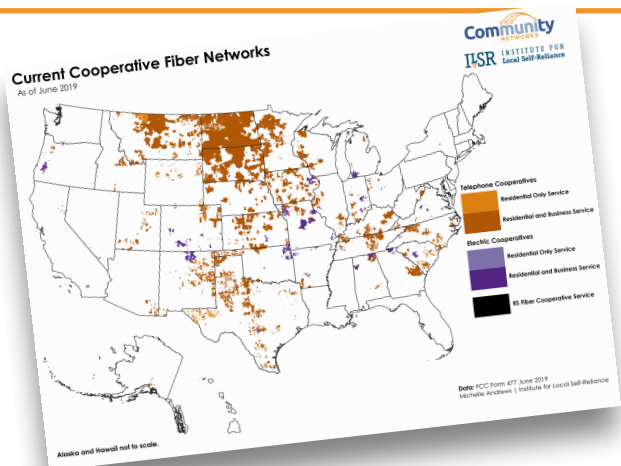# Cooperatives Fiberize Rural America:
A Trusted Model For The Internet Era

By H. Trostle, Katie Kienbaum, Michelle Andrews, Ny Ony Razafindrabe, and Christopher Mitchell

Introduction

Since we originally released our report on rural cooperatives in 2017, we have seen a tremendous increase in attention on cooperatives as a key approach for dramatically improving rural Internet access. Many cooperatives have become more aggressive in building next-generation networks for their member-owners and their neighbors. This updated report reflects the latest data we could gather on this essential movement.

As of May 2020, we've added a new map that shows the current areas covered by fiber networks run by cooperatives, as well as areas where they are currently building out and have committed to expand service.

Rural regions in the United States largely lack high-quality Internet access, a fact that is well known and to which with various solutions are publicly discussed at both the state and federal level. However, too few have noticed that a substantial minority of rural areas actually have Internet infrastructure that is better than what metro regions have on average. Locally-rooted infrastructure cooperatives have already invested significantly in fiber optic networks and are an under-appreciated tool for expanding access rapidly in a fiscally-responsible manner across rural America.

Rural communities have solved many past infrastructure problems by creating utility cooperatives. In the 1930s, farmers came together to build non-profit, member-owned electric cooperatives. These co-ops were able to borrow money from the federal government to build a grid across low-density and sometimes rugged terrain, everywhere from Maine to southern California. Decades later,

people did the same to create telephone cooperatives.

Cooperatives should be the foundation for bringing high-quality Internet service to rural America. Internet service from satellite, dial-up, and DSL is too slow and unreliable for modern applications. Small towns and farming communities need robust Internet service to support their local economies, educate themselves, and generally improve their quality of life. Cooperatives have quietly proved that they can build Fiber-to-the-Home networks that are capable of speeds greater than 1 Gigabit per second (1,000 Mbps). More than 210 cooperatives offer gigabit service to residents or businesses.

Urban and rural areas in the U.S. are defined based on population density calculations performed by the U.S. Census Bureau. Using the areas defined as rural and the latest FCC Form 477 data from June 2019, we found that 21 percent of people living in rural areas have access to fiber Internet service. 30 percent of the fiber service available in rural areas is provided by rural cooperatives. There are two things to understand about that number:
1. There are a number of electric co-ops that are building but not reflected in the June 2019 data and it will be several years before the data catches up.
2. Only 3.8 million people live within the historical boundaries of telephone cooperatives and yet 62 percent of them could receive fiber Internet access from their co-op.

Small Internet Service Providers (ISPs) are also making investments in their rural communities, but large ISPs, such as AT&T and CenturyLink, have overlooked rural areas. This is where cooperatives can solve the problem.

This brief explores the impact that rural cooperatives have already made on Internet

Key Terms

Federal Communications Commission (FCC) – A federal government agency that regulates U.S. communications laws and policies.

Broadband – Defined by the FCC as 25 Mbps (download) / 3 Mbps (upload). Generally used as a shorthand for good Internet access.

Cooperative – A non-profit, member-owned organization that provides a needed service. Members pay a small fee to join and have voting rights within the organization.

United States Department of Agriculture (USDA) – A U.S. department that is a key source of grants and loans for cooperatives via its Rural Utilities Service (RUS) department.

Fiber-to-the-Home – A type of network technology that physically connects each home to a fiber optic line. Fiber optic connections work by transmitting information as pulses of light. It has more capacity than Cable or DSL.

"Gig" or Gigabit (Gbps) – Internet service speeds of 1,000 Mbps (more colloquially used to describe a connection that has no congestion regardless of what applications are used).

Internet Service Providers (ISPs) – Companies or organizations that provide Internet access.

Form 477 – A specific FCC form to monitor the deployment of broadband service in the U.S. ISPs provide information at the census block level.

access. It concludes with action steps and policy recommendations for universal access to high-quality Internet service in America.

Problem: Bad Rural Connectivity

Rural communities face many challenges, from dwindling populations to inaccessible health care. The limited opportunities available in rural homes drive many young workers to suburbs and metro regions, causing further population loss and further reducing opportunities for those remaining in their rural communities. The opportunities afforded by high-speed Internet access can breathe new life into rural communities, making them once again great places to live, work, and play.

The rural U.S. is home to just 14 percent of the population, but as of 2018, covers 72 percent of the land area.[1] In 2010-2016, researchers witnessed the first ever overall population decline in rural counties in U.S. history.[2] Rural-urban migration is a fact of life, but this is the first time that the rural U.S. has lost more population than can be replaced by natural population growth. Although rural areas account for so little of the population, they have been difficult to connect with broadband Internet access. Only around 2 percent of urban Americans lack access to broadband service compared to 26 percent of rural Americans.[3]

Rural economies suffer without high-speed Internet access. For small businesses, credit card and debit card transactions are delayed by slow connections. Potential entrepreneurs have difficulty accessing information online and promoting their ideas and products without a reliable connection. Tourist towns need high-speed Internet access to attract visitors and encourage them to return. In a recent survey by statistics firm Statista, 80 percent of respondents reported that Internet access was crucial for hotel service—even more important than room service.[4]

Local Voices - Michigan

Before Allband Communications Cooperative brought telephone service and broadband access to the Robbs Creek exchange in the 2000s, residents of the rural northeastern Michigan community couldn't contact emergency services. Ron Siegel, general manager, explained:

> "It was actually a very traumatic issue because people were dying…There was a young boy that drowned. There was a gentleman who had a heart attack, and the wife couldn't call for help… By the time she drove to Alpena and got in the ambulance back, he had died alone on the floor."

It's not just the economy. Rural Internet access can improve health care and education. Nearly 90 percent of teachers assign homework once a month that requires Internet access.[5] With sub-par connectivity, rural students are at a disadvantage when trying to complete their homework or independently enrich their education. High-speed Internet access also enables more educational opportunities, such as live interactive STEM courses from across the state.[6]

24 percent of U.S. veterans live in rural areas, and 72 percent of them are more than 55 years old.[7] This older segment of the population has unique health needs. Many rural communities, however, lack access to preventative services and rural communities have higher rates of chronic illness and poor overall health.[8] Telehealth initiatives could alleviate some of these disparities by providing access to routine, preventative care. Veterans and the elderly can receive telehealth services in order to stay in their communities longer and receive more frequent care. Such a shift would also lower the cost of providing medical care.

Despite this opportunity, rural regions are often stuck with dial-up, DSL, or satellite service. These technologies are too slow and unreliable to support rural economies. Some states have developed programs to subsidize rural connections in addition to some existing programs from the federal government. However, none of these programs have the scale to ensure most rural regions have modern Internet access. Fortunately, rural cooperatives have stepped up, some taking advantage of these state and federal programs and others simply finding a way to invest in the technologies necessary to deliver better Internet access.

The Cooperative Solution

For nearly 100 years, rural communities have relied on cooperatives to bring needed utilities to their homes and businesses. In the early 20th century, private electricity companies refused to extend service to most of rural America. Private investors did not believe farms and rural towns had sufficient electrical demand and instead focused on building out to urban areas and more specifically industrial areas. The federal government stepped in with the Rural Electrification Act of 1936, setting the stage for rural utility cooperatives.

Approximately 260 telephone cooperatives and 834 electric cooperatives today serve much of rural America. Electric cooperatives maintain 42 percent of the electric distribution lines in the United States, servicing 20 million homes, businesses, farms, and schools and providing reliable power to 56 percent of the entire U.S. land area, accounting for 42 million people in 48 states.[9] More than 30 states have at least one telephone cooperative.

Many cooperatives provide Internet service as a natural extension of their existing infrastructure. Telephone cooperatives started with Internet access by providing dial-up and DSL service over their copper telephone lines. Most telephone co-ops are already transitioning to all-fiber networks, upgrading everyone in their territory from the old copper phone lines of 50 years ago.[10] More than 109 rural electric co-ops have embarked on fiber optic projects to increase Internet access for their members, a number that is growing rapidly from just a handful in 2012.[11]

Why Fiber?

Fiber networks offer faster, more reliable service than other types of networks. They have been hailed as "future-proof" infrastructure and have long technological lifespans. Additionally, fiber

networks support multiple uses for homes and businesses, including Internet service, telephone, video, and security. Fiber networks have high capital costs initially, but lower operating costs than many other types of networks over the long term.

Many electric cooperatives may already have fiber in place for another purpose. Several started by building fiber optic lines to substations and large demand centers to increase the reliability of the electric system through better monitoring. This forms the backbone of the network for Internet access to businesses and residents.

Cooperative Fiber Map

The map on page 6 features the 360+ telephone and electric cooperatives or their subsidiaries that are currently offering fiber Internet access to homes or businesses. It is based on data from the FCC Form 477 June 2019 v1, and it is compiled at the census block level.[12] This map may slightly overstate coverage: an ISP may claim a census block as served if an ISP serves, or can easily serve, at least one location in that census block. Rural census blocks often cover larger areas than urban census blocks.

This map includes information on projects through June 2019; new projects that started in late 2019 will not be reflected on this map.

Growth in Areas Covered by Cooperatives Map

The map on page 7 shows the growth in areas where cooperatives offer fiber Internet service from 2018-2019. As with the other maps, it is based on FCC Form 477 data at the census block level. The areas depicted are networks

Local Voices - Minnesota

In Minnesota's farm country, residents recognized that they were being shut out of economic and educational opportunities due to the lack of connectivity. Jake Rieke, vice chairman of the RS Fiber Cooperative board, shared his story:

"I was seriously considering having to move off the farm — a farm that was homesteaded by my family in 1862 — and moving to a town with better broadband access because I felt that there was a serious possibility that I was putting my kids at a disadvantage."
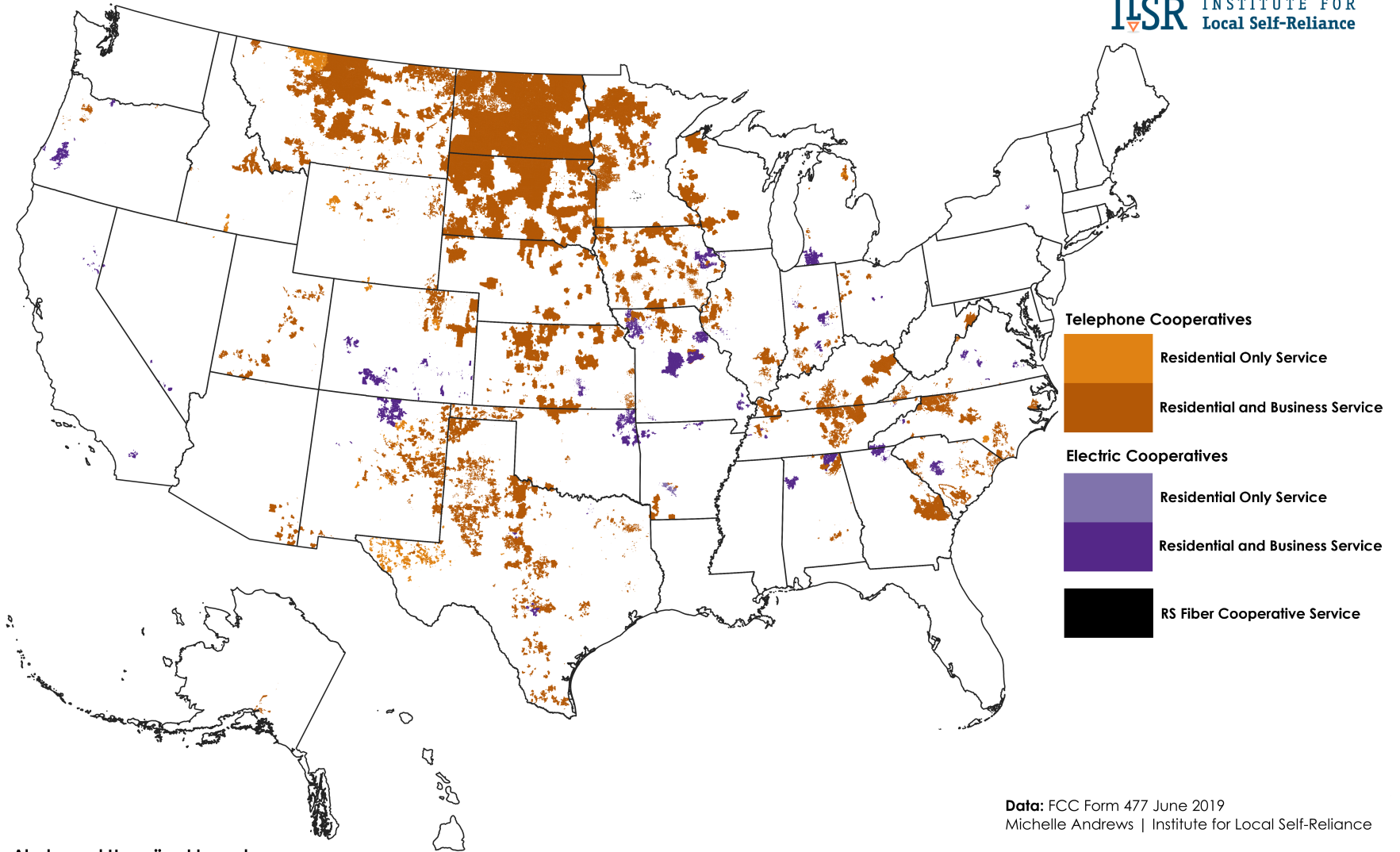
newly present in 2019 that were not in the 2018 Form 477 data.

Current and Predicted Areas Covered by Cooperatives Map

The map on page 8 shows the current areas where electric and telephone cooperatives offer fiber Internet service, as well as the areas they are predicted to expand service, based on funding received from the Connect America Fund II Auction. RS Fiber Co-op in Minnesota is shown in its own category. This map is based on FCC Form 477 data from June 2019.

Current Cooperative Fiber Networks
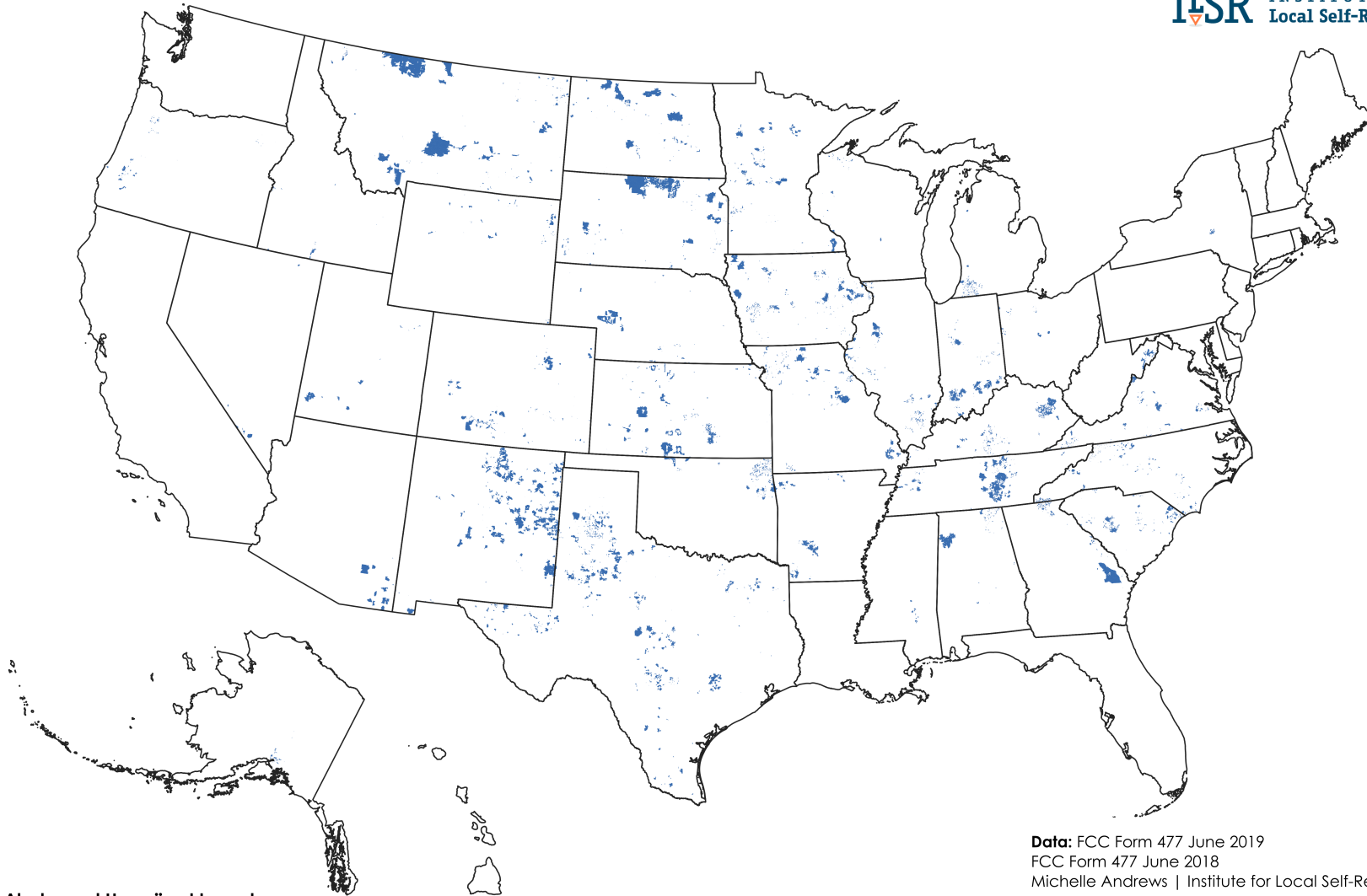
As of June 2019

Community NETWORKS

ILSR INSTITUTE FOR Local Self-Reliance

Telephone Cooperatives

Residential Only Service

Residential and Business Service

Electric Cooperatives

Residential Only Service

Residential and Business Service

RS Fiber Cooperative Service

Data: FCC Form 477 June 2019
Michelle Andrews | Institute for Local Self-Reliance

Alaska and Hawaii not to scale.

Growth in Area Covered by Cooperative Fiber Networks

By Census Block (June 2018 - June 2019)

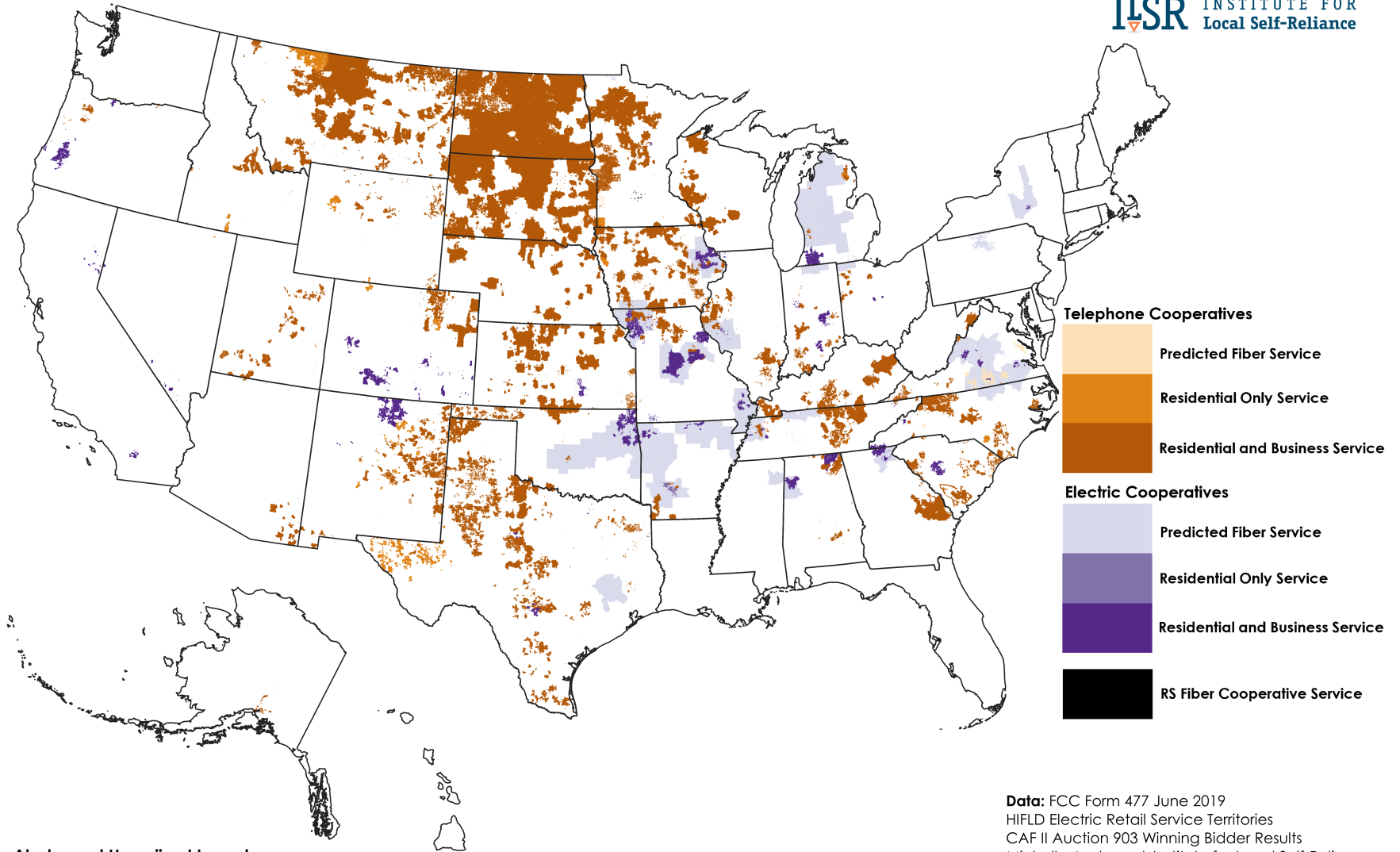■ Growth in Co-op fiber Internet access

Community NETWORKS

ILSR INSTITUTE FOR Local Self-Reliance

Alaska and Hawaii not to scale.

Data: FCC Form 477 June 2019
FCC Form 477 June 2018
Michelle Andrews | Institute for Local Self-Reliance

Predicted and Current Cooperative Fiber Networks
As of June 2019

Community NETWORKS

ILSR INSTITUTE FOR Local Self-Reliance

Telephone Cooperatives

Predicted Fiber Service

Residential Only Service

Residential and Business Service

Electric Cooperatives

Predicted Fiber Service

Residential Only Service

Residential and Business Service

RS Fiber Cooperative Service

Alaska and Hawaii not to scale.

Data: FCC Form 477 June 2019
HIFLD Electric Retail Service Territories
CAF II Auction 903 Winning Bidder Results
Michelle Andrews | Institute for Local Self-Reliance

Cooperative Coverage: Top Five States

According to FCC statistics, 81.7 percent of the landmass of North Dakota has access to fiber optic services from cooperatives. This table shows the percentage of other top states in landmass coverage by fiber from cooperatives.

Cooperative Fiber Coverage		
North Dakota	56,000 sq. mi.	81.7%
South Dakota	40,000 sq. mi.	53.4%
Montana	39,000 sq. mi.	27.0%
Iowa	13,000 sq. mi.	23.4%
Minnesota	18,000 sq. mi.	22.3%

The Future is Cooperative

The vast majority of organizations on this map are telephone and electric cooperatives that have served their communities for decades. But we know of at least two relatively newly formed cooperatives and have covered their stories on MuniNetworks.org.

- In Michigan, a man wanted telephone service for his consulting business in the 1990s and the community needed 911 service for their families. They built the Allband Communications Cooperative that now manages a Fiber-to-the-Home network and supports rural research.[13]

- RS Fiber in Minnesota came out of a consortium of rural towns and counties that recognized the need for high-speed Internet access.[14]

Forming a new cooperative is challenging, which is why we believe the most common solution for rural regions not currently served by

cooperatives will be for nearby cooperatives to expand their service territory. In North Carolina, Wilkes Telephone Cooperative is taking that approach through its broadband subsidiary RiverStreet Networks. After connecting its members, the co-op began to expand outside its service territory in both North Carolina and Virginia by acquiring other providers, merging with another telephone cooperative, and seeking federal funding.[15] Currently, RiverStreet is partnering with North Carolina Electric Cooperatives to deploy pilot projects across the state.[16]

Electric cooperatives have the potential to connect much of rural America. Although only 10 percent of electric cooperatives in the U.S. have a fiber Internet access project, many are now considering the challenge—crafting feasibility studies, attending broadband conferences, and collaborating with others in their communities. We have been told it is the most common conversation at meetings of rural electric co-ops.

State Laws

Since the first release of this report in 2017, state legislatures have begun to ease restrictions on cooperative broadband networks. Both Georgia and Mississippi have removed legal uncertainty by explicitly authorizing electric cooperatives to offer Internet access, and North Carolina has overturned a restriction that prevented electric cooperatives from accessing federal broadband funding.[17]

Other states are going one step further by enacting legislation to help facilitate the deployment of cooperative broadband networks. In 2017, Indiana passed the Facilitating Internet Broadband Rural Expansion (FIBRE) Act, which allows cooperatives to use electric easements for broadband networks.[18] Legislatures in Colorado, Maryland, North

Local Voices - Missouri

In central Missouri, Co-Mo Electric Cooperative's fiber network saved members approximately $20-25 per month on Internet access and telephone service, according to Randy Klindt, former general manager of the co-op's broadband network. Klindt shared:

"When this project is complete, that's about $1-1.5 million of disposable income put back into our member's pockets that they can spend on other things."

Carolina, and Texas have since implemented similar laws.[19] In some states, opposition from incumbent providers limited potential improvements for cooperatives, but these laws have tended, at least, to be steps in the right direction.

Funding For Projects

Fiber network projects have significant capital expenditures at the start of their projects, and even once completed, cooperatives may find that they need additional funding for marketing campaigns or computer literacy projects. A majority of cooperatives have taken advantage of at least one of several federal and state funding programs to make these investments feasible, while some have built fiber networks without subsidies.

Some cooperative projects received grants or loans from the federal stimulus program, the American Recovery & Reinvestment Act (ARRA), which included the Broadband Technology & Opportunity Program (BTOP) administered by the National Telecommunications and Information Administration (NTIA) as well as the Broadband Initiatives Program (BIP) administered by the U.S. Department of Agriculture (USDA).

Other cooperatives took advantage of the Federal Communications Commission's (FCC) Connect America Fund (CAF) Rural Broadband Experiments Program. Grant recipients included Allamakee-Clayton Electric Cooperative in Iowa, BARC Electric Cooperative in Virginia, and Paul Bunyan Telephone Cooperative in Minnesota. In 2018, yet more cooperatives participated in the CAF Phase II reverse auction, which awarded $225 million in subsidies to 35 rural electric co-ops.[20] Starting in 2020, the FCC's Rural Digital Opportunity Fund will distribute approximately $20 billion to fund rural broadband deployment. Many cooperatives are likely to participate in the fund's reverse auctions.

Many of the telephone cooperatives have wisely reinvested support from the FCC's Universal Service Fund in recent decades to slowly expand fiber optic service across their territories. As an example, North and South Dakota regularly feature among the fastest states for broadband due to their telephone co-ops having built so much fiber.[21] They also have more square miles served by co-ops than any other state. When the area is broken down by census blocks, co-ops cover 81.7 percent of North Dakota and 53.4 percent of South Dakota.

The USDA currently manages several programs as well. Some are through its Rural Utilities Services (RUS) division and others are through programs like Cool & Connected, which provides planning assistance for broadband deployment and community development. RUS manages the Community Connect Grants, the Distance Learning & Telemedicine Grants, the Farm Bill Broadband Loans & Loan Guarantees, the Rural e-Connectivity (ReConnect) Pilot Program, and the Telecommunications Infrastructure Loans & Loan Guarantees programs.[22]

Some cooperatives initially applied for federal grants and loans, but were not dissuaded when rejected. Co-Mo Electric Cooperative in Missouri applied multiple times for ARRA funding, but each application was rejected. The communities still clamored for service, so they moved forward on their own. Co-Mo Electric self-financed a gigabit Fiber-to-the-Home network.

In addition to federal funding sources, co-ops are often eligible for state and local grants. The Minnesota Border-to-Border Broadband Grant Program has awarded funds to several cooperatives, and multiple states looked to it as a model for their own grant programs.[23] Local government funding for connectivity is rarer, but in Minnesota, numerous counties have provided loans and grants to electric and telephone cooperatives for broadband projects, often to supplement federal or state funding.[24] For example, Cook County, Minnesota, offered Arrowhead Electric Cooperative a $4 million grant after the co-op was awarded $16 million in stimulus funding.

The story of rural Internetification is just starting to be told, but it is clear that cooperatives will have a large role. The sooner policymakers realize that and prioritize cooperatives as targets for subsidy programs, the faster and less expensive it will be to connect everyone.

Recommendations

Federal and state governments must recognize that cooperatives are one of the best tools for ubiquitous, rural, high-speed Internet access.

1. Design funding programs with cooperatives in mind.
   a. Letters of credit from the largest banks may be hard to come by for smaller cooperatives.
   b. Make applications as simple and easy as possible. Staff time is limited at small cooperatives.
   c. Develop grant and loan programs rather than create incentives in the tax code for infrastructure investment.

2. Encourage cooperatives by removing barriers and encouraging partnerships.
   a. Remove barriers to electric cooperatives exploring the possibility of fiber network. Cooperatives should not be prevented from applying to federal grants that they are eligible for because of hindersome state laws.
   b. Encourage partnerships, including with existing muni networks.

3. If you live in a rural area, talk to your neighbors, co-op manager, and board members about the potential for Internet networks. Successful cooperative projects are community-led projects. About 70 percent of electric cooperatives have less than 10 percent average turnout for their board member elections.[25]
   a. Co-Mo Electric Cooperative in Missouri had excited members go door-to-door and gave out yard signs to encourage folks to get involved with the project. Many community members also wrote letters of support for the project.
   b. In New Mexico, the local business community voiced their needs at Kit Carson Electric Cooperative board meetings to encourage the co-op to build a fiber network.

   c. Delta Montrose Electric Association in Colorado overcame an initial reluctance to develop an Internet access project after overwhelming demand from its members.[26]

4. Make it clear that rural connectivity is about more than entertainment. Farmers, programmers, and entrepreneurs all need high-speed Internet access. Rural connectivity also supports needed research.
   a. Allband Communications Cooperative started a non-profit called ACEWR, which collaborates with universities and research institutions across the United States. It is a prime spot for research on local wildlife, endangered species, and conservation projects. The nonprofit also has an online workforce development program to train locals in new skills, empowering them to succeed in the 21st century economy.

About the Authors

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Contact Us

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Endnotes

[1] USDA Economic Research Services defines rural as the total population of nonmetro counties.
https://www.ers.usda.gov/media/10448/transcript_-rural-america-at-a-glance-2019-edition.pdf

[2] https://www.ers.usda.gov/topics/rural-economy-population/population-migration/recent-population-change

[3] The FCC uses the 2010 census block identification to estimate rural population.
https://docs.fcc.gov/public/attachments/FCC-19-44A1.pdf

[4] https://www.statista.com/chart/9620/hotels-just-give-me-wi-fi

[5] https://www.theatlantic.com/education/archive/2018/10/lacking-internet-millions-teens-cant-do-homework/574402/

[6] https://muninetworks.org/content/community-network-services-cns-brings-stem-education-and-more-rural-southwest-georgia

[7] https://www.census.gov/content/dam/Census/library/publications/2017/acs/acs-36.pdf

[8] https://www.ruralhealthinfo.org/topics/rural-health-disparities

[9] https://www.electric.coop/wp-content/uploads/2020/05/NRECA-Fact-Sheet-5-2020-1.pdf)

[10] https://muninetworks.org/content/rural-cooperatives-page

[11] https://muninetworks.org/content/rural-cooperatives-page

[12] https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477

[13] https://muninetworks.org/content/rural-telephone-cooperative-forges-its-own-path-michigan

[14] https://muninetworks.org/reports/rs-fiber-fertile-fields-new-rural-internet-cooperative

[15] https://muninetworks.org/content/north-carolina-co-ops-merge-connect-rural-communities-across-states and https://muninetworks.org/content/north-carolina-co-ops-partner-broadband-community-broadband-bits-podcast-bonus-episode-five

[16] https://muninetworks.org/content/co-op-cooperation-rural-north-carolina-riverstreet-working-electric-co-ops

[17] See http://www.legis.ga.gov/legislation/en-US/Display/20192020/SB/2, http://billstatus.ls.state.ms.us/2019/pdf/history/HB/HB0366.xml, and https://www.ncleg.gov/BillLookUp/2019/S310 for the respective bills

[18] https://muninetworks.org/content/indiana-eases-easements-electric-co-ops-fibre-act

[19] See https://leg.colorado.gov/bills/sb19-107, https://capitol.texas.gov/BillLookup/History.aspx?LegSess=86R&Bill=SB14, and https://www.ncleg.gov/BillLookUp/2019/S310 for the respective bills

[20] https://www.electric.coop/electric-co-ops-get-big-boost-rural-broadband-efforts-fcc-auction/

[21] https://muninetworks.org/tags/tags/north-dakota

[22] https://www.rd.usda.gov/programs-services/all-programs/telecom-programs

[23] https://mn.gov/deed/programs-services/broadband/grant-program/

[24] https://muninetworks.org/content/minnesota-counties-help-fund-cooperative-broadband-projects-economic-development

[25] https://ilsr.org/just-how-democratic-are-rural-electric-cooperatives

[26] https://muninetworks.org/content/dmea-co-op-serving-broadband-and-innovation-colorado-community-broadband-bits-podcast-314