER'S ROLE ACROSS KENTUCKY	07
	• KENTUCKY WIRED	08
	• BROADBAND GOALS FOR ALL KENTUCKY COMMUNITIESS	09
3	SKY FM PROJECT OVERVIEW	13
4	SKY FM COUNTY PLAYBOOKS	21
	• CLAY COUNTY	23
	• KNOTT COUNTY	39
	• LESLIE COUNTY	59
	• LETCHER COUNTY	79
	• PERRY COUNTY	99

This SKY FM Broadband Plan is available at www.kentuckywiredhelp.com.

Special thanks and acknowledgement to the Southeastern Kentucky Final Mile project partners for your support and leadership: Kentucky Communications Network Authority and The Center for Rural Development.

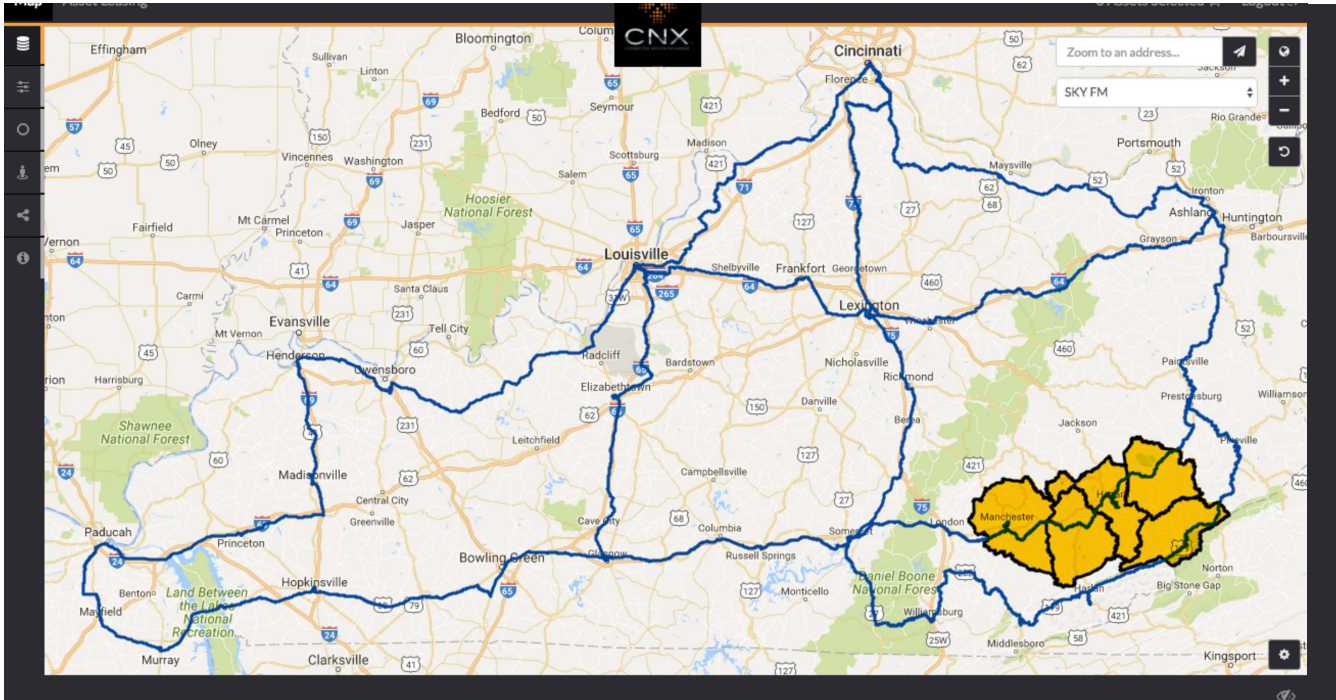


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1 EXECUTIVE SUMMARY



As depicted on CNX's Broadband Platform, the KentuckyWired fiber (main trunk) route across KY is in blue. The five county SKY FM project region is in yellow (Clay, Knott, Leslie, Letcher, and Perry Counties)

INTRODUCTION

High-speed and high-capacity broadband internet is fundamental to Kentucky's future economic growth, job creation, global competitiveness, and a better way of life. With that understanding, a collaborative partnership with community leaders, broadband industry stakeholders, and public sector partners has been formed called Southeastern Kentucky Final Mile (SKY FM). This planning document is an outcome of that partnership.

The SKY FM initiative aims to connect Clay, Leslie, Letcher, Knott and Perry counties with reliable, high-speed and high-capacity broadband access in order to spur much needed and innovative economic development, workforce preparation and job creation.

KentuckyWired is a statewide public private partnership that will expand a middle-mile fiber optic broadband infrastructure to every Kentucky county. The figure above depicts the KentuckyWired fiber route plan along with the five county SKY FM region.

The SKY FM broadband project supported local planning in each of the five counties of the SKY FM region. The planning involved leadership from the county judge executive for each county, the provider community, local leaders from public and private entities, and state leaders. CNX facilitated the planning that was rooted in important data regarding current broadband networks (including fiber) and pending fiber deployments through KentuckyWired.

The October, 2016 Lane Report summarizes Standard & Poor analysis “of the 25 counties across the nation that have suffered the most coal job losses since the end of 2011, eight are in Kentucky.”

PERRY COUNTY	#6 (1,370 JOBS)
LETCHER COUNTY	#11 (905 JOBS)
KNOTT COUNTY	#15 (836 JOBS)
LESLIE COUNTY	#21 (665 JOBS)

SOURCE: “Business Briefs: Eastern Kentucky”, The Lane Report, October 2016, p. 5.

SKY FM GOALS

- Enlist the involvement of private and public stakeholders to develop a highly-actionable plan that results in expanded broadband infrastructure to attract new jobs, industries, and businesses;
- Build partnerships with industry to make reliable, high-speed broadband available to every citizen, business, and institution in the five county area;
- Equip the region to grow a technologically-skilled workforce;
- Promote and plan for the expanded use of broadband opportunities in government, transportation, health, education, and public safety sectors to improve the overall quality of life of our residents;
- Work to close gaps in broadband capacity, access, adoption and affordability for our citizens and among our communities; and
- Improve the digital literacy of the residents of our five county area and promote reliance upon online resources for business, government, and leisure purposes.

KEY FINDINGS

Access to fiber is key to improved connectivity for homes, businesses, and community anchor institutions (CAIs). The EKN and KentuckWired fiber routes are capable of supporting county-wide fiber deployment in all five SKY FM counties. Letcher, Knott, and Perry counties have important fiber network assets in place and are ready for extension and further use. Clay and Leslie counties will require greater investment in a more county-wide fiber distribution network.

According to public and private leaders in each county, establishing and/or expanding fiber networks for last mile solutions is a priority. However, leaders in all five counties cite the need for more adoption programs that make network investments a worthwhile investment. Of particular interests are programs that help create, identify, or prepare for jobs and assist in diversifying the region’s economy.

Stakeholders from each county found benefit in the public private planning spurred by the SKY FM initiative and expressed interest in its continuance.

NEXT STEPS: THE SKY FM REGION'S PLAYBOOK

With the production of this plan, each of the five SKY FM counties has a “Broadband Playbook” that takes into account the following:

- Broadband connectivity data analysis
- Pending state development of KentuckyWired
- Specific input and priorities of county leaders from public and private sectors through cross sector broadband planning workshops
- Proven best practices from similar communities across the state and country
- Best practices regarding broadband use programming and each county's technology adoption programming needs
- Input from privately owned broadband/technology companies

Each county playbook takes this information set and organizes it around:

- a. Critical community broadband strategies
 - Network Expansion
 - Digital Literacy Programming
 - Technology-Driven Economic Development/Jobs
 - Local Public Private Partnerships (P3) and Planning
- b. Cost effectiveness
- c. Project Prioritization by local leaders
- d. Implementation requirements

While a more detailed reporting of each county's priorities and next steps are organized by county in this planning document, a summary of broadband priorities as identified by each county's leadership is included here.

	General Assessment	County Leadership's Broadband Priorities
<p>Clay County</p>	<p>Much of Clay County can access the internet, but not at speeds capable of supporting emerging and important applications like virtual healthcare and education, ecommerce, and industrial needs for high volume data exchange. The KentuckyWired fiber network will bring significant opportunity for Clay County to implement effective and affordable last mile networks and expanded coverage to key community anchor institutions.</p>	<p>Elk Hill Industrial Park, the industrial park located off Fox Hollow Road, and the Clay County Industrial Board's industrial park located in Manchester need access to reliable, affordable and/or redundant fiber in order to prepare for expanded production and new businesses.</p> <p>In addition, the Federal Correctional Institution needs redundant fiber as well. Other areas of interest include: Oneida Baptist Institute; Red Bird Mission and Manchester Memorial Hospital.</p> <p>Work with tower owners and/or carriers in Clay County to determine interest in upgrading tower facilities with fiber access in conjunction with future fiber expansion and/or KentuckyWired projects. Clay County is served by 25 wireless communications tower.</p>
<p>Knott County</p>	<p>Knott County has significant fiber to the premise assets already in place through Thacker-Grigsby Telephone and TVS cable system. While gaps in high-speed coverage remain, Thacker-Grigsby and TVS have build plans in place to have fiber to the premise throughout Knott County within the next 3-5 years.</p> <p>Local resources should be prioritized in two areas:</p> <ol style="list-style-type: none"> 1) increasing local demand for currently available broadband through training, telework and awareness programs; 2) seeking a public-private partnership with local providers to accelerate deployment plans by lowering costs of capital to build the FTTP networks. 	<p>Fiber access in downtown Hindman and the surrounding area is a priority. In addition, Mine Made Adventure Park Campground and Knott County Sportsplex need better coverage to further bolster tourism-based economic development.</p> <p>Other priority project areas include: Wells Mountain and Hickory Hill Recovery Center and their surrounding areas; Chestnut Mountain development; and, old Carr Creek High School and Welcome Center.</p> <p>Work with tower owners and/or carriers in Knott County to determine interest in upgrading tower facilities with fiber access in conjunction with future fiber expansion and/or KentuckyWired projects. According to the FCC ASR database and as of November 13, 2016, Knott County is served by 24 wireless communications tower.</p>
<p>Leslie County</p>	<p>Leslie County's primary internet connectivity comes through TDS telephone's network of primarily DSL internet connections. DSL speeds are limited by the technology and competition in the area is limited, despite demand for increased speeds and more reliable connectivity services.</p> <p>Additionally, Verizon owns wireless spectrum rights in the area and to date has been unwilling to grant inverse roaming agreements with local providers like Appalachian Wireless in the market, thus further limiting LTE coverage and availability.</p>	<p>Priority projects in Leslie County include: fiber access in the downtown Hyden area including Mary Breckinridge ARH Hospital, Frontier Nursing University, Hyden Health and Rehabilitation Center, as well as residences and retail corridors surrounding those areas.</p> <p>Other areas of interest include: the Leslie County 911 Center; Richard M. Nixon Recreation Center; Hurricane Creek Mine Memorial and Frontier Nursing Service/Wendover Bed and Breakfast Inn area.</p> <p>Work with tower owners and/or carriers in Leslie County to determine interest in upgrading tower facilities with fiber access in connection with future fiber expansion and/or KentuckyWired projects. Leslie County is served by 13 wireless communications tower.</p>

	General Assessment	County Leadership’s Broadband Priorities
<p>Letcher County</p>	<p>Generally internet connectivity in Letcher County is fairly robust, as compared to surrounding counties. Coax networks operated by TVS and Inter Mountain CVable offer 25Mbps+ service. However, a small area near the Hallie and Skyline communities have limited access.</p> <p>Additional fiber backhaul infrastructure is needed to maintain growing demands on the data network.</p> <p>Letcher County should focus initial investment on increasing use of these networks through awareness and training programs that demonstrate the value of this existing connectivity to businesses and consumers.</p>	<p>Roxana Federal Prison needs fiber access, along with residential areas around it.</p> <p>Residential areas in vicinity of RFP should be evaluated for FTTH feasibility.</p> <p>Enhanced fiber back haul and redundancy to bring in faster, more reliable access, particularly in Gateway Industrial Park</p> <p>Work with tower owners and/or carriers in Letcher County to determine interest in upgrading tower facilities with fiber access in connection with future fiber expansion and/or KentuckyWired projects. Letcher County is served by 21 wireless communications tower.</p>
<p>Perry County</p>	<p>Perry County has wide disparity of access throughout various areas of the county. The City of Hazard, for example, is Gigabit ready with Gig service currently available through Thacker-Grigsby. Yet, outlying communities like Buckhorn have no or very limited service available to them.</p> <p>As such, Perry County has identified strategic broadband service priorities that align with economic development priorities for the region for deployment of potential public-private partnerships</p>	<p>Priorities for Perry County include:</p> <ul style="list-style-type: none"> • extending downtown Hazard fiber networks to surrounding commercial corridors, encompassing the Hazard ARK Regional Medical Center, UK Center for Excellence in Rural Health, Galen College of Nursing/Old Hospital and Airport Gardens Retail Center; • Buckhorn Lake State Resort Park lodge, marina and campgrounds along with the Buckhorn area and Buckhorn Children’s’ Center; • Coal Fields Regional Industrial Park and Wendell H. Ford Airport, along Route 15, for redundancy and fiber to the homes in surrounding areas; • The City of Vicco and the surrounding area; and • Additional healthcare providers, including Homeplace Clinic and Leatherwood/Blackey Medical Clinic and surrounds. <p>Work with tower owners and/or carriers in Perry County to determine interest in upgrading tower facilities with fiber access in connection with future fiber expansion and/or KentuckyWired projects. Perry County is served by 32 wireless communications tower.</p>

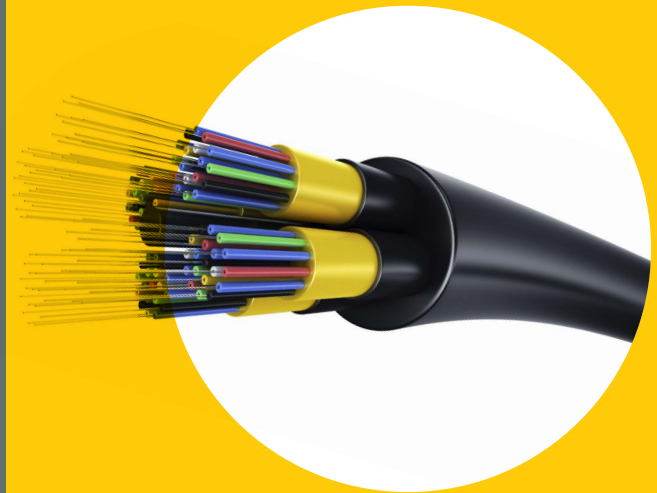
2 OVERVIEW OF FIBER IN KENTUCKY

FIBER'S ROLE ACROSS KENTUCKY

Broadband networks are quickly becoming the central nervous system of the Commonwealth of Kentucky. Urban, suburban, and rural communities alike now require access to state of the art broadband networks in order to more fully engage in commerce, education, public safety, community services, etc. Any community with inadequate broadband risks being overlooked, having higher costs, and facing a dwindling capacity to create jobs.

Fiber-optic networks are often referred to as “back haul” or “transport” networks.

These networks are made of hair-like glass fibers and are capable of carrying enormous data loads at lightning speed when compared to other network types. Fiber networks are more expensive to build than wireless or other wired type networks. Investments in fiber not only provide ultra fast data connections for anchor tenants (large customers like industrial sites and large businesses, schools and hospitals), those investments also improve the performance of other types of networks, including connections for homes and cellular phone towers.



Fiber-optic networks are now required infrastructure for any community that seeks to thrive. Fiber broadband is capable of delivering state of the art data sharing speeds and capacity. With access to fiber network services, any community in Kentucky can create a level playing field to provide education, healthcare, economic development, public safety and government services more efficiently and effectively.

Demand for mobile or wireless internet access continues to grow exponentially as the tolerance for coverage gaps declines. Wireless carriers place their equipment on towers to densify their coverage. In order to meet the connectivity demands of today's Kentuckians, the placement of mobile telecommunications equipment is forecasted to grow annually. This growing demand for wireless services has resulted in an equally immense demand for fiber optic networks to connect each wireless site to one another (often referred to as “fiber to the tower”). Many providers have made sufficient investment in towers and local networks to provide voice and data services effectively. However, many of those tower sites that host the local network equipment lack access to fiber. Fiber is the missing infrastructure element that is key to provide reliable, faster, and higher quality mobile voice and data services.

KENTUCKYWIRED

KentuckyWired is a statewide fiber network that is under construction through a public-private partnership. The project will result in the construction of more than 3,000 miles of fiber optic cable throughout the state. According to a September 16, 2016 joint announcement, Governor Matt Bevin and U.S. Congressman Hal Rogers jointly stated they hope the statewide network will be completed by 2019. Initial construction efforts are underway in eastern Kentucky, with expansion planned westward. The Kentucky Communications Network Authority (KCNA) is overseeing the effort and is collaborating with public leaders within state and local governments and the private sector, especially broadband companies. In eastern Kentucky, The Center for Rural Development is providing project oversight and collaboration between the federal government, the Commonwealth and eastern Kentucky counties.

The KentuckyWired fiber network will provide a point of presence (POP) in designated public facilities in each Kentucky county. From that point, each county can determine how best to grow and expand access to the network. Consolidating the network needs of the public facilities across the state will provide significant efficiencies for connectivity costs. By taking advantage of lower “bulk” priced connectivity rates, local governments can support the upgraded connections to public facilities (schools, parks, libraries, first responders, health care clinic, etc).

The public use of the KentuckyWired network will not consume all of the network’s bandwidth or connectivity capacity, however. There is abundant excess capacity to support additional local public sector and commercial needs for entities such as county government, libraries, hospitals, businesses, industrial parks and neighborhoods.

The KentuckyWired network is a public private network that will lower the cost of internet delivery and the expansion of high-speed networks. These savings can be used to accelerate both private and public investments in network improvements in every community statewide.

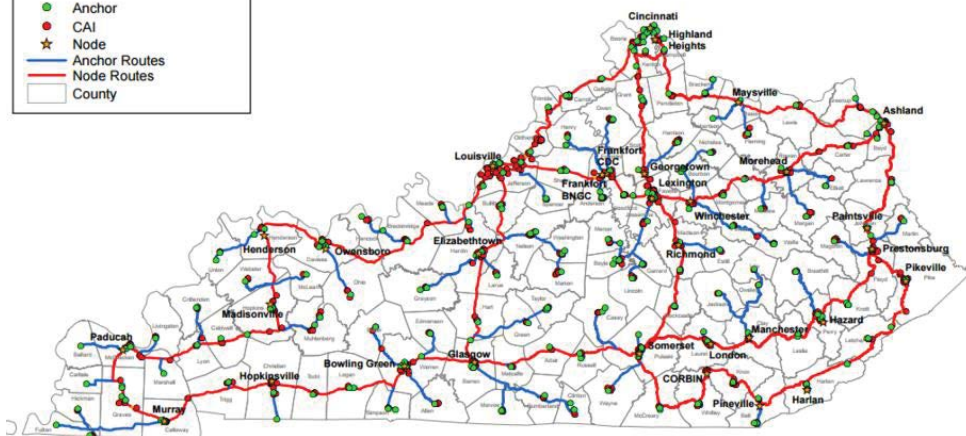


Middle Mile Architectural Plan

Expedited development to complete priority rings along I-75 Spine and in Eastern Kentucky



- Anchor
- CAI
- ★ Node
- Anchor Routes
- Node Routes
- County



Preliminary - Not To Be Used for Construction

Network Completion
By FALL 2018

<http://finance.ky.gov/initiatives/Broadband/PublishingImages/2015/map5-5-15.jpg>

BROADBAND GOALS FOR ALL KENTUCKY COMMUNITIES

Fiber optic networks are becoming required infrastructure for thriving communities. Public facilities must be capable of sharing large amounts of information in real time. Businesses need reliable fast internet with large capacity for data transmission. Healthcare providers need to control costs by remotely connecting specialists through dependable and secure connections. Parents seek to provide the best possible access to educational resources for their children who increasingly need high-speed internet access to complete school assignments. The possibilities of connectivity can be overwhelming. Fiber optic networks are the foundation for meeting these connectivity needs.

Communities must plan for how to best develop the appropriate infrastructure for fiber networks (access) and their meaningful use (adoption/applications). Following are the basic access and adoption infrastructure needs Kentucky communities should pursue in order to maximize the impact of high speed broadband.

- A Fiber to all public facilities with network redundancy for public safety.** Each public facility needs the capacity to share information safely and dependably in real time. This includes schools, libraries, healthcare, first responders, homeland security, parks, local government, transportation, and law enforcement. Rural communities typically face challenges with fiber access to each of these public properties. For communities with fiber access to its public facilities, redundancy is often a challenge. Redundancy or duplication of access to critical components of public agencies means that important public services will remain available if one of the network sources is disrupted.

- B 50+ Mbps download speed available to each home and 100+ Mbps to each business.¹** 50Mbps for residential access is a reasonable target for connectivity that supports current and developing applications that require greater speed thresholds, particularly teleworking applications.²

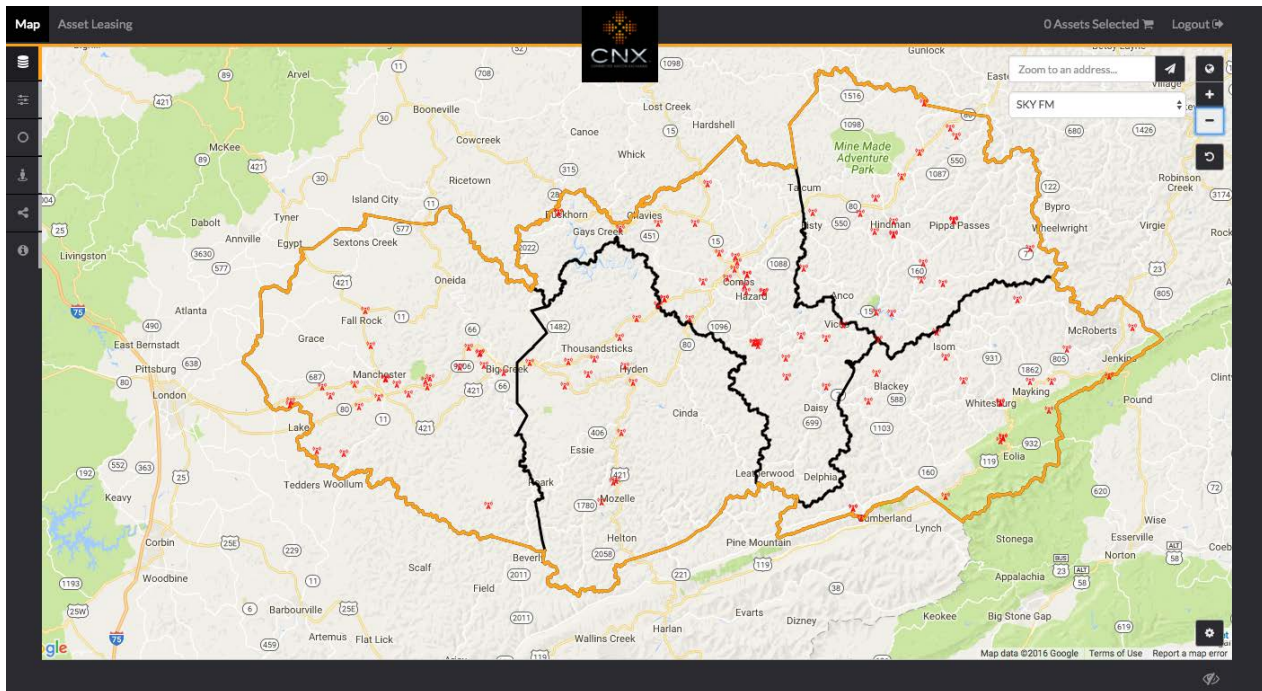
- C Fiber to the premise (FTTP) for commercial and public sector anchor tenants.** FTTP ensures key large industrial and public sector entities have access to high-speed and high-capacity fiber with redundancy. Fiber availability with redundancy is becoming common practice for companies to require as a prerequisite to site selection. The amount of data involved in modern manufacturing is staggering. Additionally, supply chain management requires a significant and fluid ongoing exchange of data regarding production. Access to redundant fiber provides assurance for anchor tenants that disruptions will be minimized in the event of a network interruption.

1 The definition of broadband has changed recently in terms the speed of the connection. In 2015, the Federal Communications Commission voted to change the speed of internet service that is considered “broadband” from 4Mbps to 25Mbps for download speed (and from 1Mbps to 3Mbps for upload speed). When speeds are below these thresholds, the use of basic internet based applications (video conferencing, remote instruction, cloud data services, etc.) can be a challenge. Regardless, 25Mbps should be considered a baseline for minimum connectivity standards.

2 The size of a 45 minute HD educational is roughly a 600 megabits. A 5 mbps connection would take 15 minutes to download the video; by comparison a fiber based 100 mbps connection would take 50 seconds; and, a gigabit connection (1000 mbps) would download the video in 5 seconds. <https://www.fastmetrics.com/how-fast-is-fiber-optic-internet.php>

D Fiber to the tower (FTTT) for improved mobile service. Rural communities often struggle with dependable and complete coverage for mobile data services (voice service, internet connectivity). Communities with terrain challenges find the challenges even more heightened. Population densities and the expense of construction are often prohibitive for public and private network providers. Wireless data signals travel from tower to tower as subscribers move throughout the community. Often, there are sufficient towers in a given community to support virtually the entire area; however, the wireless network gets bogged down with the volume of “traffic” it carries. The solution for this involves running high-capacity fiber to the tower sites. Once there, the data traffic or “backhaul” can be directed to the fiber network for faster and more efficient distribution. As a result, the mobile wireless network has more capacity and more reach.

Community leaders should work closely with mobile data network operators to maximize any fiber build plans to include underserved and new tower construction coverage as anchor tenants on any potential new fiber networks in the county. The image below depicts the SKY FM region’s 115 telecommunications towers registered with the Federal Communications Commission, as seen in the image below taken from the CNX data portal.



As depicted on CNX’s Broadband Platform, there are 115 wireless communication towers in the SKY FM region.

E Digital literacy programs to address adoption barriers. Research consistently identifies that there are barriers to using broadband that go beyond its availability. In 2015, 33% of households across the U.S. that could access broadband chose not to. That number climbs to 45% for rural household across the country.³ Cost is by far the most often cited reason for families not adopting broadband at home.

The internet is now the primary means of discovering and applying for jobs. Also, for workers looking to add new skills to widen the range of jobs for which they qualify do so through web-based workforce development programs.

Entrepreneurs use high-speed connections to improve their skills as a small business owner. Digital literacy programs address all of these important needs. Public libraries, adult education programs, technical schools, higher education, and other community agencies and nonprofits can offer training to help residents learn not only how to use the connection but how to pursue meaningful change with that connection.

Research also indicates that using the internet to more efficiently interact with government services is a growing priority. Communities with digital literacy programs help residents learn not only how to use the computer and the internet but to use the internet to help them save money and improve their own economic position.

F K-12 1:1 PROGRAMS AND NON-TRADITIONAL INSTRUCTION.

1:1 Programs.

K-12 school districts across the U.S. are moving to what are known as 1:1 programs (“one to one”). Such technology strategies provide one internet enabled device (laptop/tablet) for each student. This enables teachers to engage students with instruction that is better aligned with their individual capabilities. More advanced students can get more advanced training while students that need extra help can receive it as well. 1:1 programs also help alleviate pressures from the rising costs of textbooks and the instructional content. With these programs, teachers can spend more time problem solving with students (homework and projects) and less time transferring information that can be delivered through an internet enabled device.

However, 1:1 programs have limited impact if the student has no dependable internet connection at home. Internet connectivity across the community is a prerequisite to maximizing the value and educational impact of 1:1 programs. These educational programs have also demonstrated the ability to increase the digital literacy of the entire household as students, in turn, help parents and other family members become comfortable with basic technology use.

Non-traditional Instruction (e.g. remote instruction on snow days).

School districts whose instructional schedule is more vulnerable to weather interruption are taking advantage of internet-based technology for instructional snow days. These are days when it is not safe for students to be transported to the school property due to weather, but, alternatively, teachers engage students over an internet-abled device with lectures, instructional content, practice homework, project based work, etc.

³ <http://www.pewinternet.org/2015/12/21/home-broadband-2015/>

G Ongoing Local Broadband Capacity Leadership. The use of high-speed and high-capacity fiber networks is growing and ever-evolving. As applications continue to be developed that take advantage of the networks, more users will adopt this essential platform. Each community must take ownership for the unique opportunities and desires of its residents. Broadband, unlike some other forms of community infrastructure, is never a “build it and forget it” proposition. Sustaining a community’s capacity for broadband based success and innovation requires ongoing leadership to monitor the dynamics of the community’s needs and assets and ongoing planning to take advantage of the development opportunities that arise. Fiber-based networks are a critical component of any serious job building program. However, building a network alone is by no means a guarantee of success. It is important that each community embrace its need for ongoing public private collaboration for community based broadband planning by establishing the mechanism and priority of sustaining broadband capacity.



3 SOUTHEASTERN KENTUCKY FINAL MILE (SKY FM)

BROADBAND FIBER PLANNING PROJECT: CLAY, KNOTT, LESLIE, LETCHER, AND PERRY COUNTIES

Given that high-speed broadband fiber is a foundation for economic growth, job creation, global competitiveness, and a better way of life, a collaborative partnership with community stakeholders, broadband industry leaders, and public partners has been formed called Southeastern Kentucky Final Mile (SKY FM). This planning document is an outcome of that partnership.

The SKY FM project aims to connect the Clay, Leslie, Letcher, Knott and Perry counties with reliable, high-speed and high-capacity broadband access. With the decline of coal, the SKY region needs infrastructure to enable economic diversification that will revitalize the region's economy. High speed broadband accelerates this economic and community development to improve the economic, social, and personal quality of life of our citizens and puts our communities at the forefront for recruiting and encouraging new business opportunities. We believe the path to reigniting our economy, improving the lives of our citizens, and creating new opportunities lies in an expanded, reliable high-speed broadband network.

SKY FM GOALS

- Enlist the involvement of private and public stakeholders to develop a highly-actionable plan that results in expanded broadband infrastructure to attract new jobs, industries, and businesses;
- Build partnerships with industry to make reliable, high-speed broadband available to every citizen, business, and institution in the five county area;
- Equip the region to grow a technologically-skilled workforce;
- Promote and plan for the expanded use of broadband opportunities in government, transportation, health, education, and public safety sectors to improve the overall quality of life of our residents;
- Work to close gaps in broadband capacity, access, adoption and affordability for our citizens and among our communities; and
- Improve the digital literacy of the residents of our five county area and promote the reliance upon online resources for business, government, and leisure purposes.

THIS SKY FM PLANNING REPORT IS THE OUTCOME OF:

- information gathered from telecommunication companies about their network presence and plans,
- information from the National Broadband Map and research from the Federal Communications Commission (FCC),
- research regarding the digital inclusion resources and needs for each county, the economic development strategies in each county, and
- the public private input from cross-sector workshops hosted by CNX in each of the five counties.

The plan prioritizes next steps for community broadband success in each county that increases the availability and utilization of high-speed and high-capacity broadband. Cross sector workshops were pivotal discussions that included elected officials, public sector leaders from K-12, higher ed, economic development, public safety as well as private sector leadership from technology companies and broadband companies in particular.

CNX has engaged the SKY FM project according to an important eight-step methodology established by the Commonwealth. Here are the steps and outcomes to date:

STEP 1 INITIAL LOCAL ENGAGEMENT MEETINGS

OBJECTIVE: To secure enlistment and commitment of local stakeholders and influencers in the community broadband planning project.

OUTCOME: A community broadband leadership team that is committed to the vision of harnessing the power of broadband to grow local communities.

DETAILS: This project began through organization of a local leadership meeting in partnership with the KentuckyWired team. This meeting was held in Hazard, Kentucky on March 9, 2016 and was attended by representatives and community leaders from all 5 counties, including 3 of the 5 county Judge Executives, as well as education officials and local business leaders. In this and subsequent follow-up local engagement meetings (via phone and face-to-face) with community leaders, a strong commitment was established and work completed to develop a broadband plan which addresses broadband adoption and final mile broadband needs.

STEP 2 STRATEGIC PLANNING PRE-WORK

OBJECTIVE: To develop a community-specific, disciplined project approach that drives the local planning process toward informed action.

OUTCOME: An assembly of community broadband data along with an interactive map and data analytics tool informs a community-specific broadband planning project plan outline.

DETAILS: In anticipation of the official project kickoff event and as a result of the local community leader engagement meetings, CNX prepared a list of target attendees and stakeholders to invite to the kickoff event. In addition, CNX began collection of local relevant data and initiated the development and launch of the interactive map for the five county region. This initial interactive map included data sets from the national broadband map, as well as other state and local data sources, and was continually updated as more data became available. This map and its potential uses served as a cornerstone of the kickoff event.



Eric Mills of CNX and Dr. Jennifer Lindon, president/CEO HCTC at the Project Kickoff Meeting

STEP 3 COMMUNITY KICKOFF MEETINGS

OBJECTIVE: Raise awareness and generate local momentum for supporting the community broadband planning project.

OUTCOME: An energetic kickoff event in which the community ceremoniously seizes control of its technology future and begins work in earnest to solve its local community broadband challenges and leverage local broadband opportunities.

DETAILS: In partnership with local leaders, CNX organized the community kickoff event for the SKY FM broadband planning project at the campus of Hazard Community and Technical College on June 8, 2016. A broad range of community sectors were represented among the nearly 50 attendees, which included federal and state officials such as an official from Congressman Hal Rogers' office, both Representatives Tim Couch and John Short, along with a representative from Senator Johnny Ray Turner. County government officials were also in attendance including Judge Executives Scott Alexander of Perry County, Jim Ward of Letcher County, Zach Weinberg of Knott County, and Jimmy Sizemore of Leslie County. Numerous city officials including Mayors Jimmy Ray Lindon of Hazard and Todd Depriest of Jenkins, city administrators and managers were also present. Other officials included Larry Combs, the Manager of Broadband Implementation at the Center for Rural Development, Sandi Curd, the Promise Zone Coordinator for Kentucky Highlands Investment Corporation, Dana Case from the Kentucky Communications Network Authority, and various other education and business leaders. Dr. Jennifer Lindon, CEO of Hazard Community and Technical College, welcomed the group and participated in the kickoff. Senior leaders from local broadband providers in the region were also in attendance, including representatives from Harlan Community TV, Thacker-Grigsby, TVS Cable, AT&T, and People's Rural Telephone Cooperative.

The participants at the kickoff meeting expressed a great deal of interest, a genuine willingness to cooperate, and a sincere desire to collectively work to find solutions to community broadband challenges. During this meeting, CNX representatives covered the project scope and discussed the outcomes of the planning project. Most importantly, community leaders and attendees were invited and encouraged to continue their involvement in this planning effort and to recruit others.

STEP 4 SECTOR WORKSHOPS

OBJECTIVE: To facilitate group dialogue on individual sector needs and identify common challenges and opportunities for broadband growth in the community.

OUTCOME: Identify the specific challenges and opportunities faced by various sectors of the community leadership infrastructure, including analysis on community broadband issues presenting barriers to growth in broadband access, adoption and use.

DETAILS: Following the successful kickoff event, energy and enthusiasm for the project remained high. The CNX project team planned the various sector workshops across the five county region. CNX began in July meeting with broadband providers to pursue possible partnerships and innovative solutions to accelerate last mile deployments in the communities they serve.

STEP 5 COMMUNITY TEAM PLANNING SESSIONS

OBJECTIVE: To report on the findings of the sector specific workshops with a goal of bringing sharp focus and pivot of the community planning team's focus toward that of solutions to address the community's unique broadband challenges.

OUTCOME: Aggregate the data gathered from the sector workshops and develop the community broadband plan outline that includes proposed solutions and their viability and potential for success.

DETAILS: The findings and key priorities from the sector workshops in each community were aggregated by the CNX project team. The findings generally indicated broad variances between the counties, largely oriented to their respective levels of access. Counties like Letcher, where broadband access is relatively more uniform, focused their workshop planning discussions around adoption and demonstrating the relevance of connectivity. Whereas, in counties like Leslie, with broadband minimally available, the workshop participants focused their responses almost universally upon their pervasive access limitations.

CNX worked with community leaders for the Plenary Planning Session to analyze these findings as a group, review the plan outline, and prioritize a path forward with potential solutions for each county. In addition, CNX worked with each county judge to ensure that local leadership's priorities, and notably in the case of access issues - priority final mile projects - are reflected in the final broadband plan. A group plenary session with the county judges was conducted on October 27, 2016 in the Perry County Courthouse.

STEP 6 COMMUNITY BROADBAND PLAN DEVELOPMENT

OBJECTIVE: To enlist and unite local community broadband leaders around a shared vision for solving the community's broadband challenges and making best use of existing broadband opportunities.

OUTCOME: Develop the strategic community broadband plan and implementation roadmap draft that has been approved by the community planning leadership team. The plan and roadmap draft formally assesses feasibility and implements viable solutions which highlight sector specific and cross sector priorities and needs.

DETAILS: The plan for each county was developed with significant county demographic research and trend data assembled to inform local broadband plans and viability of proposed solutions. Priority was placed on data development for local broadband availability to add relevant context to the more general demographic and trend data. This data was used as the basis for the mapping, which also is part of the final plan.

STEP 7 FINAL PLAN DEVELOPMENT

OBJECTIVE: To provide a blueprint for community broadband success based on the self-assessment and shared vision for solving common broadband challenges.

OUTCOME: The final plan is fully assembled and formally presented to local government, key stakeholders, and sponsoring organizations and individuals. It comprehensively outlines current state of community broadband challenges, opportunities, locally driven and supported solutions with a roadmap for implementation.

DETAILS: The public presentation of the final plan is Monday, November 21, at 2 pm EST at Hazard Community and Technical College - First Federal Center, Room 223, 1 Community College Drive, Hazard, KY.

STEP 8 COMMUNITY ENGAGEMENT EVALUATION

OBJECTIVE: To determine the effectiveness of the approach and the local engagement in addressing community broadband challenges.

OUTCOME: Through use of a standardized project survey assessment tool, quantify project effectiveness and opportunities for improvement of the engagement model for Kentucky specific concerns and stakeholder interests.

STEP 4 | SECTOR WORKSHOPS HIGHLIGHTS:

A prominent step for each county was the Step 4 Sector Workshop. CNX hosted the sector workshops in each of the SKY FM five counties in August and September of 2016. In total, approximately 65 individuals attended one or more of these five important and interactive sessions. In addition, CNX team members continued to locate and accumulate relevant data and information in preparation for the plan's development as the final phases of the SKY FM broadband planning project neared completion.

Each workshop was a facilitated group and public private dialogue on individual sector needs and common challenges and opportunities for broadband growth in the community. The discussions included analysis of community broadband issues that presented barriers to growth in broadband availability and utilization.

FOLLOWING ARE SOME DETAILS FROM EACH OF THE SECTOR WORKSHOPS:

WHITESBURG | LETCHER COUNTY | AUGUST 18TH

Approximately 25 participants attended and participated in a healthy broadband discussion.



HYDEN | LESLIE COUNTY | AUGUST 25TH

Another dynamic session occurred in Hyden with approximately 23 attendees. The discussion covered a variety of topics including access, barriers, and potential solutions.



MANCHESTER | CLAY COUNTY | AUGUST 25TH

The Clay County sector meeting engaged about a dozen interested citizens and representatives from the provider community.

Pictured: Clay County cross-sector meeting participants included Keith Gabbard with PRTC; Sandi Curd, Promise Zone Coordinator, Kentucky Highlands Investment Corporation; local county broadband committee member, Earl Owens, and others.



HAZARD | PERRY COUNTY | SEPTEMBER 1ST

A packed room of nearly 30 people attended and participated in the Hazard sector meeting at the Hazard Community & Technical College. Participants included a representative from Congressmen Hal Rogers' Office; Judge Executive Scott Alexander; several representatives from the health care and education sectors, as well as a host of area providers.

Pictured: Judge Executive Scott Alexander listens intently as Benny Hamilton, Grant Writer with the Perry Fiscal Court, describes county-specific broadband needs and desire



LEBURN | KNOTT COUNTY | SEPTEMBER 1ST

A diverse group of approximately 25 people shared their opinions on broadband within Knott County at the September 1st cross-sector meeting.

Pictured: Knott County sector participants including Judge Executive Zach Weinberg; County School Superintendent Kim King; provider representatives; and several engaged residents.





SKY FM COUNTY PLAYBOOKS

THE BALANCE OF THIS DOCUMENT PROVIDES DETAILS FOR EACH OF THE FIVE SKY FM COUNTIES. EACH COUNTY PLAN INCLUDES:

- An overview of the county;
- An overview of the sector broadband planning workshop;
- A detailed mapping series of that county's broadband network that shows;
 - areas with broadband
 - areas without broadband
 - household density in unserved areas
 - current county fiber network and fiber to the home availability
 - pending/KentuckyWired fiber network
 - broadband priorities for that county
- An analysis of that county's broadband barriers and opportunities; and
- A plan of action based on local input, the network data, and best practices.



SKY FM COUNTY PLAYBOOK

CLAY COUNTY

CLAY COUNTY BROADBAND PLAYBOOK

CLAY COUNTY AT GLANCE

Clay County is home to 21,000 Kentuckians according to the 2015 census. The county covers 471 square miles. Its county seat is Manchester.

CLAY COUNTY HAS 21 ANCHOR INSTITUTIONS (PUBLIC FACILITIES):

K-12 schools	12	Healthcare facilities	3
Post secondary sites	1	Public safety	3
Public library	1	Local Government	1

CLAY COUNTY OVERVIEW

Clay County's major industries include coal and mining related fields. However, the recent downturn in these industries has decimated the local and regional economy. In 2016, the Clay County unemployment rate is 10.2%, but even this elevated figure does not reflect a substantial percentage of the adult population no longer even seeking to participate in the workforce.

As a part of the SKY FM broadband planning process to address the county's need for expanded broadband, Clay County leaders, including representatives from ClayWired, have met to gather data, identify ways in which a high-speed data network could advance strategic economic development priorities, and then compile those efforts into this community broadband plan.

BROADBAND OPPORTUNITIES IN CLAY COUNTY: SECTOR BROADBAND PLANNING WORKSHOPS



Clay County sector workshop participants discuss broadband planning.

Step 4 of the SKY FM broadband planning project involved sector broadband workshops.

STEP 4 | SECTOR WORKSHOPS

OBJECTIVE: Facilitate group dialogue on individual sector needs and identify common challenges and opportunities for broadband growth in the community.

OUTCOME: Identify the specific challenges and opportunities faced by various sectors of the community leadership infrastructure, including analysis on community broadband issues presenting barriers to growth in broadband access, adoption and use.

CNX hosted and facilitated a SKY FM sector workshop and broadband planning session on August 25, 2016 at the Clay County Courthouse in Manchester.

Thirteen participants representing eleven entities discussed Clay County's broadband-based opportunities, barriers, and priority next steps. Participating entities included:

Kentucky Cable Association
Clay County Fiscal Court
ClayWired
The Center for Rural Development
Eastern Kentucky Network
Mountain Association for Community Economic Development (MACED)
AT&T
Kentucky Highlands Investment Corporation
Clay County Schools
Thacker-Grigsby/TVS
TVS Cable
CNX

HIGHLIGHTS OF THE SECTOR PLANNING DISCUSSION

CLAY COUNTY GENERAL CONNECTIVITY ASSESSMENT

During the sector workshop, participants discussed broadband-based opportunities for Clay County, barriers to broadband expansion, and solutions going forward.

BROADBAND BARRIERS

- Public facilities need more bandwidth.
- Service outside of Manchester needs improvements.
- Not all of Clay County residents know how to use the internet effectively.

BROADBAND OPPORTUNITIES

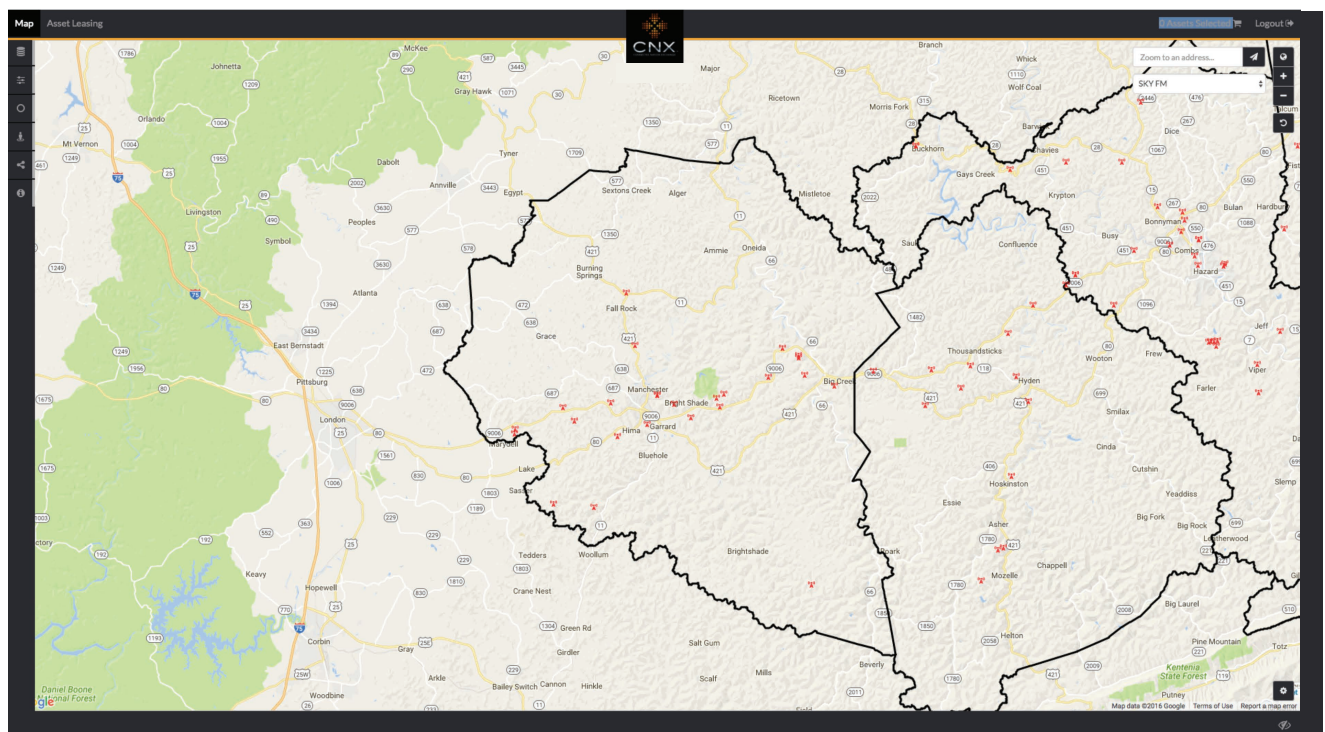
- Gather more info to better understand the networks in Clay County.
- The ClayWired committee can coordinate ongoing planning for broadband expansion and use.

GROWING BROADBAND'S PRESENCE IN CLAY COUNTY

CNX gathered data from multiple broadband providers and other sources to bring data to bear upon the local planning for the expansion of broadband in Clay County. Important outcomes of the SKY FM project are the identification of priority broadband expansion projects that require an engineering solution.¹ The broadband data has been visualized in CNX's broadband planning tool and has been shared with Clay County broadband representatives with the goal of identifying and prioritizing broadband expansion projects that will have the most impact for Clay County's economic development and overall quality of life. What follows are the highlights of that data analysis.

CLAY COUNTY TELECOMMUNICATIONS TOWERS

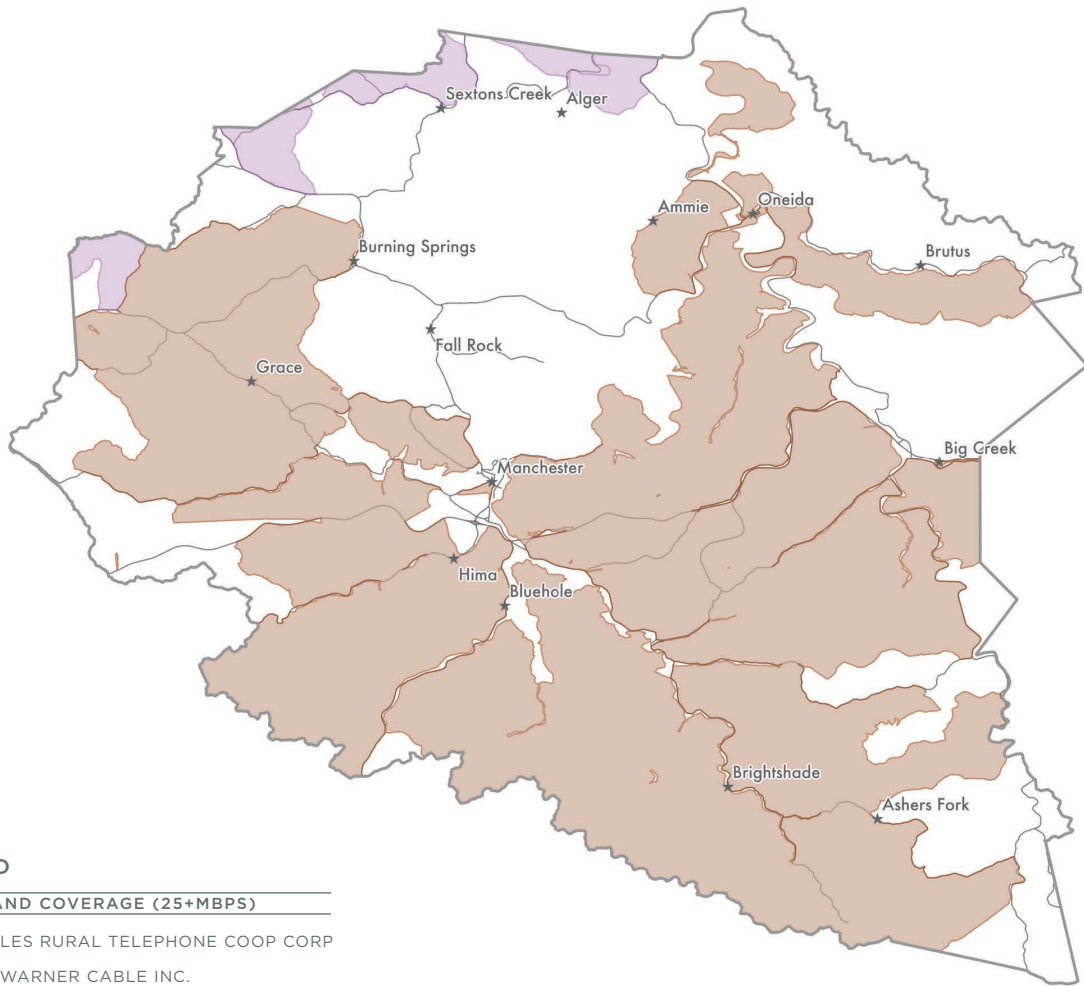
Mobile connectivity demands and data consumption are growing at exponential rates nationwide. Rapidly emerging "smart devices" only underscore the need for robust mobile data infrastructure. Telecommunications towers that support mobile data applications become dramatically more effective when those towers are connected to a fiber network. County leaders should work closely with mobile data network operators to maximize any fiber build plans to include underserved and new tower construction coverage as anchor tenants on any potential new fiber networks in the county. Clay County has 25 wireless communications towers registered with the Federal Communications Commission, as seen in the image below taken from the CNX data portal.²



As depicted on CNX's Broadband Platform, there are 25 wireless communication towers in Clay County.

1 The preliminary engineering and cost estimation of these solutions is a recommended, immediate next step of the SKY FM project.

2 The data is cited from the FCC ASR database (<http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly>). The data are current as of 2016/11/13.

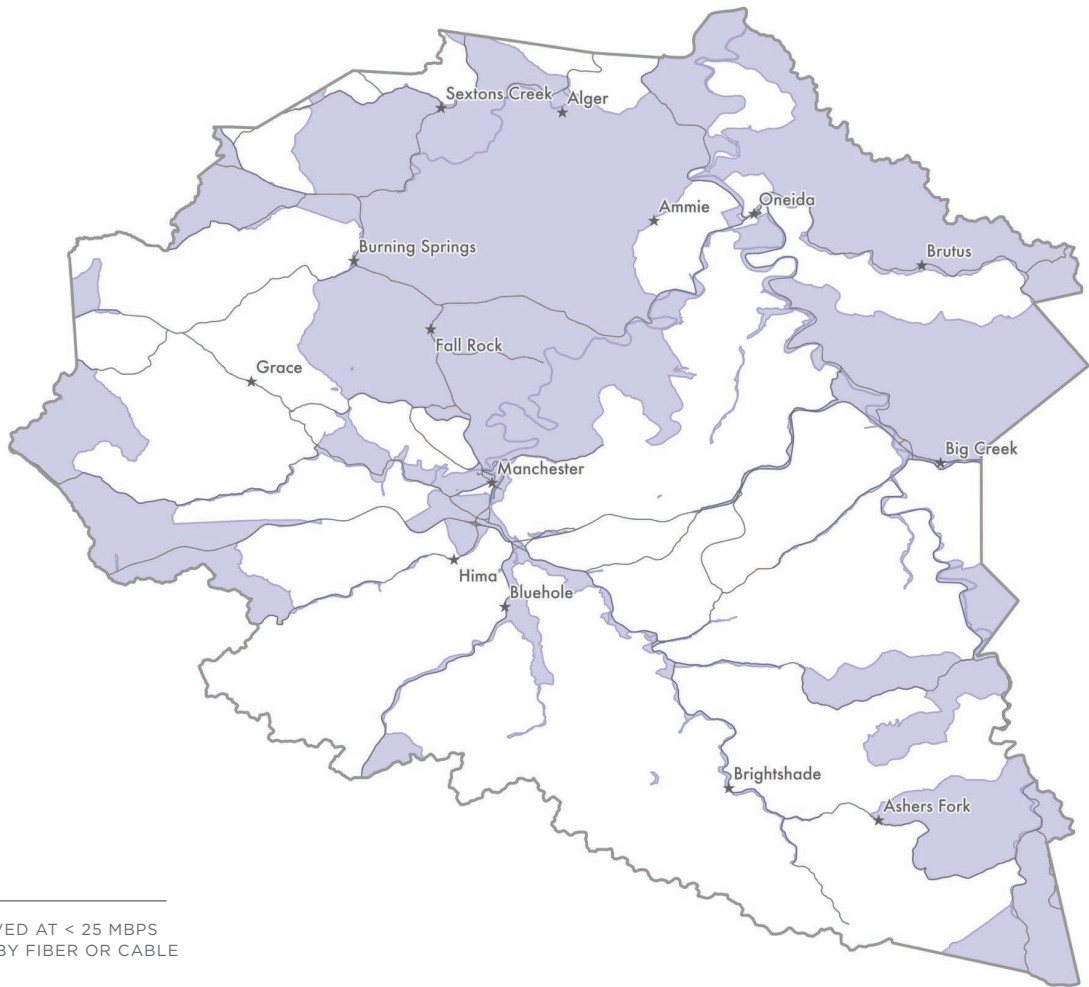


CLAY COUNTY HOUSEHOLD 25MBPS+ AVAILABILITY

For planning purposes and to in order to maintain industry standards for broadband speed, 25Mbps should be the minimum standard for internet connectivity that is considered broadband.³ The map above shows the areas of Clay County that are served by 25Mbps or higher connections. The different colors represent the various providers of internet service. Any area not colored represents either an unserved or underserved portion of the community.⁴

³ The FCC now defines “broadband” as an internet connection that is capable of 25Mbps and above for data download and 3Mbps and above for data upload.

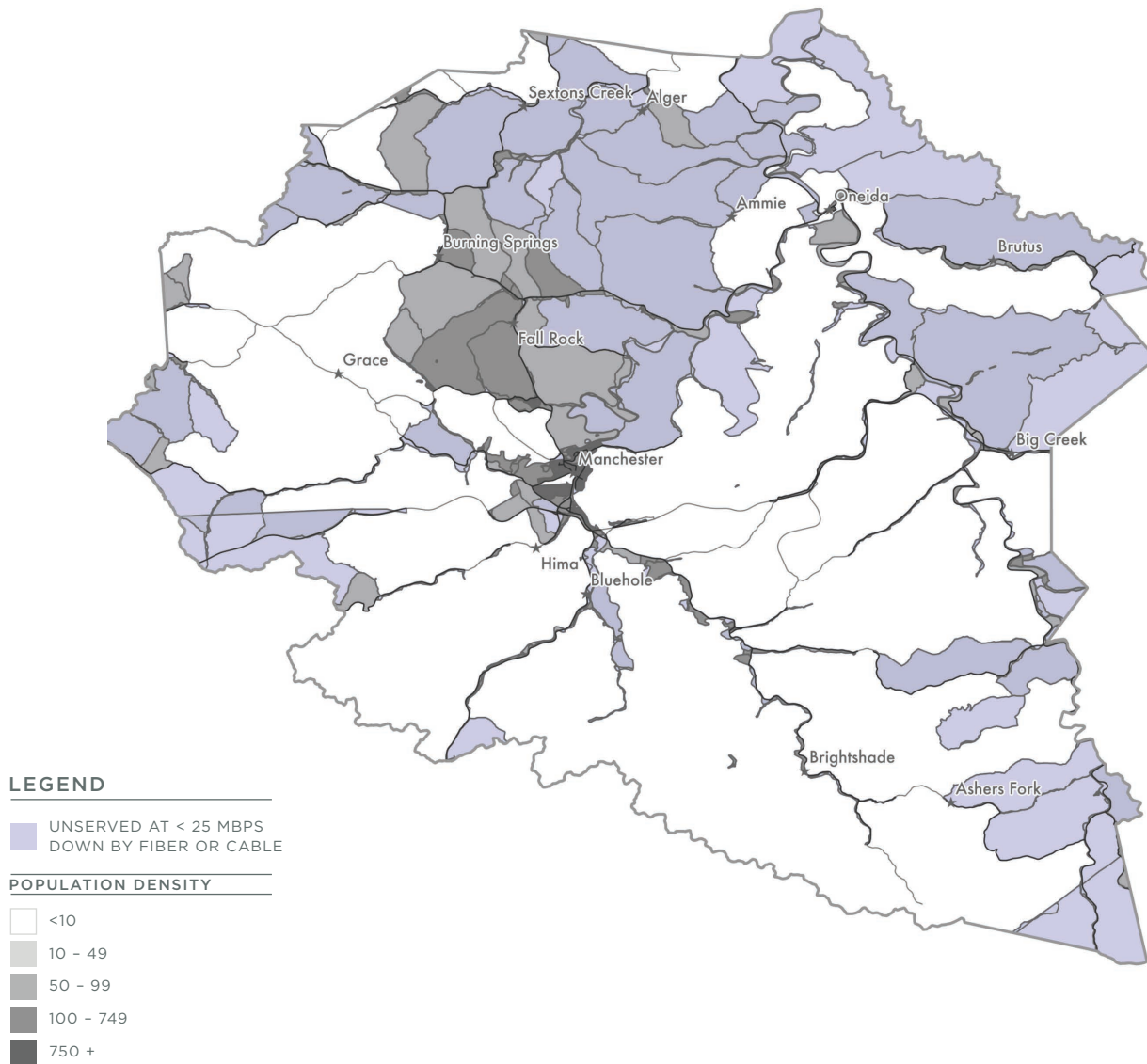
⁴ Unserved means no internet service is available. Underserved means internet service is available, but it does not meet the 25 Mbps threshold.



UNDERSERVED CLAY COUNTY COMMUNITIES

This map depicts in color those portions of Clay County that are underserved by internet speeds of 25Mbps or greater.⁵

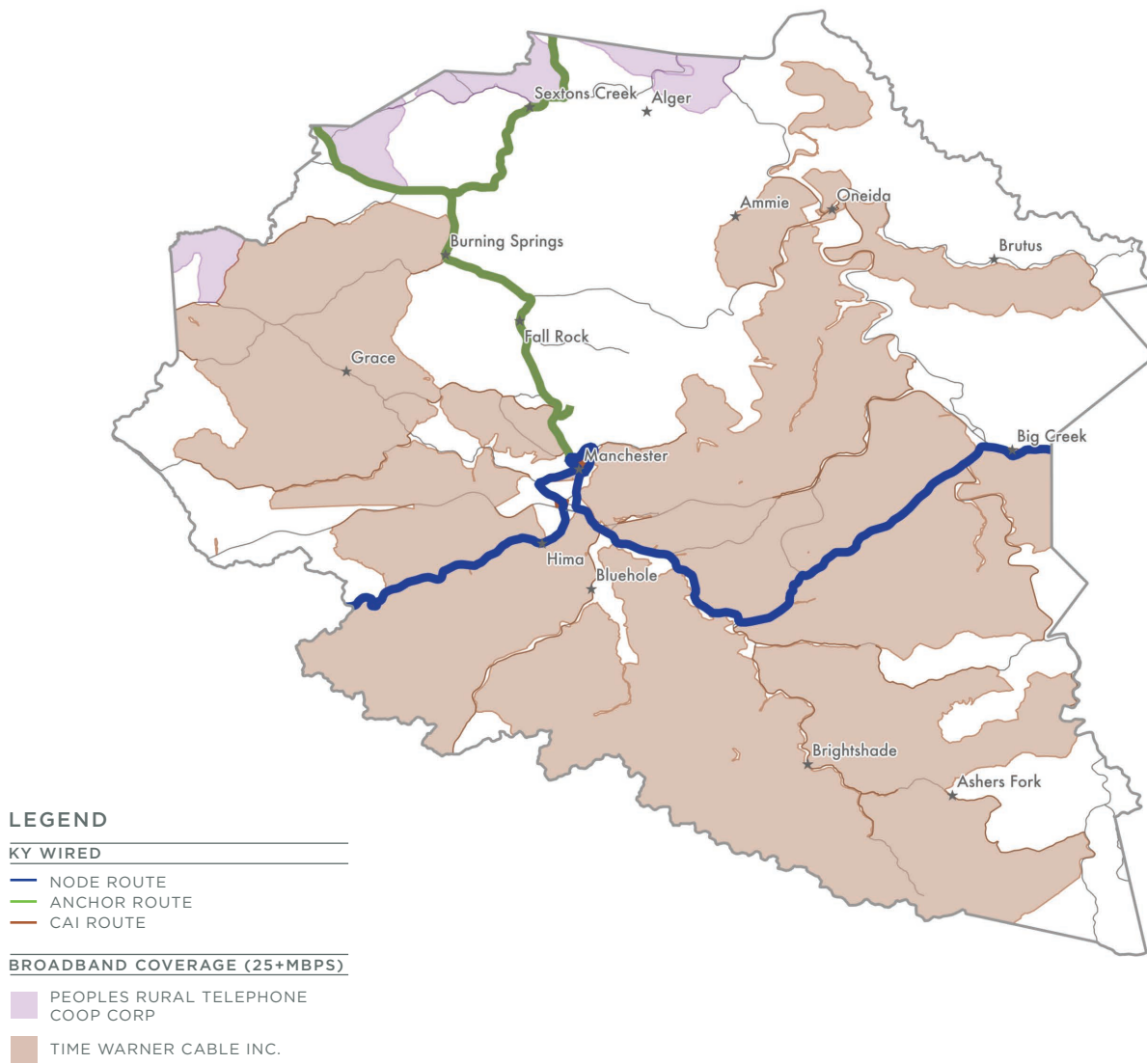
⁵ The density of households is organized by census blocks.



DENSITY OF HOUSEHOLDS IN UNDERSERVED PORTIONS OF CLAY COUNTY

Considering the number of homes in an underserved portion of the county is a helpful indicator of how many residents will be positively impacted by an expansion in broadband availability. Figure x depicts the density of homes in underserved areas. The darker shades of grey color indicate more densely-clustered homes in that portion of the county.⁶

⁶ The density of households is organized by census blocks.



PENDING FIBER NETWORKS AND 25MBPS+ SERVICE AREAS - KENTUCKYWIRED IN CLAY COUNTY

Fiber is the ultimate in broadband service for speed and capacity. While broadband is defined at 25 Mbps+, fiber is capable of delivering speeds up to 1,000 Mbps (gigabit speed). As stated earlier, fiber is an important resource for large tenants (industrial parks for example) and for critical services (public safety, healthcare, etc.). The map above demonstrates the addition of the KentuckyWired network. KentuckyWired is the statewide fiber network referenced earlier that will provide a fiber based node in each Kentucky county thus enabling each county to implement its own last mile strategy for homes, businesses, and public facilities. The blue line represents the proposed KentuckyWired path.

These maps demonstrate in a more technical manner the broadband opportunities Clay County leaders discussed as part of the SKY FM planning project. Knowing where network access is lacking, how it affects the community, and where pending development is coming can inform relevant planning for improvements.

CLAY COUNTY BROADBAND PRIORITIES

After conferring with the providers of broadband in Clay County, analyzing the network resource availability, and assessing where network resources are vitally needed, Clay County broadband representatives have identified multiple areas of interest for network expansion.

These broadband priority areas have been elevated due to their: immediate economic development impact; the capacity to help expand the network presence for more Clay County residents; and cost effective nature of the project.

Clay County’s broadband priority areas are depicted in the map below. These are sites, locations, and communities where network improvements can have an impact on the local economy and general quality of life for Clay County. Confronting access challenges throughout the county, priority project areas at this juncture encompass fiber access to the:

- Elk Hill Industrial Park
- Industrial park off Fox Hollow Road
- Clay County Industrial Board’s industrial park in Manchester
- Federal Correctional Institution
- Oneida Baptist Institute
- Red Bird Mission
- Manchester Memorial Hospital



ADOPTION

Along with this network expansion, Clay County must also provide opportunities for its residents and businesses to access important training on how to use these tools to their greatest effect through adoption programs. The public library is often the hub for technology training for those seeking to gain computing skills. Currently, Clay County Library in Manchester has 6 computers with each having a 50Mbps connection to the internet. Basic computing classes are offered semi-annually with usually three participants.



With improved broadband presence in homes, the library or other public facilities, Clay County residents could access many of the available and free digital literacy resources like the following:

- www.digitalliteracy.gov offers free adoption programs that range from learning the basics of a computer to job skills. The free computer basics programs include computer use, how to use software/applications, using the internet, communication through the web, and internet safety.
- <http://driveyourlearning.org/> is a free resource for technology adoption that offers participants training content from a variety of trainers. Participants can choose their learning priorities: job skills, social media, life skills, education and basic computer programming.
- www.common sense media.org offers families tools aimed to help their children excel in a media driven world without sacrificing safety.
- <http://lib2gov.org/> offers tools for public libraries specifically to help patrons access online government services.

GROWING BROADBAND'S IMPACT THROUGH THE CLAY COUNTY PLAYBOOK

What follows is Clay County's Playbook for maximizing the impact of broadband. It takes into account the county's broadband needs, goals, barriers and solutions. It is informed by the current state of broadband in Clay County and information about pending broadband development through KentuckyWired. More specifically, the playbook reflects the culmination of:

- A** the broadband connectivity data analysis accomplished through the CNX visualization tool;
- B** the pending fiber development through KentuckyWired and its proposed routes;
- C** specific input and priorities of Clay County leaders from public and private sectors through Sector Broadband Planning Workshops;
- D** proven best practices from similar communities across the state and country;
- E** best practices regarding adoption programming and Clay County's adoption needs; and
- F** input from privately owned broadband/technology companies.

The playbook takes this information set and organizes it around foundational community broadband strategies:

- Network Expansion;
- Increase Digital Literacy;
- Technology Driven Economic Development/Jobs; and
- Local Public Private Partnership (P3) and Planning.

Lastly, the playbook organizes these informed strategies by cost effectiveness, prioritization, and necessary times for completion.

CLAY COUNTY BROADBAND PLAYBOOK

STRATEGIC BROADBAND PRIORITIES

Clay County's broadband landscape offers opportunities as a result of cable networks that serve a large portion of the county. In addition, Windstream advertises broadband throughout the balance of the county, though as local members of the broadband team noted, Windstream service offered limited speeds and questionable service quality in some areas due to the inherent technical limitations of DSL. Nonetheless, some coverage is available to a large portion of the county.

However, Clay County still has substantive gaps in coverage scattered throughout the county, particularly in the northern part of the county where limited cable connectivity is available. In addition, in many of the existing services areas, aging networks limit service quality and speed. As such, Clay County should seek to modernize its telecommunications infrastructure utilizing the KentuckyWired network, particularly in advancing economic development priorities.

Similarly, local leadership will be critical in enabling the community to realize the promise and potential of the significant fiber connectivity existing and soon to be added to the community. Clay County leaders should continue supporting the existing local broadband board "ClayWired" to provide stability, further leadership, and broad points of view in establishing the county's technology development priorities.

INDUSTRIAL DEVELOPMENT

The Elk Hill Industrial Park offers tremendous advantage for the community as a regional hub for industry. Redundant fiber networks continue to be a competitive advantage for industrial parks. As such, county leaders should pursue constructing a lateral off of the KentuckyWired main fiber ring to the Elk Hill Park. Properly planned, such an investment could also expand service to homes in the area through a potential public-private partnership.

FIBER ENABLED JOBS

As the community prioritizes support for network deployment and access improvements, similarly and with the same level of zeal, community leaders must also attack the issue of broadband adoption. Increasing access alone will not automatically result in the county realizing all of the promises and true benefits of high-speed broadband access. The county must be prepared to use a high-speed network.

ENHANCEMENT OF ADOPTION

Community leaders should develop a plan to enhance broadband adoption through relevance and awareness. Broadband must make a difference in peoples' lives before people view it as important. A plan to accomplish this goal could include fostering telework/work-from-home based opportunities, industrial recruitment of fiber dependent industries to bring new jobs to the area, training and educational partnerships with local schools and more, etc.

CLAY COUNTY PLAYBOOK

Development of these strategic priorities represents a significant economic opportunity for Clay County. To accomplish these goals, Clay County leadership should employ an execution strategy as outlined below:

1 | ECONOMIC DEVELOPMENT / JOBS

- A** Establish top sector priorities for economic growth opportunities by leveraging existing assets in the community;
- B** Continued collaboration with ClayWired to identify and prioritize growth/expansion goals and opportunities, particularly those enabled through increased high-speed connectivity; and
- C** With support from economic development consultants, finalize an action plan to achieve the growth goals.

Econ Dev./Jobs	3 Months	6 Months	12 Months	Ongoing
	Establish top sector priorities for economic growth opportunities by leveraging existing assets in the community, particularly the Elk Hill Industrial Park	Assess connectivity needs for specific industrial development targets, develop fiber deployment plans to provide these connectivity needs as needed	Increase public awareness and public training opportunities for personal and entrepreneurial uses of broadband to increase digital literacy	Market the access and adoption programs to position Clay County as “open for business” with technology employers

2 | FIBER NETWORK EXPANSION

- A** Determine Network Expansion Priority Areas & Platform
 - Align with economic development strategies/objectives
- B** Commission Engineering Study to Design and Derive Cost Estimates
 - Engage planning and engineering firm to design “desktop” build plans
- C** Establish Partnerships for Build-Out Financing
 - Seek Out and Formalize Provider Partnerships
 - Organize appropriate financial structuring for network construction and operations transaction with support of technical and legal consultants
 - Secure financing through grants, loans, bonds
- D** Complete Field Engineering and Commission Construction

Fiber Network Expansion	3 Months	6 Months	12 Months	Ongoing
	Commission engineering studies for and gather more connectivity info for the following areas of interests: <ul style="list-style-type: none"> • Elk Hill Industrial Park • Industrial park off Fox Hollow Road • Clay County Industrial Board’s industrial park in Manchester • Federal Correctional Institution • Oneida Baptist Institute • Red Bird Mission • Manchester Memorial Hospital 	Develop last mile strategy that takes advantage of KentuckyWired fiber route Conduct a fiber to the tower (FTTT) study that identifies the cell towers in Clay County without a fiber connection and strategies for taking advantage of the Kentucky-Wired fiber network for improved mobile data capacity county wide Survey existing tower facilities, wireless coverage demand, and accessibility within Clay County Work with tower owners and/or carriers to complete a cost feasibility analysis to determine interest and viability in upgrading tower facilities with fiber access in conjunction with future fiber expansion and/or Kentucky-Wired projects	Refresh connectivity inventory Review local policies for unnecessary barriers to private investment resources Develop a redundancy strategy for anchor institutions and anchor/commercial tenants	Annual refresh of Clay County broadband map Annual Clay County Sector Broadband Planning Workshop

3 | INCREASE DIGITAL LITERACY

Increase Digital Literacy	3 Months	6 Months	12 Months	Ongoing
	Inventory basic computer skills training resources in Clay County	<p>Establish faster connections at Clay County Public Library</p> <p>Develop strategy for offering free wifi at Clay County public facilities</p> <p>Develop a county wide adoption strategy that includes:</p> <ul style="list-style-type: none"> • Public wifi sites • Basic computer skills training through the Clay County Pubic Library • Workforce training • Digital literacy awareness campaigns 	Establish a Clay County 1:1 program task force to develop a connectivity plan suitable to support a K-12 1:1 that includes residential use of devices	Increase the digital literacy training at the Clay County Library: jobs applications, device/access/use, E-books, setup of new devices

4 | LOCAL PUBLIC PRIVATE PLANNING

Local	3 Months	6 Months	12 Months	Ongoing
Public Private Planning				
	Develop strategy for promoting ClayWired's goals and plans	Continue the ClayWired Broadband planning	First annual "Clay County Technology Progress Report"	Update annually the Clay County Technology Report



SKY FM COUNTY PLAYBOOK

KNOTT COUNTY

KNOTT COUNTY BROADBAND PLAYBOOK

KNOTT COUNTY AT GLANCE

Knott County is home to nearly 16,000 Kentuckians according to the 2015 census. The county covers 353 square miles. Its county seat is Hindman.

The home of Alice Lloyd College is in Pippa Passes, a Knott County community.

KNOTT COUNTY HAS 20 ANCHOR INSTITUTIONS (PUBLIC FACILITIES):

K-12 schools	7	Healthcare facilities	3
Post secondary sites	2	Public safety	6
Public library	1	District Court House	1

KNOTT COUNTY OVERVIEW

Knott County major industries include coal and mining, timber and forestry related fields. However, the recent downturn of the coal industry has decimated the local and regional economy. In 2016, the Knott County unemployment rate is 10.5%, but even this elevated figure does not reflect a substantial percentage of the adult population no longer even seeking to participate in the workforce.

As a part of the SKY FM broadband planning process, Knott County leaders gathered for multiple work sessions over the last several months to gather data, identify ways in which a high-speed data network could advance strategic economic development priorities, and then compile those efforts into this community broadband plan.

BROADBAND OPPORTUNITIES IN KNOTT COUNTY: SECTOR BROADBAND PLANNING WORKSHOPS



Eric Mills (CNX) facilitates Knott County Sector Workshop with County Judge Executive Zach Weinberg. Knott County Sector Broadband Session September 1, 2016

STEP 4 SECTOR WORKSHOPS

OBJECTIVE: Facilitate group dialogue on individual sector needs and identify common challenges and opportunities for broadband growth in the community.

OUTCOME: Identify the specific challenges and opportunities faced by various sectors of the community leadership infrastructure, including analysis on community broadband issues presenting barriers to growth in broadband access, adoption and use.

Per the SKY FM plan, CNX hosted and facilitated a sector broadband planning workshop on September 1, 2016 at the Knott County Sportsplex in Leburn. This important planning session, attended by a broad swath of public and private stakeholders, demonstrated the community's interest and commitment to improving the access to high-speed and high-capacity broadband.

Twenty-one participants representing eleven entities discussed Knott County's broadband-based opportunities, barriers, and priority next steps. Participating entities included:

Knott County Schools

The Center for Rural Development

Mountain Association for Community Economic Development (MACED)

Kentucky Communications Network Authority (KCNA)

Knott County Fiscal Court IT/911 Coordinator

Knott County Library

Thacker-Grigsby/TVS

Eastern Kentucky Network

TVS Cable

Knott County Judge Executive

CNX

HIGHLIGHTS OF THE SECTOR PLANNING DISCUSSION

BROADBAND OPPORTUNITIES

EDUCATION AND BROADBAND

- K-12 Education
 - Non Traditional Days - snow days
 - Alternative Homebound - increase in graduation
 - Dual credit/college classes - increase in access/decrease in college costs
- Appalachian Artisan Center - 501c3
 - Remote crafting classes
 - Instructional videos
 - E-commerce
- Alice Lloyd College
 - Entrepreneurship curriculum
 - Workshops/convocations
 - Online utilization
 - Could expand IT related programming
- Settlement School
 - Ag development
 - Dyslexia programming (unique)
 - Connect the region's cultural assets
 - Tourism

HEALTHCARE AND BROADBAND

- Telemedicine
- After hours' illness
- Home monitoring
- Medical records
- KASPER

ECONOMIC DEVELOPMENT AND BROADBAND

- Telework
 - Work from Home/Virtual Office
 - Web Development
 - Telework
 - Anchor Institutions shift from technology consumers to technology developers
 - Labor market as asset tapped into, marketed better, accessed better with technology
- Economic Development - MACED
 - Supporting entrepreneurs
 - Nurturing new entrepreneurs
 - Financing
 - Technical assistance – help for people who want to start business
 - Grocery stores/energy efficiency (Knott Co.)
 - IOT – smart cooling
- Agriculture
 - Local food networks
 - CSA's
 - Agri-tourism

BARRIERS TO BROADBAND EXPANSION

- Culture shift needed from “get a job” to “make a job”
- Near term focus on crisis distracts from bigger picture/strategic planning
- Adoption programs needs
- Some residents are intimidated by technology

BROADBAND SOLUTIONS

- Small business development and ecommerce training
- Knott County Central curriculum for entrepreneurship, coding, and aviation
- Plan for Knott County’s access to global markets
- Consider cooperative model of those who make and those to do ecommerce

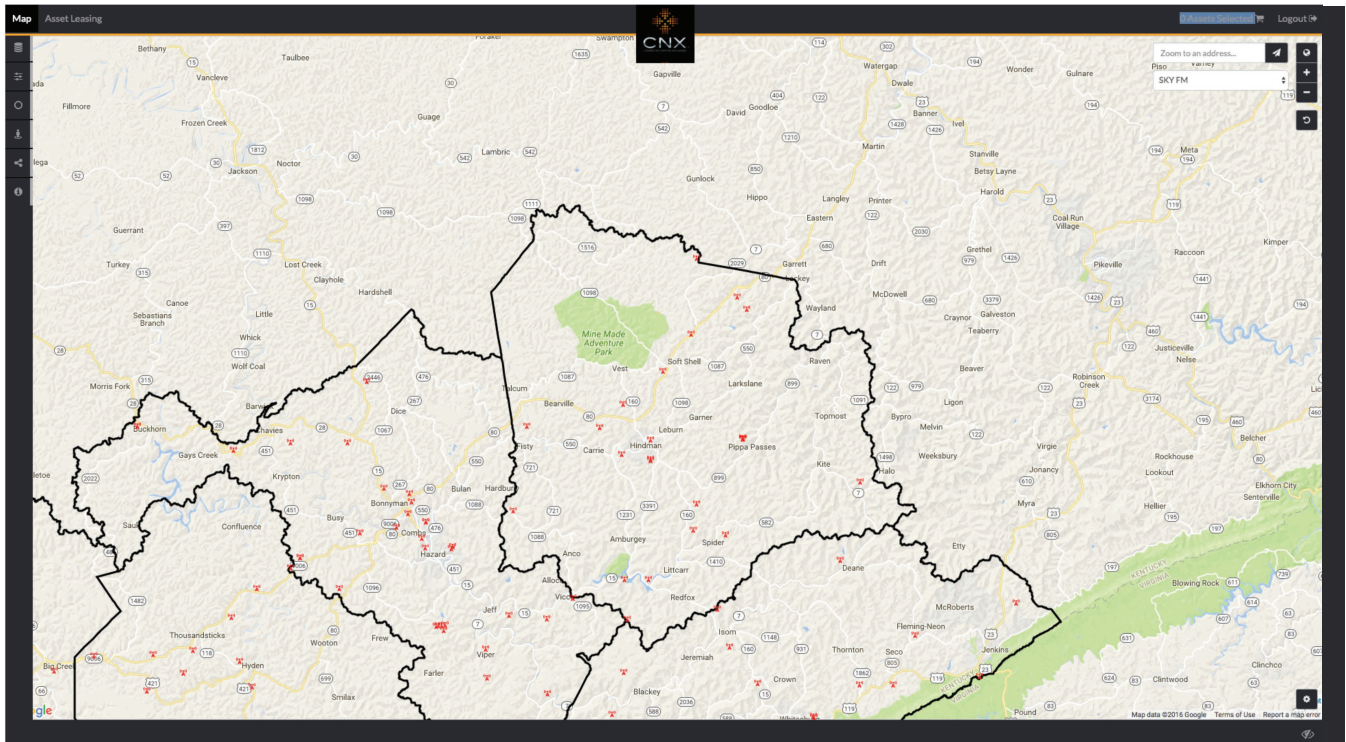
These important sector discussions have formed a baseline of broadband needs and opportunities for Knott County. The SKY FM project calls for these leader informed priorities to be examined from the perspective of the Knott County broadband network presence and capacity.

GROWING BROADBAND'S PRESENCE IN KNOTT COUNTY

CNX gathered data from multiple broadband providers and other sources to bring data to bear upon the local planning for the expansion of broadband in Knott County. Important outcomes of the SKY FM project are the identification of priority broadband expansion projects.¹ The broadband data has been visualized in CNX's broadband planning tool and has been shared with Knott County's Judge Executive Zach Weinberg with the goal of identifying and prioritizing broadband expansion projects that will have the most impact for Knott County's economic development and overall quality of life. What follows are the highlights of that data analysis and working with Judge Weinberg.

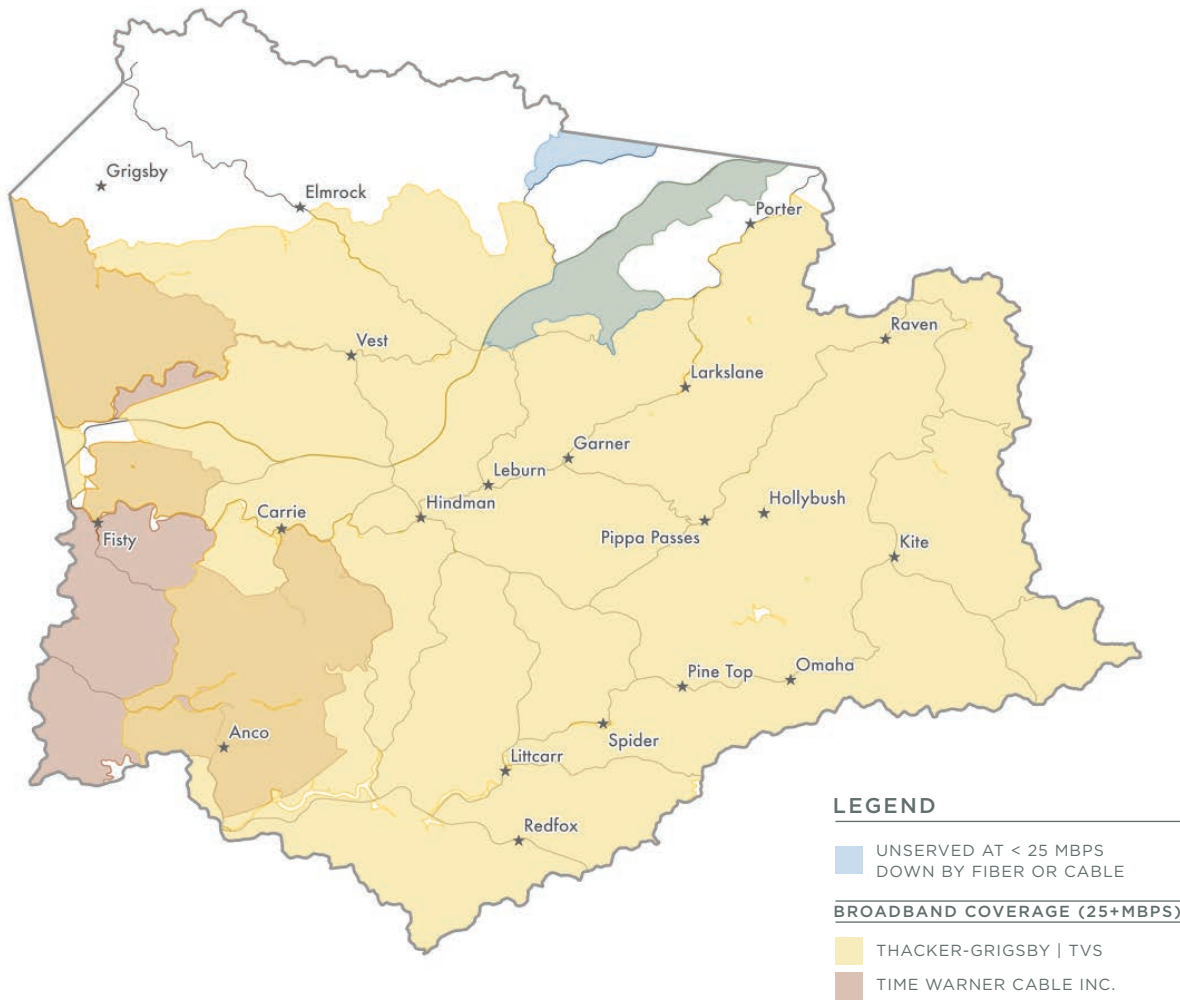
KNOTT COUNTY TELECOMMUNICATIONS TOWERS

Mobile connectivity demands and data consumption are growing at exponential rates nationwide. Rapidly emerging "smart devices" only underscore the need for robust mobile data infrastructure. Telecommunications towers that support mobile data applications become dramatically more effective when those towers are connected to a fiber network. County leaders should work closely with mobile data network operators to maximize any fiber build plans to include underserved and new tower construction coverage as anchor tenants on any potential new fiber networks in the county. Knott County has 24 wireless communications towers registered with the Federal Communications Commission, as seen in the image below taken from the CNX data portal.²



As depicted on CNX's Broadband Platform, there are 24 wireless communication towers in Knott County.

- 1 The preliminary engineering and cost estimation of these solutions is a recommended next step of the SKY FM project.
- 2 The data is cited from the FCC ASR database (<http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly>). The data are current as of 2016/11/13.



KNOTT COUNTY HOUSEHOLD 25MBPS+ AVAILABILITY

For planning purposes and in order to maintain industry standards for broadband speed, 25Mbps should be the minimum standard for internet connectivity that is considered broadband.³ The map above shows the areas of Knott County that are served by 25Mbps or higher connections.⁴ The different colors represent the various providers of internet service. Any area not colored represents either an unserved or underserved portion of the community.⁵

3 The FCC now defines “broadband” as an internet connection that is capable of 25Mbps and above for data download and 3Mbps and above for data upload.

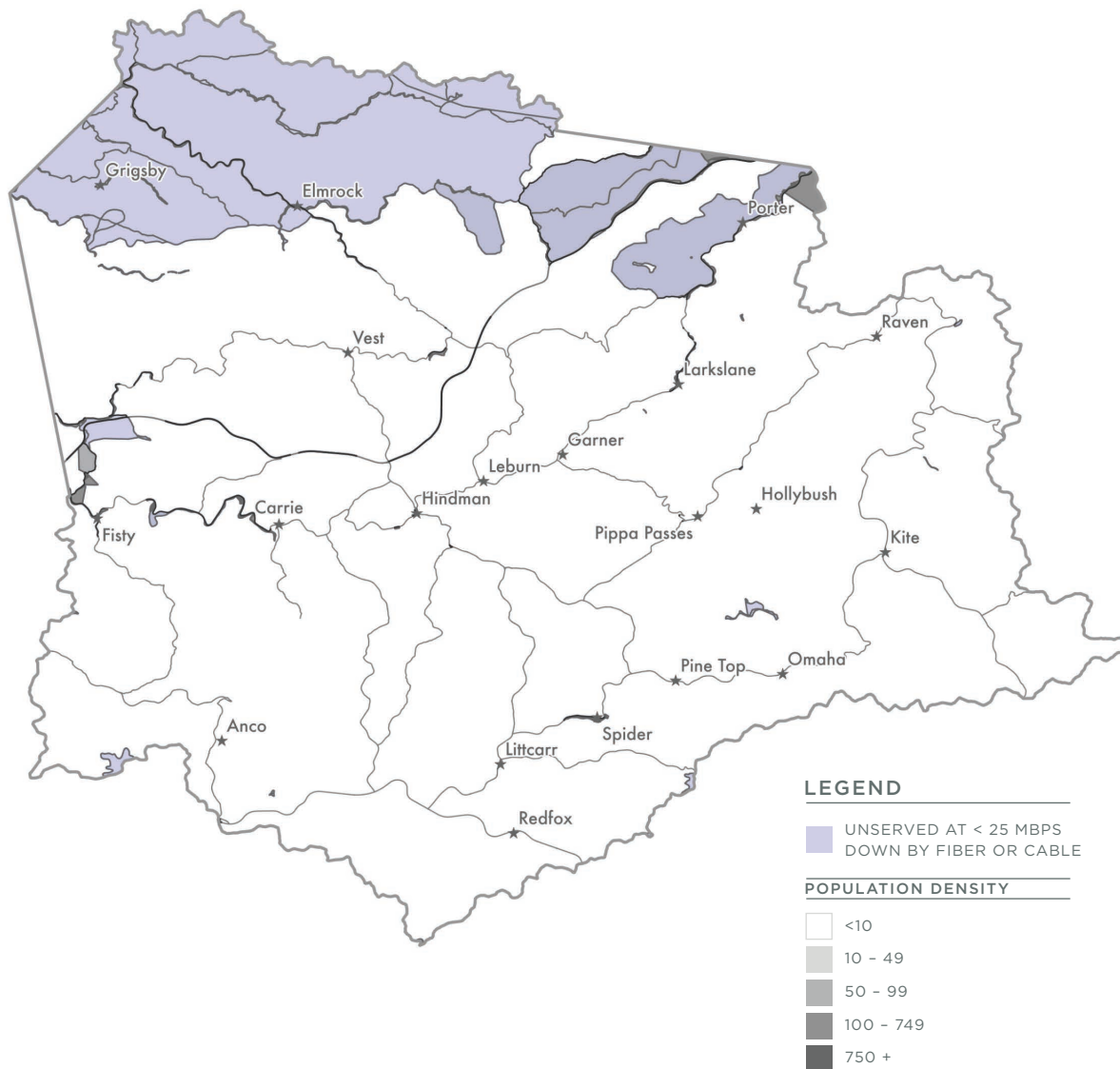
4 The colored areas of map above represent the various cable providers that are capable of providing 25Mbps service.

5 Unserved means no internet service is available. Underserved means internet service is available, but it does not meet the 25 Mbps threshold.



UNSERVED KNOTT COUNTY COMMUNITIES

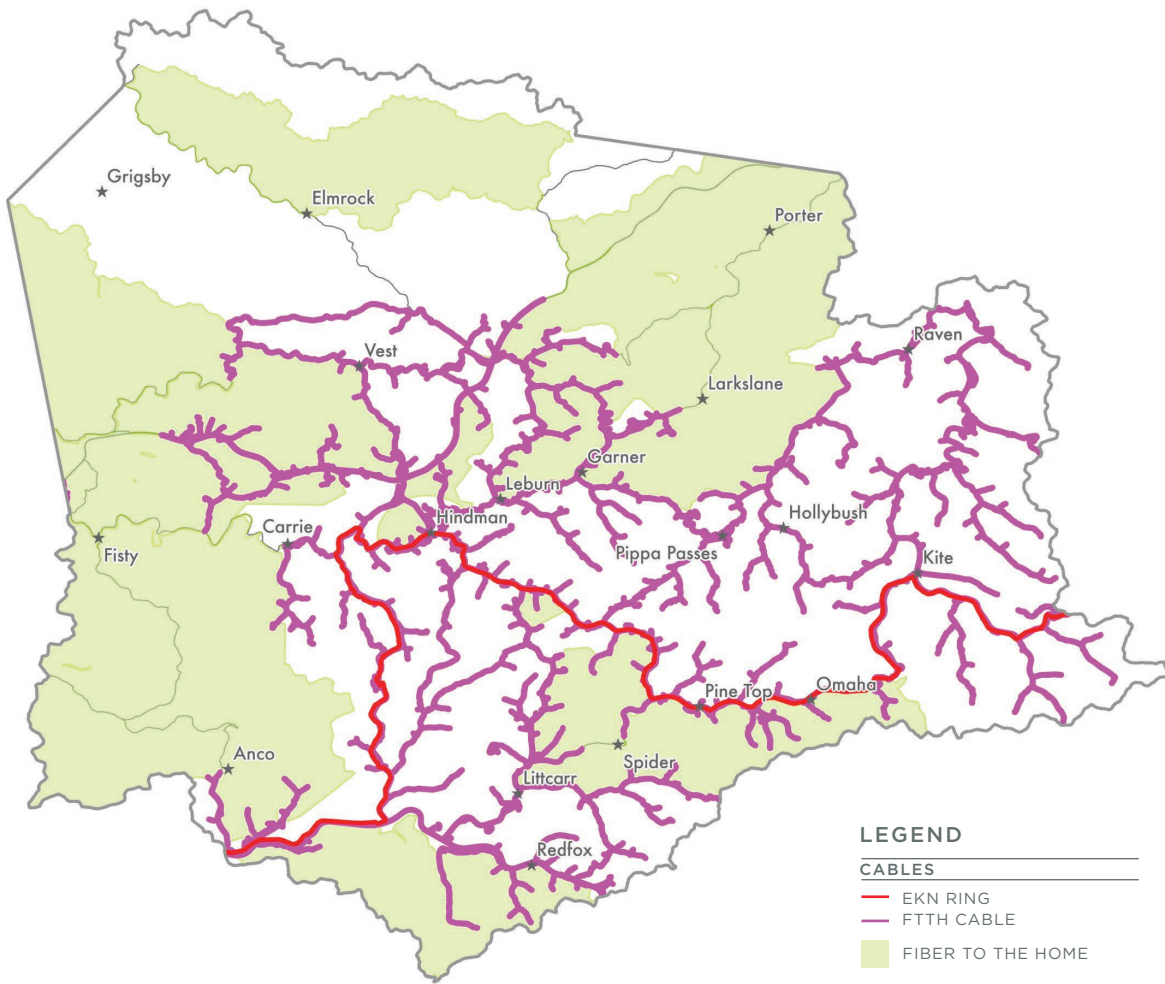
The map above depicts in color those portions of Knott County that are underserved by internet speeds of 25Mbps or greater.



DENSITY OF HOUSEHOLDS IN UNDERSERVED PORTIONS OF KNOTT COUNTY

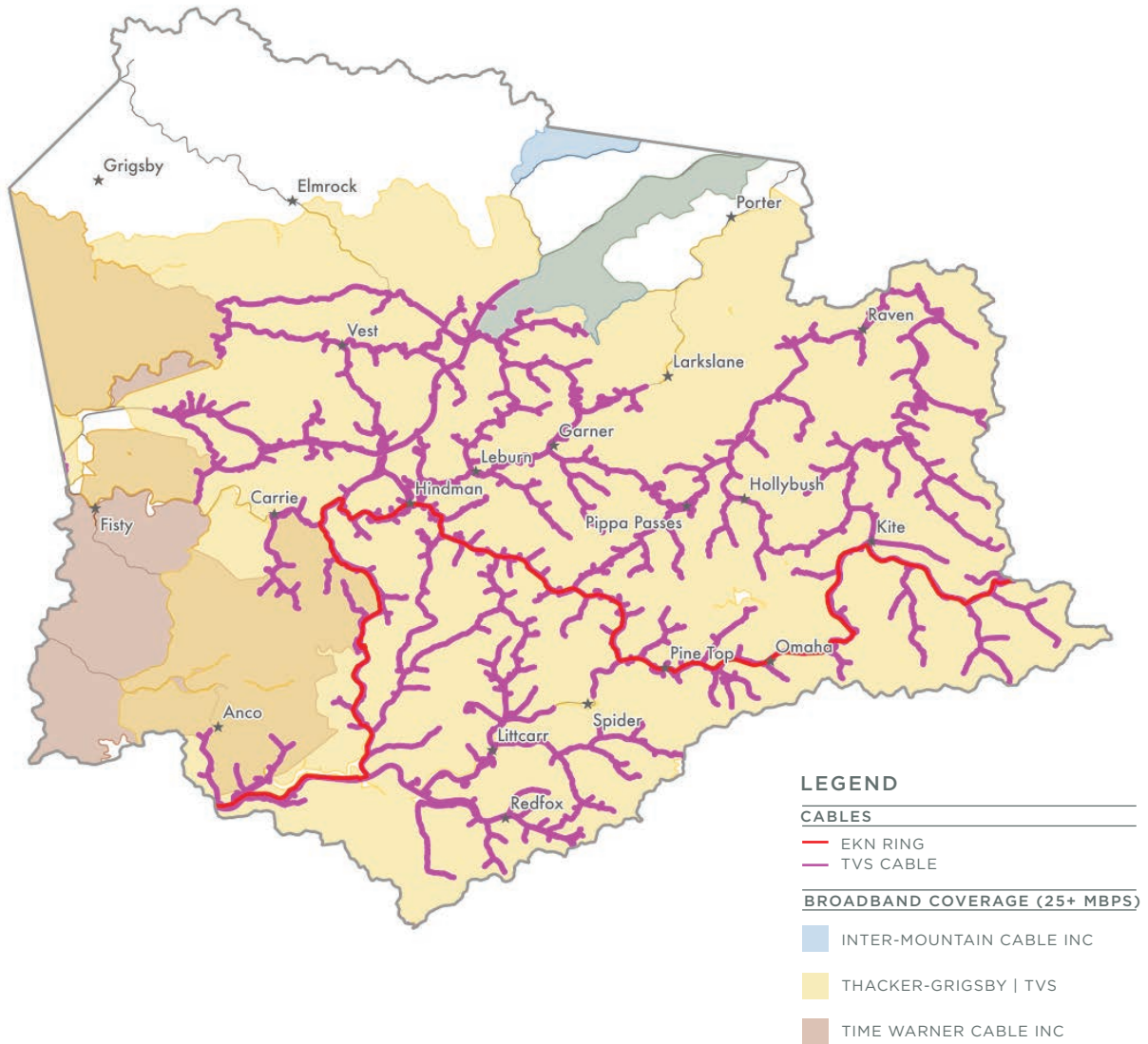
Considering the number of homes in an underserved portion of the county is a helpful indicator of how many residents will be positively impacted by an expansion in broadband availability. The map above depicts the density of homes in underserved areas. The darker the shades of grey color the greater the number of homes located in that portion of the county.⁶

6 The density of households is organized by census blocks.



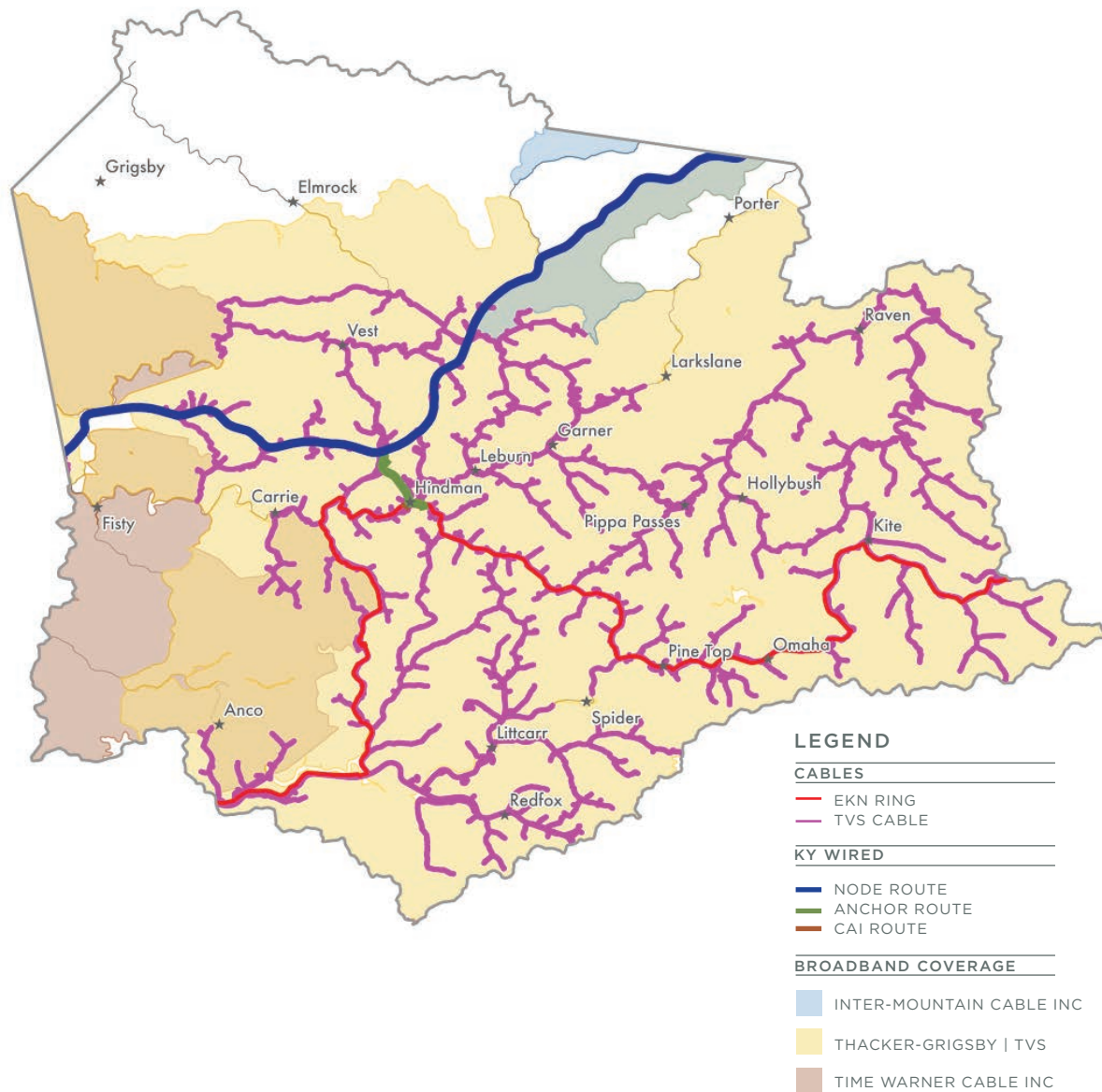
FIBER TO THE HOME IN KNOTT COUNTY

The map above is the ultimate in broadband service for speed and capacity. While broadband is defined at 25 Mbps+, fiber is capable of delivering speeds up to 1,000 Mbps (gigabit speed). As stated earlier, fiber is an important resource for large tenants (industrial parks for example) and for critical services (public safety, healthcare, etc.). Knott County is largely unserved with fiber as depicted in the map above. The colored areas indicate the portions of the community where homes have the ability to access fiber based broadband.



CURRENT FIBER NETWORKS IN KNOTT COUNTY

High-speed and high-capacity fiber networks are the backbone of a community’s internet connectivity. Underserved portions of the county need a means to connect to the fiber network or an extension of the fiber itself. The map above depicts the general existing fiber networks in Knott County. The Map above also demonstrates the relationship of fiber to the “last mile” network referenced above. “Last mile” providers are the companies that help individual homes and businesses connect to the fiber networks.



PENDING FIBER NETWORKS - KENTUCKYWIRED IN KNOTT COUNTY

The map above demonstrates the addition of the KentuckyWired network. KentuckyWired is the statewide network referenced earlier that will provide a fiber based node in each Kentucky county thus enabling each county to implement its own last mile strategy for homes, businesses, and public facilities. The blue line represents the proposed KentuckyWired path.

These maps demonstrate in a more technical manner the broadband opportunities Knott County leaders discussed as part of the SKY FM planning project. Knowing where network access is lacking, how it affects the community, and where pending development is coming can inform relevant planning for improvements.

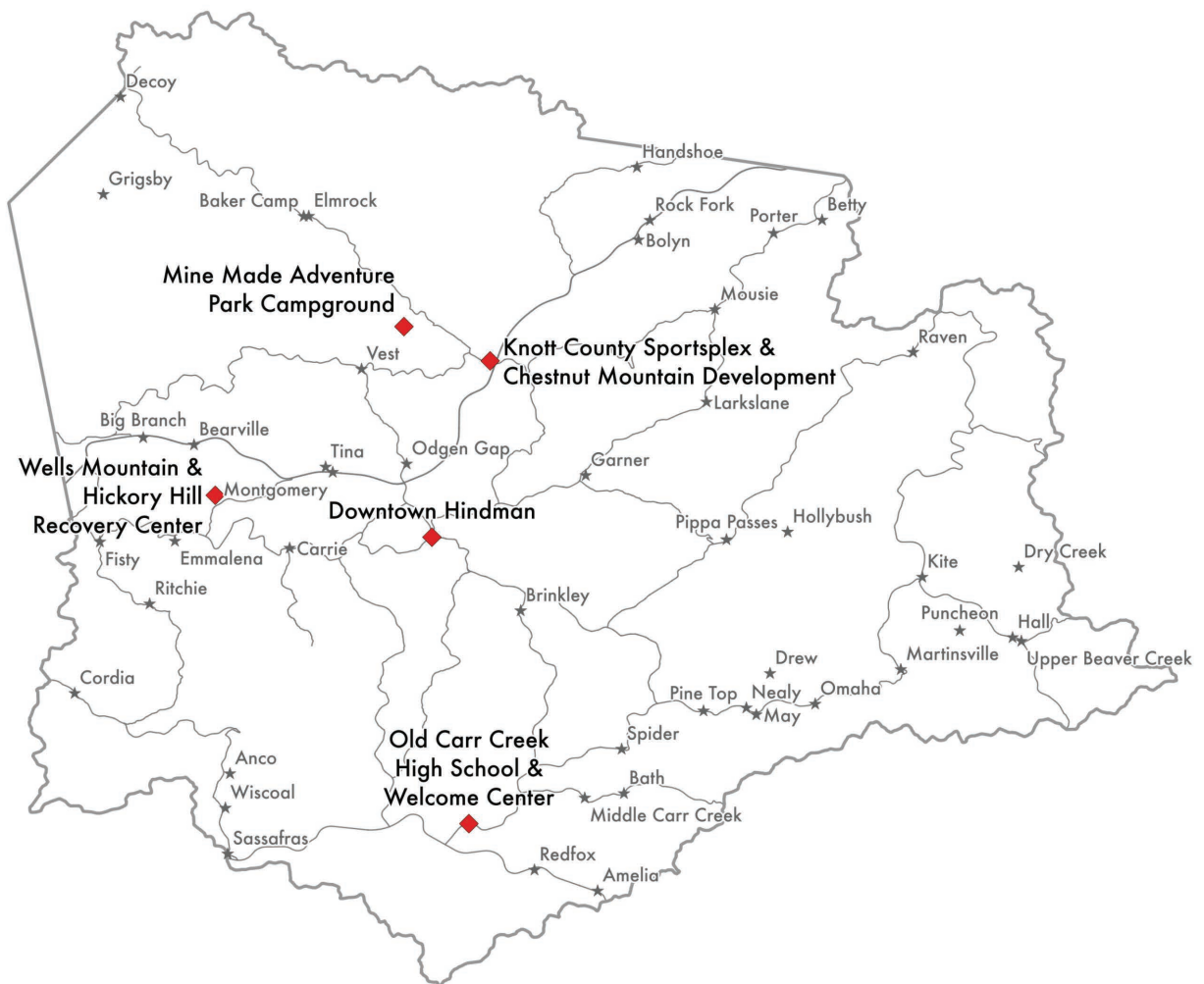
KNOTT COUNTY BROADBAND PRIORITY AREAS

After conferring with the providers of broadband in Knott County, analyzing the network resource availability, and assessing where network resources are vitally needed, Knott County Judge Executive Zach Weinberg has identified areas of interest for network expansion.

These broadband priority areas have been elevated due to their immediate economic development impact; the capacity to help expand the network presence for more Knott County residents; and cost effective nature of the project

Knott County's broadband priority project areas are depicted in the map below. These are sites, locations, and communities where network improvements can have an impact on the local economy and general quality of life for Knott County. Confronting access challenges throughout the county, priority project areas at this juncture encompass fiber access to the:

- Downtown Hindman and vicinity
- Mine Made Adventure Park Campground
- Wells Mountain and Hickory Hill Recovery Center area
- Knott County Sportsplex and Chestnut Mountain Development Area
- Old Carr Creek High School and Welcome Center area



ADOPTION

The Knott County Public Library in Hindman is located on the first floor of the Opportunity Center.

Along with this network expansion, Knott County must also provide opportunities for its residents and businesses to access important training on how to use these tools to their greatest effect through adoption programs. The public library is often the hub for technology training for those seeking to gain computing skills. Currently, Knott County Library in Hindman has 10 computers with each having a 10Mbps connection to the internet. There are no digital literacy programs reported at the library.

Many free digital literacy resources are available to Knott County residents either through their own residential internet connection or through public computers at the library.

- www.digitalliteracy.gov offers free adoption programs that range from learning the basics of a computer to job skills. The free computer basics programs include computer use, how to use software/applications, using the internet, communication through the web, and internet safety.
- <http://driveyourlearning.org/> is a free resource for technology adoption that offers participants training content from a variety of trainers. Participants can choose their learning priorities: job skills, social media, life skills, education and basic computer programming.
- www.common sense media.org offers families tools aimed to help their children excel in a media driven world without sacrificing safety.
- <http://lib2gov.org/> offers tools for public libraries specifically to help patrons access online government services.



GROWING BROADBAND'S IMPACT THROUGH THE KNOTT COUNTY PLAYBOOK

In effort to revitalize and diversify the county's economy, local leaders have undertaken significant planning projects and in coordination with the 5 county region have identified opportunities to utilize technology and fiber optic connectivity in new ways to enhance strategic economic development priorities such as healthcare, tourism development and industrial development. What follows is Knott County's Playbook for maximizing the impact of broadband toward these goals. It reflects the culmination of:

- A** broadband connectivity data analysis;
- B** pending state development (KentuckyWired); specific input and priorities of Knott County leaders from public and private sectors through Sector Broadband Planning Workshops;
- C** proven best practices from similar communities across the state and country;
- D** best practices regarding adoption programming and Knott County's adoption needs; and
- E** input from privately owned broadband/technology companies.

The playbook takes this information set and organizes it around foundational community broadband strategies, cost effectiveness, prioritization, and necessary times for completion:

- Network Expansion;
- Increase Digital Literacy;
- Technology Driven Economic Development/Jobs; and
- Local Public Private Partnership (P3) and Planning.

KNOTT COUNTY BROADBAND PLAYBOOK

STRATEGIC BROADBAND PRIORITIES

Knott County has significant fiber to the premise assets already in place through Thacker-Grigsby Telephone and TVS cable system. While some gaps in high-speed coverage remain, Thacker-Grigsby and TVS have build plans in place to have fiber to the premise throughout Knott County within the next 3-5 years.

Given the robust fiber network planned or already in place, local resources should be prioritized in three areas:

ACCELERATE FIBER DEPLOYMENT THROUGH PARTNERSHIP

Fiber networks offer a substantial competitive advantage for communities with ubiquitous, high-speed broadband coverage. To realize this growth potential more quickly, local officials and community leaders should join with the primary broadband providers in the community to evaluate ways in which this deployment could be accelerated through public-private partnership. In many cases, capital costs limit the pace with which fiber networks can be deployed by private entities. If a public-private partnership can lower the barriers in accessing capital, these networks could be deployed more quickly.

FIBER ENABLED JOBS

As the community prioritizes support for network deployment, similarly and with the same level of zeal, community leaders must attack the issue of broadband adoption. A robust, ubiquitous network will not provide value to the community if the community is not prepared to use that network. Community leaders should develop a plan to enhance broadband adoption through relevance and awareness. Broadband must make a difference in peoples' lives before people view it as important. A plan to accomplish this goal could include fostering telework/work-from-home based opportunities, industrial recruitment of fiber dependent industries to bring new jobs to the area, training and educational partnerships with Alice Lloyd College and other post-secondary institutions, etc.

TOURISM

Knott County has long held tourism as a priority for economic development and diversification. Community leaders should revisit and revise their county tourism plans as necessary to ensure that fiber availability and deployment is a central element of both the county's marketing plans as well as deployment and access in tourist destinations in the County. For example, robust mobile access should be prioritized around the Mine Made Adventure Park. These types of connectivity assets will be a mark of distinction for tourist destinations, particularly in the local region, as robust connectivity is a growing prerequisite for travelers.

Development of these strategic priority industries represents a significant economic opportunity for a future economic base in Knott County. To accomplish these goals, Knott County leadership should employ an execution strategy as outlined below:

KNOTT COUNTY PLAYBOOK

Development of these strategic priority industries represents a significant economic opportunity for a future economic base in Knott County. To accomplish these goals, Knott County leadership should employ an execution strategy as outlined below:

1 | ECONOMIC DEVELOPMENT / JOBS

- A** Establish top sector priorities for economic growth opportunities by leveraging existing assets in the community;
- B** Organize a local coalition for each sector to identify and prioritize growth/expansion goals and opportunities, particularly those enabled through increased high-speed connectivity; and
- C** With support from economic development consultants, finalize an action plan to achieve the growth goals.

Econ Dev./Jobs	3 Months	6 Months	12 Months	Ongoing
	Establish economic development priorities that take full advantage of improved broadband availability	Provide more training for local businesses on how to use the internet for their operations and marketing	Increase public awareness and public training opportunities for personal and entrepreneurial uses of broadband	Annual refresh of economic development priority

2 | FIBER NETWORK EXPANSION

- A Determine Network Expansion Priority Areas & Platform
 - Align with economic development strategies/objectives
- B Establish Partnerships for Build-Out Financing
 - Seek Out and Formalize Provider Partnerships
 - Organize appropriate financial structuring for network construction and operations transaction with support of technical and legal consultants
 - Secure financing through grants, loans, bonds

Fiber Network Expansion	3 Months	6 Months	12 Months	Ongoing
	<p>Commission engineering studies for and gather more connectivity info for the following areas of interests:</p> <ul style="list-style-type: none"> • Downtown Hindman and vicinity • Mine Made Adventure Park Campground • Wells Mountain and Hickory Hill Recovery Center area • Knott County Sportsplex and Chestnut Mountain Development Area • Old Carr Creek High School and Welcome Center area 	<p>Establish inventory of broadband areas of service and quality of service across the county</p> <p>Develop last mile strategy that takes advantage of KentuckyWired fiber route.</p> <p>Conduct a fiber to the tower (FTTT) study that identifies the cell towers in Knott County without a fiber connection and strategies for taking advantage of the KentuckyWired fiber network for improved mobile data capacity county wide</p> <p>Survey existing tower facilities, wireless coverage demand, and accessibility within Knott County</p> <p>Work with tower owners and/or carriers to complete a cost feasibility analysis to determine interest and viability in upgrading tower facilities with fiber access in conjunction with future fiber expansion and/or Kentucky-Wired projects</p>	<p>Refresh connectivity inventory</p> <p>Review local policies for unnecessary barriers to private investment resources</p> <p>Develop a redundancy strategy for anchor institutions and anchor/commercial tenants</p>	<p>Annual refresh of Knott County broadband map</p> <p>Annual Knott County Sector Broadband Planning Workshop.</p>

3 | INCREASE DIGITAL LITERACY

Increase Digital Literacy	3 Months	6 Months	12 Months	Ongoing
	Inventory basic computer skills training resources in Knott County	<p>Establish faster connections at Knott County Public Library</p> <p>Develop strategy for offering free wifi at Knott County public facilities</p> <p>Develop a county wide adoption strategy that includes:</p> <ul style="list-style-type: none"> • Public wifi sites • Basic computer skills training through the Knott County Pubic Library • Workforce training • Digital literacy awareness campaigns 	<p>Establish a Knott County 1:1 program task force to develop a connectivity plan suitable to support a 1:1 K-12 deployment.</p> <p>All Knott County facilities to have free public wifi.</p>	Increase the digital literacy training at the Knott County Library: jobs applications, device/access/use, E-books, setup of new devices

4 | LOCAL PUBLIC PRIVATE PLANNING

Local	3 Months	6 Months	12 Months	Ongoing
Public Private Planning				
	Work with Thacker-Grigsby and Eastern Kentucky Network to clarify service areas in Knott County	Establish a Knott County Broadband Advisory Team	Develop first annual "Knott County Technology Progress Report"	Quarterly meetings of the Knott County Broadband Advisory Team



SKY FM COUNTY PLAYBOOK

LESLIE COUNTY

LESLIE COUNTY BROADBAND PLAYBOOK

LESLIE COUNTY AT GLANCE

Leslie County is home to nearly 11,000 Kentuckians according to the 2015 census. The county covers 404 square miles. Its county seat is Hyden. Leslie County is the home of Frontier Nursing University in Wendover.

LESLIE COUNTY HAS 21 SCHOOLS AND LOCAL GOVERNMENT FACILITIES:

K-12 schools	5	Public safety	4
Post secondary sites	3	Community ed/extension	2
Public library	1	Community center	1
Healthcare facilities	3	Local government	2

LESLIE COUNTY OVERVIEW

Leslie County major industries include coal and mining related fields. However, the recent downturn of the coal industry has decimated the local and regional economy. In 2016, the Leslie County unemployment rate is 12.4%, but even this elevated figure does not reflect a substantial percentage of the adult population no longer even seeking to participate in the workforce. Much of Leslie County is underserved for broadband, which is a vital economic tool. Leslie County leaders are concerned that the lack of connectivity on an ongoing basis will increase outmigration for Leslie County. Leslie County Judge Executive Jimmy Sizemore is to be commended for establishing a broadband board of community stakeholders and leaders to provide direction to the county's efforts, as much work needs to be done.

Leslie County residents appear eager to access the internet. A Kentucky Department for Libraries and Archives study published in 2015 confirmed Leslie County Public Library ranked number one in the state for annual wireless sessions per capita¹ and for circulation of electronic material per capita.² Leslie County residents are eager to access information through the internet, but they have difficulty doing so at home or other locations. Patrons' use of Leslie County Public Library resources indicate a larger trend in Leslie County where its residents are in need of broadband based communications but are underserved for those broadband based services.

As a part of the SKY FM broadband planning process to address the county's need for expanded broadband, Leslie County leaders met for multiple work sessions over the last several months to gather data, identify ways in which a high-speed data network could advance strategic economic development priorities, and then compile those efforts into this community broadband plan.

1 <http://publiclibrariesonline.org/2015/06/how-kentuckys-public-libraries-are-enabling-digital-literacy/>

2 <http://kdla.ky.gov/librarians/plssd/Documents/KDLA1314.pdf>

BROADBAND OPPORTUNITIES IN LESLIE COUNTY: SECTOR BROADBAND PLANNING WORKSHOPS



Eric Mills (CNX) facilitates the Leslie County sector workshop along with Leslie County Judge Executive Jimmy Sizemore at the Leslie County 911 Dispatch Office

STEP 4 SECTOR WORKSHOPS

OBJECTIVE: Facilitate group dialogue on individual sector needs and identify common challenges and opportunities for broadband growth in the community.

OUTCOME: Identify the specific challenges and opportunities faced by various sectors of the community leadership infrastructure, including analysis on community broadband issues presenting barriers to growth in broadband access, adoption and use.

CNX hosted and facilitated a SKY FM sector workshop and broadband planning session on August 25, 2016 at the Leslie County 911 Center in Hyden. This important planning session, attended by a broad swath of public and private stakeholders, demonstrated the community's interest and commitment to improving the access to high-speed and high-capacity broadband. Twenty-one participants representing a variety of entities discussed Leslie County's broadband-based opportunities, barriers, and priority next steps. Participating entities included:

Kentucky Cable Association
City of Hyden
Appalachian Regional Healthcare
Leslie County
Hyden Citizens Bank
The Center for Rural Development
Eastern Kentucky Network
Leslie County Library
Hazard Community & Technical College
Leslie County Emergency Management

AT&T
Kentucky Highlands Investment Corporation
Frontier Nursing University
Leslie Board of Education
Mary Breckinridge ARH Hospital/Leslie
Fiber Board
Thacker-Grigsby/TVS
TVS Cable
CNX

HIGHLIGHTS OF THE CROSS-SECTOR PLANNING DISCUSSION

BROADBAND OPPORTUNITIES

ECONOMIC DEVELOPMENT - Job opportunities/customer service opportunities

- Telework/telecommuting
 - Tourism
 - Facilitate entrepreneurship opportunities/expanded marketing opportunities for local niche businesses (i.e. media development/visual arts/remote service industries)
 - Access to resources (raw materials) at “wholesale pricing”
- Enhancing emergency communications
 - Improved communications with health care facilities
- Health Care
 - Telemedicine affording local patients the opportunity to receive remote treatment from specialists
 - Home monitoring of patients

EDUCATION

- Online and/or virtual learning (at home and remotely during the school day)
- Expanded use of virtual learning resources from home
- Adult education
- Remote access for students to attend school remotely on snow days
- Employment upon education
- Dual credit offerings/ability
- Improve college readiness and graduation rates

ECONOMIC ENHANCEMENT

- Retaining the expenditure of monies for goods, services, coursework, etc., locally

BARRIERS TO BROADBAND EXPANSION

- Low adoption rate. A provider noted an area with a 29% subscription rate where service is available.
- Not all Leslie County residents can afford the monthly cost of internet service.
- Some Leslie County residents have a decreased perceived value of internet service.
- Leslie County internet subscribers have decreased perceived value for faster internet service (why should I upgrade?).
- Aging population lacks basic computing skills.
- Outmigration of younger citizens
- Leslie County is not densely populated.
- The Leslie County community needs “bigger picture thinking” in order to prioritize technology driven economic development.
- Slow service speeds to Leslie County homes
- Environmental challenges to expansion of broadband service

BROADBAND SOLUTIONS

ADOPTION

- Kiosks for education/awareness building at Hazard Community & Technical College
- Greater focus on telework career pathway in schools
- Thinking of digital extension like the agriculture extension model
- Awareness campaigns needed because “people don’t know what they don’t know”
- Consider a local USF subsidy program
- Provide ecommerce training for small businesses and entrepreneurs
- Economic Development/jobs

ENCOURAGE “maker economy” and open new markets for new products

- Identify global markets in which Leslie County can compete to displace lost mining jobs
- Participate in continuing education for public private partnerships
- Increase training for telework/customer service jobs
- Promote Leslie County community: great place to live, attractive to home based professionals (lifestyle professionals), media development, remote service industries, content creation, and access to raw materials
- Frontier Nursing University needs IT workers
- Continue an ongoing Leslie County public private partnership for technology planning

PUBLIC SAFETY

- Public safety/911 services can provide information in real time
- Better broadband can increase effectiveness of emergency communications
- Emergency room/ambulance data needs effective transfer platform

EDUCATION

- 1:1 initiative in Leslie County public schools is limited to on-campus devices due to low home broadband access/adoption.
- Promote online/virtual learning
- Develop alternative instruction program (snow days)
- Provide workforce/adult retraining programs for those who need updated work skills
- Align curriculum with employers
- Frontier Nursing offers online nursing courses

HEALTHCARE

- Utilize telemedicine cost savings measures and improved healthcare
- Use improved network conditions to provide remote monitoring of home based care

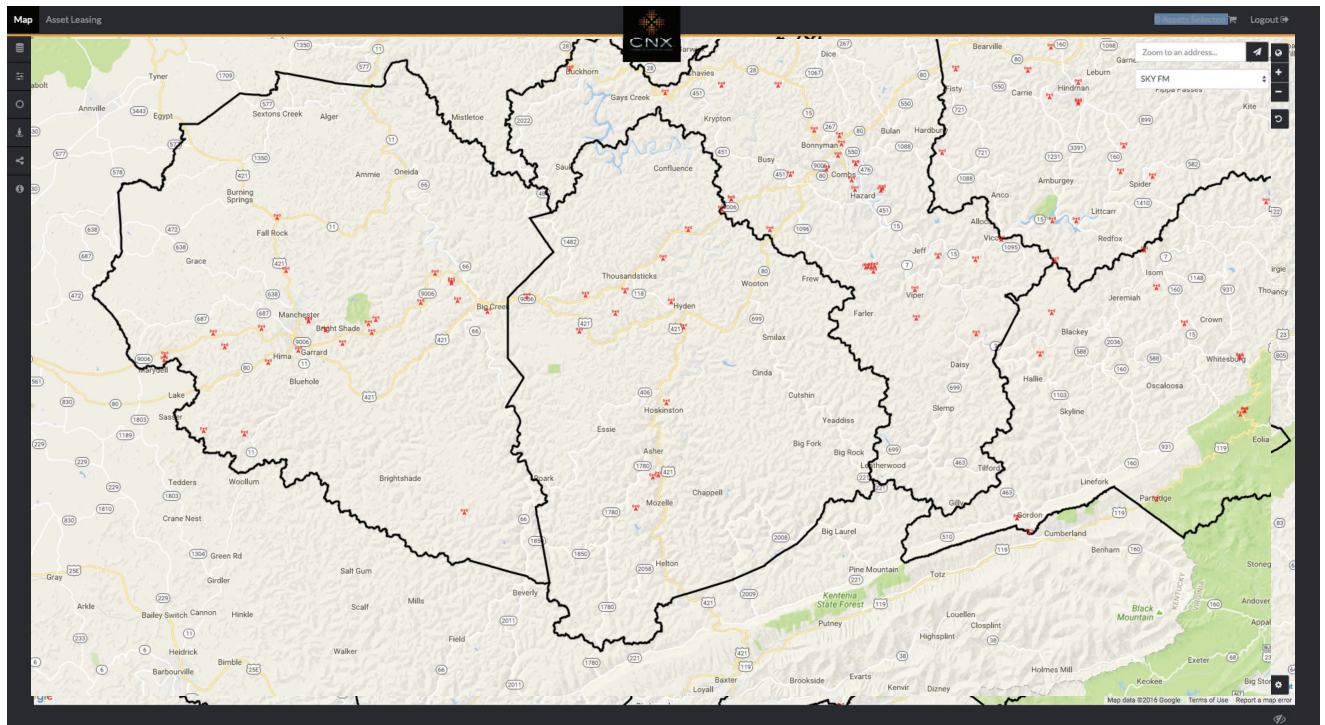
These important sector discussions have formed a baseline of broadband needs and opportunities for Leslie County. The SKY FM project calls for these leader informed priorities to be examined from the perspective of the Leslie County broadband network presence and capacity.

GROWING BROADBAND'S PRESENCE IN LESLIE COUNTY

CNX gathered data from multiple broadband providers and other sources to bring data to bear upon the local planning for the expansion of broadband in Leslie County. Important outcomes of the SKY FM project are the identification of priority broadband expansion projects that require an engineering solution.³ The broadband data has been visualized in CNX's broadband planning tool and has been shared with Leslie County's Judge Executive Jimmy Sizemore with the goal of identifying and prioritizing broadband expansion projects that will have the most impact for Leslie County's economic development and overall quality of life. What follows are the highlights of that data analysis and working with Judge Sizemore.

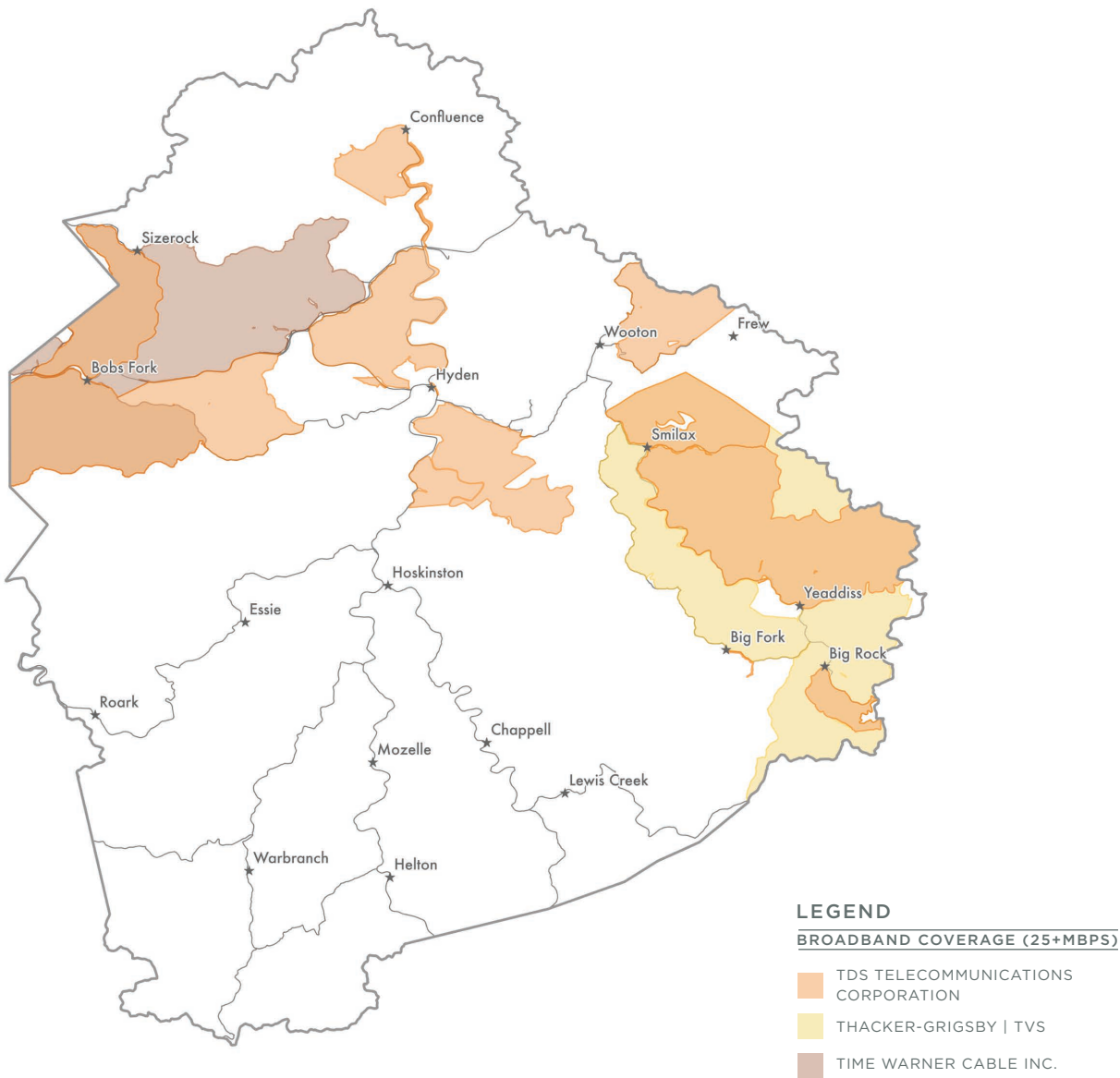
LESLIE COUNTY TELECOMMUNICATIONS TOWERS

Mobile connectivity demands and data consumption are growing at exponential rates nationwide. Rapidly emerging "smart devices" only underscore the need for robust mobile data infrastructure. Telecommunications towers that support mobile data applications become dramatically more effective when those towers are connected to a fiber network. County leaders should work closely with mobile data network operators to maximize any fiber build plans to include underserved and new tower construction coverage as anchor tenants on any potential new fiber networks in the county. Leslie County has 13 wireless communications towers registered with the Federal Communications Commission, as seen in the image below taken from the CNX data portal.⁴



As depicted on CNX's Broadband Platform, there are 13 wireless communication towers in Leslie County.

-
- 3 The preliminary engineering and cost estimation of these solutions is a recommended next step of the SKY FM project.
 - 4 The data is cited from the FCC ASR database (<http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly>). The data are current as of 2016/11/13.
-



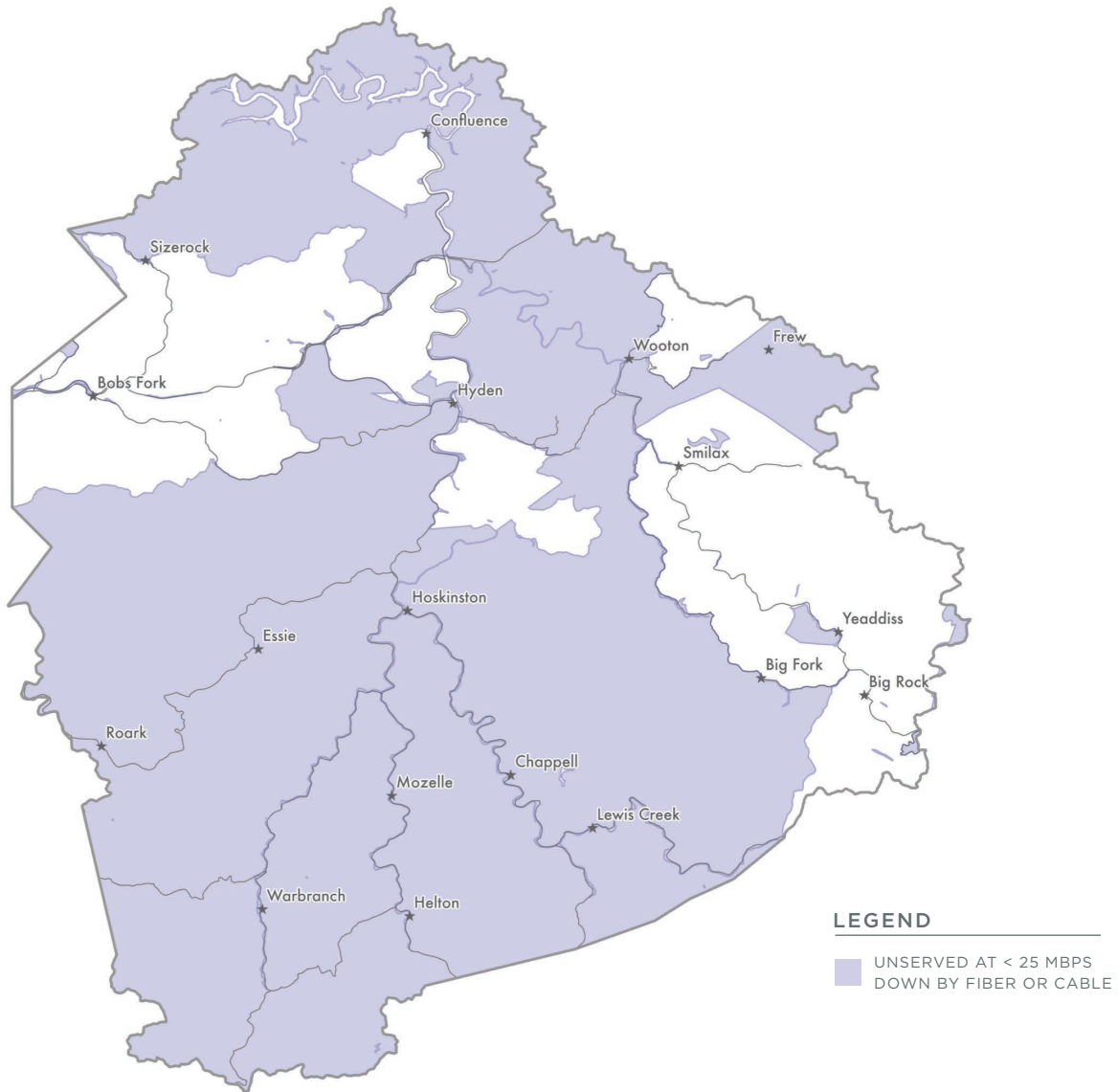
LESLIE COUNTY HOUSEHOLD 25MBPS+ AVAILABILITY

For planning purposes and to in order to maintain industry standards for broadband speed, 25Mbps should be the minimum standard for internet connectivity that is considered broadband.⁵ The map above shows the areas of Leslie County that are served by 25Mbps or higher connections.⁶ The different colors represent the various providers of internet service. Any area not colored represents either an unserved or underserved portion of the community.⁷

5 The FCC now defines “broadband” as an internet connection that is capable of 25Mbps and above for data download and 3Mbps and above for data upload.

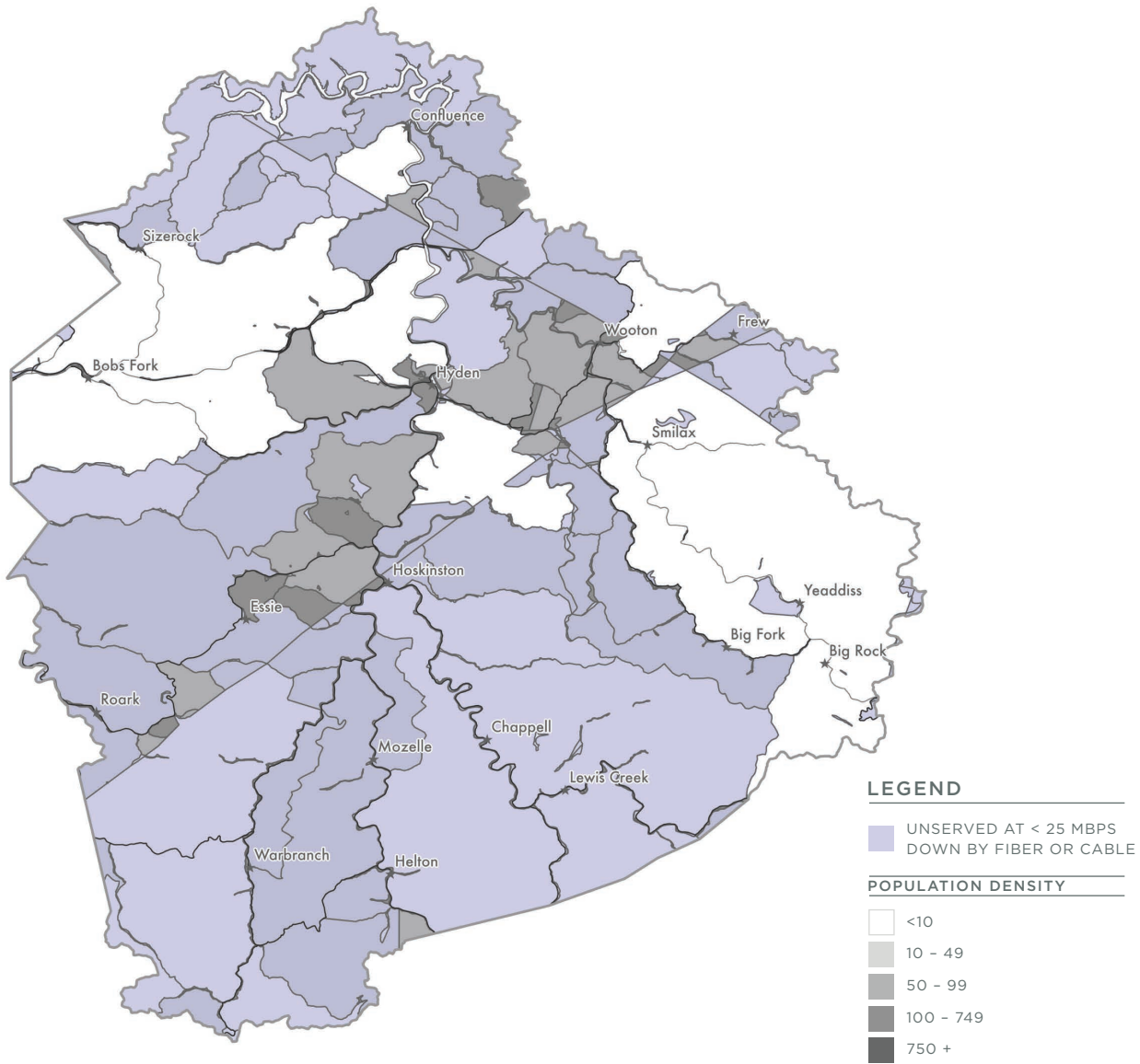
6 The colored areas of the map above represent the various cable providers that are capable of providing 25Mbps service.

7 Unserved means no internet service is available. Underserved means internet service is available, but it does not meet the 25 Mbps threshold.



UNSERVED LESLIE COUNTY COMMUNITIES

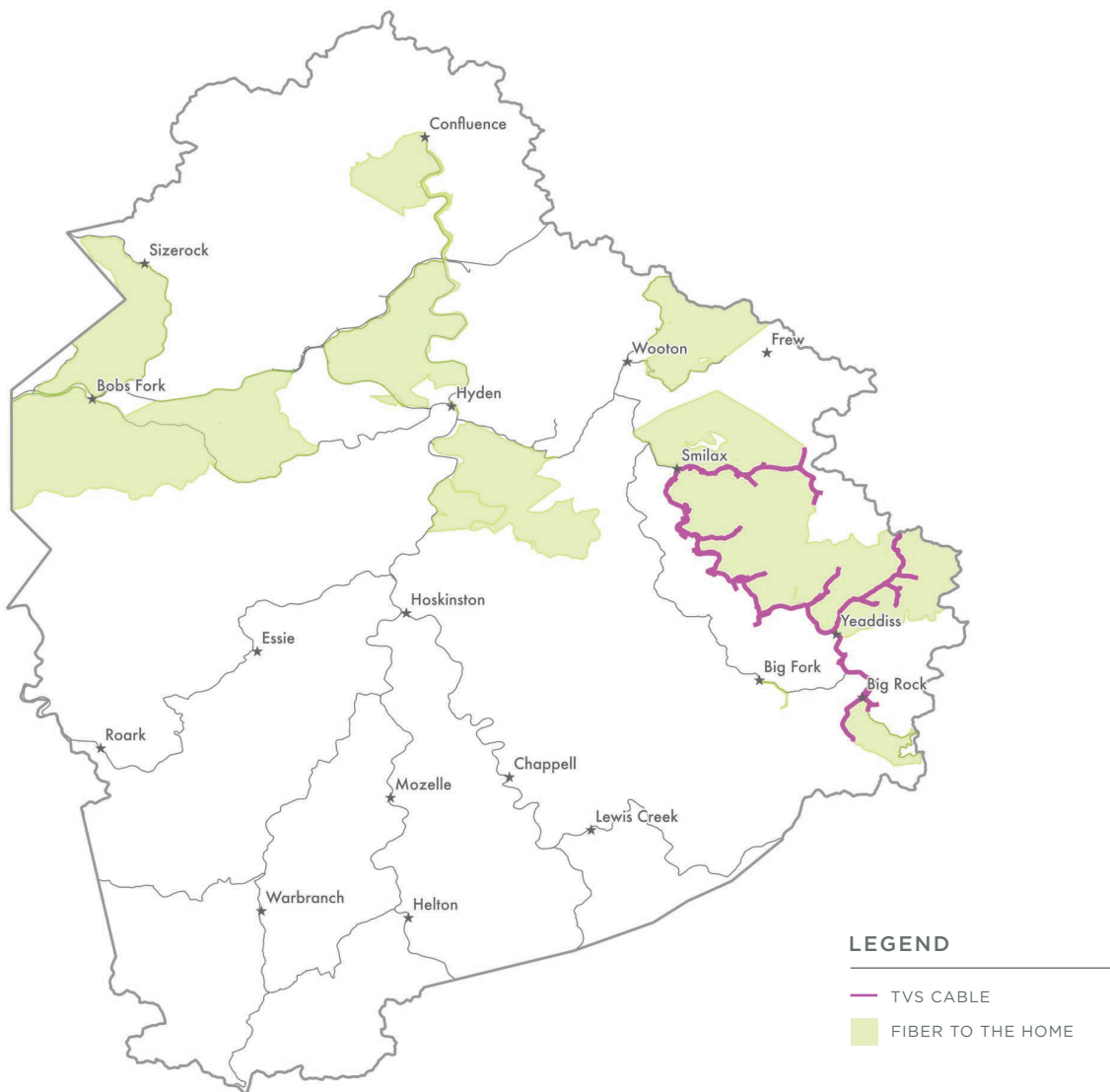
The map above depicts in color those portions of Leslie County that are underserved by internet speeds of 25Mbps or greater.



DENSITY OF HOUSEHOLDS IN UNDERSERVED PORTIONS OF LESLIE COUNTY

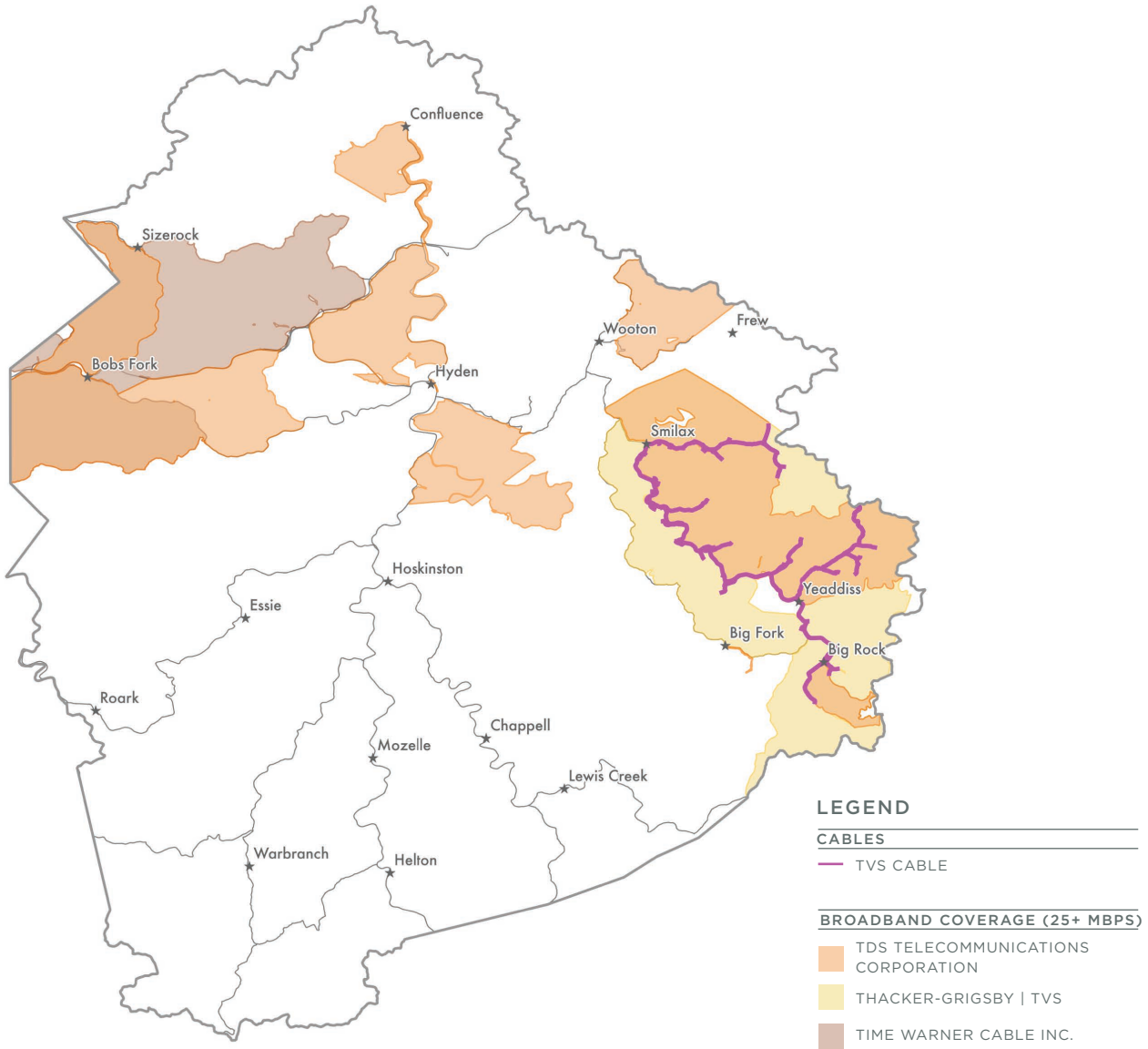
Considering the number of homes in an underserved portion of the county is a helpful indicator of how many residents will be positively impacted by an expansion in broadband availability. The map above depicts the density of homes in underserved areas. The darker the shades of grey color the higher the number of homes are located in that portion of the county.⁸

⁸ The density of households is organized by census blocks.



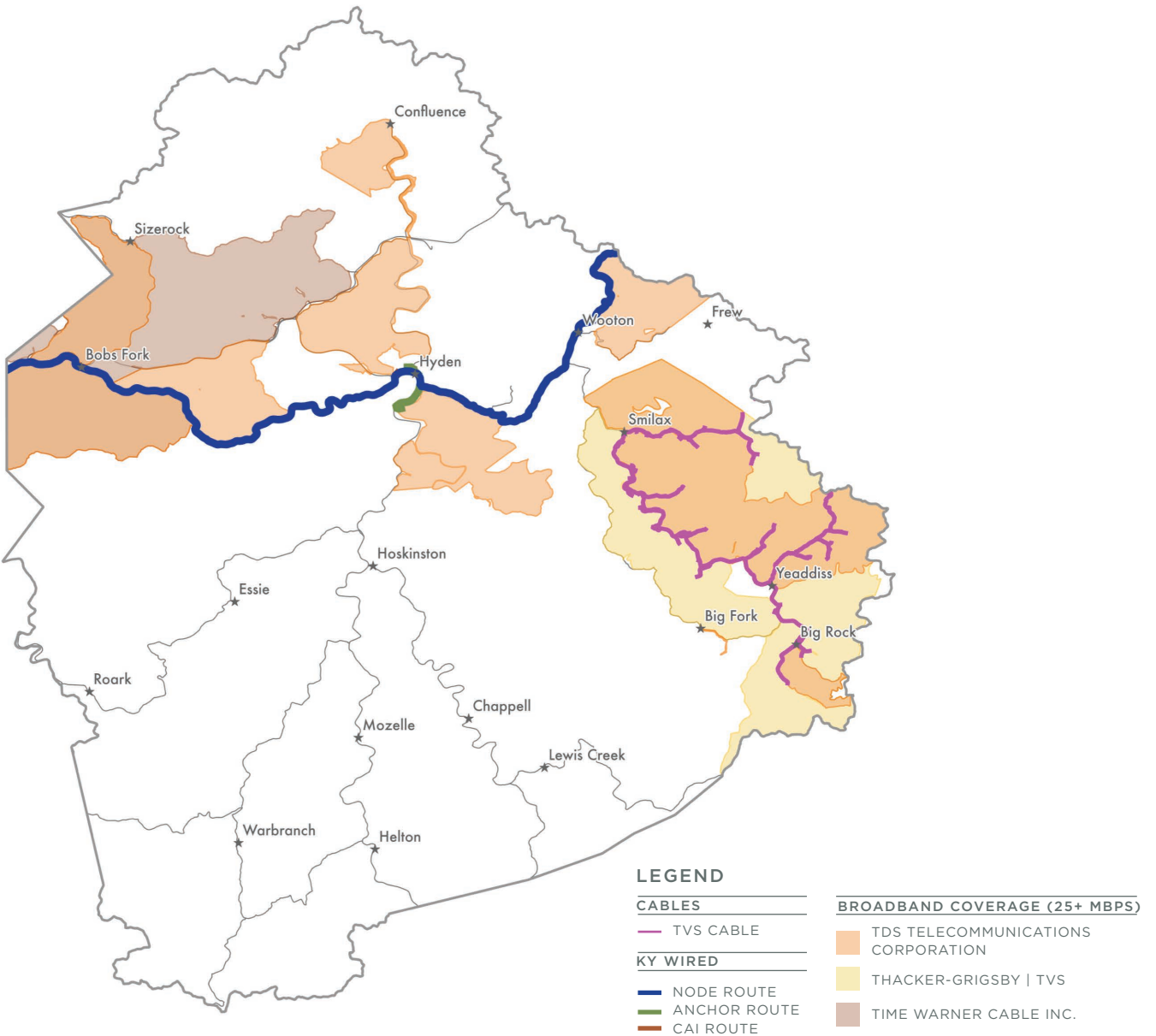
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Fiber networks are the backbone of a community’s internet connectivity. They are high-speed and high-capacity networks. Underserved portions of the county need a means to connect to the fiber network or an extension of the fiber itself. The map above depicts the general existing fiber networks in Leslie County. The map above also demonstrates the relationship of fiber to the “last mile” network referenced above. “Last mile” providers are the companies that help individual homes and businesses connect to the fiber networks the map above.



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The map above demonstrates the addition of the KentuckyWired network. KentuckyWired is the statewide network referenced earlier that will provide a fiber based node in each Kentucky county thus enabling each county to implement its own last mile strategy for homes, businesses, and public facilities. The blue line represents the proposed KentuckyWired path.

These maps demonstrate in a more technical manner the broadband opportunities Leslie County leaders discussed as part of the SKY FM planning project. Knowing where network access is lacking, how it affects the community, and where pending development is coming can inform relevant planning for improvements.

LESLIE COUNTY BROADBAND PRIORITY AREAS

After conferring with the providers of broadband in Leslie County, analyzing the network resource availability, and assessing where network resources are vitally needed, Leslie County Judge Executive Jimmy Sizemore has identified several areas of interest for network expansion. These broadband expansion priority areas have been elevated due to their: immediate economic development impact; the capacity to help expand the network presence for more Leslie County residents; and cost effective nature of the project.

Leslie County’s broadband expansion priority areas are depicted in the map above below. These are sites, locations, and communities where network improvements can have an impact on the local economy and general quality of life for Leslie County. Confronting access challenges throughout the county, priority project areas at this juncture encompass fiber access to:

- downtown Hyden area including Mary Breckinridge ARH Hospital, Frontier Nursing University; and Hyden Health and Rehabilitation Center; as well as residences and retail corridors surrounding those areas;
- the Leslie County 911 Center;
- Richard M. Nixon Recreation Center;
- Hurricane Creek Mine Memorial; and
- Frontier Nursing Service/Wendover Bed and Breakfast Inn area.



ADOPTION

Along with this network expansion, Leslie County must also provide opportunities for its residents and businesses to access important training on how to use these tools to their greatest effect through adoption programs. The public library is often the hub for technology training for those seeking to gain computing skills. Currently, Leslie County Library in Hyden has 20 computers with each having a 10Mbps connection to the internet. There are no digital literacy programs reported at the library. The library does have an e-book program where patrons can access digital books.

As earlier noted, in 2015, Leslie County Public Library ranked number one in the state for annual wireless sessions per capita⁹ and circulation of electronic material per capita.¹⁰ Leslie County residents are eager to access information through the internet, but they have difficulty doing so at home or other locations.

With improved broadband presence in homes, the library or other public facilities, Leslie County residents could access many of the available and free digital literacy resources like the following:

- www.digitalliteracy.gov offers free adoption programs that range from learning the basics of a computer to job skills. The free computer basics programs include computer use, how to use software/applications, using the internet, communication through the web, and internet safety.
- <http://driveyourlearning.org/> is a free resource for technology adoption that offers participants training content from a variety of trainers. Participants can choose their learning priorities: job skills, social media, life skills, education and basic computer programming.
- www.common sense media.org offers families tools aimed to help their children excel in a media driven world without sacrificing safety.
- <http://lib2gov.org/> offers tools for public libraries specifically to help patrons access online government services.

9 <http://publiclibrariesonline.org/2015/06/how-kentuckys-public-libraries-are-enabling-digital-literacy/>

10 <http://kdla.ky.gov/librarians/plssd/Documents/KDLA1314.pdf>

GROWING BROADBAND'S IMPACT THROUGH THE LESLIE COUNTY PLAYBOOK

In an effort to revitalize and diversify the county's economy, local leaders have undertaken significant planning projects and in coordination with the five county region have identified opportunities to utilize technology and fiber optic connectivity in new ways to enhance strategic economic development priorities such as healthcare, tourism development and industrial development. What follows is Leslie County's Playbook for maximizing the impact of broadband toward these goals. It reflects the culmination of:

- A** broadband connectivity data analysis;
- B** pending state development (KentuckyWired);
- C** specific input and priorities of Leslie County leaders from public and private sectors through Sector Broadband Planning Workshops;
- D** proven best practices from similar communities across the state and country;
- E** best practices regarding adoption programming and Leslie County's adoption needs; and
- F** input from privately owned broadband/technology companies.

The playbook takes this information set and organizes it around foundational community broadband strategies, cost effectiveness, prioritization, and necessary times for completion:

- Network Expansion;
- Increase Digital Literacy;
- Technology Driven Economic Development/Jobs; and
- Local Public Private Partnership (P3) and Planning.

Lastly, the playbook organizes these informed strategies by cost effectiveness, prioritization, and necessary time for completion.

LESLIE COUNTY BROADBAND PLAYBOOK

STRATEGIC BROADBAND PRIORITIES

Leslie County faces significant broadband challenges, both in access and adoption. County Judge Executive Jimmy Sizemore is to be commended for establishing a broadband board of community stakeholders and leaders to provide direction to the county's efforts, as much work needs to be done.

To make substantive progress in improving access and adoption of high-speed broadband in Leslie County, local leaders and stakeholders should rally behind and support the work of the county's broadband board. Using this group as a platform, local leaders can organize efforts around two key priorities:

ACCELERATE ACCESS THROUGH PUBLIC-PRIVATE PARTNERSHIP

Fiber networks offer a substantial competitive advantage for communities with ubiquitous, high-speed broadband coverage, but in this area, Leslie County is lagging behind due to limited involvement by local incumbent providers. To realize the true promise and potential of fiber networks, the county will therefore be required to take a more prominent role in providing the leadership and incentive to establish a locally-owned fiber network.

As such, local officials and community leaders should seek out public and private broadband provider entities that understand broadband network construction and operations, particularly those with experience in partnering with municipal entities. This group then should establish network access priorities and complete desktop engineering studies to understand the scope and cost of any possible new network build. With the support of industry partners, Leslie County officials and local leaders can then evaluate potential financing options for this network through public or public-private partnership approaches and make a determination of the county's role in a new, locally based fiber network construction project and establish the most viable path forward to see this network come to fruition.

FIBER ENABLED JOBS

As the community prioritizes support for network deployment and access improvements, community leaders must also attack the issue of broadband adoption similarly and with the same level of zeal and effort. Increasing access alone will not automatically result in the county realizing all of the promises and true benefits of high-speed broadband access. The county must be prepared to use a high-speed network.

Community leaders should develop a plan to enhance broadband adoption through relevance and awareness. Broadband must make a difference in peoples' lives before people will view it as important. A plan to accomplish this goal could include fostering telework/work-from-home based opportunities, industrial recruitment of fiber dependent industries to bring new jobs to the area, training and educational partnerships with local schools and more, etc.

Development of these strategic priorities represents a significant economic opportunity in Leslie County. To accomplish these goals, Leslie County leadership should employ an execution strategy as outlined below:

1 | ECONOMIC DEVELOPMENT / JOBS

- A Establish top sector priorities for economic growth opportunities by leveraging existing assets in the community;
- B Establish top sector priorities for economic growth opportunities by leveraging existing assets in the community
- C Continued collaboration with the broadband board established by Judge Executive Sizemore to identify and prioritize growth/expansion goals and opportunities, particularly those enabled through increased high-speed connectivity

Econ Dev./Jobs	3 Months	6 Months	12 Months	Ongoing
	Leslie County broadband board can identify priority broadband based workforce solutions	Explore alignment between K-12 curriculum, technical training centers/HCTC, and workforce programs Provide more training for local businesses on how to use the internet for their operations and marketing--ecommerce	Increase public awareness and support public training opportunities for personal and entrepreneurial uses of broadband	Promote free workforce development and small business ecommerce training programs

2 | FIBER NETWORK EXPANSION

- A Determine Network Expansion Priority Areas & Platform
 - Align with economic development strategies/objectives
- B Commission Engineering Study to Design and Derive Cost Estimates
 - Engage planning and engineering firm to design “desktop” build plans
- C Establish Partnerships for Build-Out Financing
 - Seek Out and Formalize Provider Partnerships
 - Organize appropriate financial structuring for network construction and operations transaction with support of technical and legal consultants
 - Secure financing through grants, loans, bonds, or public private partnerships
- D Complete Final, Field Engineering and Commission Construction

Fiber Network Expansion	3 Months	6 Months	12 Months	Ongoing
	<p>Gather more connectivity info for the following areas of interests and commission engineering studies to access fiber expansion projects in:</p> <ul style="list-style-type: none"> • Downtown Hyden area including Mary Breckinridge ARH Hospital, Frontier Nursing University; and Hyden Health and Rehabilitation Center; as well as residences and retail corridors surrounding those areas; • The Leslie County 911 Center; • Richard M. Nixon Recreation Center; • Hurricane Creek Mine Memorial; and • Wendover Bed and Breakfast Inn area 	<p>Continue development of last mile strategy that takes advantage of KentuckyWired fiber route.</p> <p>Conduct a fiber to the tower (FTTT) study that identifies the cell towers in Leslie County without a fiber connection and strategies for taking advantage of the KentuckyWired fiber network for improved mobile data capacity county wide.</p> <p>Survey existing tower facilities, wireless coverage demand, and accessibility within Leslie County</p> <p>Work with tower owners and/or carriers to complete a cost feasibility analysis to determine interest and viability in upgrading tower facilities with fiber access in conjunction with future fiber expansion and/or Kentucky-Wired projects</p>	<p>Refresh connectivity inventory.</p> <p>Review local policies for unnecessary barriers to private investment resources.</p> <p>Develop a redundancy strategy for anchor institutions and anchor/commercial tenants.</p>	<p>Annual refresh of Leslie County broadband map</p> <p>Annual Leslie County sector broadband planning workshop</p>

3 | INCREASE DIGITAL LITERACY

Increase Digital Literacy	3 Months	6 Months	12 Months	Ongoing
	Inventory basic computer skills training resources in Leslie County.	<p>Establish faster connections at Leslie County Public Library</p> <p>Develop strategy for offering free wifi at all Leslie County public facilities.</p> <p>Develop a county-wide adoption strategy that includes:</p> <ul style="list-style-type: none"> • Public wifi sites • Basic computer skills training through the Leslie County Public Library • Workforce training • Digital literacy awareness campaigns 	<p>Establish a Leslie County 1:1 program task force to develop a connectivity plan suitable to support the extension of Leslie County's 1:1 program to include residential use of devices (currently a barrier due to low connectivity and adoption in Leslie County student homes).</p> <p>All Leslie County facilities to have free public wifi.</p>	Increase the digital literacy training at the Leslie County Library: jobs applications, device/access/use, E-books, setup of new devices.

4 | LOCAL PUBLIC PRIVATE PLANNING

Local Public Private Planning	3 Months	6 Months	12 Months	Ongoing
	Promote public awareness and participation within the Leslie County broadband effort.	Continue the Leslie County broadband board planning.	First annual "Leslie County Technology Progress Report."	<p>Develop annual update to Leslie County Technology Report.</p> <p>Quarterly meetings of the Leslie County broadband board.</p>



SKY FM COUNTY PLAYBOOK

LETCHER COUNTY

LETCHER COUNTY BROADBAND PLAYBOOK

LETCHER COUNTY AT GLANCE

Letcher County is home to 23,000 Kentuckians according to the 2015 census. The county covers 339 square miles. Its county seat is Whitesburg.

LETCHER COUNTY HAS 24 SCHOOLS AND LOCAL GOVERNMENT FACILITIES:

K-12 schools	12	Healthcare facilities	3
Cooperative extension	1	Public safety	2
Public library	4	Local government	2

LETCHER COUNTY OVERVIEW

Letcher County's major industries include coal and mining related fields. However, the recent downturn in these industries has decimated the local and regional economy. In 2016, the Letcher County unemployment rate is 11.4%, but even this elevated figure does not reflect a substantial percentage of the adult population no longer even seeking to participate in the workforce.

As a part of the SKY FM broadband planning process to address the county's need for expanded broadband, Letcher County leaders met for multiple work sessions over the last several months to gather data, identify ways in which a high-speed data network could advance strategic economic development priorities, and then compile those efforts into this community broadband plan.

BROADBAND OPPORTUNITIES IN LETCHER COUNTY: SECTOR BROADBAND PLANNING WORKSHOPS



Letcher County Broadband Planning Workshop facilitated by CNX and Letcher County Judge Executive Jim Ward

STEP 4 | SECTOR WORKSHOPS

OBJECTIVE: Facilitate group dialogue on individual sector needs and identify common challenges and opportunities for broadband growth in the community.

OUTCOME: Identify the specific challenges and opportunities faced by various sectors of the community leadership infrastructure, including analysis on community broadband issues presenting barriers to growth in broadband access, adoption and use.

CNX hosted and facilitated a SKY FM sector workshop and broadband planning session on August 18, 2016 at Caudill Hall, Room 122, of Southeast Community & Technical College in Whitesburg.

Approximately twenty participants representing public and private entities discussed Letcher County's broadband-based opportunities, barriers, and priority next steps.

HIGHLIGHTS OF THE SECTOR PLANNING DISCUSSION

BROADBAND OPPORTUNITIES

EDUCATION

- Expand curriculum and content offerings for students
- Opportunity for online degrees
- Development of expanded workforce skill set with additional online course and training programs
- Help counter social injustice by affording residents equal access (currently wifi offered to residents at public library)
- Southeast Kentucky Community and Technical College (SECC), among other area higher education institutions, also offers online classes.
- Attendees reported that Jenkins City Schools have 200 mg and that 10 gig exists between the county schools.

HEALTHCARE

- Allow access to remote and/or specialized care clinics and medical providers
- Mountain Comprehensive Care offers specialized services in association with Kentucky River Comprehensive Care
- Kentucky River Comprehensive Care-- offers telehealth counseling and other fiber-enabled health care applications
- Needs exist for psychiatric care and addiction treatment; attendees shared that a special program will be launching soon in Whitesburg allowing pregnant women in addiction to receive treatment
- Juveniles continue to need access to care
- Centralize school nurses; attendees stated that Mountain Comprehensive Care had a partnership with the schools to provide school nurses.

ECONOMIC DEVELOPMENT

- Southeast Kentucky Community & Technical College offers training in digital media, systems and related areas
- Nurture and grow small businesses
- A strength is the existing interstate connectivity, ideal for projects such as the planned federal prison in Roxana
- Inter Mountain Cable has three different sources for backhaul through three different states, so their network is very reliable
- Allow residents to stay at home which in turn helps stabilize and even grow the population (outmigration)

BARRIERS TO BROADBAND EXPANSION

- Average revenue per user (ARPU)
- Backhaul costs prohibitive to providers
- Make ready costs high
- Equipment costs expensive
- Some providers face subsidized competition
- Consumer education

BROADBAND SOLUTIONS

- Public private partnerships
- Transitional cost subsidies for telework
- Turn to organizations such as the FFA for technology training

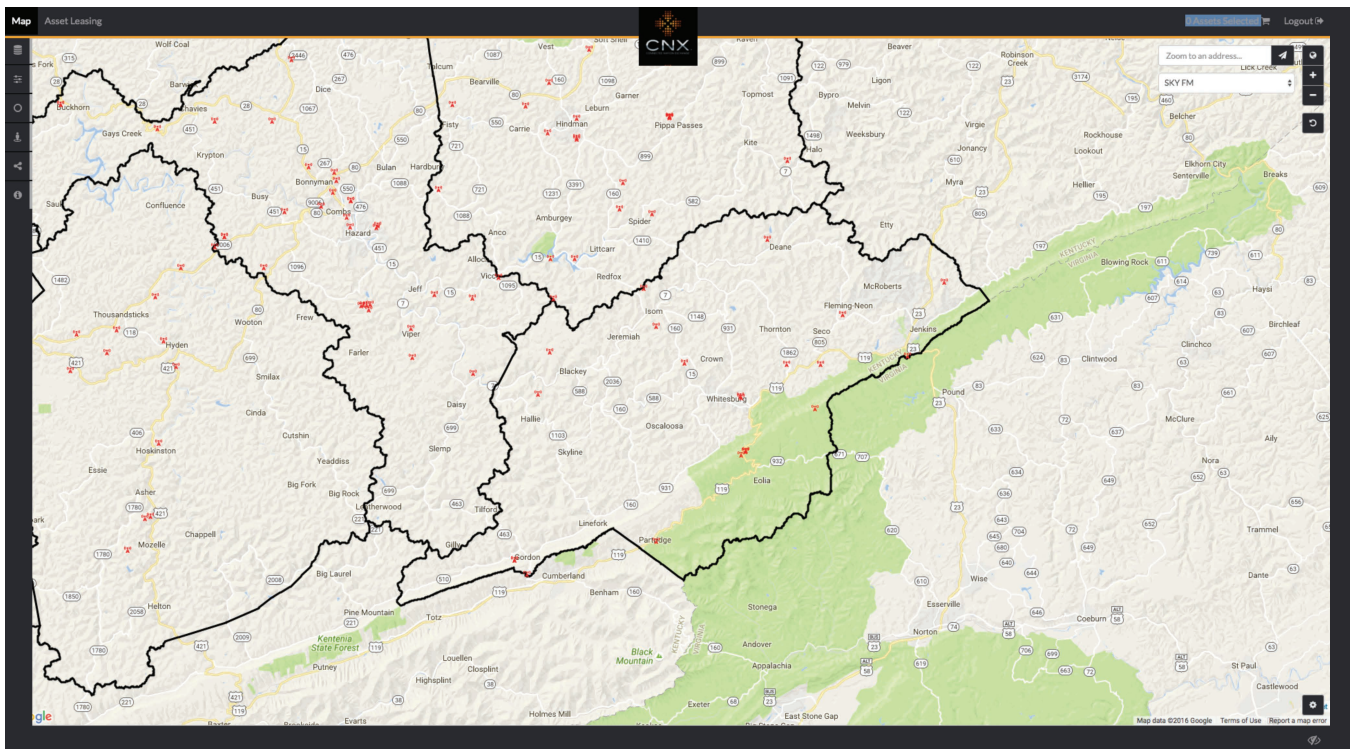
These important sector discussions have formed a baseline of broadband needs and opportunities for Letcher County. The SKY FM project calls for these leader informed priority areas to be examined from the perspective of the Letcher County broadband network presence and capacity.

GROWING BROADBAND'S PRESENCE IN LETCHER COUNTY

CNX gathered data from multiple broadband providers and other sources to bring data to bear upon the local planning for the expansion of broadband in Letcher County. Important outcomes of the SKY FM project are the identification of priority broadband expansion projects that require an engineering solution.¹ The broadband data has been visualized in CNX's broadband planning tool and has been shared with Letcher County leaders with the goal of identifying and prioritizing broadband expansion projects that will have the most impact for Letcher County's economic development and overall quality of life. What follows are the highlights of that data analysis and working with the Letcher County Judge Executive Jim Ward.

LETCHER COUNTY TELECOMMUNICATIONS TOWERS

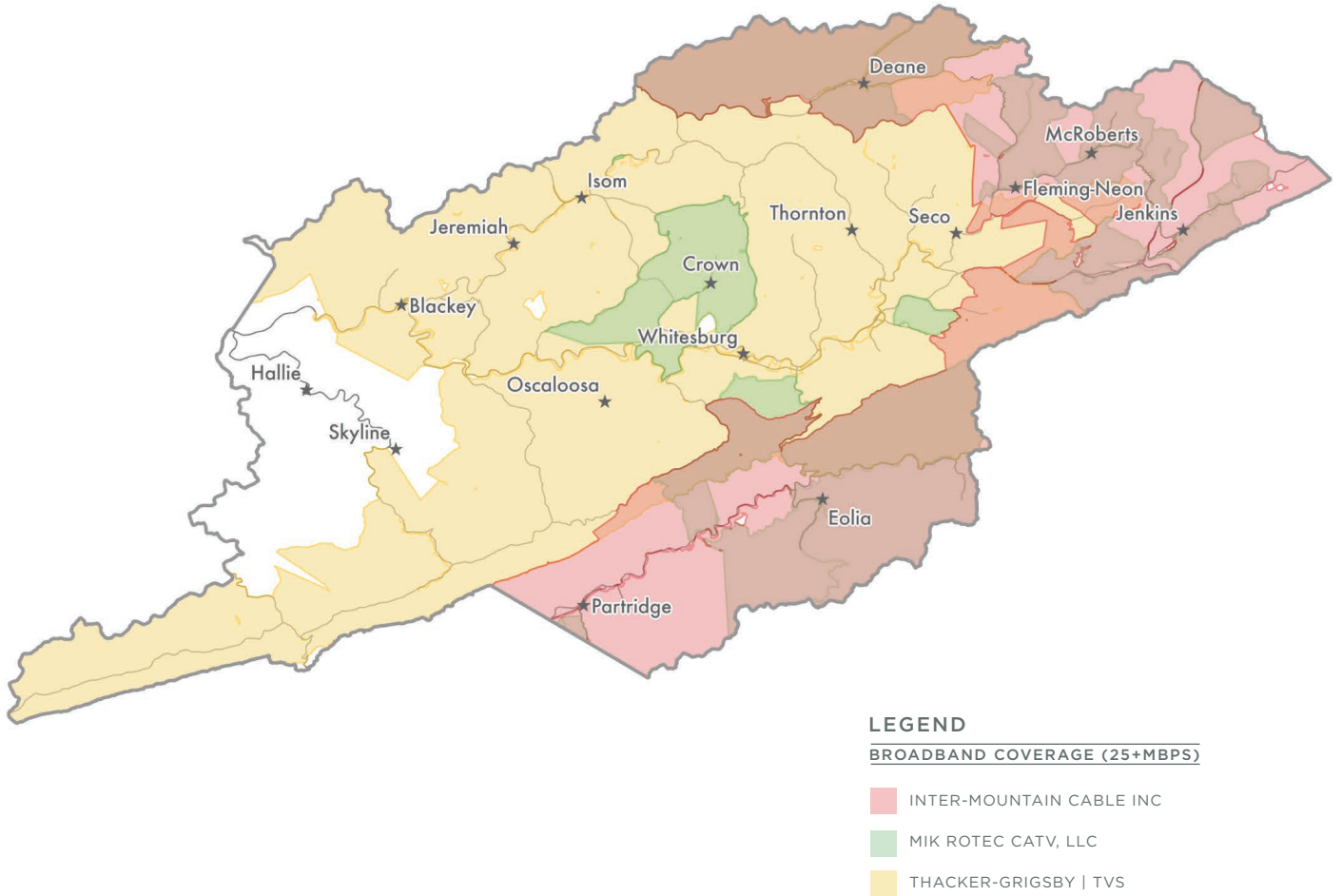
Mobile connectivity demands and data consumption are growing at exponential rates nationwide. Rapidly emerging "smart devices" only underscore the need for robust mobile data infrastructure. Telecommunications towers that support mobile data applications become dramatically more effective when those towers are connected to a fiber network. County leaders should work closely with mobile data network operators to maximize any fiber build plans to include underserved and new tower construction coverage as anchor tenants on any potential new fiber networks in the county. Letcher County has 21 wireless communication towers registered with the Federal Communications Commission, as seen in the image below taken from the CNX data portal.²



As depicted on CNX's Broadband Platform, there are 21 wireless communication towers in Letcher County.

1 The further evaluation, prioritization and the preliminary engineering and cost estimation of these solutions is a recommended, immediate next step of the SKY FM project.

2 The data is cited from the FCC ASR database (<http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly>). The data are current as of 2016/11/13.



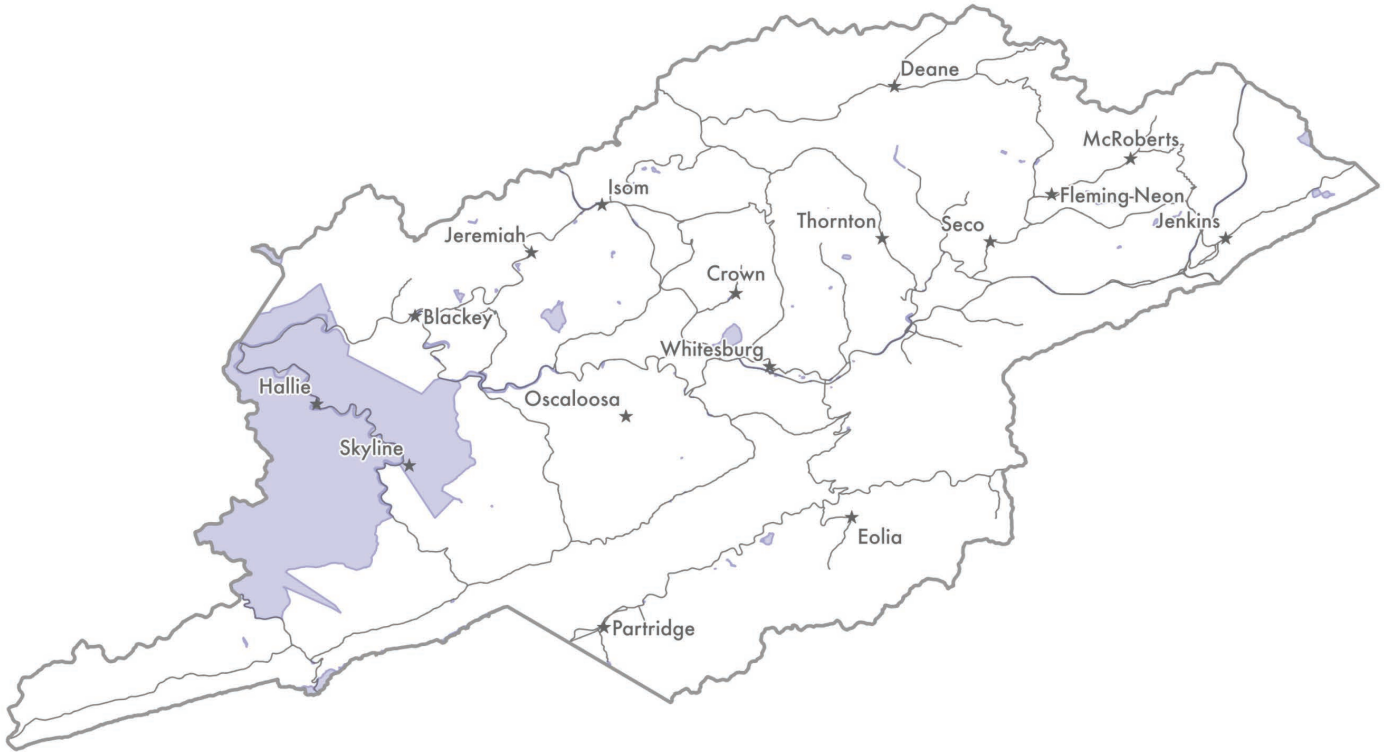
LETCHER COUNTY HOUSEHOLD 25MBPS+ AVAILABILITY

For planning purposes and to in order to maintain industry standards for broadband speed, 25Mbps should be the minimum standard for internet connectivity that is considered broadband.³ The map above shows the areas of Letcher County that are served by 25Mbps or higher connections. The different colors represent the various providers of internet service.⁴ Any area not colored represents either an unserved or underserved portion of the community.⁵

3 The FCC now defines “broadband” as an internet connection that is capable of 25Mbps and above for data download and 3Mbps and above for data upload.

4 The colored areas of the map above represent the various cable providers that are capable of providing 25Mbps service.

5 Unserved means no internet service is available. Underserved means internet service is available, but it does not meet the 25 Mbps threshold.

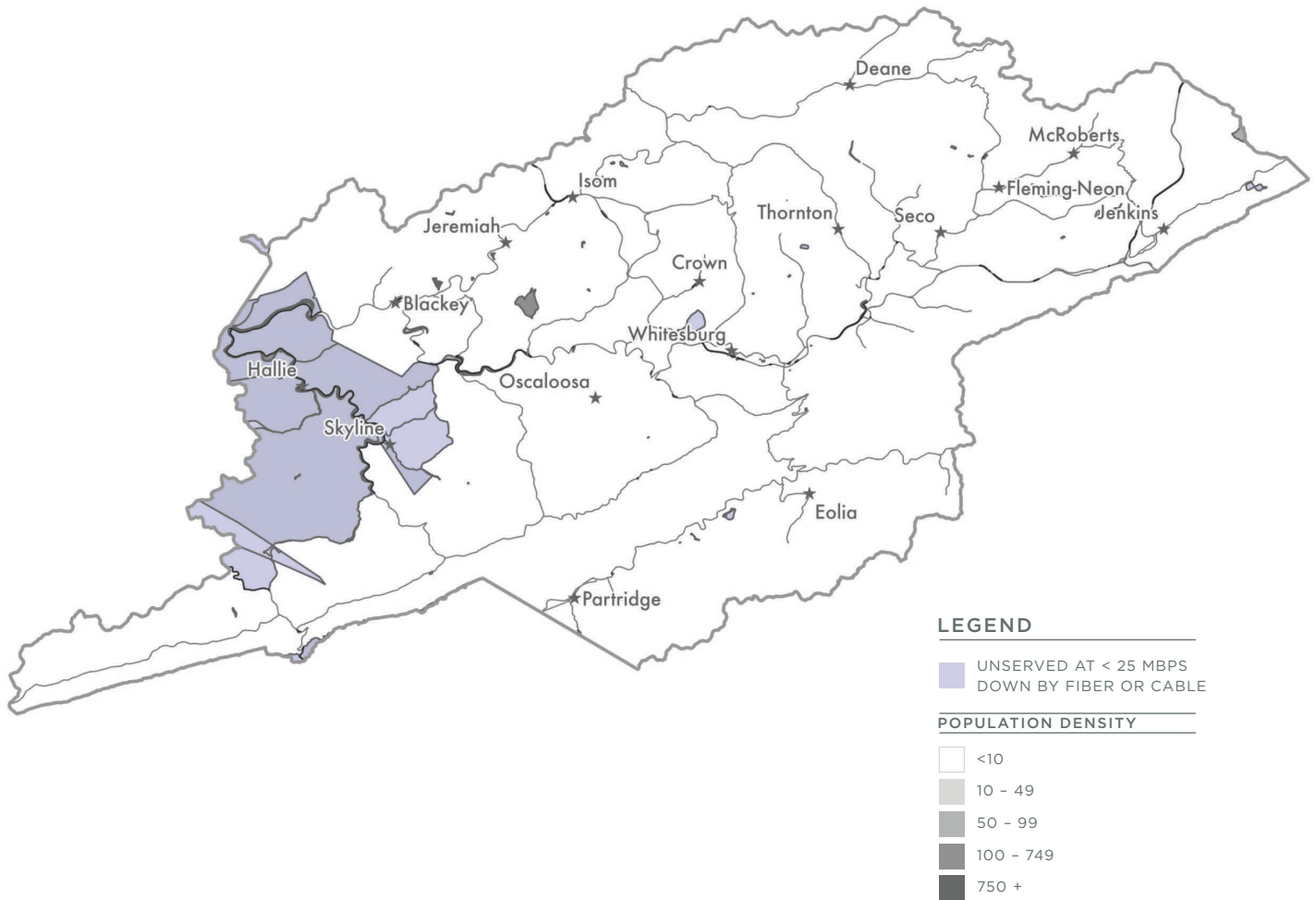


LEGEND

- UNSERVED AT < 25 MBPS
 DOWN BY FIBER OR CABLE

UNDERSERVED LETCHER COUNTY COMMUNITIES

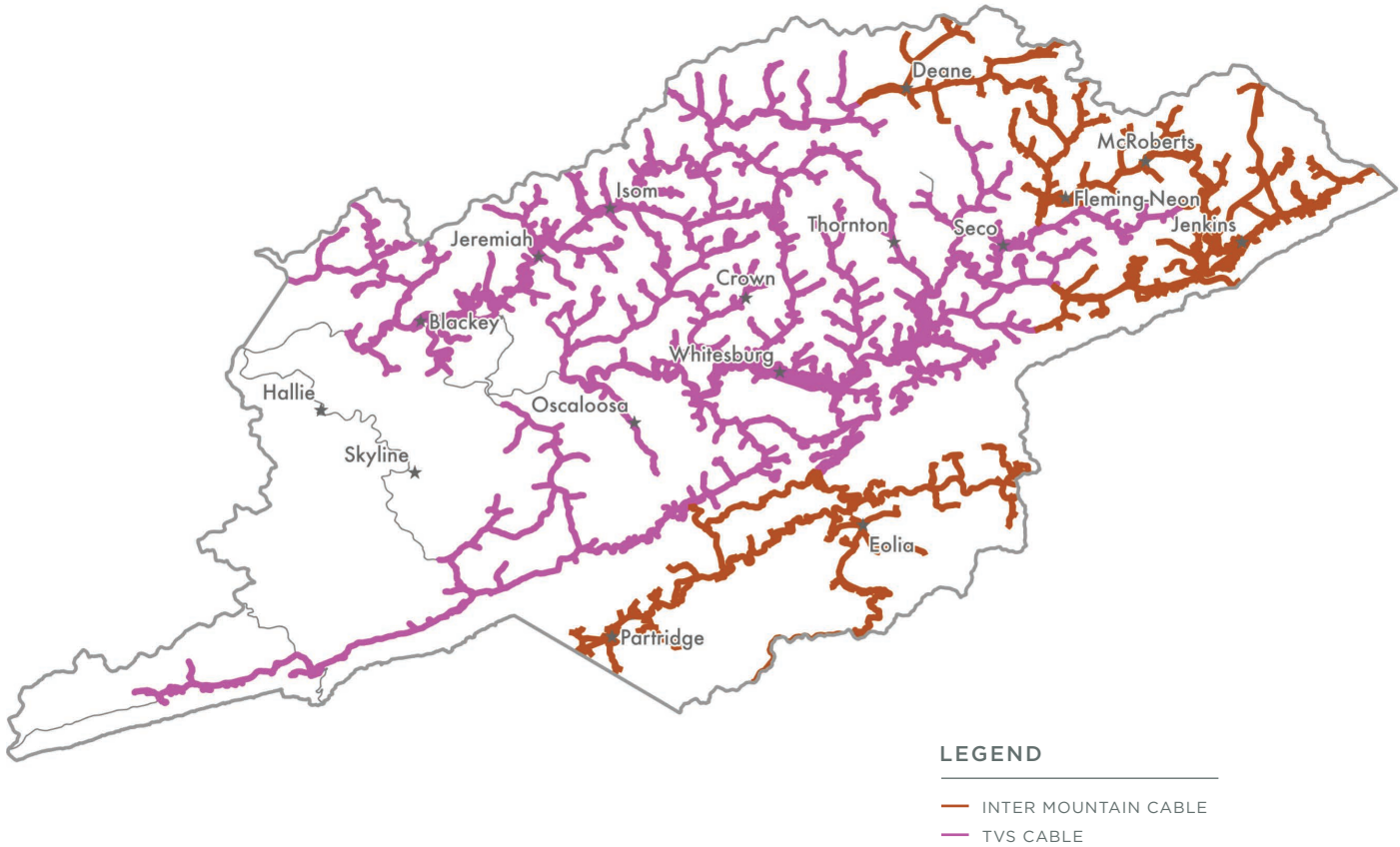
The map above depicts in color those portions of Letcher County that are underserved by internet speeds of 25Mbps or greater.



DENSITY OF HOUSEHOLDS IN UNDERSERVED PORTIONS OF LETCHER COUNTY

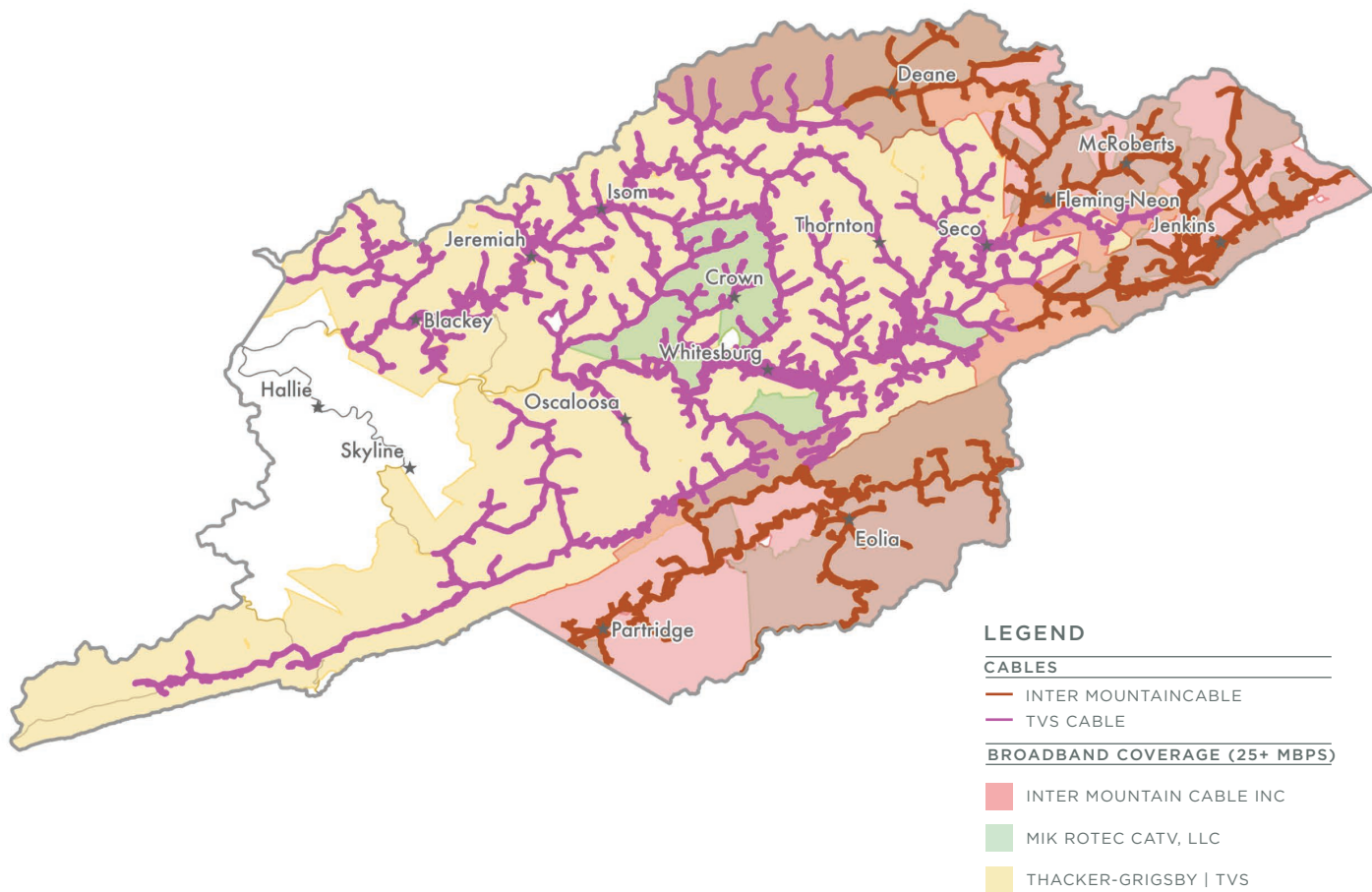
Considering the number of homes in an underserved portion of the county is a helpful indicator of how many residents will be positively impacted by an expansion in broadband availability. The map above depicts the density of homes in underserved areas. The darker the shades of grey color the higher the number of homes are located in that portion of the county.⁶

6 The density of households is organized by census blocks.



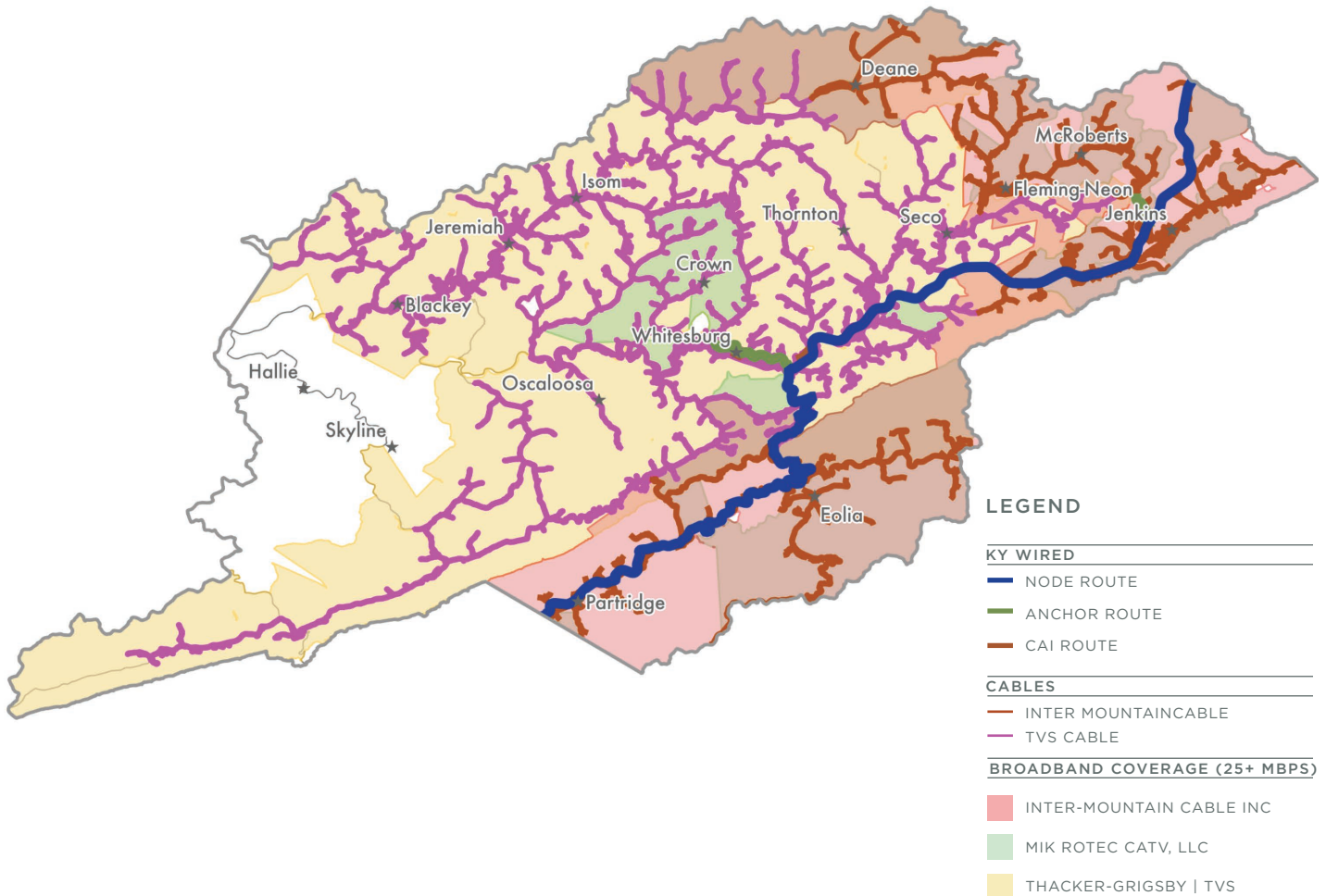
FIBER TO THE HOME IN LETCHER COUNTY

Fiber is the ultimate in broadband service for speed and capacity. While broadband is defined at 25 Mbps+, fiber is capable of delivering speeds up to 1,000 Mbps (gigabit speed). As stated earlier, fiber is an important resource for large tenants (industrial parks for example) and for critical services (public safety, healthcare, etc.). Letcher County is largely unserved with fiber as depicted in the map above. The colored areas indicate the portions of the community where homes have the ability to access fiber based broadband.



CURRENT FIBER NETWORKS IN LETCHER COUNTY

Fiber networks are the backbone of a community’s internet connectivity. They are high-speed and high-capacity networks. Underserved portions of the county need a means to connect to the fiber network or an extension of the fiber itself. The map above depicts the general existing fiber networks in Letcher County. The map above also demonstrates the relationship of fiber to the “last mile” network referenced above. “Last mile” providers are the companies that help individual homes and businesses connect to the fiber networks.



PENDING FIBER NETWORKS - KENTUCKYWIRED IN LETCHER COUNTY

The map above demonstrates the addition of the KentuckyWired network. KentuckyWired is the statewide network referenced earlier that will provide a fiber based node in each Kentucky county thus enabling each county to implement its own last mile strategy for homes, businesses, and public facilities. The blue line represents the proposed KentuckyWired path.

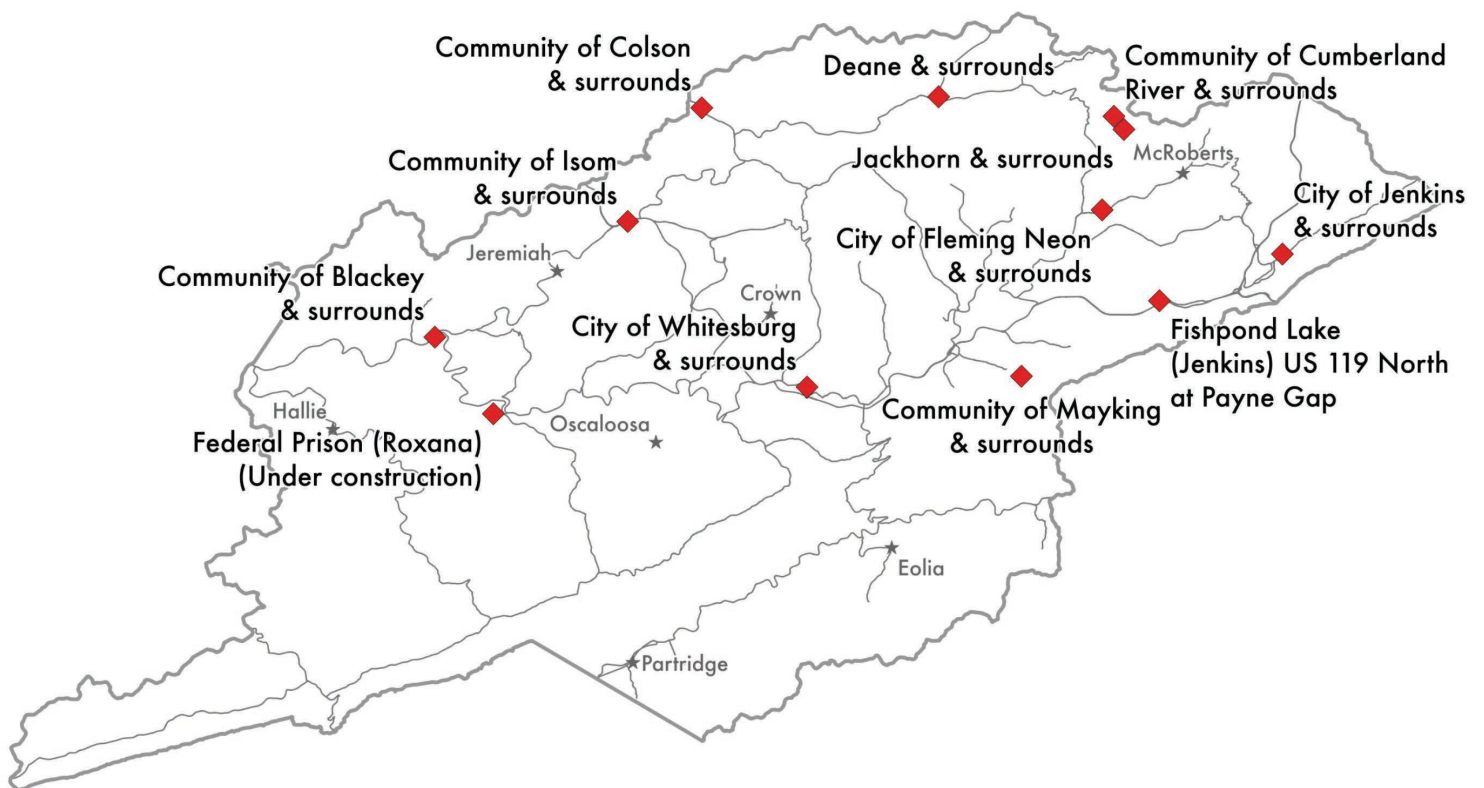
These maps demonstrate in a more technical manner the broadband opportunities Letcher County leaders discussed as part of the SKY FM planning project. Knowing where network access is lacking, how it affects the community, and where pending development is coming can inform relevant planning for improvements.

LETCHER COUNTY BROADBAND PRIORITY AREAS

After conferring with the providers of broadband in Letcher County, analyzing the network resource availability, and assessing where network resources are vitally needed, Letcher County Judge Executive Jim Ward have identified multiple areas of interest for network expansion. These broadband priorities have been elevated due to their: immediate economic development impact; the capacity to help expand the network presence for more Letcher County residents; and cost effective nature of the project.

Letcher County's broadband priority areas are depicted in the map above below. These are sites, locations, and communities where network improvements can have an impact on the local economy and general quality of life for Letcher County. Confronting access challenges throughout the county, priority project areas at this juncture encompass fiber access to the:

- (proposed) Federal Prison (Roxana)
- City of Whitesburg and vicinity
- City of Jenkins and vicinity including Gateway Industrial Park, Fishpond Lake
- City of Fleming Neon and vicinity
- Isom Community and vicinity
- Blackey Community and vicinity
- Mayking Community and vicinity
- Cumberland River Community and vicinity
- Colson Community and vicinity
- Deane and vicinity
- Jackhorn and vicinity



ADOPTION

Along with this network expansion, Letcher County must also provide opportunities for its residents and businesses to access important training on how to use these tools to their greatest effect through adoption programs. The public library is often the hub for technology training for those seeking to gain computing skills. Currently, Letcher County Public Library has four locations: two in Whitesburg, one in Blackey, and one in Neon. Between the four locations there are fifty public computers available. Basic computing classes are offered with usually four to five participants.

With improved broadband presence in homes, the library or other public facilities, Letcher County residents could access many of the available and free digital literacy resources like the following:

- www.digitalliteracy.gov offers free adoption programs that range from learning the basics of a computer to job skills. The free computer basics programs include computer use, how to use software/applications, using the internet, communication through the web, and internet safety.
- <http://driveyourlearning.org/> is a free resource for technology adoption that offers participants training content from a variety of trainers. Participants can choose their learning priorities: job skills, social media, life skills, education and basic computer programming.
- www.common sense media.org offers families tools aimed to help their children excel in a media driven world without sacrificing safety.
- <http://lib2gov.org/> offers tools for public libraries specifically to help patrons access online government services.

9 <http://publiclibrariesonline.org/2015/06/how-kentuckys-public-libraries-are-enabling-digital-literacy/>

10 <http://kdla.ky.gov/librarians/plssd/Documents/KDLA1314.pdf>

GROWING BROADBAND'S IMPACT THROUGH THE LETCHER COUNTY PLAYBOOK

What follows is Letcher County's Playbook for maximizing the impact of broadband. It takes into account the county's broadband needs, goals, barriers and solutions. It is informed by the information regarding the current state of broadband in Letcher County and information about pending broadband development through KentuckyWired. More specifically, the playbook reflects the culmination of:

- A** the broadband connectivity data analysis accomplished through the CNX visualization tool;
- B** the pending fiber development through KentuckyWired and its proposed routes;
- C** specific input and priorities of Letcher County leaders from public and private sectors through Sector Broadband Planning Workshops;
- D** proven best practices from similar communities across the state and country;
- E** best practices regarding adoption programming and Letcher County's adoption needs; and
- F** input from privately owned broadband/technology companies.

The playbook takes this information set and organizes it around foundational community broadband strategies, cost effectiveness, prioritization, and necessary times for completion:

- Network Expansion;
- Increase Digital Literacy;
- Technology Driven Economic Development/Jobs; and
- Local Public Private Partnership (P3) and Planning.

Lastly, the playbook organizes these informed strategies by cost effectiveness, prioritization, and necessary time for completion.

LETCHER COUNTY BROADBAND PLAYBOOK

STRATEGIC BROADBAND PRIORITIES

Letcher County has significant broadband access with speeds of at least 25Mbps download for much of the county already in place through assorted providers. However, there remain a few gap areas, particularly in the western part of the county that should be addressed. Nonetheless, demand and “take rates” are exceedingly low in the county. This means a below average number of residents subscribe to broadband, and if they do they frequently subscribe to lower speeds. Therefore, adoption and proving the value of broadband in the community should be a priority for county leaders.

In addition, deepening the existing network through additional fiber back haul and fiber to the premise build outs will increase service reliability and speed availability. In tandem, efforts by local leaders to demonstrate value and drive up broadband adoption should be coupled with access improvements driven by demand.

ADOPTION THROUGH FIBER ENABLED JOBS AND SERVICES

As the community evaluates opportunities to deepen and expand fiber networks in the county, support for adoption programming must be undertaken with the same level of zeal and effort. A robust, ubiquitous network will not provide value to the community if the community is not prepared to use that network.

Community leaders should develop a plan to enhance broadband adoption through relevance and awareness, with a particular focus on telework enabled employment opportunities and fiber enabled services, such as healthcare and government services. Broadband must make a difference in peoples’ lives before people will view it as important. As such, county leaders should establish a formal broadband planning group that prioritizes creative uses of broadband in partnership and in areas near where existing customers have increasing demand for access, such as Appalshop and the Gateway Industrial Park.

ACCELERATE FIBER DEPLOYMENT THROUGH PARTNERSHIP

Fiber networks offer a substantial competitive advantage for communities with ubiquitous, high-speed broadband coverage. To realize this growth potential more quickly, local officials and community leaders should join with the primary broadband providers in the community to evaluate ways in which fiber to the premise (FTTP) networks could be accelerated through public-private partnership. In many cases, capital costs limit the pace with which fiber networks can be deployed by private entities. If a public-private partnership can lower the barriers in accessing capital, these networks could be deployed more quickly.

FEDERAL PRISON

As the proposed federal prison construction takes shape in the Roxana community, surrounding areas that could serve as potential home sites for prison employees should be prioritized for coverage. Not only will the prison serve as an “anchor tenant” within a potential new fiber network in these underserved areas, as described above, the prison will also bring with it an onslaught of new employees and vendors, all of whom will be seeking housing and potentially commercial space to locate businesses. The county, and particularly commercial areas near Roxana such as Whitesburg, should be preparing to capture as many of the new residents as possible moving in with the prison by identifying broadband availability, while also identifying space for businesses and home sites to make the transition simple and easy in attracting these new residents to stay and live local.

LETCHER COUNTY PLAYBOOK

Development of these strategic priorities represents a significant economic opportunity for Letcher County. To accomplish these goals, Letcher County leadership should employ an execution strategy as outlined below:

1 | ECONOMIC DEVELOPMENT / JOBS

- A Establish top sector priorities for economic growth opportunities by leveraging existing assets in the community;
- B With support from appropriate subject matter experts, finalize an action plan to achieve the growth goals through broadband-based jobs

Econ Dev./Jobs	3 Months	6 Months	12 Months	Ongoing
	Establish economic development priorities that take full advantage of improved broadband availability, particularly the planned federal prison, Gateway Industrial Park and key anchor tenants	Explore improvements between K-12 curriculum, technical training centers and workforce programs	Increase public awareness and public training opportunities for personal and entrepreneurial uses of broadband to increase digital literacy	Annual refresh of economic development priorities

2 | FIBER NETWORK EXPANSION

- A** Determine Network Expansion Priority Areas & Platform
 - Align with economic development strategies/objectives
- B** Commission Engineering Study to Design and Derive Cost Estimates
 - Engage planning and engineering firm to design “desktop” build plans
- C** Establish Partnerships for Build-Out Financing
 - Seek Out and Formalize Provider Partnerships
 - Organize appropriate financial structuring for network construction and operations transaction with support of technical and legal consultants
 - Secure financing through grants, loans, bonds, or public private partnerships
- D** Complete Final, Field Engineering and Commission Construction

Fiber Network Expansion	3 Months	6 Months	12 Months	Ongoing
	<p>Commission engineering studies for and gather more connectivity info for the following areas of interests:</p> <ul style="list-style-type: none"> • (proposed) Federal Prison (Roxana) • City of Whitesburg and vicinity • City of Jenkins and vicinity including Gateway Industrial Park, Fishpond Lake • City of Fleming • Neon and vicinity • Isom Community and vicinity • Blackey Community and vicinity • Mayking Community and vicinity • Cumberland River Community and vicinity • Colson Community and vicinity • Deane and vicinity Jackhorn and vicinity 	<p>Develop last mile strategy that takes advantage of Kentucky-Wired fiber route.</p> <p>Conduct a fiber to the tower (FTTT) study that identifies the cell towers in Letcher County without a fiber connection and strategies for taking advantage of the KentuckyWired fiber network for improved mobile data capacity county wide.</p> <p>Survey existing tower facilities, wireless coverage demand, and accessibility within Letcher County.</p> <p>Work with tower owners and/or carriers to complete a cost feasibility analysis to determine interest and viability in upgrading tower facilities with fiber access in conjunction with future fiber expansion and/or KentuckyWired projects.</p>	<p>Refresh connectivity inventory</p> <p>Review local policies for unnecessary barriers to private investment resources</p> <p>Develop a redundancy strategy for anchor institutions and anchor/commercial tenants</p>	<p>Annual refresh of Letcher County broadband map</p> <p>Annual Letcher County Sector Broadband Planning Workshop.</p>

3 | INCREASE DIGITAL LITERACY

Increase Digital Literacy	3 Months	6 Months	12 Months	Ongoing
	Inventory basic computer skills training resources in Letcher County	<p>Establish faster connections at Letcher County Public Library</p> <p>Develop strategy for offering free wifi at Letcher County public facilities</p> <p>Develop a county wide adoption strategy that includes:</p> <ul style="list-style-type: none"> • Public wifi sites • Basic computer skills training through the Letcher County Public Library • Workforce training • Digital literacy awareness campaigns 	<p>Establish a Letcher County 1:1 program task force to develop a connectivity plan suitable to support a Letcher County K-12 1:1 program to include residential use of devices</p> <p>All Letcher County facilities to have free public wifi</p>	Increase the digital literacy training at the Letcher County Library: jobs applications, device/access/use, E-books, setup of new devices

4 | LOCAL PUBLIC PRIVATE PLANNING

Local Public Private Planning	3 Months	6 Months	12 Months	Ongoing
	Establish Letcher County Broadband Advisory Team	Work with providers to establish and clarify service areas in Letcher County	First annual "Letcher County Technology Progress Report"	Annual update to Letcher County Technology Progress Report



SKY FM COUNTY PLAYBOOK

PERRY COUNTY

PERRY COUNTY BROADBAND PLAYBOOK

PERRY COUNTY AT GLANCE

Perry County is home to just under 28,000 Kentuckians according to the 2015 census. The county covers 343 square miles. It is the home of Hazard, “the Queen City of the Mountains.”

Perry County is also home to Hazard Community and Technical College and Hazard Appalachian Regional Healthcare (ARH) Medical Center. ARH operates 10 hospitals and provides other health services across Eastern Kentucky and Southern West Virginia.

PERRY COUNTY HAS 21 ANCHOR INSTITUTIONS (PUBLIC FACILITIES):

K-12 schools	10	Public safety	2
Post secondary sites	3	KY River ADD	1
Public library	1	Perry Fiscal Court	1
Healthcare facilities	3		

PERRY COUNTY OVERVIEW

Perry County has historically been a regional center of commerce, particularly in the coal, lumber and retail industries. However, the recent downturn of the coal industry has decimated the local and regional economy. In 2016, the Perry County unemployment rate is 9.8%, but even this elevated figure does not reflect a substantial percentage of the adult population no longer even seeking to participate in the workforce. Of the twenty-five counties across the United States that have been impacted by losses in the coal industry, Perry County ranks sixth in terms of most jobs lost with 1,370.¹

Access to fiber enabled high-speed internet has been identified as a strategic priority in transitioning the local economy and attracting new industries, according to Perry County leaders. With an updated fiber communications infrastructure, Perry County can offer a multitude of opportunities in support of economic diversification.

Among the most important of these many opportunities is workforce retraining for displaced coal miners. By combining advanced skilled workers with world-class communications infrastructure, Perry County will be more competitive in attracting employers jobs in more diversified sets of industries. Additionally, with aggressive fiber optics infrastructure upgrades, Perry County will be empowered to offer more and better government services, educational and learning opportunities for students, enhancements to public safety, improved healthcare, and many more community services.

As a part of the SKY FM broadband planning process, Perry County leaders gathered for multiple work sessions over the last several months to gather data, identify ways in which a high-speed data network could advance strategic economic development priorities, and then compile those efforts into this community broadband plan.

¹ “Business Briefs: Eastern Kentucky.” The Lane Report, October 2016 , p.5.

BROADBAND OPPORTUNITIES IN PERRY COUNTY: SECTOR BROADBAND PLANNING WORKSHOPS



(LEFT) Perry County Fiscal Court Grant Writer, Benny Hamilton, confers with CNX team members concerning the broadband challenges and opportunities within Perry County. (MIDDLE & RIGHT) Perry County Sector Workshop and Judge Executive Alexander addressing the group.

STEP 4 SECTOR WORKSHOPS

OBJECTIVE: Facilitate group dialogue on individual sector needs and identify common challenges and opportunities for broadband growth in the community.

OUTCOME: Identify the specific challenges and opportunities faced by various sectors of the community leadership infrastructure, including analysis on community broadband issues presenting barriers to growth in broadband access, adoption and use.

Per the SKY FM plan, CNX hosted and facilitated a sector planning session on September 1, 2016 at the Hazard Community and Technical College. This important planning session, attended by a broad swath of public and private stakeholders, demonstrated the community’s interest and commitment to improving the access to high-speed and high-capacity broadband. Twenty-seven participants representing nearly twenty entities discussed Perry County’s broadband-based opportunities, barriers, and priority next steps. Participating entities included:

- E-911 services
- Hazard City Schools
- Appalachian Regional Healthcare (ARH)
- Hazard Community & Technical College (HCTC)
- Mountain Association for Community Economic Development (MACED)
- Office of Congressman Hal Rogers
- Center for Rural Development
- Kentucky Communications Network Authority
- City of Hazard
- Perry County Judge Executive
- Thacker-Grigsby/TVS
- Eastern Kentucky Network
- Kentucky Cable Association
- Perry County Schools
- Hazard Mayor’s Office
- Foundation for Appalachian Kentucky
- Perry County Extension
- Kentucky River Area Development District (KRADD)
- Hazard/Perry County Chamber and Perry Economic Development
- Community Trust Bank
- CNX

HIGHLIGHTS OF THE SECTOR PLANNING DISCUSSION

PERRY COUNTY GENERAL CONNECTIVITY ASSESSMENT

- Much of Perry County is served by TVS cable.
- The northwest portion of Perry County including and around Buckhorn Lake State Resort Park is unserved.
- Fiber based gigabit service is available in downtown Hazard.

BROADBAND OPPORTUNITIES

EDUCATION AND BROADBAND

- Both institutions and students need expanded access to broadband. Expanded broadband could:
 - reduce costs
 - enable non traditional instruction (snow day learning)
 - strengthen student achievement through tutoring and better access to higher education resources for advanced K-12 students
 - benefit 1:1 which still require more connectivity to both schools and the homes where students live.

JOBS/WORKFORCE SKILLS

- More broadband would help local employers expand their services and workforce.
- New skills that are broadband based are needed for new jobs.

ECONOMIC DEVELOPMENT AND BROADBAND

- Jobs
 - Telework/work from home/remote work opportunities are needed but require access to dependable and faster broadband.
 - ARH needs medical coders/transcription services that could be enabled through broadband at home and training.
 - IT services are needed in Perry County
 - Entrepreneurs in Perry County could sell to any market through ecommerce with a broadband connection.
- Network redundancy and network reliability is important for both attracting new businesses but also for improving public safety, education, and healthcare.
- Healthcare - UK/ARH - Perry County is a Healthcare Hub
 - Equipment support/remote diagnostics (UK Campus Training Program) could reduce healthcare costs if monitored via broadband.
 - Telemedicine over broadband could help Perry County residents receive healthcare by specialists in other parts of the country.
- Buckhorn Lake State Resort Park could attract more tourists with improved connectivity and redundancy to the park.
 - Addressing the state park's needs could help expand residential service in that portion of Perry County as well.

BARRIERS TO BROADBAND EXPANSION

- Remoteness/lack of population density is a barrier to broadband expansion in Perry County. Finding connectivity solutions that have public, private, commercial and individual benefit helps lower the costs for all involved.
- Those who either cannot access the internet or lack the skills for internet use are difficult to teach or train. Digital literacy programs play an important role in making the most of network expansion.
- K-12 students don't have a clear path to tech careers and training programs beyond high school.
- There are not enough jobs for people with new technology skills.
- The availability and affordability of residential broadband service in Perry County varies widely.
- The long history of employment in the mining industry has tempered expectations of an entrepreneurial culture. Much of the Perry County workforce has a "work for" mentality.
- It is difficult for Perry County residents to embrace the "internet of things" trend.

SOLUTIONS FOR CONSIDERATION IN PERRY COUNTY

- Career inventories – improve the alignment between adults and workforce programs.
- Establish economic development priorities that take full advantage of improved broadband availability.
- Increase public awareness and public training opportunities for personal and entrepreneurial uses of broadband.
- Increase the variety of digital literacy options at the Perry County Library: job applications, device/access/use, E-books, setup of new devices.
- Offer more public Wi-Fi at all Perry County anchor institutions.
- Provide local businesses with more training on how to use the internet for their operations and marketing.

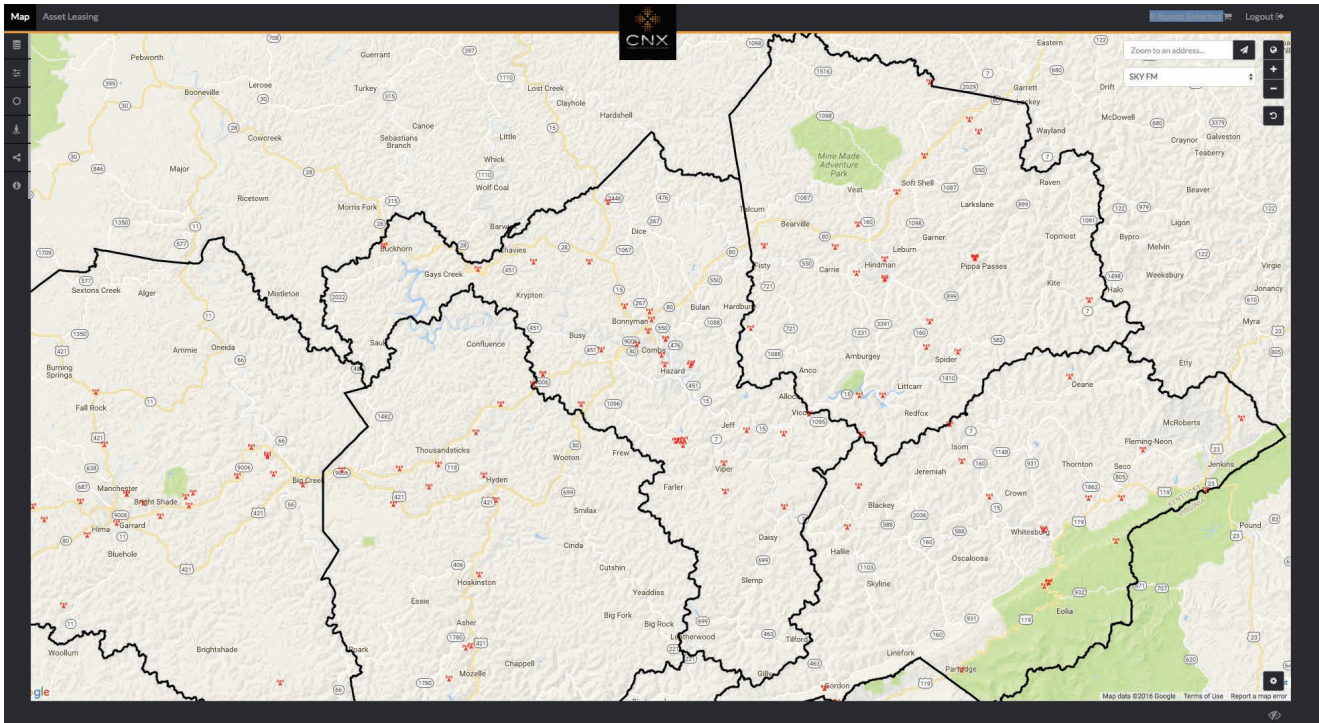
These important cross-sector discussions have formed a baseline of broadband needs and opportunities for Perry County. The SKY FM project calls for these leader informed priorities to be examined from the perspective of the Perry County broadband network presence and capacity.

GROWING BROADBAND'S PRESENCE IN PERRY COUNTY

CNX gathered data from multiple broadband providers and other sources to bring data to bear upon the local planning for the expansion of broadband's presence in Perry County. Important outcomes of the SKY FM project are the identification of priority broadband expansion projects that require an engineering solution.⁵ The gathered data has been visualized in CNX's broadband planning tool and has been shared with Perry County's Judge Executive Scott Alexander with the goal of identifying and prioritizing broadband expansion projects that will have the most impact for Perry County's economic development and overall quality of life. What follows are the highlights of that data analysis after working with Judge Alexander.

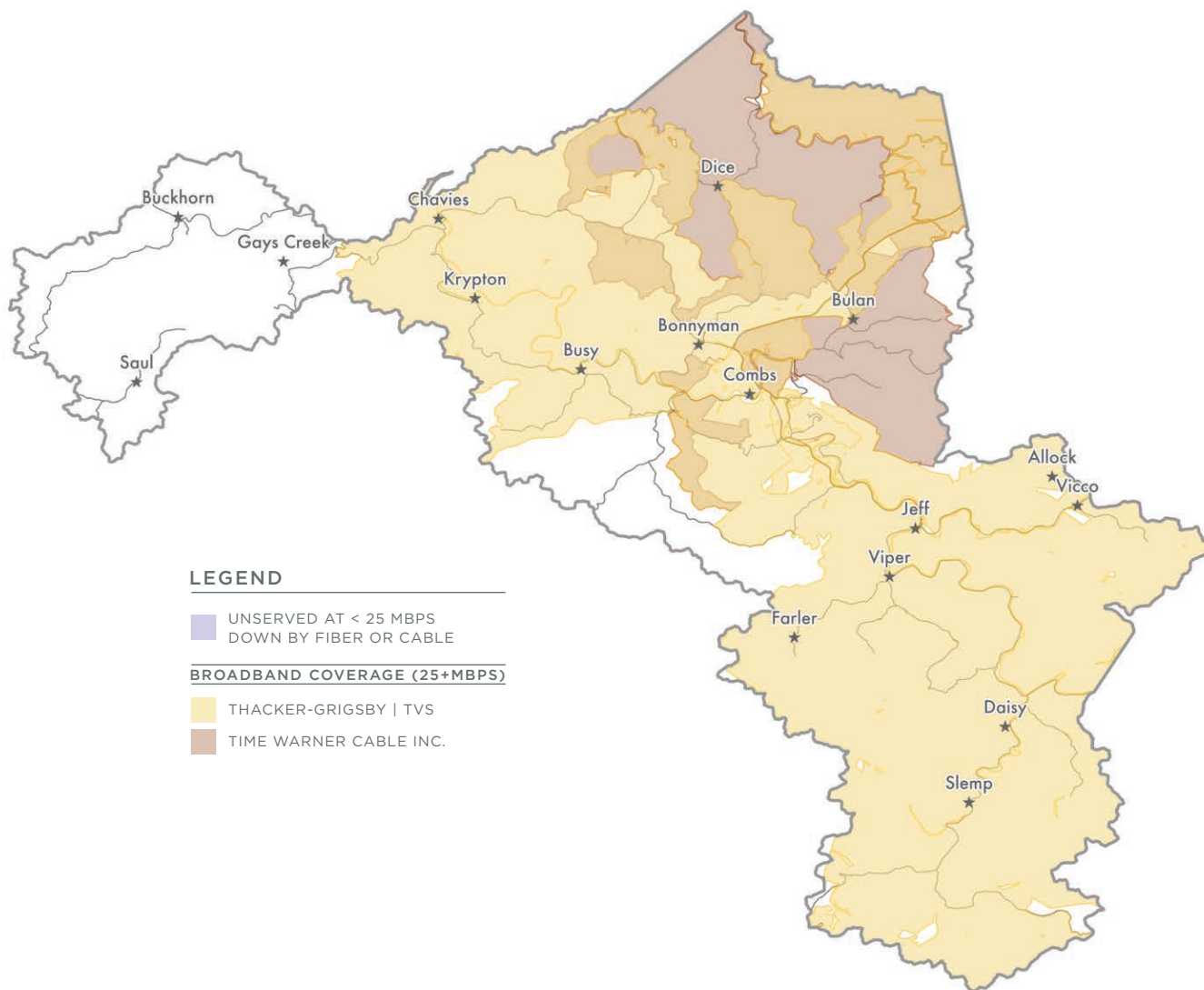
PERRY COUNTY TELECOMMUNICATIONS TOWERS

Mobile connectivity demands and data consumption are growing at exponential rates nationwide. Rapidly emerging "smart devices" only underscore the need for robust mobile data infrastructure. Telecommunications towers that support mobile data applications become dramatically more effective when those towers are connected to a fiber network. County leaders should work closely with mobile data network operators to maximize any fiber build plans to include underserved and new tower construction coverage as anchor tenants on any potential new fiber networks in the county. Perry County has 32 wireless communication towers registered with the Federal Communications Commission, as seen in the image below taken from the CNX data portal.²



As depicted on CNX's Broadband Platform, there are 32 wireless communication towers in Letcher County.

² The data is cited from the FCC ASR database (<http://wireless.fcc.gov/uls/index.htm?job=transaction&page=weekly>). The data are current as of 2016/11/13.



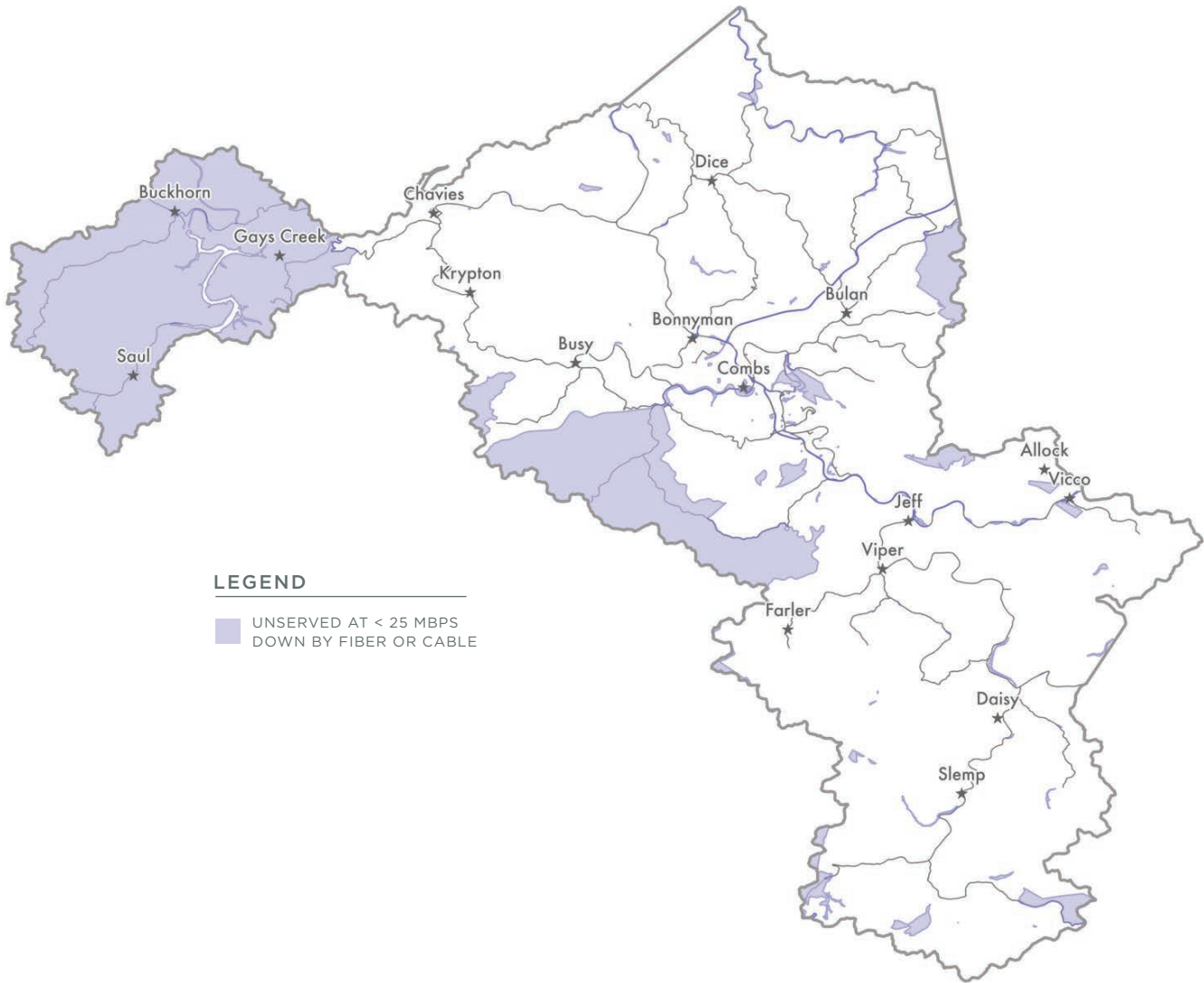
PERRY COUNTY HOUSEHOLD 25MBPS+ AVAILABILITY

As referenced earlier in this planning report, 50Mbps is a more relevant target for residential broadband service. 50Mbps is capable of supporting the meaningful use of important and developing applications, particularly those applications use for teleworking, e-commerce, and entrepreneurship. For planning purposes, 25Mbps has been used for the data analysis.³ The map above shows the areas of Perry County that are served by 25Mbps or higher connections.⁴ The different colors represent the various providers of internet service. Any area not colored represents either an unserved or underserved portion of the community.⁵

3 The FCC now defines “broadband” as an internet connection that is capable of 25Mbps and above for data download and 3Mbps and above for data upload.

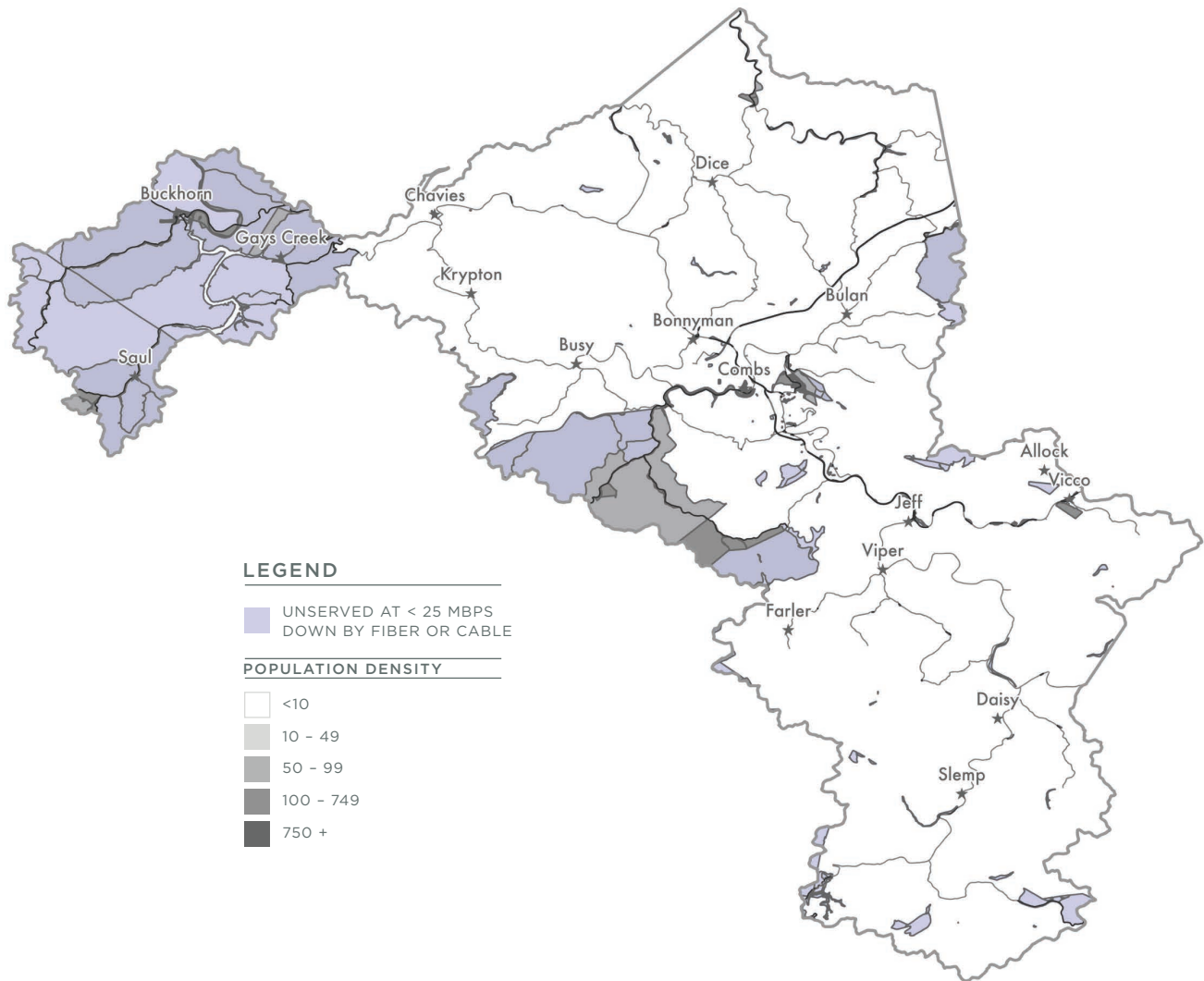
4 The colored areas of the map above represent the various cable providers that are capable of providing 25Mbps service.

5 Unserved means no internet service is available. Underserved means internet service is available, but it does not meet the 25 Mbps threshold.



UNDERSERVED PERRY COUNTY COMMUNITIES

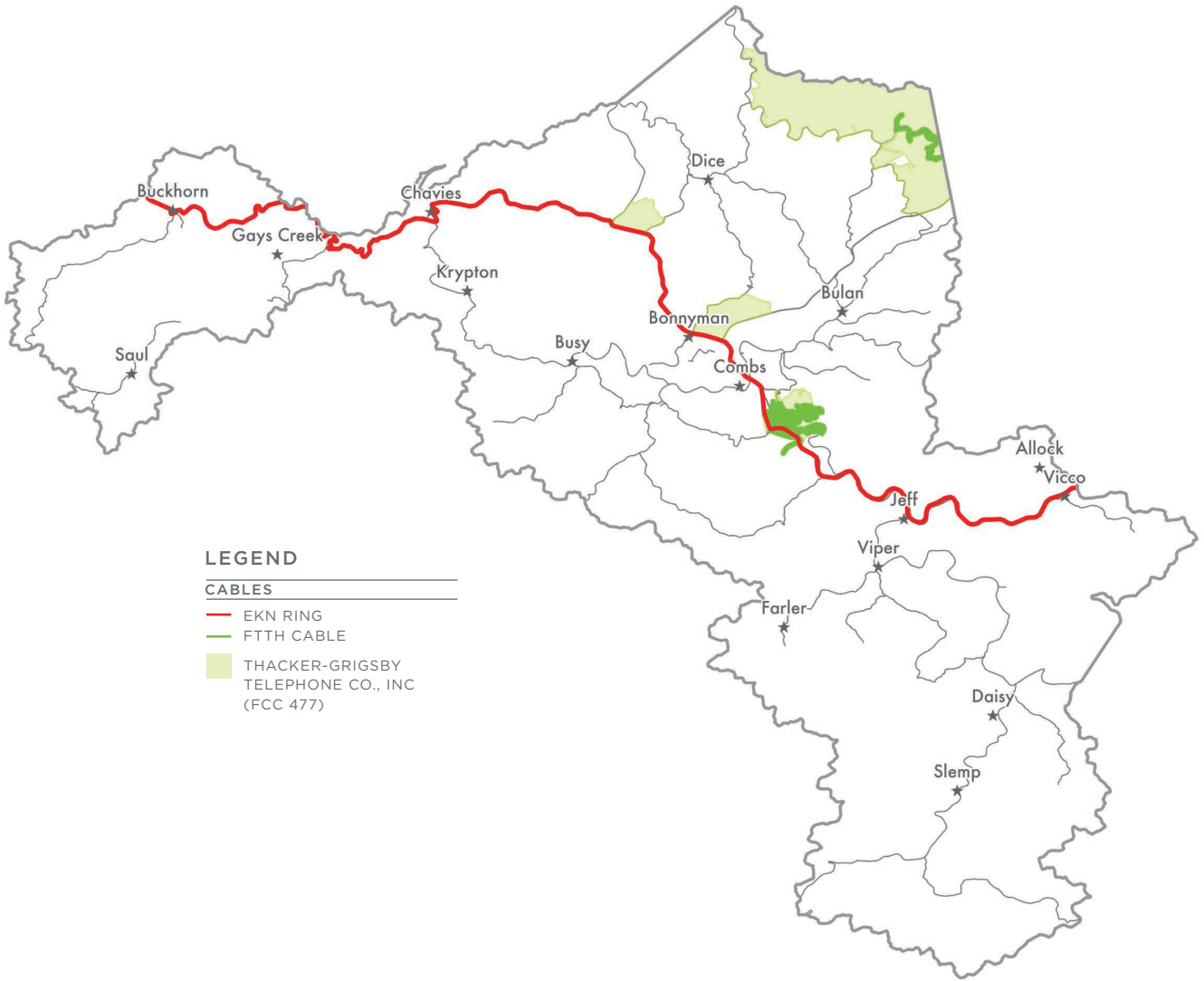
The map above depicts in color those portions of Perry County that are underserved by internet speeds of 25Mbps or greater.



DENSITY OF HOUSEHOLDS IN UNDERSERVED PORTIONS OF PERRY COUNTY

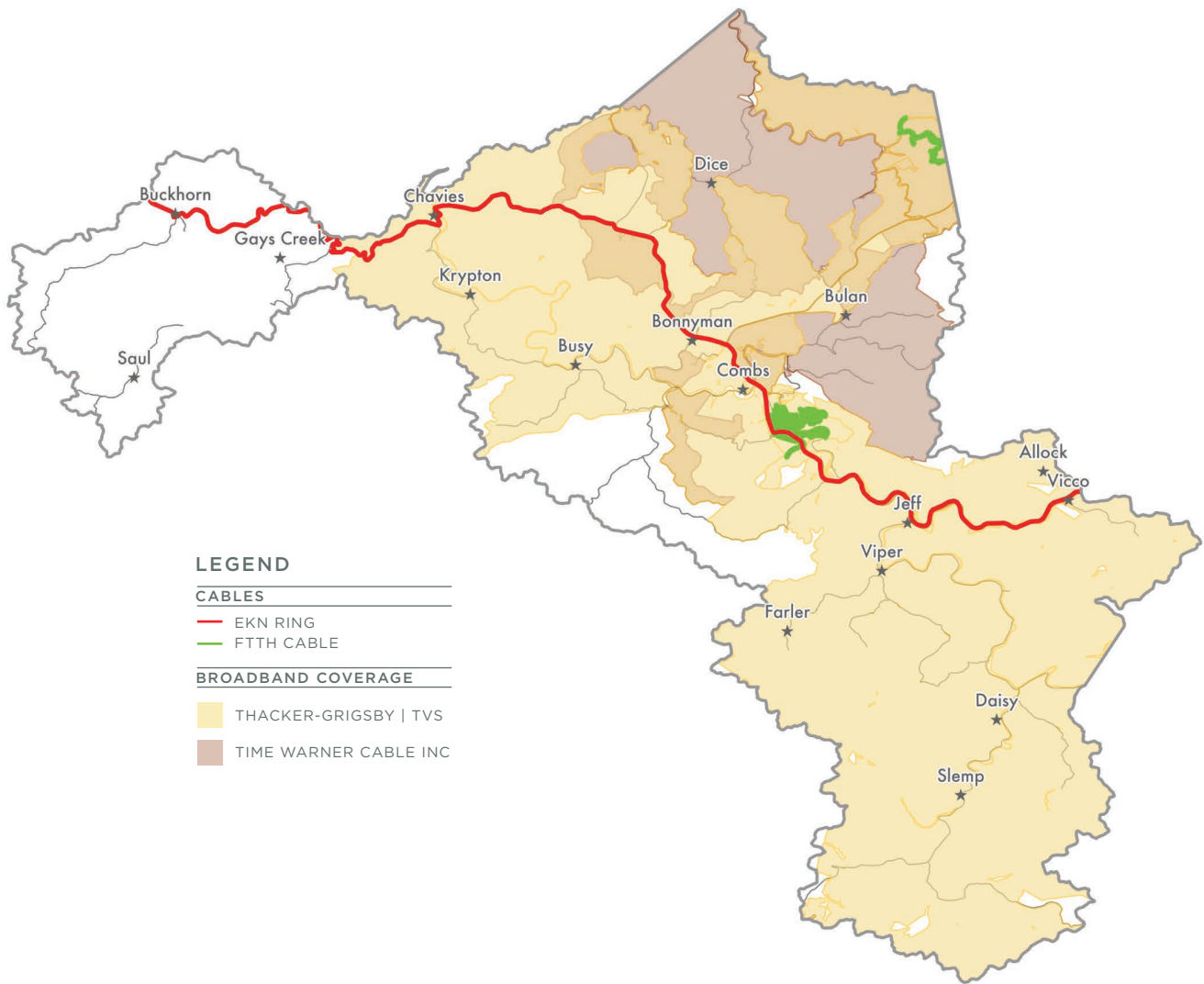
Considering the number of homes in an underserved portion of the county is a helpful indicator of how many residents will be positively impacted by an expansion in broadband availability. The map above depicts the density of homes in underserved areas. The darker the shades of grey color the higher the number of homes are located in that portion of the county.⁶

⁶ The density of households is organized by census blocks.



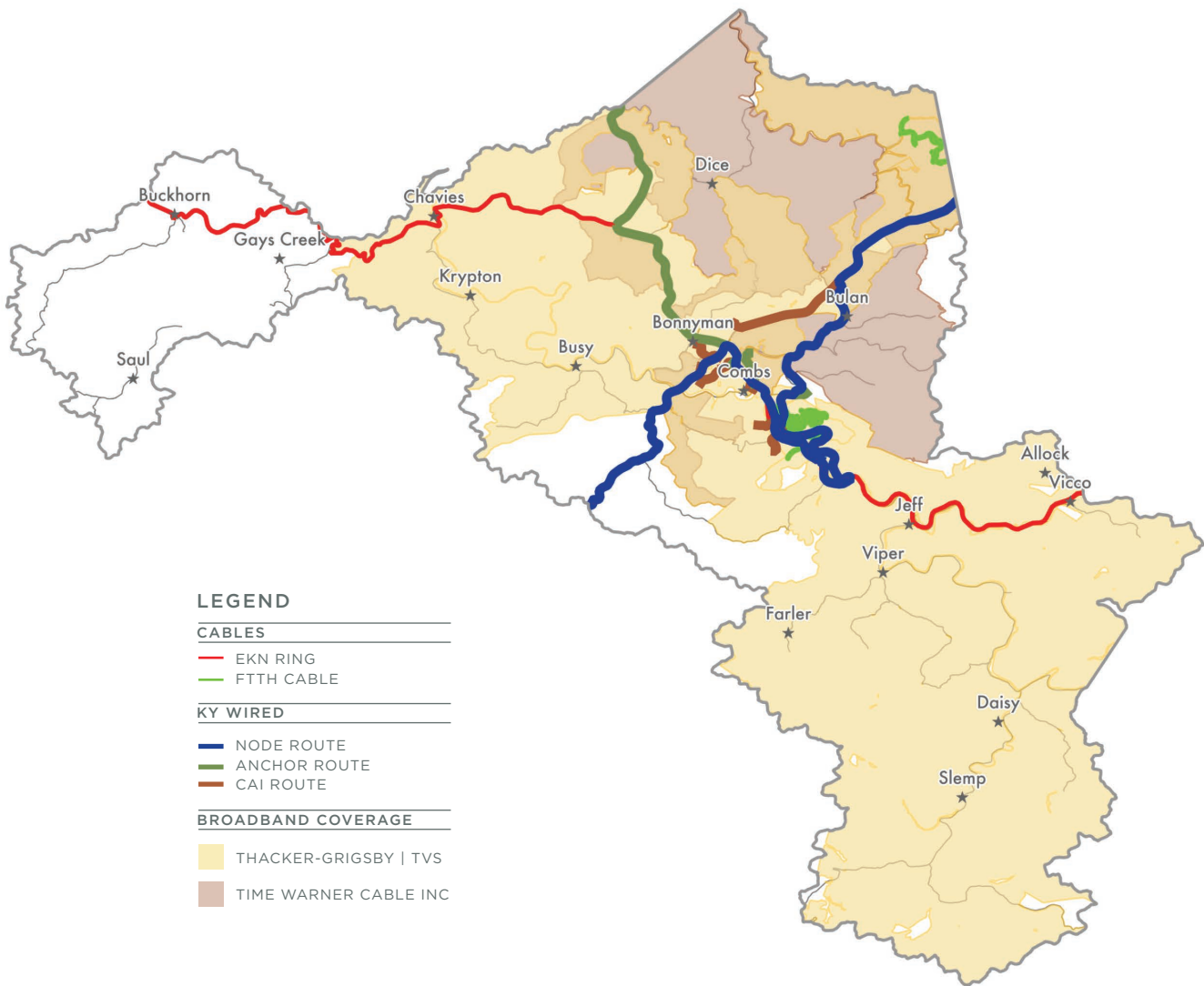
FIBER TO THE HOME IN PERRY COUNTY

Fiber is the ultimate in broadband service for speed and capacity. While broadband is defined at 25 Mbps+, fiber is capable of delivering speeds up to 1,000 Mbps (gigabit speed). As stated earlier, fiber is an important resource for large tenants (industrial parks for example) and for critical services (public safety, healthcare, etc.). Perry County is largely unserved with fiber as depicted in the map above. The colored areas indicate the portions of the community where homes have the ability to access fiber based broadband.



CURRENT FIBER NETWORKS IN PERRY COUNTY

Fiber networks are the backbone of a community’s internet connectivity. They are high-speed and high-capacity networks. Underserved portions of the county need a means to connect to the fiber network or an extension of the fiber itself. The map above depicts the general existing fiber networks in Perry County. The map above also demonstrates the relationship of fiber to the “last mile” network referenced above. “Last mile” providers are the companies that help individual homes and businesses connect to the fiber networks.



PENDING FIBER NETWORKS KENTUCKYWIRED IN PERRY COUNTY

The map above demonstrates the addition of the KentuckyWired network. KentuckyWired is the statewide network referenced earlier that will provide a fiber based node in each Kentucky county thus enabling each county to implement its own last mile strategy for homes, businesses, and public facilities. The blue line represents the proposed KentuckyWired path.

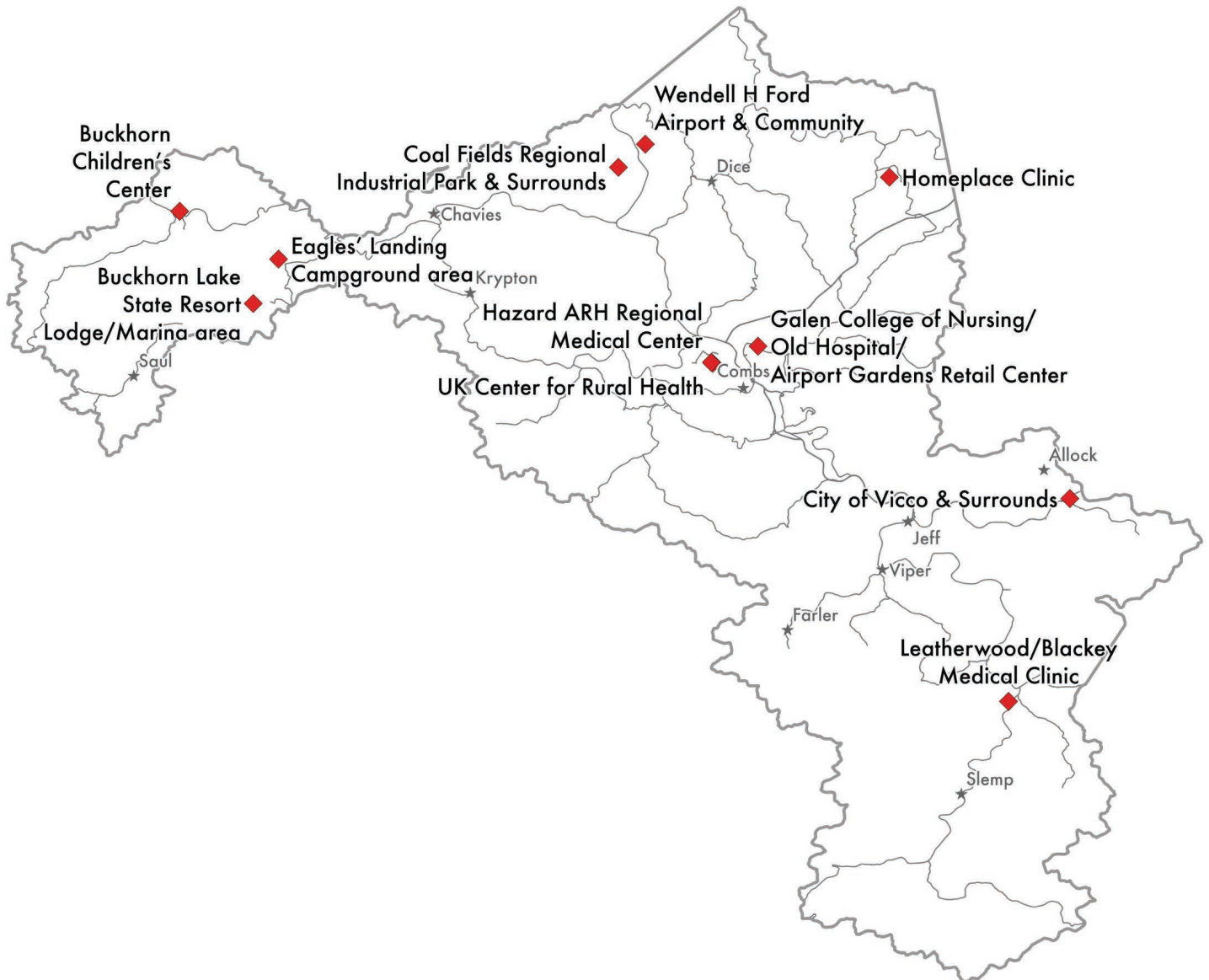
These maps demonstrate in a more technical manner the broadband opportunities Perry County leaders discussed as part of the SKY FM planning project. Knowing where network access is lacking, how it affects the community, and where pending development is coming can inform relevant planning for improvements.

PERRY COUNTY BROADBAND PRIORITY AREAS

After conferring with the providers of broadband in Perry County, analyzing the network resource availability, and assessing where network resources are vitally needed, Perry County Judge Executive Scott Alexander has identified ten areas of interest for network expansion. These broadband priority areas have been elevated due to their:

- a. immediate economic development impact;
- b. the capacity to help expand the network presence for more Perry County residents; and
- c. cost effective nature of the project.

Perry County's broadband priority areas are depicted in figure x below. These are sites/locations/communities where network improvements can have an impact on the local economy and general quality of life for Perry County.



PERRY COUNTY BROADBAND STRATEGY FOR PLANNING

To realize more robust fiber broadband access, communities must have or make available backhaul or “trunk line” access to fiber which can then be split up to serve end users, either through private carriers or in a municipal network. As noted by the data maps above, Perry County, particularly in the northern part of the county, enjoys robust fiber backhaul access.

The KentuckyWired project’s fiber optic backbone currently under construction, coupled with the anticipated lower costs for connectivity associated with this new network offer significant potential to expand high speed data connectivity to strategic economic development priority areas in Perry County. Moreover, the existing long haul fiber ring of the East Kentucky Network also crosses a large portion of northern Perry County where these priority areas are located.

While backhaul fiber is available in the local area, fiber to the premise or “last mile” availability of gigabit connectivity in Perry County remains very limited. All fiber to the premise networks are currently owned by local broadband provider Thacker-Grigsby who has made sizable investments in last mile fiber in the county, focused mainly in the smaller areas of the northeastern part of the county. Most importantly though, Thacker-Grigsby offers fiber to the premise gigabit internet services in downtown Hazard, a remarkable asset for the community!

Broadband access generally via coax or “TV cable” networks are currently operated by TVS cable and Charter / Time Warner in the county. As noted by the maps above, significant portions of the county have 25Mbps+ download service already available, and while not gigabit speeds, these networks still offer 100Mbps+ download speeds which are very competitive for most residential customers’ needs at present.

These existing pockets of high-speed connectivity and/or backhaul in the county – including Thacker-Grigsby’s gigabit fiber to the premise network in downtown Hazard – offer tremendous opportunity and competitive advantage with other regions across the nation. However, these networks must be expanded farther so that higher speeds will be expanded to a broader area to offer a real competitive advantage in attracting industry. In addition to fiber services being made available to more people, parallel efforts should be undertaken with equal vigor to market and raise awareness of these services. For example, Perry County should aggressively seek the “gigabit community” designation to help provide national level awareness to the community’s growing connectivity.



Corresponding with this network expansion, Perry County must also provide opportunities for its residents and businesses to access important training on how to use these tools to their greatest impact through adoption programs. The public library is often the hub for technology training for those seeking to gain computing skills. Currently, Perry County Library has 35 computers for public use. These computers have a 100 mbps connection speed, according to library staff. Computer-use training programs are offered annually. Participation in these annual programs is not strong according to library staff.

Many free digital literacy resources are available to Perry County residents either through their own residential internet connection or through public computers at the library;

- www.digitalliteracy.gov offers free adoption programs that range from learning the basics of a computer to job skills. The free computer basics programs include computer use, how to use software/applications, using the internet, communication through the web, and internet safety.
- <http://driveyourlearning.org/> is a free resource for technology adoption that offers participants training content from a variety of trainers. Participants can choose their learning priorities: job skills, social media, life skills, education and basic computer programming.
- www.common sense media.org offers families tools aimed to help their children excel in a media driven world without sacrificing safety.

GROWING BROADBAND'S IMPACT THROUGH THE PERRY COUNTY PLAYBOOK

What follows is Perry County's Playbook for maximizing the impact of broadband. It takes into account the county's broadband needs, goals, barriers and solutions. It is informed by the data regarding the current state of broadband in Perry County and information about pending broadband development through KentuckyWired. More specifically, the playbook reflects the culmination of:

- A** the broadband connectivity data analysis accomplished through the CNX visualization tool;
- B** the pending fiber development through KentuckyWired and its proposed routes;
- C** specific input and priorities of Perry County leaders from public and private sectors through Sector Broadband Planning Workshops;
- D** proven best practices from similar communities across the state and country;
- E** best practices regarding adoption programming and Perry County's adoption needs; and
- F** input from privately owned broadband/technology companies.

The playbook takes this information set and organizes it around foundational community broadband strategies:

- Network Expansion;
- Increase Digital Literacy;
- Technology Driven Economic Development/Jobs; and
- Local Public Private Partnership (P3) and Planning.

Lastly, the playbook organizes these informed strategies by cost effectiveness, prioritization, and necessary times for completion.

PERRY COUNTY BROADBAND PLAYBOOK

PRIORITY INDUSTRIES

HEALTHCARE

County leadership has identified the commercial corridors around the downtown area as a top priority for enhanced data connectivity and network development. As the location for the Hazard ARH Regional Medical Center and the UK Center for Excellence in Rural Health, these health care anchors and the commercial developments in and around them offer significant growth potential through the use of gigabit connectivity.

TOURISM DEVELOPMENT

County leaders have also prioritized tourism development in and around the Buckhorn area also as a priority for network expansion. This naturally serene area currently lacks reliable high-speed data connectivity at the state park and campground areas, as well as the Buckhorn Children's Facility. As such, the area is frequently overlooked for destination events and corporate meetings. Adding gigabit service availability in this area would match the beauty of the natural surroundings with the demands of modern tourist and business travelers and drive up overall economic activity in the county.

INDUSTRIAL DEVELOPMENT

Finally, county leaders have also prioritized gigabit network availability and redundancy to increase the competitiveness of the region's industrial parks and neighborhoods in and around the Wendell Ford Airport.

PERRY COUNTY PLAYBOOK

Development of these strategic priority industries represents a significant economic opportunity for a future economic base in Perry County. To accomplish these goals, Perry County leadership should employ an execution strategy as outlined below:

1 | ECONOMIC DEVELOPMENT / JOBS

- A** Establish top sector priorities for economic growth opportunities by leveraging existing assets in the community;
- B** Organize a local coalition for each sector to identify and prioritize growth/expansion goals and opportunities, particularly those enabled through increased high-speed connectivity; and
- C** With support from economic development consultants, finalize an action plan to achieve the growth goals.

Econ Dev./Jobs	3 Months	6 Months	12 Months	Ongoing
	Using career inventories, improve the alignment between adults and workforce programs	Establish economic development priorities that take full advantage of improved broadband availability. Provide more training for local businesses on how to use the internet for their operations and marketing	Increase public awareness and public training opportunities for personal and entrepreneurial uses of broadband	Annual refresh of economic development priorities

2 | FIBER NETWORK EXPANSION

- A** Determine Network Expansion Priority Areas & Platform
 - Align with economic development strategies/objectives
- B** Commission Engineering Study to Design and Derive Cost Estimates
 - Engage planning and engineering firm to design “desktop” build plans
- C** Establish Partnerships for Build-Out Financing
 - Seek Out and Formalize Provider Partnerships
 - Organize appropriate financial structuring for network construction and operations transaction with support of technical and legal consultants
 - Secure financing through grants, loans, bonds
- D** Complete Final, Field Engineering and Commission Construction

Fiber Network Expansion	3 Months	6 Months	12 Months	Ongoing
	Commission engineering studies and gather more connectivity info for the following areas of interests: <ol style="list-style-type: none"> a. Buckhorn Lake State Resort Park b. Galen College of Nursing/Airport Gardens c. City of Vicco area d. Eagles Landing Campground e. City of Buckhorn/Buckhorn Children’s Center f. Coal Fields Regional Industrial Park and surrounds g. Wendell H. Ford Airport and community h. Homeplace Clinic i. Leatherwood/Blackey Medical Clinic 	Gather more connectivity info for the following areas of interests: Conduct a fiber to the tower (FTTT) study that identifies the cell towers in Perry County without a fiber connection and strategies for taking advantage of the KentuckyWired fiber network for improved mobile data capacity county wide	Refresh inventory of broadband areas of service and quality of service across the county Review local policies for unnecessary barriers to private investment resources Develop a redundancy strategy for anchor institutions and anchor/commercial tenants	Annual refresh of Perry County broadband map Annual Perry County Cross Sector Broadband Planning Workshop

3 | INCREASE DIGITAL LITERACY

Increase Digital Literacy	3 Months	6 Months	12 Months	Ongoing
	Inventory basic computer skills training resources in Perry County	<p>Work with Public Library to offer “How to test your broadband speed at home” training</p> <p>Develop strategy for offering free wifi at all Perry County public facilities</p> <p>Develop strategy to enhance computer skill training resources in Perry County</p>	Establish a Perry County 1:1 program task force to develop a connectivity plan suitable to support a 1:1 K-12 deployment	Increase the variety of digital literacy options at the Perry County Library: jobs applications, device/access/use, E-books, setup of new devices

4 | LOCAL PUBLIC PRIVATE PLANNING

Local Public Private Planning	3 Months	6 Months	12 Months	Ongoing
	Work with Thacker-Grigsby and East Kentucky Network to clarify service areas in Perry County	Establish a Perry County Broadband Advisory Team	First annual “Perry County Technology Progress Report	Pursuit and identification of funding opportunities

This document is based upon information directly provided to CNX as well as publicly available information, and reflects current market conditions, all of which are accordingly subject to change and such changes may be material.

CNX has relied upon the accuracy and completeness of all information made available to us and available from public sources.

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