## Broadband Case Study:
Jackson County REMC

Cooperative Profile

Jackson County REMC serves approximately 20,000 electric members across parts of ten south-central Indiana counties as shown in Figure 1. Its service territory encompasses 1,252 square miles. The area is rural in character with 6.9 members per mile of distribution line, slightly lower than the average for NRECA cooperatives nationwide. Ninety-five percent (95%) of the co-op's membership base is comprised of residential customers.
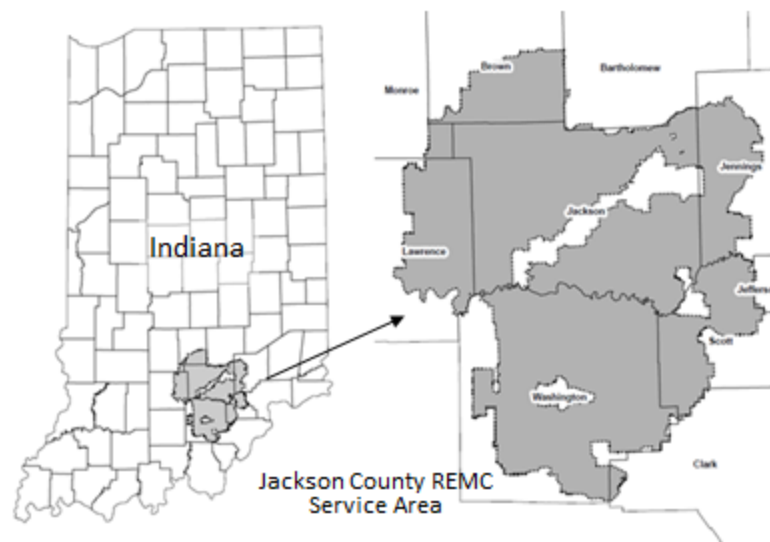
Figure 1. Jackson County REMC Electric Membership Area

Jackson County REMC president and CEO Mark McKinney is very aware that his service area contains locations that are unserved or underserved as far as broadband Internet access goes. "I get approached all the time in grocery stores and at ball games by members who want to tell me how badly they need faster Internet service," he reports. He notes that reliable cellular service is also still lacking in some pockets. More importantly though, McKinney has witnessed net outmigration, as people leave the area in search of better economic opportunities.

There were also good internal business reasons for thinking about the possibility of expanded broadband. Jackson County REMC decided that linking its substations with fiber-optic lines was key to improving the reliability of communications and data backhaul compared to its current cellular and 220 Megahertz radio systems, which can be unreliable at times. For all of these reasons, the co-op's board of directors voted in May 2017 to offer broadband services to its members by creating a new operating division and deploying a fiber-optic network.

Part of the initial phase of fiber buildout was to connect substations. This became the backbone for the co-op's Fiber-to-the-Home (FTTH) project. The cooperative has gotten off to a fast start — since November 2017, the co-op has deployed 700 miles of fiber and connected nearly 1,000 broadband subscribers with a very high take-rate by households along its fiber routes through the first two phases of deployment. Its recently formed broadband division, Jackson Connect, is quickly becoming a household name across the co-op's part of Indiana.

Business Drivers of the Broadband Investment

Member demand for high-speed Internet access was the primary motivating force behind Jackson County REMC's entry into fiber broadband services. Community economic development did not play a significant role, at least in the near-term. With commercial and industrial customers representing only 5 percent of the membership base, about 1,000 customers in total, expanding existing businesses and attracting new ones was, in McKinney's mind, not the immediate driver of the co-op's broadband initiative. However, he recognized that fiber broadband is an important part of the foundation for future economic activity. A strategic planning session in early 2016 with board and staff participation recognized the need to extend broadband access to members to stem the outward flow of people, as expanded broadband access would encourage new kinds of businesses in the local economy down the road.

Electric operations played an important, supporting role in the co-op's decision as well. In addition to the previously mentioned linking-up of twenty distribution substations and metering points for more reliable SCADA (Supervisory Control and Data Acquisition system) and AMI (Advanced Metering Infrastructure) data backhaul, the co-op also plans to connect fiber to eighty intelligent control devices on its system, including capacitor bank controls for system power factor improvement and voltage stabilization.[1] They further plan to connect fiber to automated tie-line switches for enhanced distribution system automation.

Project Overview and Deployment Approach

A four-phased fiber deployment was adopted by Jackson County REMC, beginning with the 220-mile fiber backbone and initial customer connections in Phase 1. Phase 2, which is nearly complete, deployed fiber mainline past 2,736 more homes. To date, a total of 3,524 homes have been passed, of which 1,005 have subscribed and more than 400 are in various stages of installation. The Phase 1 take-rate was an eye-popping 69 percent. Phase 2, in which a majority of sections opened in May 2019 as this case study was being written, already has a take-rate of 25 percent. Network construction is prioritized based on

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[1] A primer on power factor correction can be found at: https://www.cui.com/catalog/resource/power-factor.pdf

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expressions of interest by co-op members on a crowdsourcing platform. Members requesting broadband connections complete an application; however, no upfront fee for the fiber drop or installation is required.[2] According to McKinney, what began as a five-year, mainline construction project is now projected to wrap up in just over three years. Connections to all members who initially signed-up should be done in less than four years.

How has the co-op been able to ramp up so quickly? Part of the answer is the assistance they receive from skilled partners. Jackson County REMC teamed up with Pulse Broadband, an arm of the National Rural Telecommunications Cooperative (NRTC), and uses experienced, local contractors for mainline construction and drop installations. Hiring experienced people has played a major role in the co-op's ability to speed up the project.

Figure 2.
Crew installing a fiber splitter cabinet in the Pleasant Grove area outside of Brownstown, Indiana.
Photo courtesy of Jackson Connect, LLC.

Broadband Business Case

Jackson County REMC has made a strategic statement and major financial commitment with its decision to deploy a system-wide fiber network and enter the broadband services business. $25 million has been invested in the network to date.[3] The full cost of the fiber network is estimated at around $64 million. The co-op's financial model estimates that revenues in year five will be $8.2 million, against projected, annual operating expenses of $2.3 million. Projected revenues reflect an assumption that the five-year take-rate would be 46 percent, an estimate from an early feasibility study. Results to date suggest the original financial outlook was conservative. McKinney now expects to be cash-flow positive in year four. Above and beyond the business case for the broadband services business, the co-op is moving to capitalize on the fiber network for an array of Smart Grid applications. Money has also been saved by replacing an expensive broadband connection that had been used for telephone service, online payment services, and data transfers between on-site computers and network servers, including daily data backups.

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[2] Once construction moves on to the next zone, members in an earlier zone must pay $500 for the fiber drop to their home, so there is a financial incentive to sign up in a timely manner.

[3] Until August of 2018, fiber network construction was financed by CoBank. In that month, the co-op was awarded a $74 million loan from the U.S. Department of Agriculture's Rural Utilities Service. About $58 million of the loan is specifically tied to Smart Grid applications, including demand response elements in the home as well as connection to all of the co-op's distribution automation monitoring and control points. The loan also funds the fiber modem in homes (technically called the Optical Network Terminal), so Jackson REMC can connect to smart devices. e.g., smart thermostats, electric meters, etc.

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Broadband Business Model

Jackson Connect is an operating division of the cooperative, not a for-profit subsidiary. It has ten full-time and three part-time fiber broadband personnel. Some electric employees, including customer service reps, handle inquiries and work tasks for both the electric and broadband sides of the business. After-hours, fiber support calls are handled through a cooperative partner, Ninestar Connect.[4] McKinney expects to need an additional 15 broadband personnel when the fiber network buildout is complete. In comparison, the current staffing level for the cooperative is 85 employees. McKinney notes that once the broadband business becomes cash flow positive, excess earnings will flow to fiber patronage capital.[5] Keeping fiber and electric patronage capital separate requires that separate accounting records be maintained for the electric and broadband divisions, which the co-op is already doing. However, McKinney admits that setting up divisionalized accounting was "a learning process."

What broadband services is Jackson Connect offering? The answer is: broadband Internet at speeds from 50 Mbps to 1 Gbps, with 75 percent subscribing to the 50 Mbps service. Surveys conducted by Jackson County REMC indicated that only 28 percent of members have a landline telephone. Moreover, the co-op believes that video streaming from the Internet, so-called over-the-top (OTT) programming, is growing at a rate that is likely to undermine the case for delivering traditional TV channels.

McKinney sees in his broadband launch a direct parallel with the arrival of electricity nearly a century ago, "I go back to when we started providing electricity to our members; we didn't tell them what appliances to buy once they started receiving electricity, but we taught them how to utilize all aspects of the benefits of electricity. We are doing the same with broadband; we are going to help members utilize the benefits of a broadband connection." The co-op will organize several training events each year, during which they assist members to understand what they can do with their broadband connection, including voice over IP telephony solutions such as Ooma, and OTT programming in lieu of conventional TV channels delivered over cable, enabled by devices such as Roku or Amazon Fire Stick. The co-op offers managed in-home Wi-Fi as part of its service package at no additional cost. For those who want to extend the range of their Wi-Fi signal, the co-op offers a Wi-Fi extender for $4.95 per month.

Network Architecture

Jackson County REMC's broadband network is 100 percent fiber-optic, using the Gigabit Passive Optical Networks (GPON) architecture, similar to the majority of previous cases reported on in this NRECA series. GPON uses passive splitters in the fiber distribution network, enabling one fiber strand from the network mainline to serve multiple homes and businesses.

Market Setting

McKinney reports that there are limited sources of broadband available in his area, including pockets of DSL (Digital Subscriber Lines). Incumbent DSL providers include AT&T and Frontier. Cable TV

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[4] See the 2018 NRECA broadband case study on Ninestar Connect at: https://www.cooperative.com/programs-services/bts/Documents/Advisories/Advisory-Broadband-Case-Study-NineStar-July-2018.pdf

[5] Electric members must be connected to fiber to receive an allocation of fiber patronage capital.

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(Comcast) is available in areas just outside the city limits of Seymour, Salem, and Scottsburg. Several local wireless providers (Blueriver Networking and Xstream Wireless among them) also operate in the area. The City of Scottsburg and surrounding areas are served by Citizens Communications, a wireless broadband provider that offers plans from 512 Kilobits per second to 3 Mbps. Viasat/Exede and HughesNet offer satellite-based broadband services up to 25 to 30 Mbps. Jackson Connect's actual take-rates to date suggest that consumer demand was not being met by preexisting Internet service providers.

Regulatory and Tax Issues

Property taxes on the new fiber assets were an issue that Jackson County REMC decided to address proactively. McKinney and his team approached counties Jackson Connect will be operating in, arguing that the cooperative is providing community infrastructure in support of economic development and should, therefore, be considered for tax abatements. Their approach has proven successful. Jackson County alone approved a $5.43 million tax abatement for Phase 1 of the project (see sidebar) and another $9.72 million for Phase 2. McKinney reports that, based on the five counties he approached for tax abatements on fiber plant, the co-op expects to save a total of $2.1 million in property taxes over a ten-year period.

Potential complications regarding the co-op's use of private electric easements for its new fiber network were addressed by state lawmakers in 2017. The new law, which passed after receiving strong support from the statewide association, Indiana Electric Cooperatives, eliminated the need to adjust private easements with existing above-ground infrastructure, which co-op officials had called a key obstacle.[6] Since Jackson County REMC was one of the first Indiana cooperatives to embark on a major, fiber broadband deployment project, and because 95 percent of the fiber is being placed overhead, this relief was especially important.

Several years ago, the co-op's board of directors approved a policy to encourage broadband deployment in its service territory by waiving the pole rental fee third parties would pay if certain criteria were met, namely that the broadband attachment would serve co-op members. Jackson Connect is meeting these criteria and is receiving the pole rental waiver for its first five years.

Council OKs Broadband Abatement
Jackson County REMC plans to deliver service to customers in 10 counties

A regional cooperative's plans to make high-speed broadband service available to all of its customers through a fiber-to-the-home connection could have broader implications for southern Indiana. Those include attracting new businesses and supporting the needs of agriculture and agribusiness in rural parts of Jackson County and parts of nine other counties served by Jackson County REMC, company officials report. Those officials with the member-owned rural electric cooperative discussed the project Wednesday, while asking Jackson County Council members to approve a $5.43 million abatement for the project during a council meeting at the sheriff's department in Brownstown.

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[6] See the November 28, 2017 NRECA article, "Charting a New Broadband Course," by Cathy Cash at:
https://www.electric.coop/indiana-broadband-jackson-county-remc/

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…continued:

"Broadband connectivity has gone from being a luxury to a necessity," REMC general manager Mark McKinney said. The purpose of the project, which will lead to five new jobs this year and five more in 2018, is to help prepare the company for the current and future needs of its 20,000 members. Jim Plump, executive director of Jackson County Industrial Development Corp., said the project is similar in substance to one that began almost 80 years ago, when the Rural Electrification Administration was established to bring electricity to rural communities.

Plump, who presented the program to the council for REMC, said it's a "win-win" for all involved because it will not only benefit the company and its customers but improve the quality of life for everyone. He later said when it comes to marketing the county to potential industries, economic development officials try to eliminate reasons companies might choose to locate elsewhere. One of the ways to do that is to make sure infrastructure, including broadband, is in place. That's especially helpful to companies trying to do business overseas. Councilman Brian Thompson said he likes the project because it has the potential to attract business to rural parts of the county. "It sets the climate for the next five or 10 businesses that look at locating here," he said.

According to a news release from the company, the board of directors took several factors into consideration when making the decision to move forward with the project. Those considerations include how the project can enhance the quality of life for members, meet the needs of agriculture and agribusiness, provide an enhanced path for education and health care opportunities and help keep the community viable. The $5.43 million is the company's initial investment for Phase 1 of the project, which has an overall price tag of $20 million just for Jackson County and $60 million systemwide. The initial work involves installing the mainline of the system. "It touches almost all of our 10 counties and is the footprint for Phase 2," McKinney said. Besides Jackson County, REMC serves parts of Bartholomew, Brown, Clark, Jefferson, Jennings, Lawrence, Monroe, Scott and Washington counties.

Matt Persinger, REMC's information technology coordinator, said Phase 1 involves running fiber optic to every substation and then between some of those substations to provide redundancy. "As part of Phase 1, there will be a test area here close to the office," Persinger said. That test area contains about 990 members who will have the opportunity to be connected to the system. Persinger said the company will use those connections to work out any issues with the system. Phase 2 will see an expansion of the system to other areas depending upon the interest of members in each area. "The key is to get the money coming in quickly," McKinney said. He said it will take about three years for the service to become cash positive and 16 years for the company to pay for its investment. Overall, the project will take about five years to complete and could lead to additional jobs beyond the 10, Persinger said. Electric service will not be affected during the project, and safe, reliable and affordable electric service will remain a key focus for the cooperative, McKinney said.

The council eventually voted to approve the abatement.

Article by Aubrey Woods, The Seymour Tribune, June 23, 2017.
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Measurable Community Impacts

In spite of the relatively small number of commercial/industrial and institutional customers that Jackson County REMC serves, impressive dollar savings have been derived from improved broadband availability. One school that is now connected to the co-op's fiber network has seen their monthly bill for fiber broadband go from $5,733 to $350, while download speed has improved from 200 Mbps to 1 Gbps. That equates to a drop in cost from $28.67 per Mbps to 35¢, an astounding 98.8 percent savings. And,

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while it is too early to measure the impact on people moving out of or into the area, McKinney has already been told by some members that they are no longer planning to move to an area with broadband coverage to maintain their home-based businesses. A 2018 Purdue University study, "Estimation of the Net Benefits of Indiana Statewide Adoption of Rural Broadband," found that the economic benefit-to-cost ratio for Jackson County REMC's broadband investment is 4.09, meaning there is an expected economic benefit of $4.09 for every $1.00 the co-op invests. Table 1 shows tabulated results from the study for seven Indiana cooperatives. Jackson County REMC exhibits the highest benefit-to-cost ratio of the seven co-ops studied.

Cooperative	NPV	Ann. NPV	B/C	Members	NPV/member	B/member cost	Rev/cost
Tipmont	560,280,195	48,847,781	3.96	22,631	24,757	4.49	0.54
Henry County	190,129,578	16,576,363	3.24	8,500	22,368	3.96	0.45
Jackson County	582,505,581	50,785,491	4.09	24,203	24,067	4.33	0.58
Marshall County	165,610,509	14,438,679	3.03	7,249	22,846	4.06	0.40
Noble County	246,440,421	21,485,799	3.47	10,646	23,149	4.13	0.48
Orange County	166,377,353	14,505,536	2.97	7,756	21,451	3.75	0.41
Whitewater	341,256,815	29,752,324	3.84	11,741	29,065	5.44	0.44

The sum of net present value of benefits for the seven cooperatives is $2,252,600,453. There are 92,726 members in these co-ops, so the net benefit per member is $24,293 (weighted average) for the seven cooperatives.

Table 1. Metrics for Broadband Investment by Indiana Cooperatives Included in the Study. Source: Purdue University Center for Regional Development (2018).[7]

Why is this Case Important?

Jackson County REMC has embarked on a strategic initiative to extend fiber broadband access to 100 percent of its membership in parts of ten Indiana counties. The roughly $64 million fiber investment the co-op has undertaken is intended in large part to stem the outward migration of people from the area by providing the infrastructure necessary for long-term economic growth. A 2018 study by Purdue University indicates that the co-op made the right decision, citing a four-to-one ratio of economic benefits to broadband investment costs. Jackson County REMC's approach is fairly typical of other cooperatives featured in this NRECA broadband series. It formed a new operating division, elected to go with 100 percent FTTH, and is prioritizing its fiber buildout based on advance member sign-ups.

But, how did this co-op get off to such a fast start? It boils down to several key aspects. They keep things simple. They partner where it makes sense. They do not offer telephone service or TV programming,

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[7] Alison Grant, Wallace E. Tyner, and Larry DeBoer, Purdue University Center for Regional Development, "Estimation of the Net Benefits of Indiana Statewide Adoption of Rural Broadband," August 2018, p.3. https://www.pcrd.purdue.edu/files/media/006-RPINsights-Indiana-Broadband-Study.pdf

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recognizing the unmistakable trends away from landline phone service and toward video streaming in lieu of traditional TV. And, they engineered an approach that produces exceedingly high take-rates for their newly offered broadband services. Consumers in the area must be pleased that their trusted, local cooperative has expanded their service offerings beyond electricity.

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