

Electric Co-ops Build FTTH Networks

In rural areas that lack broadband, electric cooperatives are deploying fiber to help their members.

By Masha Zager / *Broadband Communities*

Fifty years after Edison and his competitors began lighting urban streets and homes, most of the U.S. countryside still lacked electric power. No one – except farmers – could imagine what farms might do with electricity or could believe that businesses other than farms might locate in rural areas. Franklin Roosevelt’s Rural Electrification Administration changed all that, providing financing for local governments and nonprofit organizations to deliver electricity in rural areas.

Today, with nearly the entire country served by electricity, electric cooperatives still fill most of the gaps left by investor-owned utilities. More than 900 electric co-ops serve about 42 million people at 18 million premises in 47 states, according to the National Rural Electric Cooperative Association. Though some of these areas have suburbanized over the years, the great majority are still rural.

A number of electric co-ops have taken on a new challenge: broadband. In areas that are as deficient in broadband infrastructure as they once were in electric infrastructure, co-op members have urged their leadership teams to remedy the situation. Without broadband, the survival of some electric co-ops is in doubt as residents and businesses move to the cities – so when co-ops cannot persuade local carriers to invest in broadband, they sometimes become the broadband providers of last resort.

Some co-ops deployed broadband over power lines, an option that made use of their existing infrastructure. However, though broadband over power line technology has been used successfully to monitor electrical equipment, it is not well suited for commercial Internet service, and many of these efforts were ultimately abandoned. In addition, a major broadband over power line vendor went out of business in early 2012. A number of electric co-ops offer satellite Internet service through an arrangement with the National Rural Telecommunications Cooperative; wireless and DSL service are also offered by some.

FIBER OPTIC NETWORKS

In 2002, Douglas Electric Cooperative founded Douglas Fast Net to bring advanced telecommunications to Douglas County, Ore. Douglas Fast Net serves homes with WiMAX and DSL, and it provides fiber optic Internet service to businesses, schools and medical facilities – the earliest fiber-to-the-premises deployment by an electric co-op that this magazine is aware of.

In 2006, Blue Ridge Mountain Electric Membership Cooperative, which also provides wireless and DSL in some parts of its territory, began building a fiber-to-the-home network. It now serves more than 4,000 broadband customers in Georgia and North Carolina, providing Internet access directly and delivering voice and video over fiber through retail partners.

CO-MO ELECTRIC COOPERATIVE – TIPTON, MO.

Co-Mo Cooperative applied for broadband stimulus funding to build a fiber-to-the-home network and, like the majority of applicants, was not selected for an award. However, the grant application process unleashed a wave of enthusiasm, and the many letters from cooperative members who hoped to use broadband to pursue education, start home businesses and fulfill other goals persuaded Co-Mo not to give up. "A lot of them realized they wouldn't get service any other way," says Randy Klindt, the general manager of Co-Mo Comm, the cooperative's telecom subsidiary.

Without federal dollars, investing in a full fiber buildout seemed risky, and the cooperative decided to test a small-scale fiber network before committing to a large project. Klindt says the pilot project was intended to validate the company's assumptions about both construction costs and the market for fiber services.

Co-Mo's central Missouri territory is divided between farmland in the north and rugged lake country in the south. For the pilot project, Klindt picked two distinct areas, one northern and one southern, that accurately

reflected the cooperative's territory in terms of both demographics and geology. The pilot areas included farmers, seasonal second-home owners, aerial plant, underground plant, rocky terrain and even a small area that already had broadband service. Altogether there were about 1,100 households in the pilot areas; if 25 percent of them signed up for FTTH services – and construction costs proved out – the pilot would be a success.

A SUCCESSFUL PILOT

The pilot was more than a success. Construction costs came in at about 15 percent below projections, and the take rate is two years in advance of projections. After a year of offering voice and data services, Co-Mo estimates the take rate at about 46 percent of households (exact numbers are hard to come by because some electric meters are attached to unoccupied premises such as grain bins).

The take rate is especially impressive because the company was operating under two handicaps – first, voice and data were the only services offered at the outset, and second, subscribers were asked to put \$100 down before construction even started. (One local bank,

acting in support of the project, contributed the \$100 sign-up fee for any customers that wanted to subscribe to FTTH services.)

On the basis of the success of the pilot project, Co-Mo added an IPTV headend – video services go live this spring – and decided to build fiber out to the entire service area in four phases over the next four years. Phase 1 is in design and will start construction this spring, with services turned up this summer. Although the pilot area densities were representative of the territory as a whole (eight customers per linear mile), phase 1 has 12 customers per mile and should have an even better chance of success. Like Google with its Kansas City "fiberhoods," Co-Mo is conducting a race for sign-ups in the phase 1 territory to decide which sections to build out first.

Phase 1 was financed from traditional co-op finance sources. "It really helped having results from the pilot to get the financing," Klindt comments. So far, the board has approved funding only for phase 1 so the plan can be modified if necessary.

The financial relationship between the two halves of Co-Mo is complex. The electric co-op owns the poles and the fiber – it plans to use fiber to communicate with its electricity distribution devices and may eventually communicate with meters via fiber as well. The telecom subsidiary leases fiber from the parent company and provides triple-play services over it.

Fiber is already starting to make a difference in Co-Mo's area. Klindt says he received an email from a resort home owner thanking him for installing fiber so he can spend more time at his lake house. For a community that depends on second-home owners for a significant part of its economic base, holding onto the "seasonals" for a little longer can have a noticeable impact on the economy.



The Co-Mo Connect broadband project is proceeding along the electric cooperative's lines. Where there are overhead lines, the fiber is being lashed overhead. Here, a crew installs conduit that will protect underground fiber.

ELECTRIC COOPERATIVES

The FTTH parade got under way in earnest with the arrival of the broadband stimulus program in 2009. Blue Ridge Mountain EMC, along with nearby Habersham EMC, joined the North Georgia Network (NGN) Cooperative, which received a \$33 million BTOP grant to build a middle-mile fiber optic network throughout northeast Georgia. Blue Ridge is using the NGN network to expand its fiber-to-the-home service, and Habersham is preparing to offer FTTH service for the first time. In addition, six electric co-ops received BIP stimulus funding from the Rural Utilities Service to

build FTTH networks (see sidebar on United Electric Cooperative).

The stimulus program had indirect effects as well. Many co-ops that either saw their stimulus proposals turned down or did not apply for stimulus funding became aware of the potential of fiber for their members. Several succeeded in launching fiber-to-the-home projects without government support. Today, at least 16 electric co-ops (including one, NineStar Connect, that is both a telephone and an electric co-op) are deploying fiber-based Internet services to homes or

businesses. Some others deploy fiber to cell towers or in middle-mile networks.

WILL THE BUILDOUT CONTINUE?

Are these 16 electric co-ops the advance guard of a larger movement, or has the trend already come and gone? Many observers think a significant number of co-ops might eventually deploy FTTH, but there is no consensus about how many of the 900-plus electric co-ops (of which about 850 are retail electricity providers) are good candidates.

The issue isn't demand for broadband – most electric co-ops'

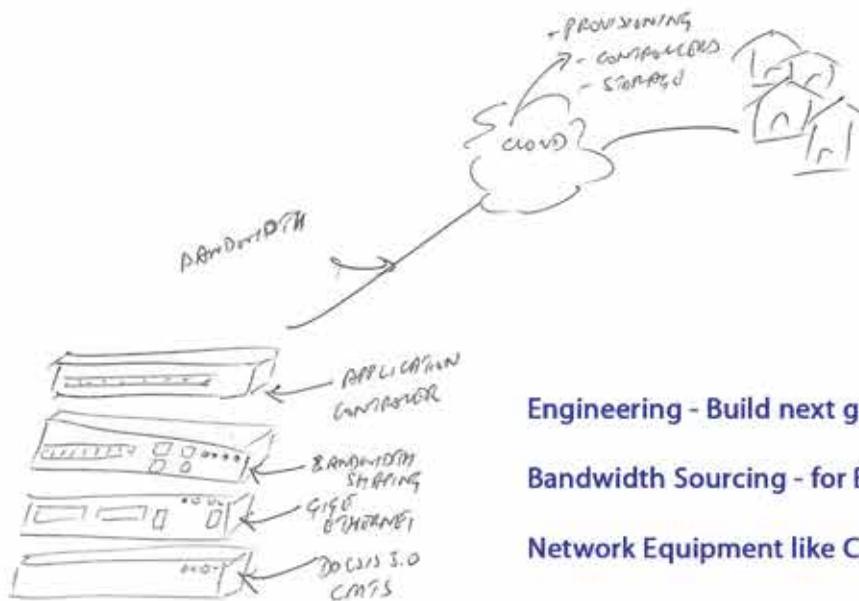
ELECTRIC COOPERATIVES DEPLOYING FIBER TO THE PREMISES

Provider	States	Date Started	Vendors	Technology	Services	Broadband Stimulus Funding	Notes
Arrowhead Electric Cooperative	MN	2010	Calix, Pulse Broadband	GPON	Data, Voice	BIP	
Blue Ridge Mountain Electric Membership Cooperative	GA, NC	2006	Allied Telesis, OFS	Active Ethernet	Data	BTOP	
Co-Mo Electric Cooperative	MO	2011	Calix, Pulse Broadband	GPON	Data, Smart Grid, Video, Voice		
Consolidated Electric Cooperative	OH	2012	ADTRAN	Active Ethernet	Data, Video, Voice		
Douglas Fast Net	OR	2002	ADTRAN, Ciena	Active Ethernet	Business Services, Data		Fiber to businesses only
French Broad Electric Membership Corporation	NC				Data		Fiber to businesses only
Habersham Electric Membership Cooperative (partner of Internet EMC)	GA	2010	Allied Telesis	Active Ethernet	Business Services, Data	BTOP	
Kit Carson Electric Cooperative	CO, NM	2010	Atlantic Engineering Group, Pulse Broadband		Data, Smart Grid, Voice	BIP	
Lake Region Electric Cooperative	OK	2012	CommScope, Pulse Broadband	EPON	Data, Voice		Pilot project
Lumbee River Electric Membership Corp.	NC	2010	Allied Telesis		Data, Smart Grid, Video, Voice	BIP	
NineStar Connect (also telephone co-op)	IN	2002	Calix, OFS	EPON, GPON	Data, Smart Grid, Video, Voice		
North Alabama Electric Cooperative	AL	2010	ADTRAN	Active Ethernet, GPON	Data, Voice	BIP	
Ralls County Electric Cooperative	MO	2010	Pulse Broadband		Data, Smart Grid	BIP	
REctec (Northeast Oklahoma Electric Cooperative)	AR, CO, OK			Active Ethernet	Data		Fiber to businesses only
Southeast Colorado Power Association (SECOM)	CO	2009	Calix	Active Ethernet, GPON	Data		
United Electric Cooperative	MO	2010	Atlantic Engineering Group, Calix, Pulse Broadband	GPON	Data, Smart Grid, Video, Voice	BIP	

Source: **BROADBAND COMMUNITIES** fiber-to-the-home deployment database. See the full list of 800-plus FTTH deployers in the United States at www.fiberville.com

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territories are underserved with broadband today, and their members are eager for better service – but whether co-ops have sufficient resources to build and operate fiber networks and whether they believe these activities are consistent with their missions.

About 300 of the co-ops – which together account for about 75 percent of homes served – have more than eight customers per linear mile. Eric Freesmeier, CEO of Pulse Broadband, an integrator that has worked with six electric co-ops on FTTH projects, says almost any co-op with eight customers per mile could “legitimately build and deploy full fiber to the home to all its members” without any government subsidies.

In addition, Freesmeier says, a number of co-ops with linear densities of six to eight customers per mile “initially couldn’t make what we feel is a strong business case but could deploy in phases, building in their higher-density areas first and using those revenues to subsidize the lower-density areas.” These co-ops’ tradition of “fairness” would encourage them to build out fiber to their entire service areas if they built to any part of them, Freesmeier explains. On the other hand, the most rural and remote co-ops – those with fewer than six customers per linear mile – could not economically build out fiber, he says, “short of a full government subsidy.”

Freesmeier, who has discussed FTTH with close to 100 co-ops, sees “extreme interest” in fiber and suspects the industry may be at a “tipping point.” He says some co-op executives now feel they have no choice but to build FTTH.

SOME CO-OPS ARE WARY

David Russell, solutions marketing director at Calix, an access equipment vendor that is working with several electric co-ops, expects no more than 50 to 100 electric co-ops to deploy FTTH. Though he agrees that more co-ops could make a good business case for fiber, his conversations with co-op managers led him to believe many have qualms about departing from traditional lines of business and

Electric co-ops have loyal customers, established funding sources, skilled workers – and no impediments to deploying broadband.

others are “gun-shy” after struggling to provide broadband over power lines.

Mike Keyser, CEO and general manager of BARC Electric Cooperative in Virginia, says the Rural Broadband Initiative, which he chairs, already includes more than 50 electric co-ops, and he estimates, based on a recent survey, that there is a pool of about 250 that are interested in pursuing broadband. However, some of these are looking to partner with municipalities or local telcos for broadband, and some that hope to build their own broadband networks may opt for technologies other than FTTH. The Rural Broadband Initiative has just become a part of the Utilities Telecom Council, an organization many cooperatives already belong to. This merger should help diffuse knowledge about broadband deployment among electric co-ops.

ELECTRIC CO-OPS’ ADVANTAGES

Electric co-ops have many important advantages when it comes to FTTH deployment. First, they are highly popular with their members and thus likely to have high take rates. “Co-op members love their co-ops,” Freesmeier says. “They have a voice in their governance. ... Members are more apt to purchase their goods and services than to ship dollars out of the community.” Keyser agrees, adding, “Members look at it like, ‘This must be a good thing because the co-op is providing it to us.’”

Second, unlike most investor-owned companies, co-ops are accustomed to investing in long-term infrastructure with payback periods of 10 or 15 years and aren’t fazed by these numbers. Freesmeier recalls, “Once, when we were trying to show a payback period as short as we could make it, a [co-op manager] stopped me and said, ‘Don’t

try to argue for shorter paybacks – I won’t believe it.’”

Third, there is no one to say “no.” Co-op owners, directors and managers are all local residents – and they all suffer from lack of broadband. They don’t have to persuade executives in far-off headquarters that they really need broadband, and they don’t face the legal restrictions that inhibit municipal electric utilities in many states.

Fourth, though Freesmeier believes most co-ops with eight or more customers per mile can make a good business case for FTTH with only residential triple-play services, new sources of revenues can potentially enhance the business case. For one thing, all electric utilities will have to implement smart grids eventually. Although some of today’s smart-grid applications can be implemented on wireless or power line networks, Freesmeier says all electric co-ops “realize that ultimately, true smart grid requires real-time, two-way, immediate response, and the only technology that would enable that would be fiber.” Many co-ops have already deployed fiber to their substations, and extending it to customer premises is not that much of a stretch. In addition to smart-grid applications, cellular backhaul and video monitoring of properties such as farm outbuildings are potentially lucrative.

Fifth, electric co-ops have ready access to low-cost capital. Although those that provide broadband generally create telecom subsidiaries to avoid leveraging their electric assets and comingling funds, these subsidiaries can still borrow from the financial institutions that the utilities typically rely on to fund their electric plant, including the National Rural Utilities Cooperative Finance Corporation and CoBank. Electric co-ops in rural areas are also eligible for Rural Utilities Service broadband loans, and at least



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UNITED ELECTRIC COOPERATIVE – MARYVILLE, MO.

In United Electric Cooperative's territory in northern Missouri and southern Iowa, residents had few broadband options. Though United offered fixed wireless where the terrain allowed and though DSL was available in a few areas, satellite was the only alternative for many residents. Membership surveys made clear that better broadband was needed – but with only 2.5 customers per mile, the territory was difficult and expensive to serve.

When the broadband stimulus program was announced, says Darren Farnan, United's chief development officer, the company saw that "with our density, that was a one-time opportunity to look at an option for fiber." Taking a cautious approach, United sat out the first round of stimulus grants; once it saw that FTTH was being funded, it submitted a broadband stimulus application in the second round and received \$21 million in grants and loans under the Broadband Initiatives Program to build an FTTH network. The network will cover the densest 40 percent of its service area and reach about 60 percent of members. "That was the risk we felt comfortable with," Farnan says.

As of February 2013, United has constructed 850 of a projected 1,300 miles of fiber and has just begun marketing triple-play services to the first of 14 areas. It is also running fiber to electric substations for smart-grid applications. The fiber will support remote video monitoring of the substations to deter copper theft. "Security is a big issue in the electric industry," Farnan says. Eventually, he expects other businesses to subscribe to video surveillance or other types of monitoring – for example, farmers may want to monitor the levels of their grain bins.

HIGH TAKE RATES EXPECTED

Based on the surveys it conducted – and on the lack of competitive offerings – United expects a 50

percent take rate for broadband services over three years. Some residents have expressed interest in starting up businesses that they can't currently support with the Internet access they have available; others would like to avoid driving long distances to work at offices with broadband connectivity. The local schools hope to offer their students classes in such subjects as foreign languages that they cannot currently support.

Finding workers to maintain the FTTH network is a challenge, but David Girvan, the company's network specialist, is retraining existing workers and seeking new personnel with experience in fiber. He is also working with institutions of higher education to develop internship programs.

United is hopeful that the new FTTH network will help reverse the population decline that most of its service area has suffered in recent years and the concomitant decline in economic activity and the tax base. Farnan says, "For the same reasons the electric co-ops were formed in the 1930s and 1940s, we're doing the same with broadband right now. We're trying to put the infrastructure in place to retain people, businesses, jobs and a whole way of life."



A line worker sets a Calix fiber cabinet at a United Electric Cooperative substation.

one is on track to be awarded such a loan.

Beginning this year, electric co-ops may be able to qualify for broadband support under the Connect America

Fund (CAF), the program that is replacing the high-cost portion of the Universal Service Fund. To date, however, it does not appear that any electric co-ops have submitted

paperwork to establish themselves as eligible telecommunications carriers under this program.

The Utilities Telecom Council recently filed comments with the FCC

recommending, among other things, that unclaimed CAF funds be made available to entities other than eligible telecommunications carriers. UTC will also support any electric utilities that would like to qualify for CAF funding.

Electric co-ops also have FTTH-friendly skills. They already know how to bill customers and provide high-quality customer support, and they have line workers who can easily transition into being fiber maintenance installers and technicians. Freesmeier says, "The younger guys really see it as a career opportunity to learn new skills."

Finally, as Russell points out, the co-ops own their own poles and rights-of-way. He says, "In many cases, deploying fiber is actually cheaper than building in urban areas, where rights-of-way are costly and streets may need to be dug up."

HURDLES

If the electric co-ops' advantages were all that mattered, they would all have fiber-wired their territories by now. However, they face hurdles as well – including inertia, trepidation about entering new lines of business and lack of technical skills.

One daunting hurdle is video, which has, in Freesmeier's words, "the lowest margin and the highest aggravation" of all services. Electric co-ops aren't unique in this regard – many small FTTH providers, including telcos and municipalities, have begun to wonder whether they should be in the video business, and some have opted out of video in the last few years.

Pulse Broadband, which was founded by cable TV veterans, manages video for electric co-ops that don't want to get into that business (or for those that have tried it and want to get out of it). Another option, if local residents are happy with their existing video choices, is to forgo video entirely. "You can make the numbers work without video," Freesmeier says, but he warns that "a lot of communities want ... the local high school graduation, the Friday night football, the local community advertising. A lot of our co-op clients want some kind of video offering for that reason."

The biggest mistake for rural co-ops, Freesmeier says, is trying to provide video on the cheap by offering lineups of a few dozen channels that "won't compete with DISH and DIRECTV but still have high programming costs."

Industry-specific challenges exist as well. For example, Russell points out that in many rural areas, electric meters are situated at utility poles along roads – sometimes at the end of a very long driveway, far from the resident's house. For a rural electric company, this setup makes sense because it allows the same meter to serve the barn, the chicken coop and other outbuildings in addition to the house and it lets families set up roadside lights for children getting on and off the school bus. However, it presents a challenge for a utility that wants to leverage its fiber infrastructure for broadband services. In town, the same optical network terminal (ONT) can easily connect to a smart meter and provide triple-play services; in the country, there may have to be two fiber drops and two ONTs, raising the cost of providing broadband.

ONE BITE AT A TIME

Perhaps the greatest hurdle for small electric co-ops is the risk involved in building and operating an FTTH network; to mitigate this risk, Co-Mo Electric Cooperative in central Missouri, which was turned down for broadband stimulus funding but still wanted to go ahead with fiber to the home, decided to try a pilot project (see sidebar for details) to be followed by a larger project if the pilot succeeded. Freesmeier says, "Co-Mo realized that the best way to build a \$60 million network is to eat the apple one bite at a time. ... It's an interesting phenomenon that a lot of rural electric co-ops are watching closely."

So far, the Co-Mo experiment appears to be successful, and Freesmeier expects to see a number of other co-ops replicate this model in the next year or two. Stay tuned! ❖

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