

The Center for Rural Development

LAST-MILE GUIDE

Leveraging KentuckyWired for local broadband deployment

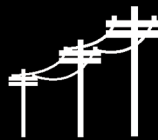
bridging the **digital divide**



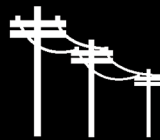
NATIONAL NETWORK



MIDDLE-MILE



LAST-MILE



END USER

Phone: 606-677-6000
Email: broadbandinfo@centertech.com
Web: www.centertech.com

Address:
2292 South Highway 27
Suite 300
Somerset, KY 42501

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Last-Mile Action Team Contributors to this document:

LONNIE LAWSON

COLBY HALL

RICHARD TAYLOR

DARRELL MAYNARD

SCOTT SURBER



OVERVIEW

The Last-Mile Action team was formed to help your community with the task of solving the “Last-Mile” dilemma that faces most of rural America. The team was created as a partnership between The Center for Rural Development, which works to positively impact the communities within 45 counties of Southern and Eastern Kentucky, and SOAR, part of whose mission it is to enhance opportunity and innovation in Appalachian Kentucky.

The last-mile is the final bit of fiber optic cable, copper wire or radio transmission that goes from a home, business, school or hospital and connects into the “middle-mile” infrastructure. The middle-mile serves as the ‘on-ramp’ to the information superhighway. Think of it like this: your home or business is often connected to a local or regional internet service provider. That provider needs a connection or on-ramp to the information superhighway. That connection between the two is the middle-mile.

There have been numerous discussions with telecommunications providers over the years regarding improving service and widening availability of broadband access, but little to no improvement had taken place until the KentuckyWired initiative.

The fiber infrastructure that exists in the service area is dated and is being used, for the most part, at capacity. Furthermore, our major telecommunications providers have expressed to our committee that there was no viable business case for building any extensive fiber lines into our region - now or in the foreseeable future.

The progress of adjoining states in meeting their broadband needs, combined with Kentucky’s recent low national rankings on broadband availability, just made the problem that much more of an issue for business recruitment and retention efforts (i.e., jobs). It became very apparent that private enterprises could not resolve this economic development issue without public assistance.

Through the experiences of communities across the nation, the concept of generating economic opportunity by increasing local access to high-speed broadband services is demonstrated time and again. Having accessible and affordable broadband services clearly creates a more favorable environment for cultivating commercial opportunities.

Unfortunately, most commercial telecommunications providers offer internet access only where it is profitable to do so. They choose whom to serve, what data speeds to make available, and are free from regulation to charge whatever fees the local market will endure. In many rural areas, longstanding incumbent internet providers often encounter little to no local competition.

In many rural communities we are finding that the highest available speeds offered by the established internet service providers are well below the current FCC broadband standards (25mbps down and 3mbps up), the service is less than reliable, and the monthly access fees routinely exceed statewide and national averages.

If a community’s only accessible internet provider chooses not to offer an affordable, fiber-based, high-speed broadband service, and nobody steps in to fill the competitive void, those companies can continue to keep the market as is, plodding along doing business as usual.



Under the leadership of Congressman Hal Rogers and Kentucky Governors Bevin and Beshear, the state and The Center for Rural Development launched KentuckyWired, a 3200-mile fiber optic cable deployment project that would bring the “middle-mile” to every county of Kentucky. Now that KentuckyWired is up and running in Eastern Kentucky, we must move our focus and our energies to the last mile.

The Kentucky Communications Network Authority (KCNA), the agency responsible for managing KentuckyWired, will have considerable excess fiber strands available for economic and community development. They will not, however, be installing any fiber lines from their node sites into subdivisions, shopping centers or industrial parks. Additionally, KCNA will not be providing internet access services to anyone outside of government stewardship. The KentuckyWired project will be a “dark” middle-mile fiber network for the private sectors of our economy. Community and business leaders, unwilling to accept the digital divide status quo, should therefore be prepared to explore enterprise level options to utilize the potential of KentuckyWired for themselves, building a public fiber system that can consolidate multiple business or residential users and connect them, en masse, to commercial internet service providers over the KentuckyWired fiber network. Accelecom, formerly Open Fiber Kentucky, is the company that has been established as the private arm of the Public Private Partnership (PPP) of the KentuckyWired project to work with governments, businesses, and ISPs to provide access to the network.

Creating and executing on a plan to build-out a “last-mile” fiber-optic infrastructure requires expertise and man-hours. Unfortunately, few communities have the necessary resources to deal with planning and managing a data communications infrastructure project.

Establishing publicly owned pathways from downtown areas, shopping centers, industrial parks to high capacity, low price internet providers may indeed be the best solution for some communities to pursue.

Since we are working across 45 counties the action team cannot actively lead local projects, but we can bring our expertise and knowledge to bear and assist your local team with last-mile broadband deployment. This roadmap is intended to be a starting point for any community with questions about last-mile deployment, but our action team is available to work with any local team to answer more specific questions.



BUILDING A LOCAL TEAM

Forming a broadband planning committee is one of the first things a community can do in working to improve broadband access.

Improving broadband internet access in your community requires strategic planning and a group of dedicated people who will work constantly and strategically toward your community's broadband goals.

The last-mile is local, and this requires local citizens to take ownership over their own deployment efforts. This means you will need a local last-mile team. The Last-Mile Action Team can help provide information and expertise to your local team. If you are willing to work with others to lead the charge, our procedures will show you how to work with existing or emerging broadband providers in your community and leverage the KentuckyWired project, working with Accelecom and the Last-Mile Action Team.

Even if you are satisfied with your current internet, community involvement in a broadband infrastructure project drives down the cost of deployment and results in more investment from the private sector. The first step in encouraging this investment does not require an engineer or a funding source, it requires a local community champion leading the charge and working to engage the community explaining the power of broadband.

Identify a key contact for your committee, likely someone who can serve as a chairperson for the committee. Be certain that person will have enough time, energy and interest to manage the efforts.

Committee Composition, Recruitment and Objectives

Your broadband planning committee should be representative of your entire community, incorporating committed stakeholders who will benefit greatly from broadband access. Strive for diversity but look for those who are committed to and passionate about your area/region and the idea. Be open to including even a student representative from a local high school who has exhibited an entrepreneurial spirit and/or a technological aptitude.

One of the first objectives of the broadband planning committee is to determine the specific broadband goals of the community. Set goals that are specific, attainable and time bound.

Surveys and interviews can provide essential information.

- Assessing the current broadband outlook is critical in planning
- Neighborhoods and businesses served by broadband
- Affordability and willingness to pay
- Download and upload speeds
- Types of available internet service – cable/DSL/fiber/wireless
- Levels of satisfaction with current services
- Reasons for non-usage among unconnected citizens and businesses



Increased internet speeds are certain to be required for applications in the future, especially for businesses, hospitals, schools, nonprofits, and other organizations. A map that shows demand and underserved areas in your community provides a powerful tool for your community. With demand and needs accurately mapped, you have the beginnings of a strategic phased expansion of broadband internet services. Create a ready-made map of hundreds of potential customers to share with potential providers- one that presents opportunities to use existing community infrastructure (towers, bridges, utility poles, buildings) in an expansion of available broadband internet services, especially fixed wireless broadband.

Your committee could help providers by engaging property owners early in the process to secure amendments to easements or new easements to allow for the installation of telecommunications equipment and infrastructure. The city or county can make their rights of way available to broadband providers on a cost-level basis or free of charge so that providers can bury conduit or install poles or towers mounted with wired or wireless equipment.

“Dig once” policies provide ready-made buried conduit, enabling future providers to more easily and cheaply install fiber by threading it through existing conduit. Installing empty conduit which is relatively inexpensive during construction projects supports future expansion by substantially lowering the expense of digging for providers. City and county governments should strongly consider this approach when other new buried utility work is being conducted. The advanced planning will save both time and money when future broadband projects are carried out.

Allowing broadband providers access to lines of sight (roofs of government buildings, water towers, and other tall structures that can be used to install transmitters, antennas and other networking equipment) can result in broadband deployment with fewer costs, promoting expansion in your area. The Last Mile Committee will work with city and county governments, fiber boards, area development districts, Chambers of Commerce and utility providers such as water districts to facilitate such discussions as well as demonstrate the benefits of such collaborations.



Telling the Story

An often overlooked but critical component of team and consensus building requires a powerful story that connects the dots and explains why these efforts are important. Evidence shows that broadband connectivity results in business retention, growth, and attraction, while also helping people earn additional income. Broadband is one component in making a particular community an attractive place to live, helping stem the population loss that many of our rural communities are experiencing and stabilize the tax base. Regional healthcare disparities can also be decreased via broadband connections with telemedicine access to experts in other locations. Identify what makes your community unique and how broadband could supplement and enhance your unique community assets. Telling the success stories from other communities that realized economic growth through broadband investment that paid for itself while demonstrating how it will be applied to your community helps everyone see the vision and get on board.

Elected Officials

Local government can greatly impact the economics of broadband investment in their community. There is no one-size fits all approach or right answer here, but there are a multitude of options for elected officials to impact the economics without having to become mired in technical engineering details. Local fiber boards can also be a great asset to government officials. If fiber boards exist in a county, how they are handled and who they report to may be different in each situation, but they can serve as champions for broadband advancement for a particular area.

Reducing Deployment Cost

Before any network construction even starts local governments can explore policy options that will incentivize and accelerate network investments. Once again these are not requirements or appropriate for all communities. They are simply options to explore for your community. While not all-inclusive, ideas to consider include:

- Dig-Once Policy (would require laying conduit for future broadband projects during any new underground utilities work)
- One-Touch-Make-Ready (ordinance or statute that requires utility pole owners to allow a single construction crew to make changes to multiple utility wires)
- Leasing Capacity from KCNA through Accelecom
- Providing access to secure storage for electronics



CENTERLINKS ACCESS NODE SITES

A technically preferred, and least expensive method for establishing commercial access onto KentuckyWired would be to create a local commercial access or “meet me” point, close to a commercially active area within the community and near the KentuckyWired fiber route.

Strands of fiber from a community-based Local Access Point would be run to, and be spliced into, the KentuckyWired fiber. From this community-based access point, local service providers, businesses or homes could then be connected and their data collectively backhauled from this point into a KentuckyWired core node site. This method makes much better use of the fiber resources since it eliminates the need for each individual business or home to occupy a pair of fiber exclusively. This in turn greatly reduces the cost of connecting.

To assist with this effort, The Center has begun planning publicly and commercially available “Centerlinks Access Nodes” throughout the service area. These “CAN” sites will serve as on-ramps to reach the KentuckyWired network and its service providers.

The Center, in partnership with the Kentucky Communications Network Authority (KCNA) proposes to construct final-mile fiber runs to state parks and recreation areas within its service area of Eastern Kentucky. At the terminus point, The Center will install the equipment necessary to establish the site as a Centerlinks Access Node. We anticipate that the state park and recreational area nodes will be much smaller in footprint, as compared to a fully developed CAN site due to the remote nature of the locations and the relatively low population densities proximate to these sites.

These initial sites are a necessity for the economic development of Kentucky’s most rural and underdeveloped counties, in addition to improving public safety in the rugged and mountainous terrain.

Beyond the parks and recreation areas, The Center will also identify and deploy a number (within funding constraints) of fully developed CAN sites to a variety of locations. These initial “proof-of-concept” CAN sites will allow for commercial access to the KentuckyWired middle-mile fiber infrastructure.

The typical outdoor CAN site will vary in size and configuration. Some may be as simple as a roadside pedestal to enable fiber interconnection, while others may be large enough to host local providers’ equipment. From the site, unless there is existing fiber, The Center may build sufficient fiber lines back to the KentuckyWired middle-mile fiber to service the node.

The configuration of a Centerlinks Access Node will ultimately be determined by our staff’s site survey. The on-site survey team would analyze the anticipated load of the site’s location as well as land suitability, line of site suitability for wireless and the proximity of suitable electric service.



BUILDING THE NETWORK

Defining Goals

Why would your community want to invest in broadband?

The last-mile deployment efforts can often fall victim to a game of chicken and egg as many partners are waiting for the other to act before beginning their own work. Therefore, it is important that before even broaching the questions of technology or funding, communities should start by defining their goals and stating what problem they are looking to solve with broadband deployment.

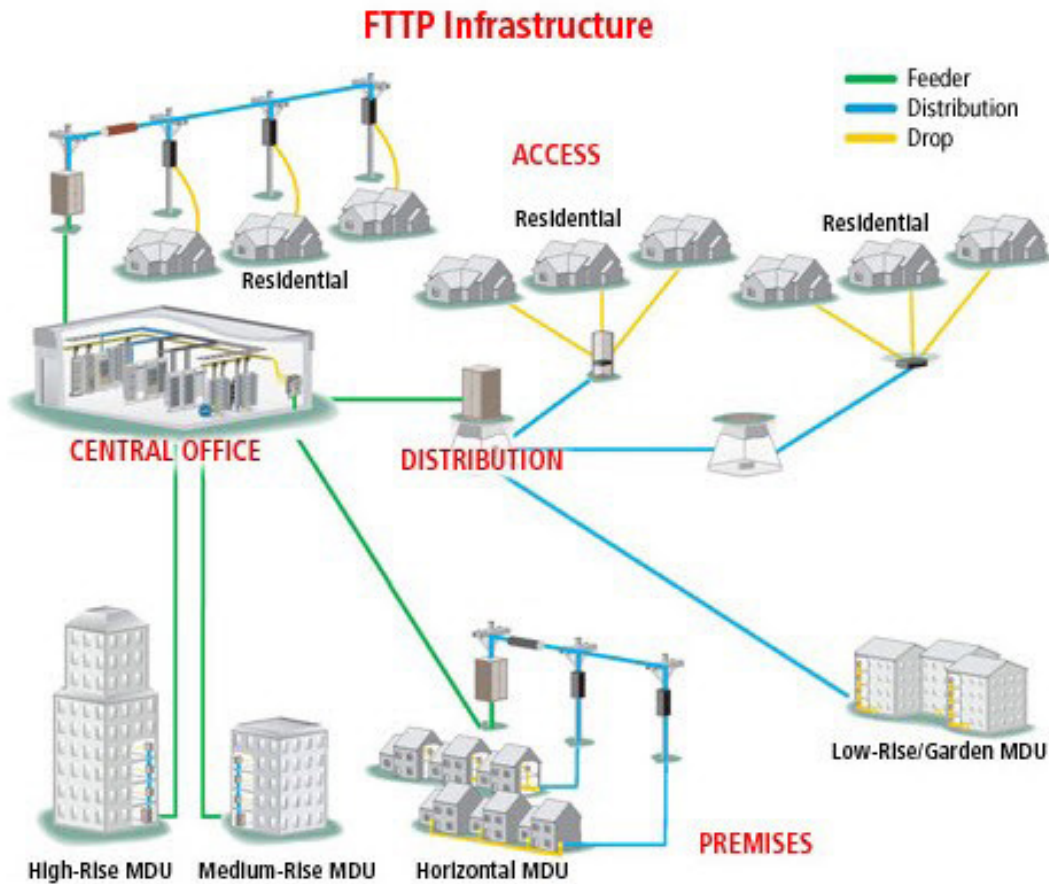
If a community is primarily focused on driving economic development through the industrial park or business consumers, they will need to focus on diverse and redundant fiber deployment to these sites. Whereas, if a community is interested primarily in increasing access to broadband and providing more homes and businesses with the opportunity for connectivity then the community can opt for single-threaded fiber deployment.

While some communities will be able to begin immediately with Fiber to the Premises (FTTP), a phased approach to last-mile deployment begins with setting these goals.

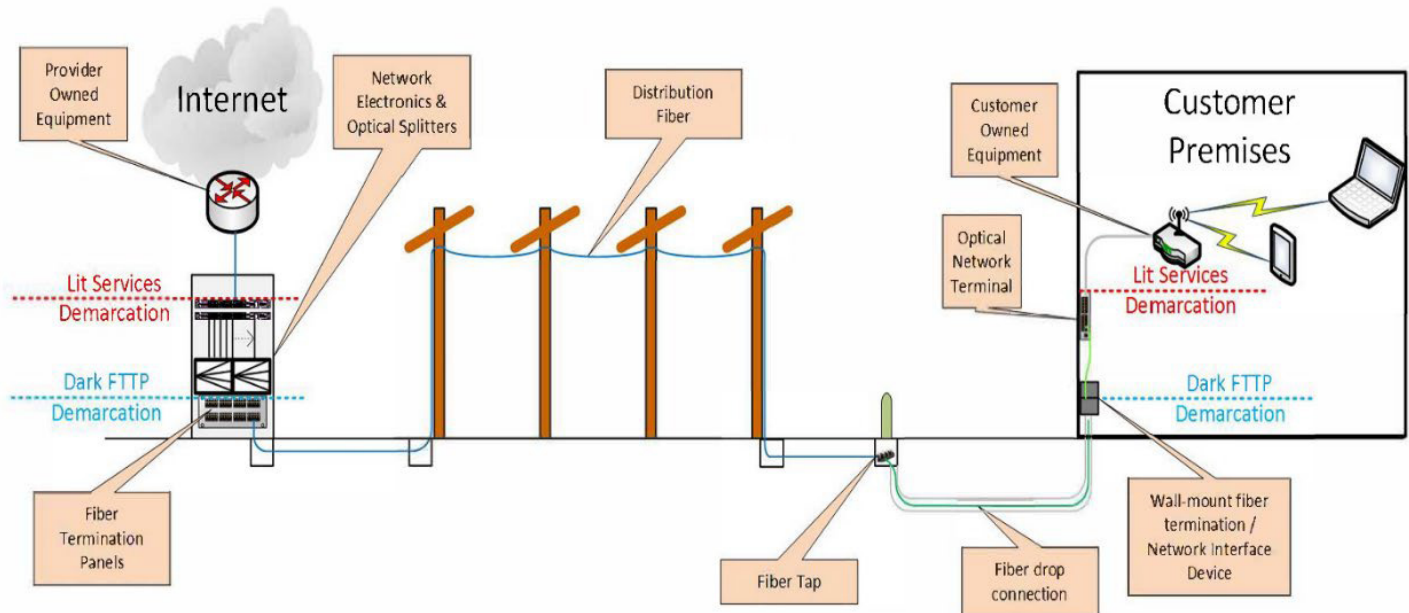
This allows communities with limited resources to solve the last-mile equation by setting a constant based on priorities. Essentially this is the demand portion determining what a community wants and the financing is the supply portion to determine how we meet that demand.



Fiber-to-the-Premise Model

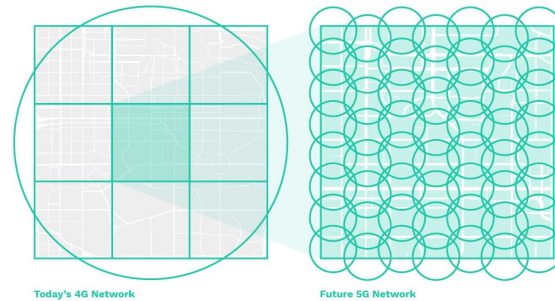


Typical FTTP Buildout Layout



A Word about 5G

While 5G will operate over frequencies capable of transmitting larger amounts of data, the signal can only travel 10% of the distance of a 4G signal and does not penetrate physical obstructions such as walls and vegetation. This means each antenna will only cover a diameter of roughly 750 feet, compared to current 4G coverage diameters of 3.5 miles. Therefore, millions of these devices will be required to provide connectivity—a solution that will not always be the ideal replacement to FTTP.



Feasibility Studies

A feasibility study should only be undertaken by a qualified firm with experience in broadband mapping, financial modeling, crowdsourcing in relation to data collection, design capabilities, etc. The study should be a comprehensive report, with supporting documentation, related to the feasibility and cost of building a broadband infrastructure over proposed fiber routes. While these can be completed at the city or municipality level, it is financially more beneficial to accomplish this at the county level. The feasibility study should include, but not be limited to, the following components:

1. Restrictions and Limitations

- Identify and provide a detailed list of any legal or environmental restrictions that would prohibit installation of the fiber infrastructure along the proposed route or add cost to the overall project budget
- Detail any other factors that will restrict or limit the proposed route

2. Data Elements Needed for Projected Infrastructure Budget

- Number of fiber routes and fiber route miles
- Number of Passes (homes/business)
- Current state of broadband in the area/region

3. Projected Infrastructure Budget

- Cost estimates for all labor and materials associated with each fiber route
- Cost estimates for all fees and licenses for each fiber route
- Identification of any ongoing costs associated with right-of-way access for each fiber route
- Cost estimates for operation, maintenance and upkeep for the newly established network

4. ISP (internet service provider) Interest in the Project

- Local ISPs likely have a vested interest in the community
- A local ISP's willingness to work with city/county government could help advance a project that perhaps would otherwise not be feasible



FUNDING

How do we invest in broadband with limited resources?

Building a fiber network is expensive in terms of up-front cost, but in the long run these networks often pay for themselves and provide economic opportunity for communities. The question therefore is not can we pay for it, but how do we get the initial capital investment required? With a multitude of funding options from private investment to grant funding it can be confusing, yet the funding source that is the appropriate fit for you should be dictated by the goals your community has defined. Not all funding sources and deployment efforts are compatible. In other words, does the funding request (Researching Feasibility/Pre-engineering Studies/Construction/etc.) fit the funding source?

The Center for Rural Development - TAP program

The Center for Rural Development's Fiber Infrastructure Project - Phase 3 is funded by a grant from the Appalachian Regional Commission and is administered by The Center for Rural Development (The Center). As part of the grant, a technology assistance program will be provided to ARC counties so they may conduct asset mapping, perform feasibility studies, conduct pre-engineering analysis of community fiber projects or other activities that will extend the reach of the KentuckyWired fiber infrastructure. This assistance does not include reimbursement of construction activities, acquisition of goods and equipment or reimbursement of applicant expenses.

The cost of obtaining approved technology assistance will be reimbursed by The Center at 80% of the approved amount. The remaining 20% will be the sole responsibility of the applicant. The Center may, at its discretion, accept documented and verified in-kind contributions or a combination of funds and in-kind to meet the required 20% applicant contribution.

This technology assistance program is being implemented in cooperation with the Commonwealth of Kentucky. It is intended to assist communities in their efforts to establish strategic plans and to formulate data-driven grant requests to finance locally initiated broadband construction projects. The Center will also be assisting with one-on-one consultations for public officials and be providing community information workshops.

Applicant Eligibility Applications for assistance may be submitted to The Center by Kentucky County or City Governments, Regional Industrial Development Authorities, Area Development Districts, Utility Commissions, Rural Electric Cooperatives, Rural Telephone Cooperatives or Fiber Infrastructure Boards with IRS Non-Profit status from the following:

- ARC Distressed Counties: Adair, Bath, Bell, Breathitt, Carter, Casey, Clay, Clinton, Cumberland, Elliott, Estill, Floyd, Harlan, Jackson, Johnson, Knott, Knox, Lawrence, Lee, Leslie, Letcher, Lincoln, Magoffin, Martin, McCreary, Menifee, Morgan, Owsley, Perry, Pike, Rockcastle, Russell, Wayne, Whitley and Wolfe.
- ARC At-Risk Counties: Boyd, Garrard, Green, Laurel, Metcalfe, Monroe, Pulaski and Rowan.



Other Funding Sources (Not an exhaustive list)

Feasibility and engineering studies are often a necessary first step in advancing last mile broadband. Beyond them comes the 'next steps,' meaning last-mile deployment of broadband, and the question arises on how to fund a particular project. With costs approaching \$50,000 or even more per mile of full FTTP broadband, the cost can become prohibitive. Even a less- expensive fixed wireless solution still can present a financial obstacle that can seem insurmountable. There are, however, many financing opportunities that exist. The list below provides some of the 'tools' that exist to fund such projects. While not exhaustive, it does give city and county governments options when deciding whether or not to engage in a last-mile project. Note that this list merely gives an overview of funding opportunities. As a particular project progresses, The Center for Rural Development and SOAR are available to assist with further details on specific funding options and can assist in researching a particular funding avenue. Additionally, this link will provide valuable information when researching funding opportunities:

[Guide_to_Federal_Broadband_Funding_Opportunities_in_US-EN.pdf \(internetsociety.org\)](#)

Financing Tools for Broadband Projects

- Good rule of thumb when thinking about financing broadband projects is to be as creative as possible. These projects more often than not require serious outside the box thinking and a combination of public and private funds.
- This burden falls on us as local government leaders and stakeholders to find a way to get the job done.
- Goal is to make sure you as a local government official are aware of all the different mechanisms of funding out there to make sure you leave no stone unturned

• Government Based Finance Options

• General Obligation (GO) Bonds

- Municipal bond backed only by the credit and taxing power of the issuer and is not connected to revenue from a given project
- No assets are used as collateral
- Kentucky cities can now issue general obligation debt as long as the city has an annual budget where expenditures do not exceed revenues
- Amount of GO bonds able to be issued is limited by population (Section 158 Kentucky State Constitution)
- GO bonds typically seen as the strongest credit in the eyes of credit rating agencies
- Rock Falls, IL is one example of a city who successfully used GO bonds for a broadband project

• Public Purpose Bond – variety of a GO bond

- Municipal bond issued by a state, municipality, or county to fund projects that benefit the public
 - Opposite of a PAB where at least 10% of the benefit goes to the private sector
 - A type of GO bond where the issuer looks to repay the debt through taxation and revenue from the project
 - Issuer not required to provide assets for collateral



• Revenue Bonds

- Municipal bond secured by the stream of revenue generated by the project
- Borrowing costs usually higher on these compared to GO bonds due to the uncertainty that comes with expected revenues
- Revenue bonds are not funded by taxpayers
- A big difference between GO and revenue bonds: revenue bonds are excluded from any specific maximum for total issuance compared to population
- Several different types of revenue bonds currently issued by state and local governments

• **Private Activity Bonds (PAB)** – tax-exempt bonds issued by or on behalf of a local or state government for the purpose of providing special financing benefits for qualified projects

- Per section 141 of the Internal Revenue Code (IRC), any municipal bond where more than 10% of the proceeds from the bond issue go to a private business and where more than 10% of the sales proceeds of the issue is secured by private a business property, this will be deemed as a PAB
- Financing for projects of a private user and government generally does not pledge its credit
 - Alternative to traditional corporate financing
- Only certain projects qualify and must have a strong public benefit
 - Qualified projects are noted in the IRC
- Different types of PABs exist

• **Industrial Revenue Bonds (IRB)** - municipal debt securities issued by a government agency on behalf of a private sector company that is intended to build or acquire factories or other heavy equipment and tools

- Formerly known as Industrial Development Bonds (IDB)
- IRBs raise capital to fund the creation of a manufacturing facility or equipment that will benefit the community at large
- Bondholders get paid back via the revenue generated by the project
- Specific provisions guide the qualification of projects for IRBs

• **Qualified Energy Conservation Bonds (QECB)**

- Federally subsidized bonds available to qualified states, local, and tribal issuers for eligible energy efficiency, renewable energy, and mass commuting projects
- Can be converted into a private activity bond

• Green Bonds

- Issued to raise money specifically for environmentally friendly projects
- More and more investors are seeking responsible and sustainable places to put their money
- Funds benefit new or existing projects meant to have positive environmental or climate effects
 - Can include communications and information technology
- Countries, companies, & state and local governments have all used this vehicle for financing
- Green Bond Principles through the International Capital Market Association can help determine whether a bond is green or not



- **Property Assessed Clean Energy Bonds (PACE)**

- Innovative mechanism for financing energy efficiency and renewable energy improvements on private property through tax assessments lasting 20 to 25 years
- Allows property owners to implement improvements without a large up-front cash payment
- Allows comprehensive projects to be more cash flow positive

- **Social Impact Bonds**

- Contract with the public sector where the bond pays for better social outcomes in certain areas and passes on the part of the savings achieved to investors
- Mechanism to allow investors to give back to the community as well as for companies to expand their social responsibility

- **Linked Deposit Programs**

- Kentucky's Linked Deposit Program is administered under the Kentucky Agricultural Finance Corporation
- Funds available to be loaned are the amount of cash in the state's unclaimed and abandoned property program

- **Greenhouse Emissions Allowance Auctions**

- As carbon capture technology continues to improve and carbon allowances monetize more, this could be a future revenue stream local governments could use to fund broadband projects

- **User Fees**

- Sum of money paid as a necessary condition to gain access to a particular service or facility
- May be needed in some cases as a condition to see a last mile project through to completion

Bond Information Sources

- <https://www.investopedia.com/terms/g/generalobligationbond.asp>
- <https://muninetworks.org/tags-149>
- <https://www.klc.org/News/8485/municipal-bonds-what-every-city-official-should-know>
- <https://www.bloomberg.com/news/articles/2019-03-24/what-are-green-bonds-and-how-green-is-green-quicktake>
- [https://www.investopedia.com/terms/i/idrb.asp#:~:text=Industrial%20revenue%20bonds%20\(IRB\)%20are,Industrial%20Development%20Bonds%20\(IDB\).](https://www.investopedia.com/terms/i/idrb.asp#:~:text=Industrial%20revenue%20bonds%20(IRB)%20are,Industrial%20Development%20Bonds%20(IDB).)
- <https://www.energy.gov/eere/slsc/property-assessed-clean-energy-programs>
- <https://www.irs.gov/tax-exempt-bonds/qualified-energy-conservation-bonds-faqs>
- https://www.energy.gov/sites/prod/files/2017/08/f36/QECB-FAQ_final.pdf
- [https://www.investopedia.com/terms/s/social-impact-bond.asp#:~:text=Key%20Takeaways-,A%20social%20impact%20bond%20\(SIB\)%20is%20a%20contract%20with%20the,the%20savings%20achieved%20to%20investors.](https://www.investopedia.com/terms/s/social-impact-bond.asp#:~:text=Key%20Takeaways-,A%20social%20impact%20bond%20(SIB)%20is%20a%20contract%20with%20the,the%20savings%20achieved%20to%20investors.)
- <https://agpolicy.ky.gov/finance/Pages/default.aspx>
- <https://casetext.com/regulation/kentucky-administrative-regulations/title-200-finance-and-administration-cabinet/chapter-14-state-investment-commission/section-200-kar-14200-linked-deposit-investment-program>



• Public & Private Options

- Public-Private-Partnership
 - This would involve local government(s) and businesses (ISPs, WISPs, etc.) working together to leverage financing to complete a particular project.
- Pay for Performance (P4P)
 - Similar to other utilities' approach, utilizes the concept of the end-user or community helping fund a particular project based on paying for actual speed and usage of broadband offerings. While not dissimilar to typical subscription based offerings, it relies more heavily on real-time data to determine cost.
- Securitized & Structured Finance
 - Alternative financing involving larger financial institutions that deals with more complicated and unconventional financing needs, such as broadband deployment.
- Catastrophe Bonds
 - Serves as a high-yield debt instrument that allows issuers to receive funding only if specific conditions occur.

• Private Sector Leveraging

- Loan Loss Reserve Funds
 - A form of credit enhancement that helps lenders control the risk that loans will not be repaid.
- Debt Service Reserves
 - A cash reserve which works as an additional security measure for a lender as it ensures the borrower always has funds deposited for the next 'x' months of debt service.
- Loan Guarantees
 - Provides a guarantor to assume the debt obligation in case of a default by the borrowing organization or entity.
- On-Bill Financing
 - Customers repay the investment through a charge on the monthly bill. Upfront capital is provided by a third party. Best used through an existing utility.
- Pooled Bond Financing
 - Can be utilized when proceeds are loaned to two or more conduit borrowers (these can be government entities, 501(c)(3) organizations, or private business. Borrowers do sacrifice some autonomy.
- Pooled Lease-Purchasing Finance
 - Local governments can combine resources to acquire real or personal property through periodic lease payments which have principal and interest components. Can provide an alternative to purchasing an asset with cash.
- Value Capture
 - Investor(s) in a project would retain some percentage of the value provided in every transaction.
- Tax Increment Financing
 - Tax Increment Financing (TIF) is an economic development tool used by public agencies to finance needed infrastructure improvements for a project (e.g., broadband infrastructure) by earmarking future tax gains resulting from the development for the improvements. This public investment will increase the value of the property as well as in the surrounding area and may spur further development.



- Opportunity Zones
 - Obtaining financing through Opportunity Zone Opportunity Funds that offer tax incentives to investors.
- Development Exactions
 - Local zoning authorities utilize regulatory powers to require property owners to provide payment or property to initiate development of an area.
- Tap Fees
 - Similar to other utilities, this serves as a connection fee to cover the cost of a service installation.
- Linkage Fees
 - This fee can be charged by local government on real estate developments to raise funds to pay for additional community needs, such as broadband.
- Impact Fees
 - Municipality-assessed fees on property developers to assist in paying for infrastructure improvements that must be built due to property development.

• Federal Programs

- Appalachian Regional Commission <https://www.arc.gov/>
 - Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) <https://www.arc.gov/arcs-power-initiative/>
 - Targets federal resources to help communities and regions affected by job losses in coal mining and coal-related operations and industries.
 - Telecommunications and Technology Program
- Federal Communications Commission <https://www.fcc.gov/>
 - Connect America Fund (CAF) <https://www.fcc.gov/general/connect-america-fund-caf>
 - Program designed to expand access to voice and broadband services for areas where those services are typically unavailable.
 - Rural Digital Opportunity Fund (RDOF) <https://www.fcc.gov/document/fcc-launches-20-billion-rural-digital-opportunity-fund-0>
 - FCC program designed to close the rural digital divide
 - E Rate Program <https://www.fcc.gov/consumers/guides/universal-service-program-schools-and-libraries-e-rate>
 - Telecommunications program to make services more affordable to schools and libraries.
 - Rural Healthcare Program <https://www.fcc.gov/general/rural-health-care-program>
 - Provides funding to eligible health care providers for telecommunications and broadband services necessary for the provision of health care.
- USDA Rural Utilities Service <https://www.rd.usda.gov/about-rd/agencies/rural-utilities-service>
 - Telecommunications Infrastructure Loan and Loan Guarantee <https://rd.usda.gov/programs-services/telecommunications-infrastructure-loans-loan-guarantees>
 - Provides financing for construction, maintenance, improvement and expansion of rural broadband services.



- Rural Broadband Access Loan and Loan Guarantees
<https://rd.usda.gov/programs-services/rural-broadband-access-loan-and-loan-guarantee>
 - Loans geared to broadband facilities construction, improvement or acquisition.
- Community Connect Grant Program
<https://rd.usda.gov/community-connect>
 - Provides financial assistance in the form of grants broadband services.
- Distance Learning and Telemedicine Grant Program
<https://rd.usda.gov/programs-services/distance-learning-telemedicine-grants>
 - Geared toward entities that provide education or healthcare through telecommunications.
- Rural eConnectivity Program
https://www.rd.usda.gov/files/508_RDeConnectivityToolkit121918.pdf
 - Promotes reliable, affordable connectivity throughout rural America
- National Telecommunications and Information Administration
<https://www.ntia.doc.gov/>
 - Promote Broadband Expansion Grant Program
 - Broadband grants geared to unserved and underserved areas.
- Department of Commerce, Economic Development Administrations
<https://www.eda.gov/>
 - Public Works & Economic Adjustment Assistance
 - Provides economically distressed communities with strategies, investment ideas, information on flexible financial resources and more.
 - Partnership Planning
 - Assists with policy initiatives and financial planning for projects such as broadband expansion.
 - Local Technical Assistance
 - Aids in filling knowledge and information gaps that may otherwise prevent local government leaders from making optimal decisions
- Department of Housing and Urban Development
<https://www.hud.gov/>
 - Community Development Block Grants (CDBG)
 - Grants provided to address community needs, including infrastructure.
 - Section 108 Loan Guarantees
 - Allows use of CDBG to access low cost loan programs.
 - Public Housing Capital Fund
 - Specific to public housing for modernization and development.
 - Choice Neighborhoods Program
 - Leverages public and private money to address struggling neighborhoods.
- New Market Tax Credits
<https://www.cdfifund.gov/programs-training/programs/new-markets-tax-credit>
 - Incentivizes community development and economic growth through the use of tax credits that attract private investment.

NEXT STEPS

While this guide was developed to assist you in taking the first steps toward last-mile connectivity and enhanced broadband in your area, you may have many more questions. Below are some resources to help you begin to answer some of those questions as you work to improve your community and its way of life.

The Center for Rural Development – www.centertech.com

SOAR - <https://www.soar-ky.org/>

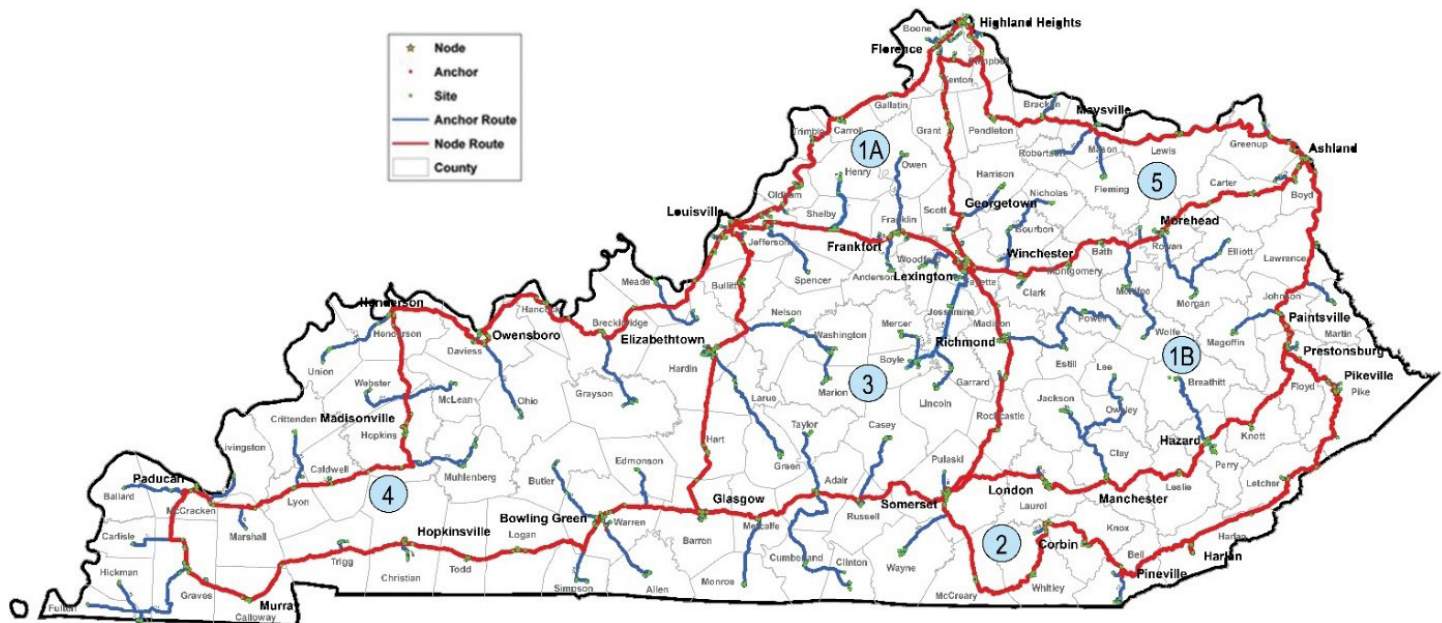
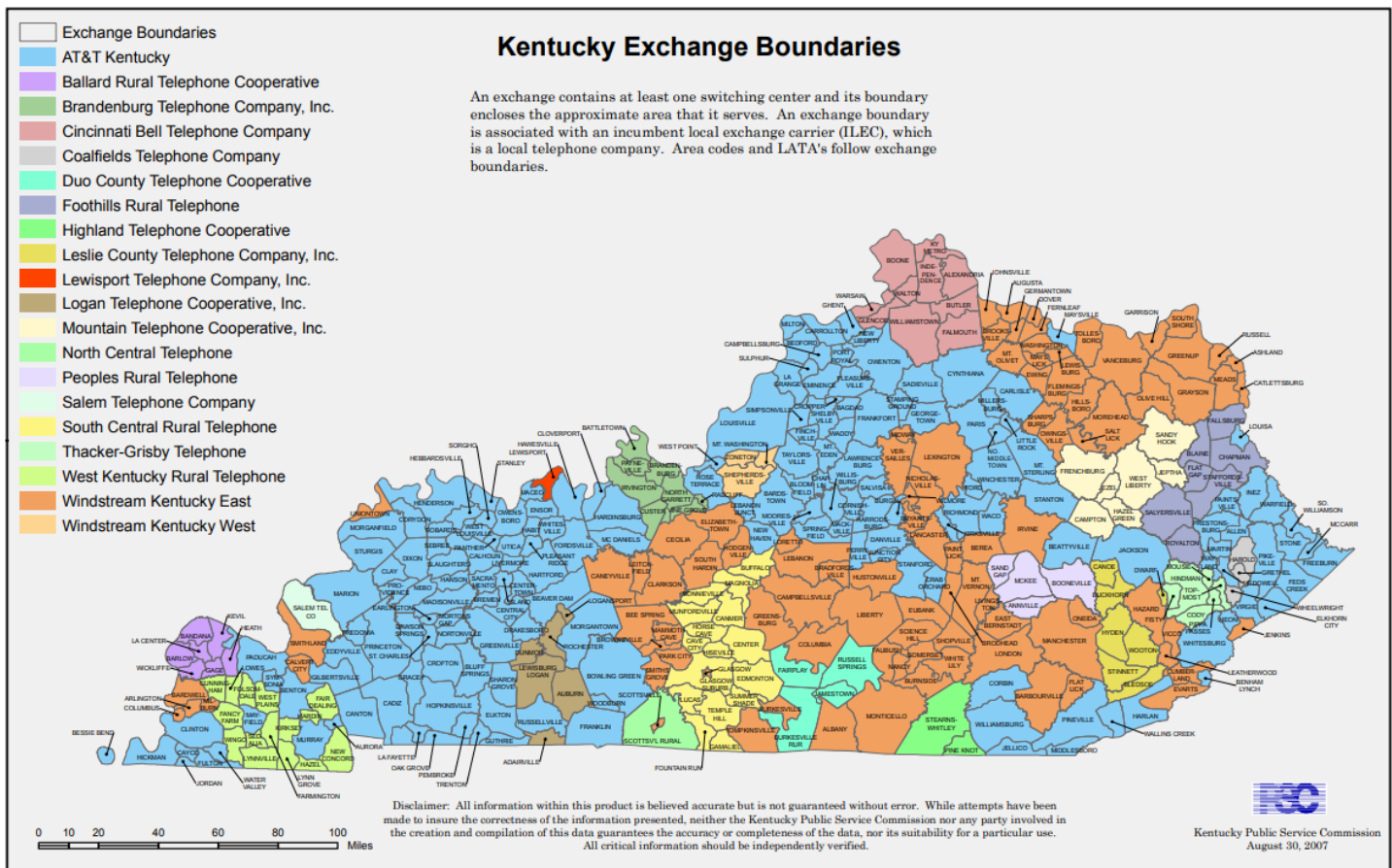
KentuckyWired – www.kentuckywired.ky.gov

Accelecom – www.accelecom.net

Finally, the Last-Mile Action Team welcomes your contact. The team is available to assist throughout the process. Richard Taylor and Scott Surber serve as points of contact for the team. You may reach of them at 606-677-6000.



BOUNDARIES MAP / RINGS MAP



LINES / RINGS TABLE

Lateral Lines	Main Trunk Line	Ring		Lateral Lines	Main Trunk Line	Ring
	Adair County	3			Knott County	1B
Allen County		4			Knox County	2
Anderson County		1A			LaRue County	3
Ballard County		4			Laurel County	1B
	Barren County	3			Lawrence County	1B
	Bath County	1B		Lee County		1B
	Bell County	2			Leslie County	1B
	Boone County	1A			Letcher County	2
Bourbon County		1B			Lewis County	5
	Boyd County	1B		Lincoln County		1A
Boyle County		1A			Livingston County	4
	Bracken County	5			Logan County	4
Breathitt County		1B			Lyon County	4
	Breckinridge County	4			Madison County	1B
	Bullitt County	3		Magoffin County		1B
Butler County		4		Marion County		3
	Caldwell County	4			Marshall County	4
	Calloway County	4		Martin County		1B
	Campbell County	1A			Mason County	5
Carlisle County		4			McCracken County	4
	Carroll County	1A			McCreary County	2
	Carter County	1B		McLean County		4
	Casey County	3			Meade County	4
	Christian County	4		Menifee County		1B
	Clark County	1B		Mercer County		1A
	Clay County	1B			Metcalfe County	3
Clinton County		3		Monroe County		3
Crittenden County		4			Montgomery County	1B
Cumberland County		3		Morgan County		1B
	Daviess County	4		Muhlenberg County		4
Edmonson County		4			Nelson County	3
Elliott County		1B		Nicholas County		1B
Estill County		1B		Ohio County		4
	Fayette County	1A			Oldham County	1A
Fleming County		5		Owen County		1A
	Floyd County	1B		Owsley County		1B
	Franklin County	1A			Pendleton County	5
Fulton County		4			Perry County	1B
	Gallatin County	1A			Pike County	2
Garrard County		1A		Powell County		1B
	Grant County	1A			Pulaski County	1B
	Graves County	4		Robertson County		5
Grayson County		3			Rockcastle County	1B
Green County		3			Rowan County	1B
	Greenup County	5			Russell County	3
	Hancock County	4			Scott County	1A
	Hardin County	3			Shelby County	1A
	Harlan County	2		Simpson County		4
Harrison County		1A		Spencer County		1A
	Hart County	3		Taylor County		3
	Henderson County	4			Todd County	4
Henry County		1A			Trigg County	4
Hickman County		4			Trimble County	1A
	Hopkins County	4		Union County		4
Jackson County		1B			Warren County	4
	Jefferson County	1A		Washington County		3
Jessamine County		1A		Wayne County		2
	Johnson County	1B			Webster County	4
	Kenton County	1A			Whitley County	2
				Wolfe County		1B
					Woodford County	1A



GLOSSARY

Whether or not they were used in this guide, the following is a list of useful terms and acronyms commonly used in the broadband and fiber optics industry.

Access Fiber – The fiber in a FTTP network that goes from the FDCs to the optical taps that are located outside of homes and businesses in the rights-of-way.

Aerial fiber - Fiber strung above ground, usually up on utility poles.

Asymmetrical Connections - Internet connections with different download and upload speeds.

Attenuation – The reduction of the amplitude of a signal, electric current, or other oscillation.

Backbone – A backbone in a FTTP network is the lines that carries broadband from larger fiber lines to the smaller fiber lines that interconnect with it.

CPE – Customer premises equipment; the electronic equipment installed at a subscriber's home or business.

Dark Fiber - Optical fiber cable that is not being "lit" or used by an ISP. Often an ISP builds in the dark fiber so they can light it up when needed; or lease it out to other ISPs or interested parties at wholesale cost.

Distribution Fiber – The fiber in a FTTP network that connects the backbone to the FDCs or SCTs.

Drop – The fiber connection from an optical tap in the right-of-way to the customer premises.

FDC – Fiber distribution cabinet; houses the fiber connections between the distribution fiber and the access fiber. FDCs, which can also house network electronics and optical splitters, can sit on a curb, be mounted on a pole, or reside in a building.

FTTP – Fiber-to-the-premises; a network architecture in which fiber optics are used to provide broadband services all the way to each subscriber's premises.

Gateway – also known as Broadband Gateway; is the access point for a Community FTTP network that connects to a larger Regional Broadband Network (e.g. KentuckyWired) and then connects on to the Global Broadband Network.

Internet of Things - The IoT is actually a complicated, and constantly changing thing. Simply put, it is the concept of the interconnectivity of many different devices (phones, cars, appliances etc.) that are all embedded with technology that connects them to the Internet.

Last Mile – The last stretch of fiber that connects the consumer to the backbone of the Internet.

MDU – Multi-dwelling unit (i.e., an apartment or office building).



Network Operation Center – The Network Operation Center (NOC) is the connection point from which the backbone fiber will be linked to the network.

OLT – Optical Line Terminal, located in the hut, is the interface to the customer and provides subscribed services.

ONT – Optical Network Terminal, located at the customer/subscriber's premise, converts the optical media being sent by the OLT.

OSP – Outside plant; the physical portion of a network that is constructed on utility poles (aerial) or in conduit (underground).

OSS – Operational Support Systems (OSS); includes a provider's provisioning platforms, fault and performance management systems, remote access, and other operational support systems for FTTP operations. OSS is housed in a network's core locations.

Passing – A potential customer address (e.g., an individual home or business).

ROW – Right-of-way; land reserved for the public good such as utility construction (typically abutting public roadways).

SLA – Service level agreements; contract between the provider and the customer that outlines in detail the requirements of the provider.

Switches – High-speed devices that receive incoming data packets and redirect them to their destination on a local area network (LAN).

Symmetrical Connections - Broadband connections that have the same download and upload speeds.

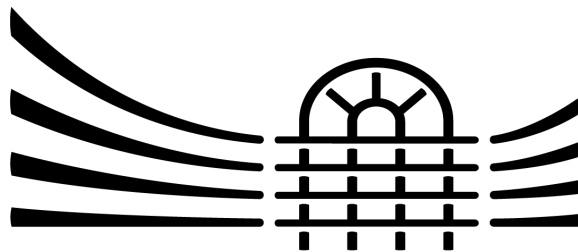
Take Rate – The percentage of potential subscribers who are offered the service that actually do subscribe.

Telecommute - Working from home with the use of technology.

Telemedicine - Remote patient care via telecommunications technology.



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The Center for Rural Development

We help people feel **safer** through public safety initiatives; let people tap into their **creative** spirit through the arts; **empower** people through leadership education opportunities; and give people **access** through advanced technology. **We change people's lives.**



The Center for Rural Development supports the implementation of KentuckyWired infrastructure to bridge the digital divide in the communities we serve.



**APPALACHIAN
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The Center for Rural Development has partnered with SOAR to develop this guide. SOAR is a non-profit, non-partisan organization that is a champion for Appalachia Kentucky. Through collaboration and innovation, they have established a network of partners, representing individuals, organizations, and businesses, who unequivocally believe THERE IS A FUTURE IN APPALACHIA.