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For all the disruptions and damage the pandemic has created, the laser focus it's put on the need to solve America's digital divide has been one of its few benefits.

"The pandemic has prompted new modes for delivery of healthcare, education and professional services, among many other things," notes a recent NRECA report. "Simply stated, [without broadband access] numerous people and businesses in rural America will struggle to emerge into a changed world."

Some \$12 billion in federal money is currently allocated for rural broadband, and that balloons to hundreds of billions with federal COVID relief grants to states that could be used for broadband. Hundreds of billions more could be added if the Biden administration's infrastructure proposal becomes law.

Electric cooperatives across the country are taking up the challenge. NRECA's latest tally shows more than 200 co-ops in 37 states are deploying broadband, and about 100 more are considering it.

And they're not alone. They have the support of a large and growing community of trusted vendor-partners who are assisting co-ops with deep technical expertise, broad industry experience and a familiarity with serving rural areas.

In this special insert, you'll read the stories of several of these co-op/vendor partnerships: why they decided to get into broadband; how they built and financed their project; pitfalls and lesson learned; and the impact on their communities.

Check out electric.coop for more co-op broadband success stories, and be sure to visit the websites of our contributing vendors to learn more about their products and services and their community-changing work with co-ops.



Scot Hoffman
Editor, *REM* Magazine

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TALLAHATCHIE VALLEY INTERNET SERVICES



TALLAHATCHIE VALLEY ELECTRIC POWER ASSOCIATION

HIGH-SPEED CONSTRUCTION, LOW INTEREST RATES AND GRANTS IMPROVE CASH FLOW

COOPERATIVE PROFILE

Tallahatchie Valley Electric Power Association (TVEPA) serves more than 27,000 members in nine north Mississippi counties west of Tupelo. The majority of TVEPA's service area is rural and consists of smaller communities. The co-op makes its headquarters in Batesville, the most populated community in the service area with more than 7,200 people.

Mississippi has ranked near the bottom—as low as 49th in some studies—among states for the availability of broadband internet services, with about 40% of the state lacking access. Since 1942, due to Mississippi law, none of the state's 25 electric co-ops had been allowed to operate for any other purpose than electricity. All of that changed in January 2019 with the bipartisan passage of the Mississippi Broadband Enabling Act. It opened the door for electric co-ops to provide high-speed internet access to its members.

PROJECT OVERVIEW

Immediately after the enactment of the state's new law, and months before the onset of COVID-19, TVEPA started the process of providing affordable, reliable broadband for its residential and business customers. Historically, internet speeds in its service area were woefully slow, and there was little choice of broadband providers from town to town. After conducting feasibility studies and securing project approval from its board of directors, TVEPA became the first Mississippi electric co-op to announce the launch of a separate broadband company called TVI fiber.

FiberRise was selected to lead the design, engineering and build-out of the network. Construction of the four-year project began in late 2019. Over 15 months and as of April 2021, TVEPA had built out over 1,100 miles of its fiber-to-the-home network,

delivering gigabit-level service to more than 3,200 customers at an average rate of 25 customer installs per day.

BROADBAND BUSINESS CASE

The project, financed by CoBank, TVEPA's longtime lending partner, is estimated to cost a total of \$60 million over three phases. TVEPA relied upon CoBank's industry-leading experience with fiber projects for quick response to this funding need. This experience includes understanding the intricacies of the grants and shifting timelines for the project. In addition to being the first lender to support electric co-op broadband construction financing, CoBank has for many years operated a communications division that is composed of a group of bankers with expert knowledge of fiber projects.

TVEPA studies indicated the co-op would be cash-flow positive upon completion of construction at 48 months. By early 2021, financial forecasting had dramatically improved for several reasons. TVEPA increased the speed of construction and customer installations, which began to produce income sooner and in greater numbers. Interest rates proved lower than initially forecasted. And, with the help of FiberRise, TVEPA was aggressive in seeking grant funds on behalf of its membership. The approximately \$41 million in grants awarded to date included \$20 million through the FCC's Rural Digital Opportunity Fund (RDOF) reverse auction, \$16 million from the U.S. Department of Agriculture's ReConnect Grant, and \$4.5 million from the Mississippi Electric Cooperatives Broadband COVID-19 Grant Program.

LESSONS LEARNED

Materials needed in providing fiber-to-the-home services are in short supply because of construction shutdowns related to COVID-19 and heightened demand, since so many electric cooperatives and competitors have entered the broadband market. Also, the scarce availability of fiber, in some cases not obtainable for 18 months due to heavy demand, is expected to become a problem. But Brad Robison, TVEPA and TVIfiber chief executive officer, says that can be overcome with partnerships and planning. An unforeseen shortage of labor has also proved problematic. TVEPA had difficulty in finding project engineers with the right experience and technical

training. In one case, it took TVEPA a full nine months to locate and hire a network engineer.

WHY IS THIS CASE STUDY IMPORTANT?

High-speed internet service from TVIfiber now reaches places normally overlooked by the for-profit service providers. This has allowed teachers and students, for example, to access new broadband hot spots, such as community centers and parking lots, that would have otherwise been unavailable for distance learning. Enhanced broadband has also allowed Mississippi residents to engage in remote video calls with their doctors, a service that has filled an essential need during the pandemic. Robison says, "Looking back at how broadband filled so many heightened needs due to COVID-19, we see this rollout now as more of a calling."

The overall success of TVEPA's broadband rollout proves that with the right technology and right partners, as well as the aggressive pursuit of grant funding, fiber-to-the-home can be delivered in a manner that is financially feasible and provides an essential service to members.

COMPANY DESCRIPTION

CoBank is one of the largest private providers of credit to the U.S. rural economy and delivers loans, leases and other financial services to infrastructure and agriculture entities. Visit CoBank.com to access a variety of reports, podcasts, videos and webinars that cover industry trends, economic predictions, political implications and more.





OKLAHOMA ELECTRIC COOPERATIVE **CUTTING THE PROJECT TIMELINE IN HALF**

COOPERATIVE PROFILE

Oklahoma Electric Cooperative (OEC) serves 46,000 members in central Oklahoma, including the south Oklahoma City metropolitan area. The co-op encompasses a mix of dense urban areas and less-populated rural communities.

PROJECT OVERVIEW

Before its decision to enter the broadband market, OEC heard from members frequently about the need for high-speed internet. They wanted broadband, and they wanted the cooperative to be the one to give it to them. In 2017, OEC conducted a feasibility study with rural fiber broadband solutions provider Conexon and decided to move forward. By April 2018, construction had begun. When OEC Fiber, the cooperative's fiber broadband subsidiary, connected its first fiber-to-the-home customers in February 2019,

the management team thought its goal of connecting 20,000 customers was a pipe dream. But by May 2020, OEC Fiber had already connected 10,000 customers. And less than a year after that, on April 12, 2021, the fiber subsidiary connected its 20,000th customer. What was originally slated to be a five-to-seven-year build is now anticipated to be finished by the end of 2021, just under four years from its start.

BROADBAND BUSINESS CASE

The rapid growth of OEC Fiber's network parallels the region the cooperative serves. Throughout the service territory, everything is booming, including residential and commercial growth, which positively impacts co-op membership and fiber broadband take rates.

The fiber-to-the-home (FTTH) project will cost an estimated \$175 million. OEC Fiber offers internet access with speeds ranging from 100 Mbps

symmetrical up to 1 Gbps symmetrical, along with VoIP telephone and HDTV. Take rates are at 42.5% overall and 34% for gigabit service.

Initial feasibility studies projected OEC Fiber to be cash-flow-positive within eight years; the project is now tracking at least two years ahead of schedule, and OEC Fiber has already begun to see a positive impact and revenue.

LESSONS LEARNED

Today, with Conexon's assistance, about 3,600 of the system's 5,500 miles of planned fiber have been built, and 124 zones have been opened. Thirteen more zones are under construction now, and four are in pre-construction phases.

OEC Fiber employed a less conventional approach to network design and construction, opting to build the system on rings so there would be multiple redundant paths, mirroring how the electric system is built.

From the beginning, OEC Fiber focused on demand to determine where and how to build. Instead of starting in densely populated zones, the cooperative focused on unserved rural areas that needed the service the most. Take rates in the initial zones soared, creating momentum to drive the project forward.

OEC Fiber President David Goodspeed credits the innovative approach to the network's rapid growth and success. It allows the network to grow with its customer base and scale to the population's needs based on density. "In this model, our network has grown, but it's grown where it needs to grow," he says.

"The demand hasn't stopped, so we won't stop until all the people are served," adds OEC Fiber Creative Director Kayla Brandt, who focuses on subscriber access and marketing.

Over the past year, the cooperative has consistently connected 1,000 subscribers per month, which was a goal set from day one. Hitting that milestone meant honing their processes.

"In 2020-2021, connectivity is more important than ever," Brandt says. "Once we started lighting the network, we couldn't connect everyone fast enough. The demand pushed us to fine-tune and do better so that we could reach more members more quickly."

OEC Fiber's broadband network uses an efficient distributed tap architecture to deliver symmetrical gigabit fiber service to customers no matter where they live. The network consists of primarily overhead construction, following the co-op's existing electrical

footprint. Once the cooperative completes the system to reach 100% of its members as planned, they plan to build outside the system where there is a need.

"It feels surreal to be here now," Brandt says. "Twenty thousand subscribers was always that magical number for us. It's an ever-shifting goal, and now the question is, what's next? We always have our eye on the horizon, and we're excited to continue growing, expanding, bringing on new subscribers and offering services in areas that really need us."

WHY IS THIS CASE STUDY IMPORTANT?

The work of Oklahoma Electric Cooperative and OEC Fiber is a relevant example of a large rural electric cooperative that fast-tracked its FTTH project with innovative build strategies while focusing on customer need and subscriber demand to drive the project. The co-op leadership translated experience and dedication into exponential growth and success, reducing the project timeline by half and reaching their goal of 20,000 subscribers just two years after connecting the first customer.

COMPANY DESCRIPTION

Conexon works with rural electric cooperatives to bring fiber to the home in rural communities. Conexon offers its electric cooperative clients end-to-end broadband deployment and operations support, working to analyze economic feasibility, secure financing, design the network, manage construction, provide operational support, optimize business performance and determine optimal partnerships.





ALCORN COUNTY ELECTRIC KEEPING YOUNG TALENT HOME

COOPERATIVE PROFILE

Alcorn County Electric (ACE) is headquartered in Corinth, Mississippi, in the northeastern corner of the state, serving power to more than 19,000 members. ACE was the first rural electric cooperative established in America under the Rural Electrification Act of 1936 at a time when only 1% of Alcorn County had electricity. ACE has dedicated the last 85 years to improving the lives of its members with good service and affordable electric rates. Today, broadband represents the next chapter in essential infrastructure for the rural community.

PROJECT OVERVIEW

Unfortunately, Mississippi ranks 49th in the nation in broadband coverage across the state. Broadband has been available in the city of Corinth, but many subscribers have been relegated to old copper-loop technologies. Members farther out in the county

have been limited to fixed wireless or satellite technologies at low speeds and unacceptable delays. Alcorn County's youth are often forced to locate to larger cities following college due to the lack of broadband in the area, missing out on the quality of life and low cost of living they enjoyed growing up which further drains the area of its most precious resources and talent. "Why can't we lead the nation in broadband connectivity?" asked the leadership at ACE.

BROADBAND BUSINESS CASE

The need and demand for broadband were obvious, but so were the hurdles. For starters, electric cooperatives in Mississippi were prohibited from offering telecommunication services. Next, fiber construction is expensive, and ACE needed to construct 1,100 miles of mainline fiber to reach all its members. A sustainable business model for low population densities would be difficult without

funding and a good business plan. Finally, would the board and the membership accept the opportunity and the risk? The risk included the fact that ACE is a power company, not a broadband company.

Local and state leaders recognized the deficiency of broadband in Mississippi and the difficulties traditional providers would have in reaching the more remote areas. In January of 2019, the state legislature passed the Mississippi Broadband Enabling Act, empowering electric cooperatives to offer broadband services and opening the door to novel approaches and ideas.

ACE had the infrastructure and the incentive to serve all its members. But they needed a partner experienced in broadband network funding, construction and operation. It would not be sufficient to utilize an architecture and technologies that did not offer significant competitive advantages. The co-op needed a business model based on a conservative take rate and one that did not require the typical technology overhaul every five to seven years. Long-term sustainability was essential. ACE turned to Huntsville, Alabama-based FiberRise for its unique approach as well as its shared values and vision.

LESSONS LEARNED

FiberRise helped secure grants that secured the business model, and they were able to scale design resources rapidly when a grant called for a challenging deadline. XGS PON provided the technology lift for the long term, allowing ACE to offer multi-gigabit services right out of the gate. ACE found that subscribers overwhelmingly select the larger bandwidth offerings, as they see a tremendous need for speed at a very affordable rate. The 2G package has influenced the take rate of the 1G package, as subscribers tend to flock to the middle-tiered package.

ACE utilized funding from state and federal organizations to reinforce the long-term viability of the broadband service. The state of Mississippi provided funds through the CARES Act, and the FCC's RDOF auction provided funding for the unserved areas of the county as well.

The ACE board and membership overwhelmingly approved the broadband project. ACE Fiber was established as a subsidiary for broadband and provided a win-win for both sides of the business. All profits from ACE Fiber are returned to the electric cooperative, so whether a member takes the broadband service or not, they will receive a benefit in the form of reduced electric rates.

WHY IS THIS CASE STUDY IMPORTANT?

The COVID-19 pandemic awakened the entire world to the need for better broadband throughout every community, both urban and rural. Alcorn County's school districts, which pride themselves on robust curriculums, still found broadband lacking for virtual classroom instruction or uploading homework assignments and projects. ACE Fiber has been able to overcome broadband deficiencies for their community with a world-class, future-proof network that supports millions of devices, gigabits of upstream and downstream bandwidth, and a service that offers a quality of life that is beginning to bring those talented young people and their families back home.

COMPANY DESCRIPTION

FiberRise, LLC enables electric utilities to implement and maintain fiber infrastructure with complete business visibility and simplicity in the delivery of broadband services. FiberRise serves electric cooperatives and investor-owned utilities throughout the South and has a proven track record of winning state, regional and federal grant awards for its customers, including CAF, CAF II, ARC, Community Connect, ReConnect and RDOF. FiberRise manages fiber projects from inception and construction through operations and maintenance with high-touch service and support. FiberRise focuses on quality of life by helping to make broadband affordable and accessible to all.



fiber-rise.com



BUTLER ELECTRIC COOPERATIVE

ONE CO-OP BILL FOR ELECTRIC, PHONE, TV AND INTERNET

COOPERATIVE PROFILE

Butler Electric, headquartered in El Dorado, Kansas, serves 7,500 members in portions of seven counties in Kansas. The cooperative employs 47 people and serves mostly residential customers, a membership that's growing at an annual rate of about 1%. It's been more than 80 years since the incorporation of Butler Electric Cooperative, and a lot has changed. What hasn't changed is one fundamental truth—the cooperative's mission to serve. And that mission has led Butler Electric to offer broadband internet service.

PROJECT OVERVIEW

If it wasn't already official before the COVID-19 pandemic, it is now—high-speed internet is a critical need, especially in the more rural and historically underserved communities throughout the U.S. Butler Electric Cooperative identified their membership's

need and desire for high-speed internet access, and in 2017 launched an internet company named Velocity. The planning and launch of the project led to some valuable takeaways, including the importance of employee engagement and partner selection. National Information Solutions Cooperative (NISC) is proud to serve both Butler Electric and Velocity as their technology partner in the effort to meet their communities' most critical needs.

BROADBAND BUSINESS CASE

In 2016, Butler Electric identified key areas where it could provide more value to the membership, and one was broadband. A survey in 2017 showed 92% of survey respondents were in favor of a broadband service offering from the cooperative.

"The idea came about because of the cooperative mindset," says Sarah Madden, Butler Electric customer service and public relations manager.

“What needs do our members have, and how can we serve those needs? What they desperately needed was reliable, high-speed internet.”

The broadband business addition was not a hard sell with the cooperative’s membership or employees. “We formally announced details of the deployment at our 2018 annual meeting,” says Angie Clevenger, Butler Electric administration and marketing manager. “Our employees supported the project. They recognized the members’ need for fast, reliable internet and we were ready to respond.”

“The 25 megabytes per second we offered easily doubled their speeds. Many members took higher-end speed packages in order to utilize streaming and home security services at their rural homes,” Madden says. “Members are able to select their speed based on price and customized needs.”

Velocity’s services rapidly became critical in light of the pandemic, and the broadband customer total has reached over 4,300.

LESSONS LEARNED

Being new to the internet business, there were several challenges for Butler Electric, including keeping pace with the rapid growth and the membership’s appetite for the fastest internet available.

Butler Electric has partnered with NISC since 2003 for its electric utility needs, and following the launch of Velocity, they wanted to provide customers just one bill for electricity, phone, TV and internet.

“With NISC products, our customer service team can easily log in and take calls from home, just like if we were in the office,” Madden says. “We were already using so many features of the NISC Enterprise, it just made sense to continue using NISC to deploy our broadband.”

For other electric utilities looking to enter the broadband realm, Madden advises learning as much as possible and choosing partners wisely. “Know your vendors. It is a benefit to partner with someone like NISC, who’s working with many of our other vendors,” she says. “We also made it a priority to work with local contractors when possible. Partnerships are very important.”

The broadband project will also touch every utility employee, Clevenger adds, so staff buy-in is critical. “Big or small, essentially everyone’s role changed. Our team understood the need our members had for broadband and jumped on board to do their part.”

WHY IS THIS CASE STUDY IMPORTANT?

Velocity’s fiber backbone was built to be able to connect with Butler Electric’s substations, which will provide better stability, security and the ability to provide the best electric service possible. The network is now also in place to support new technologies in the future.

Butler Electric CEO Tim Lindahl is proud of the cooperative’s record of meeting its members’ needs and excited about this next step in its storied history.

“Ultimately, the only reason we exist is to provide our members something that nobody else can. Moving forward, whether it’s electricity, broadband or whatever is next that our members and area communities need that nobody else is stepping up to provide, it’s still that same member service mindset from back in 1938,” Lindahl says. “We were created to serve, and we’re still serving.”

COMPANY DESCRIPTION

National Information Solutions Cooperative (NISC) is an IT organization that delivers advanced solutions, services and support to 873 independent broadband companies, electric cooperatives and other public power entities. NISC and its subsidiaries employ more than 1,200 professionals between five office locations and remotely throughout the U.S.





DE Fastlink

Powered by Dixie Electric



DIXIE ELECTRIC POWER ASSOCIATION **PROPELLED BY NECESSITY AND CIRCUMSTANCES**

COOPERATIVE PROFILE

Dixie Electric Power Association in Laurel, Mississippi, started as Jones County Electric Power Association in 1938 with 700 members, 230 miles of line and four employees. Now, the co-op has 39,130 members, 4,984 miles of line in seven counties and 98 employees. The co-op's mission is powering communities and empowering lives. Now that empowering mission includes fiber optic broadband service.

PROJECT OVERVIEW

Dixie Electric took a hard look at providing broadband service in 2018 and worked throughout 2019 to build support with their board. A survey followed showing roughly half of the region had internet service and a substantial minority had access to 25 Mbps downstream. In November 2019, Dixie Electric contacted NRTC and began a feasibility study.

By the time NRTC completed the study, the nation was locked down for the COVID-19 pandemic. But the passage of the CARES Act in March 2020 held the hope of offsetting COVID challenges. The act sent funds to states and gave legislatures wide authority to use them for economic relief and recovery.

BROADBAND BUSINESS CASE

Most experts probably wouldn't advise doing it this way, but Dixie Electric Power Association has demonstrated that necessity and circumstance can propel a fiber optic project at a very rapid pace. Less than three months after beginning construction, Dixie Electric rolled out high-quality fiber-optic service to customers in rural Mississippi.

It used funds from the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act to begin the project. The emergency nature of CARES meant that Dixie Electric had to spend all of the grant

money and make a substantial impact by year-end 2020. Behind the achievement of that goal is a story of politics, planning and hard work.

“If we had been two weeks later in the feasibility process, we would not have been able to put a project together to be considered for CARES funding,” says Dixie Electric General Manager Randy Smith. “We thought about whether or not we should [file an application], because the time frame was that close.”

“Our statewide organization and a few of us got together to come up with a plan,” says Jeremy McAndrew, Dixie Electric’s system engineer. “Our pitch was that we could build X-number of miles and serve Y-number of customers for a certain amount of CARES funding and the co-op would match that amount.”

“That’s what at the end of the day really sold it for the legislature,” Smith says.

The state’s approval, however, did not come until late June. Funding was provided on July 28. In August, Dixie Electric formed a broadband subsidiary, DE Fastlink, and began signing contracts for construction, make-ready processes and network equipment. “We were the first week of August ordering the head-end building and had to pull a lot of strings to get it here on time,” he says.

LESSONS LEARNED

The cooperative decided in September to deploy 10-gigabit symmetrical (XGS-PON) fiber infrastructure rather than a more conventional gigabit system. Dixie Electric researched the technology and talked with other broadband providers, concluding that the trend is toward higher capacities. The cooperative estimated XGS-PON would increase costs by about 2%.

“That’s not drastic, especially for this project. It just made sense that for that money you can push yourself out another 10 or 15 years,” Smith says. “I highly recommend having a trusted broadband advisor that’s completely vendor agnostic. That really helps our team make well-informed decisions.”

Construction began the third week of October. By mid-December, Dixie Electric had installed 30 customers with the deadline looming. To speed things up, Dixie Electric streamlined its process to perform several construction tasks at the same time. “Terminal and drop cable, in-home installs, and splicing were all running simultaneously. Some customers even had everything, fiber to the home, before light made it to their home,” McAndrew says.

Having an experienced project team with flexible processes and a can-do attitude enabled the whole crew to get across the finish line.

“I would say that NRTC – their boots on the ground out here and their designers – did an excellent job helping us reach the milestone,” McAndrew says. That help made up for gaps in Dixie Electric’s available labor force. More in-house employees with broadband experience are a priority as Dixie Electric continues the project.

Dixie Electric also recommends having someone at the cooperative dedicated to the project to stay on top of things and ensure critical decisions are made in a timely manner. This is particularly helpful when things do not go as planned, which will happen.

WHY IS THIS CASE STUDY IMPORTANT?

Dixie Electric maintained the long-term viability of its build while still meeting accelerated deadlines.

Work continues at a more comfortable pace. Dixie Electric plans to cover all 40,000 homes and businesses in its area within three to five years. As of mid-April, it has installed service to 350 homes. Take rates are about 46% in the areas Dixie Electric has built so far.

Considering the unusual dynamics, Dixie Electric’s fiber project has gone well. Another lesson Smith learned in the past year: “Plan as far ahead as possible. Even if you think you’re too far out in front, you’re not.”

COMPANY DESCRIPTION

NRTC is member-driven and technology-focused. They help electric cooperatives evaluate, design and build broadband networks, and they make those projects sustainable by providing essential services critical to ongoing operations. NRTC knows a one-size-fits-all approach does not work for their members; they strive to be a partner, not a vendor, and cooperative principles guide everything they do.

The logo for NRTC (Northwest Rural Telecom Cooperative) features the lowercase letters "nrtc" in a bold, black, sans-serif font. A small red triangle is positioned above the letter "t".

Member driven. Technology focused.

nrtc.coop



CENTRAL RURAL ELECTRIC COOPERATIVE **STARTING WITH A FIBER-CONNECTED GRID**

COOPERATIVE PROFILE

Founded in 1938, Central Rural Electric Cooperative (Central) provides power to more than 17,000 members in parts of seven counties in north-central Oklahoma. It serves 22,540 total meters with 4,417 miles of line, for five meters per mile of line. The cooperative's 85 employees serve 28 communities in seven counties, and the load is 62% residential, 36% commercial and 2% industrial.

PROJECT OVERVIEW

Centranet, a subsidiary of Central, will be the entity providing fiber optic internet access to homes and businesses. Centranet currently has zero fiber subscribers and expects to connect its first subscriber in the summer of 2021. But the cooperative's fiber network started 10 years ago with fiber to all its

substations. The fiber-to-the-home build is a five-year project that will be completed in five phases providing services to at least 18,000 locations including schools, businesses and residences. The project consists of more than 4,400 miles of fiber line, 95% of which is aerial, and the remaining 5% is underground. Central is striving to improve its timeline at every opportunity by leveraging experience gained from other Oklahoma cooperatives.

BROADBAND BUSINESS CASE

There are multiple reasons why the cooperative's board voted unanimously to pursue building a fiber network. Ten years ago, Central took its first steps in conjunction with its power provider, KAMO Power, to increase its smart grid capability by installing fiber in all 22 substations. This has allowed Central to perform predictive outage analysis, which has

increased system uptime and reduced outage duration. The implementation of a fiber network throughout Central's service area will improve downline automation abilities and continue to improve system reliability. It will also provide a solid foundation for real-time analysis of load trends for future demand and time-of-use rates. Economic and quality-of-life benefits to Central members will improve because fiber can be taken to the home from the same network that will benefit Central's operations.

Central's board saw the benefits fiber will provide to the cooperative on the operations side, and to enriching the quality of life for its members and communities.

"Not only will it enhance operations and improve system reliability, but also it will provide a great benefit to those living in rural areas who otherwise do not have access to reliable internet service," says Central CEO Hunter Robinson. "Just as we saw the need for rural electrification more than 80 years ago, we see the need for high-speed internet access for everyone today. We believe the view out your window shouldn't determine your ability to connect with the world."

LESSONS LEARNED

To aid in Central's rigorous project timeline, Osmose used its proprietary pole engineering solution, OsmoVision®. This state-of-the-art approach combines mobile LiDAR technology, image processing using the latest artificial intelligence and machine learning tools, and advanced analysis software, O-Calc® Pro Line Design, to create pre-construction directives for construction and fiber crews. When going into a project of this complexity, having a well-integrated team is critical. Working together with Osmose and Conexon, Central is building complex networks efficiently and effectively.

"Osmose has been a great partner of ours for several years," says Jackie Berna, Central's vice president of operations. "They are professional, timely and courteous to our members. Including them in our fiber-to-the-home project was a no-brainer for us."

Managing member expectations has been a challenge. A survey completed in March 2020 showed 97% of Central members support finding a way to bring fiber to their homes. The reality is the project will take five to seven years to complete. Continuing to wait when the need is high now can be tough.

On the technical side, one of the biggest challenges is designing the fiber network to provide a long-term, sustainable, yet flexible solution that supports future growth. Central's staff is working to create a network that is unique compared to other utilities and designed specifically for the area.

WHY IS THIS CASE STUDY IMPORTANT?

As of March 2020, 25% of Oklahoma public school children lack home internet access, according to the Oklahoma State Education Department. One school district within Central's service area projects that 40% of the students within the school district lack internet access. For these students, it's not a matter of reliability. It's accessibility. It's a hindrance for these students, and it is imperative that this gap is filled, and Central is in the best position to fill it.

COMPANY DESCRIPTION

Osmose provides inspection, life extension, rehabilitation and engineering services designed to build resiliency into transmission and distribution infrastructure. Osmose provides make-ready design, pole loading analysis, joint use audits, clearance verification and network inventories services with tools, processes and expertise to relieve strain on operations and engineering resources created by broadband initiatives.

The logo for Osmose, featuring the word "Osmose" in a large, bold, blue sans-serif font. Below it, the tagline "Resilient Grids. Strong Networks. Safe Energy." is written in a smaller, blue sans-serif font.

osmose.com



We bring the GIG!



APPALACHIAN ELECTRIC COOPERATIVE FINDING EXPERIENCED PARTNERS

COOPERATIVE PROFILE

With headquarters in New Market, Tennessee, Appalachian Electric Cooperative (AEC) has grown to serve more than 50,000 members since its incorporation in 1940. Recognizing its members had few or no broadband internet options, AEC set out on a long-term endeavor to deliver more than 2,000 miles of new fiber and provide better access for their community.

PROJECT OVERVIEW

AEC considered many options as it started to plan its broadband project. It pondered undertaking the task of creating a new broadband service in-house, managing both the plant construction and the network operations, by utilizing their talented and dedicated team. The challenge with this model was capacity. They feared their electric system might

suffer from taking on too many major tasks at once, costs would be greater, and customers would have to struggle against the challenges of an organization working through the startup phase. Building an entirely new business entity from scratch didn't seem feasible.

Furthermore, addressing their community's need for a reliable broadband network without a trusted partner with real-world experience could mean significant delays in any project timeline they set.

AEC knew the right partner would complement their team and allow them to meet the needs of their members more quickly. What this initiative needed was a seasoned partner from the broadband industry, adept at working with electric co-ops and equipped with operational and customer service expertise. Trilight came into the picture as just that—an expert team with decades of experience building, operating, marketing and managing broadband networks. Trilight is a joint venture partnership owned by seven

telephone cooperatives in Tennessee. Its mission is to partner with local electric cooperatives to bring fiber broadband service to unserved and underserved areas of their region.

“Why start from scratch when you can deliver services your members need quicker and more efficiently by partnering with experts who have a rich history with projects like this,” says Greg Williams, CEO of Appalachian Electric Cooperative.

Understanding the crucial need for a solid branding and marketing strategy that would help establish a cohesive partnership, Trilight and AEC approached Pivot, a leading broadband marketing and customer experience agency. It was considered essential they be recognized in a unified manner while maintaining the unique attributes and offerings of each respective company. As a result, a successful branding and marketing strategy was implemented that honored each party’s role and identity.

Trilight and AEC now had the foundation they needed to effectively market and operate a leading broadband service for the rural communities it was intended to serve.

BROADBAND BUSINESS CASE

Before the pandemic, there was a growing desire in AEC’s region to have them enter the broadband market. Many parts of their service area had woefully inadequate access to high-speed internet, and the local economy was suffering as a result.

LESSONS LEARNED

This broadband project was not without unforeseen challenges or surprises. Early in the process, Trilight started experiencing elevated early adopter rates, greater than anticipated, forcing it to ramp up much more quickly than expected. Although meeting the needs of this quickly rising tide was challenging, it was also a significant first indicator that they were on the right track. Fortunately, Trilight had the resources to grow its team and support the necessary expansion of its workforce.

Most surprising perhaps was the impact this expansion would have as the pandemic struck, requiring growing numbers of AEC’s members to migrate to online schooling and teleworking, thus making reliable, fast internet absolutely essential. This also confirmed AEC’s early decision to move quickly was the right one, as many would have otherwise been left in the lurch.

New business partnerships are almost always challenging at the beginning, as new relationships require buy-in from both leadership and employees;

however, both sides met the challenge with a strong collaborative spirit.

“AEC brought the desire to serve their membership with integrity and dedication,” says Trilight President Jonathan West. “Those are qualities we value. It was a partnership that was meant to be.”

WHY IS THIS CASE STUDY IMPORTANT?

The first and most important step of any successful partnership is simply finding the right match. In this case, Trilight and AEC shared a common goal that benefits AEC’s members in a meaningful way. Additionally, forming a durable alliance with an experienced provider can decrease risk while also helping to get services to market much more quickly.

AEC’s decision to partner with Trilight demonstrates agile thinking that ultimately served their membership effectively. The results speak for themselves—Trilight and AEC are now approaching 3,000 customers on the new network, and the numbers aren’t slowing down.

AEC is one and a half years into this project, and “members are enthusiastic, elated, overjoyed and cannot thank us enough for bringing what now is truly an essential service,” says Williams. There is now more motivation than ever to extend broadband. A clear, comprehensive branding, marketing and communications strategy has been a key component to their success.

COMPANY DESCRIPTION

Pivot is broadband’s leading marketing and CX (customer experience) agency. They collaborate with people doing meaningful work in the communities they serve and come alongside electric co-ops to help them grow and thrive in broadband. They accomplish this through their core offerings: marketing, branding, customer experience, research, website development and employee training programs.





MOHAVE ELECTRIC COOPERATIVE FROM FIXED WIRELESS TO FIBER

COOPERATIVE PROFILE

In 1947, Mohave Electric Cooperative (MEC) had five miles of line and served 90 meters. Today, MEC is headquartered in Bullhead City, Arizona, and provides electricity to more than 42,000 meters over 1,512 miles of energized line across three counties. Starting in 2010, MEC began a partnership with TWN Communications providing fixed wireless internet service. Now they are building out a fiber broadband network.

PROJECT OVERVIEW

Construction of MEC's fiber network began in December 2020, with construction to be phased in over approximately five years. The goal is to serve all members with broadband access at least equal to or greater than the FCC's current definition of broadband. This meant gaining an understanding of the geography of the co-op's operating territory, its nexus

with nearby metropolitan areas, and the potential to serve out-of-territory communities of interest.

The network architecture is crafted using state-of-the-art equipment and operational frameworks. It is designed with multiple points of network redundancy to ensure a reliable connection.

The access network provides members and small/medium businesses with symmetrical services at data rates up to 10 gigabits per second (Gbps). The network supports larger commercial subscribers at data rates up to 100 Gbps. The core network provides redundancy with 99.999% availability through its ring and sub-ring topology.

BROADBAND BUSINESS CASE

MEC's fiber broadband project was driven by strong member interest. Providers in the area are not providing reliable service. MEC's reputation for reliable electric service and concern for the community encouraged the members to call upon

the co-op. MEC completed a member survey as well as extensive outreach to confirm member interest.

Several key drivers besides member interest justified the project. The fiber-based network will improve reliability throughout MEC's electrical system. It will enhance economic development allowing residents to work from home. Quality of life will improve with broadband support for telemedicine, remote learning, telecommuting and leisure activities. Special attention is being given to schools, with fiber network designs tailored for interested school's communication needs.

The business case was based on a detailed assessment of the co-op's service area's access to broadband to determine what areas are served, underserved and unserved. A business plan was developed, integrating all aspects of design, construction, certification and operations.

LESSONS LEARNED

MEC approached their current broadband partner, TWN Communications, specifically because of TWN's familiarity and belief in the cooperative model. TWN had deployed some fixed wireless service into MEC's area, and they were able to provide service to some members but not all. TWN completed a feasibility study for MEC based on their desire to deploy a 100% fiber-optic broadband network throughout their service territory.

TWN's ability to not only design and build the network, but to continue ongoing operations to include customer care, billing, field services and technical support was pivotal to MEC's decision. The history and scale of network operations TWN provides help bring a level of comfort and risk mitigation for MEC.

"MEC has been serving members for 75 years strong, and our fiber-optic network will take us into the future and beyond, all while providing the option for fast, reliable internet to every MEC member," says Rick Campos, COO of Mohave Electric Cooperative.

Other lessons include:

- Unless the co-op has the appetite to start up a new business, working with trusted partners is crucial to the success of the project.
- Capturing and validating accurate information is critical.
- Carefully consider the potential growth and development of the area over the project's lifecycle.
- Don't underestimate red tape. MEC needed to work with the state legislature during COVID-19 to pass a bill allowing this project. Additionally, grant processes aren't guaranteed and are often time-consuming.
- National broadband maps are unreliable. It's necessary to perform a detailed assessment.

- Permitting is often more costly and time consuming than expected. Working with entities such as the Department of Transportation and railroads can take time.

WHY IS THIS CASE STUDY IMPORTANT?

Many rural residents will not be served by incumbent providers who have made no effort to upgrade or extend their systems. Cooperatives have an opportunity to provide these services leveraging advantages such as existing right-of-way, infrastructure, knowledge of member demand and existing member relations and trust.

Another driving factor for cooperatives is the ability to own the fiber infrastructure. The network will not only provide internet access to members but will also provide two-way communications for the existing electrical system. Structuring the project this way allows co-ops to assign a large portion of the project's capital to the co-op plant without eroding the equity ratio of the co-op.

Colin Wood, CEO of TWN says, "This is an exciting time for rural America. The opportunity for electric cooperatives to participate in upcoming federal funding programs and to work with and partner with companies like TWN will help bridge the digital divide even faster. We are proud to work alongside MEC and are excited to bring fast, reliable broadband service to cooperative members and adjacent communities."

COMPANY DESCRIPTION

For over 25 years, TWN Communications has partnered with electric cooperatives to deploy broadband and voice communication services. TWN offers a turnkey program that includes feasibility studies, funding assistance, return on investment forecasts, network design, construction, network operations and ongoing customer care.



twncomm.com



CULLMAN ELECTRIC COOPERATIVE INTEGRATING FTTH WITH AN OPERATIONS NETWORK

COOPERATIVE PROFILE

Cullman Electric Cooperative serves 45,000 member accounts over approximately 1,000 square miles of northern Alabama, primarily in Cullman and Winston counties between Birmingham and Huntsville. Cullman Electric was one of the first cooperatives to be formed in the state—second out of a total of 22 co-ops—and was the first to provide electricity to its members. Now, 85 years later, Cullman is paving another path—launching the Sprout Fiber Internet broadband service to its members.

PROJECT OVERVIEW

Cullman Electric was challenged by an aging operational technology (OT) network, with insufficient capacity to add broadband traffic. They need to aggregate the two, prioritize OT

traffic and integrate it with fiber-to-the-home (FTTH) service. With these challenges in mind, Cullman Electric launched Sprout Fiber Internet, a gigabit broadband service that brings FTTH for its rural members. To accomplish this, the co-op built a 100G fiber middle-mile backbone between their electric substations to aggregate their electrical OT and their new broadband traffic.

BROADBAND BUSINESS CASE

Cullman Electric recognized that the lack of broadband connectivity was having a negative impact on the residents in its service area, preventing them from enjoying the many benefits of modern technology—including telecommuting, streaming video services and smart home appliances. It was also having a broader economic impact, deterring new businesses and industries from expanding or relocating into the region.

Cullman Electric knew it would need much more capacity to deliver high-speed fiber internet to its residents. The rapid surge in demand due to COVID-19 resulted in significant overall broadband traffic growth—38% in less than three months.

LESSONS LEARNED

As an electric utility, Cullman Electric had legacy OT connectivity in place. Evolving to smart grid required a modernization plan, and the addition of broadband traffic required a modernization of its middle-mile infrastructure.

With a plan to offer broadband customers 300 Mbps or 1 Gbps packages, Cullman Electric needed to build a middle-mile solution between its substations with the scalability to meet its customers' demands. A 100G middle-mile aggregation solution was the clear choice.

However, the challenge was bigger than just delivering higher data speeds. It was essential that the modernized network could continue to deliver secure, prioritized and ultra-low delay connectivity for their mission-critical OT services. Cullman Electric needed a solution that enabled the aggregation of broadband and OT traffic onto a converged, modernized middle-mile aggregation network with an appropriate class of service differentiation between traffic types.

With its 5171 Platform, which delivers best-in-class middle-mile universal aggregation, Ciena enabled Cullman Electric to build a scalable 100G-200G middle-mile backbone for its mission-critical OT traffic while aggregating its gigabit Sprout Fiber Internet broadband traffic in a converged solution. The 5171 can scale to enable Cullman Electric to add broadband customers, increase bandwidth utilization per household and segregate the co-op's mission-critical OT traffic ensuring it gets the highest priority to keep the lights on in Cullman and Winston counties.

WHY IS THIS CASE STUDY IMPORTANT?

Cullman Electric's 100G middle-mile network means their customers can have faith in the performance of their subscribed services and know that they have the bandwidth to satisfy all their streaming, work-from-home, remote education, smart home and remote healthcare needs—well into the future.

Cullman also partnered with Walker and Associates, which played a key role in integrating the end-to-end solution, including Ciena for the middle

mile and a target 10G PON solution for the last mile. Cullman Electric now has the performance and scalability needed across its entire 1,000-square-mile service footprint and is poised to successfully roll out its Sprout Fiber Internet broadband service with:


- Increased bandwidth speed to deliver a middle-mile aggregation layer at 100G that has sufficient headroom for Cullman's residential customer applications.
- Improved smart grid performance delivered through field-proven, ultra-low-latency packet WAN enabling optimal teleprotection performance.
- Converged mission-critical smart grid and substation traffic along with broadband customer traffic via middle-mile aggregation while ensuring OT traffic gets the highest priority.

COMPANY DESCRIPTION

Walker and Associates is the value-added national distributor of network products for broadband providers, including wireline, wireless, cable TV, utilities, government and enterprise network operators. Ciena's 5171 is a next-generation 100G packet-optical universal aggregation platform with enhanced operations, administration and maintenance (OAM) capabilities. Complete visibility and centralized software control of the network is provided by Ciena's manage, control and plan (MCP) domain controller so that provisioning, monitoring and service assurance operations can be performed most efficiently.



walkerfirst.com/ciena.com



DOES YOUR BROADBAND PARTNER INVEST CAPITAL ALONGSIDE YOUR COOPERATIVE? TWN DOES

For over 25 years, TWN Communications has worked with America's electric cooperatives to deploy broadband and voice communication services to co-op members. Together, we work to develop unique fiber optic and fixed wireless networks to meet the growing broadband demands of cooperative members.

TWN Fiber Optic & Fixed Wireless Broadband Solutions

Reduce Spend • Increase ROI • Decrease Risk

TWN Communications Program:

- Fiber/Wireless Deployment Feasibility Study & Analysis
- Co-op Financial Modeling
- Grant/Loan and Regulatory Assistance
- ROI Forecast
- Network Design
- Network Construction
- Turnkey Program Operation
- Ongoing Network Management
- Ongoing Customer Care



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