Aligning Resources to Connect Rural Michigan to Pandemic-Ready Broadband Networks

Final Project Report

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Table of Contents

Introduction

The COVID-induced shift to "stay at home" participation in work, school, healthcare and other aspects of modern life has underscored the urgent need for universal and affordable Internet access. Beyond that, it has highlighted the need for connectivity that reliably, securely and affordably supports simultaneous use by multiple household members of symmetrical high-bandwidth applications such videoconferencing and large file transfers…or, put in somewhat simpler terms, the level of network performance our experience with COVID has led us to recognize as "pandemic ready."

The work plan for this Innovation Fellowship was designed to build on a 2019 Co-Learning Plan (CLP) that focused mainly on the role of rural electric cooperatives (RECs) in deploying high-performance fiber optic networks in rural Michigan. That CLP also: 1) examined the need for more accurate broadband availability data to support network planning and allocation of public subsidies and; 2) began exploring the potential of Michigan's regional planning organizations (RPOs), state policy and innovative business and partnership models to support the expansion of high-performance broadband.

An initial step in this fellowship's work plan was to conduct "a comparative analysis of broadband availability and usage for the state's 14 planning regions." The results of that analysis are summarized in the first two sections of this report and in Appendix A. The first section compares the planning regions based on a mix of broadband-related factors, while the second considers them in relation to REC service areas.

Another component of this project was to work with partners to "explore ways to improve broadband datasets and their ability to support more effective solutions to Michigan's rural digital divide." The results of these efforts are discussed in the third section of this report.

Another project goal was to "support collaboration between RECs, RPOs and other stakeholders in the development of regional broadband strategies and projects." Work on this front is discussed in the fourth section of the report, including analysis of the ecosystem of stakeholders, resources and relationships focused on expanding broadband in rural Michigan. It is also discussed in portions of Appendix A.

The fifth section of the report discusses an emerging model for deploying high-performance broadband networks that combines technical and business model innovations and whose adoption in Michigan could be empowered by passage of proposed state legislation. We refer to that model as User Owned and Controlled Access Networks (UOAN-UCAN).

A final section of the report briefly presents conclusions and recommendations.

Broadband Availability in Michigan's Planning Regions

In this section we present and discuss several tables that shed light on the state of broadband in Michigan's 14 planning regions. The tables rely on a range of sources, including FCC data, data compiled by Connected Nation Michigan (which reflects enhancements and corrections of FCC data), and speed data as measured by Microsoft.

Table 1 provides an overview of the state's 14 planning regions, including housing density (which is closely related to per-location broadband network costs) and two key economic metrics—unemployment and household income. It also shows the aggregate percentage of households in each region with Internet access service at advertised speeds of 3/1 Mbps and 25/3 Mbps, the latter being the current FCC threshold to qualify as "broadband" service.

While the table shows that at least 90% of households in all regions have access to 3/1 Mbps service (most at levels above 95%), the availability of 25/3 Mbps service spans a much larger range of values. For example, while the SEMCOG region, which includes seven high-density and relatively affluent counties in the southeast portion of the state, has 98% availability of 25/3 Mbps service, four regions fall below 80% on this metric, with two of these (NEMCOG and EUPRDC) falling below 60%. Not surprisingly, these regions also tend to have relatively (and for most, very) low housing density, which increases per-location costs to deploy broadband networks. They also have relatively low average household incomes and high unemployment levels.

Table 1: Broadband Availability, Housing Density and Economic Factors by Region

Region	RPO	Counties	HU2017	HU/SqMi	%Unempl	HHInc	% 3/1M	% 25/3M
1	SEMCOG	7	2,083,992	463	5.2%	$ 57,674	100%	98%
2	R2PC	3	135,369	66	4.8%	$ 51,147	99%	81%
3	SCMPC	4	221,674	97	4.4%	$ 50,346	98%	90%
4	SWMPC	3	141,037	85	5.2%	$ 48,376	99%	88%
5	GLSPDC	3	259,242	143	5.7%	$ 46,854	100%	96%
6	TCRPC	3	203,065	120	4.2%	$ 54,017	99%	90%
7	EMCOG	14	399,616	47	6.0%	$ 44,642	99%	85%
8	WMRPC	8	531,614	102	3.8%	$ 58,352	99%	89%
9	**NEMCOG**	8	101,089	21	7.9%	$ 41,568	93%	***58%***
10	Networks NW	10	183,893	39	5.8%	$ 51,592	98%	81%
11	**EUPRPDC**	3	36,990	11	8.2%	$ 43,230	92%	***58%***
12	CUPPAD	6	96,720	14	6.1%	$ 46,332	95%	83%
13	**WUPPDR**	6	52,374	9	6.7%	$ 38,681	97%	***75%***
14	**WMSRDC**	5	148,483	51	5.8%	$ 43,867	96%	***74%***
State		83	4,595,158	81	5.2%	$ 53,400	99%	91%

Source: broadband availability percentages reflect Connected Nation data as of August 2018

Table 2 compares region-wide broadband availability by access technology, including cable, DSL, fiber and fixed wireless. As with overall availability, the high density and relatively affluent SEMCOG region has the highest availability of cable-delivered 25/3 Mbps service (98%), while NEMCOG and EUPRPDC anchor the low end of the range (51-52%), with WMSRDC (67%) and WUPPDR (72%) all well below 80%. It's worth noting that for most regions availability of 25/3 Mbps cable service matches or nearly matches the availability of 3 Mbps service. This reflects the technical characteristics of most cable networks. That said, 25/3M availability lags behind 3/1M availability in several regions, most notably in the NEMCOG, EUPRPDC and WMSRDC regions. One possible explanation for some of this difference is that some areas within these regions are served by very old cable networks that have not been upgraded or well-maintained over the years and are unable to deliver 25/3 Mbps speeds.

While the gap between 3/1M and 25/3M availability tends to be small or non-existent for cable broadband, it can be quite large for DSL and fixed wireless. The gap for distance-sensitive DSL tends to be largest for low-density regions. For example, 25/3 DSL availability is only in the single digits for five rural regions (NEMCOG, Networks NW, WMSRDC in northern and western portions of the lower peninsula, and all three UP regions). As with cable, the highest level of 25/3M DSL availability (64%) is in the SEMCOG region, followed by TCRPC (50%), the three county region surrounding Lansing.

Table 2: Broadband Availability by Technology and Region

Region	RPO	HU/SqMi	%Cable3M	%Cable25M	%DSL3M	%DSL25M	%Fiber	%FW3M	%FW25M
1	SEMCOG	463	98%	98%	95%	64%	2%	6%	0%
2	R2PC	66	79%	78%	90%	18%	9%	54%	2%
3	SCMPC	97	88%	88%	89%	43%	3%	24%	2%
4	SWMPC	85	79%	77%	82%	14%	16%	88%	25%
5	GLSPDC	143	92%	92%	88%	31%	8%	71%	31%
6	TCRPC	120	86%	86%	94%	50%	16%	20%	5%
7	EMCOG	47	77%	77%	74%	19%	26%	93%	4%
8	WMRPC	102	87%	86%	82%	44%	11%	92%	4%
9	NEMCOG	21	64%	52%	61%	2%	5%	65%	3%
10	Networks NW	39	76%	76%	64%	7%	0%	86%	3%
11	EUPRPDC	11	58%	51%	55%	12%	1%	80%	0%
12	CUPPAD	14	81%	80%	56%	7%	4%	74%	0%
13	WUPPDR	9	72%	72%	61%	8%	6%	75%	0%
14	WMSRDC	51	75%	67%	72%	3%	2%	75%	13%
State		81	89%	88%	86%	43%	7%	42%	5%

Source: Connected Nation data as of August 2018

While the data indicates that the majority of homes in most rural regions have access to 3/1 Mbps fixed wireless service, these numbers collapse to single digits for 25/3 Mbps service in most regions. The data suggests that only three regions, SWMPC (25%), GLSPDC (31%) and WMSRDC (13%) have double-digit 25/3 Mbps availability of fixed wireless service. But even these numbers may overstate

on-the-ground availability given the topographical and other technical challenges faced by WISPs and their customers, especially in heavily wooded and hilly areas.

Table 3 adds another factor to our comparative analysis of broadband in Michigan's 14 planning regions: measured usage as contrasted with the advertised speeds reported by the FCC. The table is based on data made available by Microsoft based on the speeds it measures for customer interactions with the company's web sites (e.g.. downloading software updates, security patches, etc.).

Microsoft originally made this data available in early 2019, comparing measured usage data as of September 2018 to FCC availability data at the end of 2016 to. It subsequently updated its usage data to reflect measured speeds as of November 2019, which it compared to the most recently available FCC data, which reflects ISP-reported availability as of yearend 2017. In both cases the data made available by Microsoft reflected the percentage of network usage in each county that met the FCC broadband standard of 25/3 Mbps.

Table 3: 25/3 Mbps Broadband: FCC Availability vs. Measured Speeds

		Percent 25/3 Mbps Service				2016 Avail.	2017 Avail.
Region	RPO	2016 Avail	2017 Avail	2018 Use	2019 Use	v. 2018 Use	v. 2019 Use
1	SEMCOG	97%	98%	***49%***	***51%***	-48%	-47%
2	R2PC	78%	80%	30%	34%	-48%	-46%
3	SCMPC	89%	91%	37%	43%	-52%	-48%
4	SWMPC	84%	88%	33%	39%	***-51%***	***-50%***
5	GLSPDC	93%	94%	40%	44%	***-53%***	***-50%***
6	TCRPC	93%	91%	40%	41%	***-53%***	***-50%***
7	EMCOG	80%	84%	35%	37%	-46%	-48%
8	WMRPC	87%	90%	45%	47%	-42%	-43%
9	**NEMCOG**	***50%***	***53%***	***15%***	***26%***	***-35%***	***-27%***
10	Networks NW	73%	84%	24%	36%	-48%	-48%
11	**EUPRPDC**	***56%***	***60%***	***30%***	***27%***	***-27%***	***-33%***
12	CUPPAD	79%	80%	30%	34%	-49%	-46%
13	**WUPPDR**	***67%***	***69%***	***25%***	***26%***	-41%	-43%
14	**WMSRDC**	***64%***	***69%***	***25%***	***27%***	-40%	-42%
State		89%	91%	41%	44%	-47%	-46%

Notes and sources:

- *Broadband defined as speeds of at least 25 Mbps download and 3 Mbps upload*
- *Availability % reflects FCC data as of YE2016 and YE2017*
- *Use data reflects speeds measured by Microsoft as of Sept. 2018 and Nov. 2019*

As the table makes clear, the percentage of online activity reaching the 25/3 Mbps broadband threshold was far below the availability percentage reported by the FCC. For example, at the state level

the latter was 89% at the end of 2017 but measured usage met the FCC broadband threshold only 41% of the time. Both measures had increased modestly a year later, to 91% and 44%, respectively. This means that actual delivered speeds reached the minimum broadband threshold less than half as often as suggested by FCC availability data. For most counties this percentage fell into the 40-50% range and changed relatively little between the two periods.

As one might expect, the lowest percentage of broadband-level measured speeds was found in rural areas which, as shown earlier, also have the state's lowest level of broadband availability. This includes NEMCOG, EUPRPDC, WUPPDR and WMSRDC, whose percentage of usage qualifying as broadband were all in the mid-20s. NEMCOG experienced the largest improvement in closing the gap between "available" and "measured" broadband, reducing it by eight percentage points from 35 to 27. In contrast, EUPRPDC experienced the largest increase in this gap, six percentages points, from 27 to 33.

Planning Regions and Rural Electric Cooperatives

As the table below shows, Michigan's electric co-ops serve a total of nearly 325,000 consumers. The state's largest REC, by a wide margin, is Great Lakes Energy, with nearly 125,000 customers. At the other extreme is Ontonagon County REA, which serves less than 5,000 customers. As the table indicates, the majority of Michigan's RECs serve between 25,000 and 43,000 members.

Table 4: Michigan's Rural Electric Cooperatives (RECs)

Map #	Co-op Name	Customers
3	Great Lakes Energy Cooperative	124,622
-	Cloverland Electric Cooperative	42,591
5	Midwest Energy & Communications	35,960
2	Cherryland Electric Cooperative	35,144
7	Presque Isle Electric & Gas Co-op	33,389
4	HomeWorks Tri-County Electric	25,879
8	Thumb Electric Co-op	12,212
1	Alger-Delta Co-op Electric Assn.	9,982
6	Ontonagon County REA	4,873
	Total	324,652

Source: Co-op websites and documents

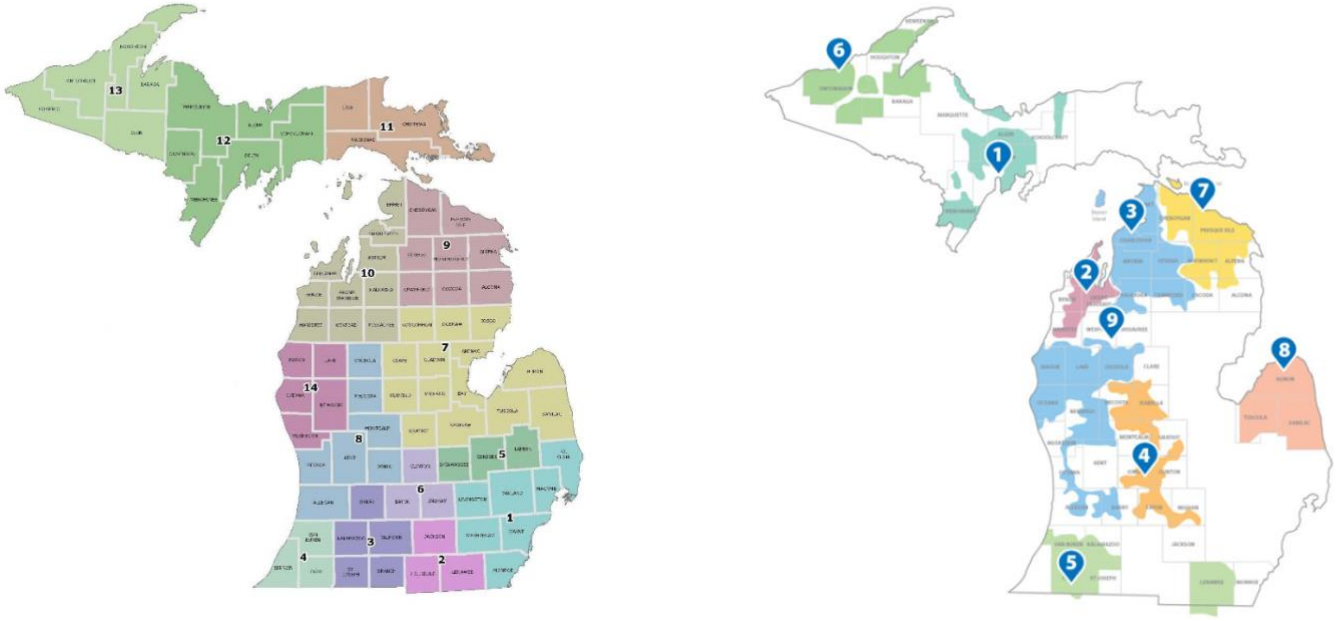
As discussed in the 2019 Co-Learning Plan (CLP) report entitled *Electric Cooperatives and the Digital Divide*, rural electric cooperatives (RECs) have a unique mix of resources they can bring to the challenge of extending high-performance broadband to America's rural communities. As that report

noted, a growing number of RECs around the country have responded to this combination of need and capability by deploying FTTH networks to their electric customers (who are also their owners). This includes three of Michigan's nine electric co-ops, highlighted in red in the above table.

Midwest Energy & Communications (MEC) is among the nation's pioneers in this arena, having started with a pilot fiber project in 2014. It was followed roughly four years later by Homeworks Tri-County Electric Cooperative and Great Lakes Energy, the state's largest REC. As discussed in the 2019 CLP report, several other Michigan RECs have considered taking similar steps and/or explored potential partnerships that can bring improved broadband service to their customers.

In this section we examine the distribution of REC customers in relation to Michigan's 14 planning regions, a rough visual sense of which is provided by the two maps below.

Figure 2: Coverage of Michigan's Planning Regions & Electric Co-ops



Note: Co-op map does not include Cloverland Electric, which serves the three counties in the Eastern U.P.

As Table 5 shows, all but two regions (SEMCOG and GLSPDC, which have the state's highest housing densities and levels of broadband availability) include some areas served by RECs. Though the percentage of a region's housing units served by RECs is only in single-digits in another six regions, it's worth keeping in mind that the areas served by RECs tend to have notably low housing density, a factor that tends to discourage network investments by commercial ISPs. As a result, these areas are likely to account for a disproportionally large percentage of unserved and underserved homes in these regions.

In six regions, the percentage of REC-served housing units is in the double-digits. At the low end of this range is SWMPC, where 16% of homes are served by MEC which, as noted above, is deploying FTTH networks throughout its service area.[1]

Table 5: Rural Electric Cooperative (REC) Customers by Region

Region	RPO	HU2017	HU/SqMi	25/3 Avail	REC1	REC1 Cust.	REC2	REC2 Cust.	REC Total	% of HU
1	SEMCOG	2,083,992	463	98%					-	0%
2	R2PC	135,369	66	81%	MEC	4,569	Homeworks	192	4,761	4%
3	SCMPC	221,674	97	90%	MEC	7,387			7,387	3%
4	SWMPC	141,037	85	88%	MEC	22,095			22,095	16%
5	GLSPDC	259,242	143	96%					-	0%
6	TCRPC	203,065	120	90%	Homeworks	5,121			5,121	3%
7	EMCOG	399,616	47	85%	Thumb	12,170	Homeworks, Great Lakes	5,929, 344	18,443	5%
8	WMRPC	531,614	102	89%	Great Lakes	21,140	Homeworks	12,949	34,089	6%
9	NEMCOG	101,089	21	***58%***	Presque Isle	33,250	Great Lakes	18,507	51,757	51%
10	Networks NW	183,893	39	81%	Great Lakes	45,507	Cherryland	35,903	81,410	44%
11	EUPRPDC	36,990	11	***58%***	Cloverland	36,390	Presque Isle	504	36,894	100%
12	CUPPAD	96,720	14	83%	Alger-Delta	9,713	Cloverland	5,994	15,707	16%
13	WUPPDR	52,374	9	***75%***	Ontonagon	4,873			4,873	9%
14	WMSRDC	148,483	51	***74%***	Great Lakes	39,591			39,591	27%
State		4,595,158	81	91%					322,128	7%

Source: Web sites of Rural Electric Cooperatives (RECs)

In the CUPPAD region the percentage of REC-served homes is also 16%, split roughly 60/40 between two RECs that are not currently deploying FTTH networks: Alger-Delta, the state's second smallest REC, and Cloverland, its second largest.[2]

Of the other four regions with double-digit percentages of REC customers, Great Lakes Energy (GLE) is active in three of them. As Table 6 shows, GLE is the state's largest REC by a wide margin. And, as noted above, it has also begun deploying FTTH to its members, starting in the Networks Northwest region, where it serves 45,507 electric customers. Combined with Cherryland's 35,903 members, this brings the REC-served percentage of this region's total housing units to 44%. Cherryland's service area is concentrated mainly in Grand Traverse county, which has presumably contributed to the co-op's low percentage of underserved households relative to its REC peers. This, in turn, has contributed to Cherryland's decision not to invest in a FTTH network but instead to explore partnerships as a way to improve broadband coverage and speeds in its service area.

[1] And, as noted in the 2019 report, MEC has shown a willingness to expand its FTTH footprint beyond its electricity service area. For example, in Washtenaw County MEC has been selected by Lyndon Township to build and manage a FTTH network the township is financing through a millage-backed bond.

[2] As discussed elsewhere in this report, Cloverland may be a bidder in the FCC's Rural Digital Opportunity Fund (RDOF) reverse auction, which will begin in October 2020.

GLE also serves more than a quarter of housing units in the WMSRDC region and, according to its web site, is inviting customers in that region to express interest in having the co-op extend its FTTH network there. As Table 5 notes, broadband availability is relatively low in the WMSRDC region, at 74%.

In the NEMCOG region, where broadband availability is only 58%, GLE's 18,507 customers, combined with the 33,250 customers served by Presque Isle Electric & Gas Co-op (PIE&G), account for just over half of the region's total housing units. As with the WMSRDC region, GLE is inviting its members in the NEMCOG region to express interest in subscribing to its FTTH-delivered Truestream services.

As discussed in the 2019 report, PIE&G had sponsored a feasibility study indicating that an investment to connect its members via fiber would be economically viable. But, as the report noted, the co-op was not well positioned to take on that investment at that time, due in large part to the fact it was already involved with two major investment projects, building a new headquarters and deploying an Advanced Metering Infrastructure. In an interview for that report, PIE&G CEO Tom Sobeck also noted that a good portion of the co-op's customers have access to 10/1 Mbps service but not 25/3 Mbps service, which would make it difficult to qualify for governmental subsidies under the rules in place at that time.

Since then, PIE&G has, with help from the Post Road Foundation, undertaken a more recent feasibility study, suggesting it may be more ready to invest in improving broadband access for its members, perhaps by participating in the October 2020 Rural Digital Opportunity Fund (RDOF) auction. Among the notable aspects of this auction are that: 1) a relatively large portion of PIE&G's service area is eligible for RDOF grants; 2) unlike an earlier reverse auction, areas with greater than 10/1 Mbps service but less than 25/3 Mbps are eligible and; 3) the RDOF auction goes a bit further than the prior auction in favoring bidders planning to deploy fiber optic networks.

In the very rural EUPRPDC region, where housing density and broadband availability are among the state's lowest, Cloverland (36,390 customers) and PIE&G (504 customers) together serve nearly all of the region's housing units. But neither co-op has begun deploying FTTH networks and the economics of such a network in this region would be extremely challenging, especially without strong grant funding support. These challenges notwithstanding, discussions are underway that include Cloverland and other regional stakeholders (e.g., schools, health clinics, government and tribal offices, and EUPRPDC) to extend fiber to the region's community anchor institutions (CAIs). And, as noted earlier, Cloverland may emerge as a winning bidder in the October 2020 RDOF reverse auction, which would involve extending broadband connectivity to at least parts of the region's underserved homes and small businesses.

Table 6 presents much of the same data included in Table 5, but from a perspective that focuses more on the distribution of each REC's electric service customer base across the state's planning regions. It highlights the fact that the three Michigan RECs deploying FTTH networks—especially GLE--tend to span multiple regions, whereas the other six are more concentrated in a single region, even the larger ones like Cloverland, Cherryland and PIE&G.

Table 6: Regional Distribution of Electric Co-op Customers

Region	RPO	Great Lakes	Cloverland	MEC	Cherryland	Presque Isle	Homeworks	Thumb	Alger-Delta	Ontonagon
1	SEMCOG									
2	R2PC			4,569			192			
3	SCMPC			7,387						
4	SWMPC			22,095						
5	GLSPDC									
6	TCRPC						5,121			
7	EMCOG	344					5,929	12,170		
8	WMRPC	21,140					12,949			
9	NEMCOG	18,507				33,250				
10	Networks NW	45,507			35,903					
11	EUPRPDC		36,390			504				
12	CUPPAD		5,994						9,713	
13	WUPPDR									4,873
14	WMSRDC	39,591								
	REC Totals	125,089	42,384	34,051	35,903	33,754	24,191	12,170	9,713	4,873

Source: Web sites of Rural Electric Cooperatives (RECs)

As the table shows, GLE serves more than 18,000 customers in each of four regions spanning the northern and eastern portions of the lower peninsula. In addition, MEC and Homeworks serve at least 4,500 and as many as 22,000 customers per region in a combined total of six regions, one of which (WMRPC) also contains more than 20,000 GLE customers. MEC's customers are concentrated in two southeastern regions and one south-central region, while Homeworks' service area spans portions of three regions in central Michigan

Appendix A of this document provides additional broadband-related information about each of Michigan's 14 planning regions, the Regional Planning Organizations (RPOs) that play key roles in planning activities within those regions, and the presence of RECs in those regions. As noted in the Appendix, all but three of Michigan's planning regions also function as Economic Development Districts (EDD), which have a close relationship with and receive funding from the federal Economic Development Agency.

The above discussion, as well as the 2019 CLP report it references, highlight the overlaps of geography and strategic interests of Michigan's RPOs and its RECs. As more of the state's RECs follow MEC in developing experience and expertise in the broadband access sector, it is reasonable to expect that more of these overlaps will translate into active cooperation focused on expanding broadband in underserved rural communities. Overall prospects and specific locations for this cooperation to occur will likely become more clear following the RDOF reverse auction, which is scheduled to begin in October 2020, shortly after the end of this fellowship.

Improving Data to Inform Broadband Planning & Subsidies

The development of broadband policy depends heavily on broadband availability data gathered from ISPs by the Federal Communications Commission (FCC). This is especially true of decisions regarding the allocation of government subsidies to improve broadband coverage and performance. Unfortunately, a growing body of evidence suggests this reliance on FCC data may be constraining and misdirecting efforts to bridge the rural digital divide.

A fundamental weakness of the FCC data is its reliance on self-reporting by ISPs and its lack of independent verification of this self-reported data. Another is its definition of "available." According to the FCC, broadband is considered available if "the provider does—or could, within a typical service interval or without an extraordinary commitment of resources—provide service to at least one end-user premises in a census block."[3] With only a single qualifying premise needed for a full block to qualify as "served," this methodology is especially problematic in rural areas, where homes in the same census block can be located miles from one another. For example, nationally, there are more than 3,200 census blocks that are larger than the entire District of Columbia (68 square miles in area) and 5 blocks that are larger than the entire state of Connecticut (5,567 square miles in area). Making matters worse is the FCC's lack of a clear and consistent definition of "extraordinary commitment of resources."[4] By leaving the interpretation of this vague phrase to individual ISPs, the FCC leaves the door open to exaggerated coverage claims to achieve competitive advantage or for other reasons.

The FCC's determination of available broadband speeds is also prone to exaggeration, since it is based on advertised rather than delivered speeds. This is a problem because some technologies face technical constraints that limit their ability to deliver advertised speeds to all homes in a given area. For example, companies using Digital Subscriber Line (DSL) or wireless technology may advertise speeds in excess of the FCC's current minimum to qualify as "broadband" (25 Mbps download combined with 3 Mbps upload), but actually be able to deliver those speeds to only a portion of homes in the areas covered by their advertising.

The FCC data's lack of timeliness is another factor limiting its ability to accurately inform policy and investment decisions. The most current version of the data tends to be at least a year old, sometimes closer to two.[5] Another policy-relevant shortcoming of the data is its lack of pricing information since, along with availability, affordability is a key factor driving broadband adoption.

The good news on this front from Washington is that the FCC and Congress have taken steps aimed at remedying key deficiencies in the current broadband data system.[6] The bad news is that, until these

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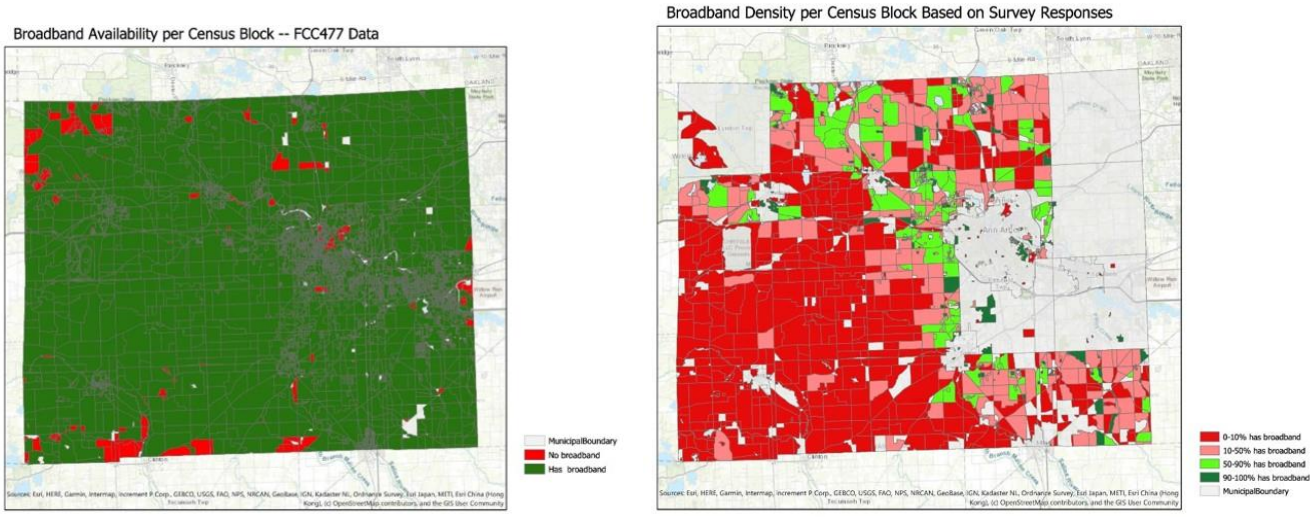
[3] *Broadband Internet: FCC's Data Overstate Access on Tribal Lands*, pg. 16-17, https://www.gao.gov/assets/700/694386.pdf
[4] *Map to Prosperity*, pg. 12. https://www.cfra.org/sites/www.cfra.org/files/publications/Map%20to%20Prosperity.pdf
[5] For example, as of April 12, 2019, the most recent data available on the FCC's web site was as of June 2017 (see https://broadbandmap.fcc.gov/#/data-download and https://www.fcc.gov/internet-access-services-reports).
[6] Congress passed the Broadband DATA Act in March 2020, which largely codifed the overall approach the FCC had taken in its Digital Opportunity Data Collection proceeding.

reforms are implemented, federal and state broadband policies and subsidies will continue to rely heavily on seriously flawed broadband availability data.

Responding to the lack of accurate broadband availability data and its impact on Michigan's digital divide, Merit Network[7], through its Michigan Moonshot initiative, launched a data collection program in 2019 to address the need for more accurate data to support planning and grant applications. In addition to user surveys, the data collection platform also includes speed tests using the Measurement Lab platform The initiative's first major data collection effort, undertaken in cooperation with MSU's Quello Center, focused on gathering data to better understand the extent and impacts of what is often referred to as the "Homework Gap." In 2020, amidst the pandemic and its impacts on our educational system, the Moonshot project began working with Wayne State University to collect data to help WSU understand the remote learning/teaching readiness of the ecosystem serving its faculty, staff and students, a service Merit will also be making available to other universities.

On another front, the Moonshot project partnered in 2020 with the Washtenaw County Broadband Task Force to conduct a survey and speed tests in most of the county's more rural townships. The primary goal was to create an accurate, granular broadband map to support grant application efforts. As the maps below illustrate, the results of that data collection effort paint a very different picture of Washtenaw County's broadband access than is provided by FCC availability data.

Figure 3: Washtenaw County Broadband Availability: FCC vs. Local Survey & Speed Test (put maps side by side)



Source: Washtenaw County Broadband Task Force, FCC data gathered and prepared by Merit Network.

[7] Merit Network is a non-profit, member-owned organization governed by Michigan's public universities. The nation's oldest Research and Education Network, Merit operates a nearly 4,000 mile fiber optic network that provides high-performance connectivity to the state's universities, broader educational community and other community anchor institutions.

The map on the left reflects broadband (25/3 Mbps) availability at the Census Block level as reported by ISPs to the FCC. Census Blocks in green are those in which the FCC data shows broadband as being available. The map on the right reflects survey and speed test data collected by the Moonshot project. In that map, red areas indicate Census Blocks where 0-10% of survey responses and accompanying speed tests indicate actual delivery of 25/3 Mbps service. Pink areas reflect Census Blocks where this percentage was 10-50% and light green represents Blocks where 50-90% of respondents were accessing the Internet at broadband speeds. Only the scattered areas shown in dark green represent Census Blocks where a least 90% of respondents were served by broadband connections (gray areas were not included in the survey).

The stark difference between these two maps underscores the risks of relying on FCC data for broadband policymaking, targeting of public subsidies, and local and regional broadband planning. It also highlights the need for and value of local, regional and/or state-level data collection efforts that can provide a more accurate and helpful picture of on-the-ground broadband connectivity.

As this fellowship was drawing to a close: 1) at least one RPO, SWMPC, was engaged in serious discussions with Merit about undertaking a broadband data collection effort at the regional or county level and; 2) the working relationship established with Merit's Moonshot initiative during the course of this fellowship was expected to continue via a consulting contract that included support for the Moonshot's data collection program.

Strengthening Michigan's Broadband Expansion Ecosystem

While access to more accurate broadband availability data is an important need that must be met, it is only part of an ecosystem of support needed to empower more effective planning and expansion of high-performance broadband networks.

To help clarify the components and dynamics of this broader support ecosystem, a graphical depiction of it was developed using the Mindmeister online platform. An interactive version of that ecosystem diagram, entitled *Successful Expansion of Pandemic Ready Broadband* is available online. It includes clickable notes and links to additional online information related to the contents of the diagram, and will be updated in the future to reflect ongoing developments and further research.

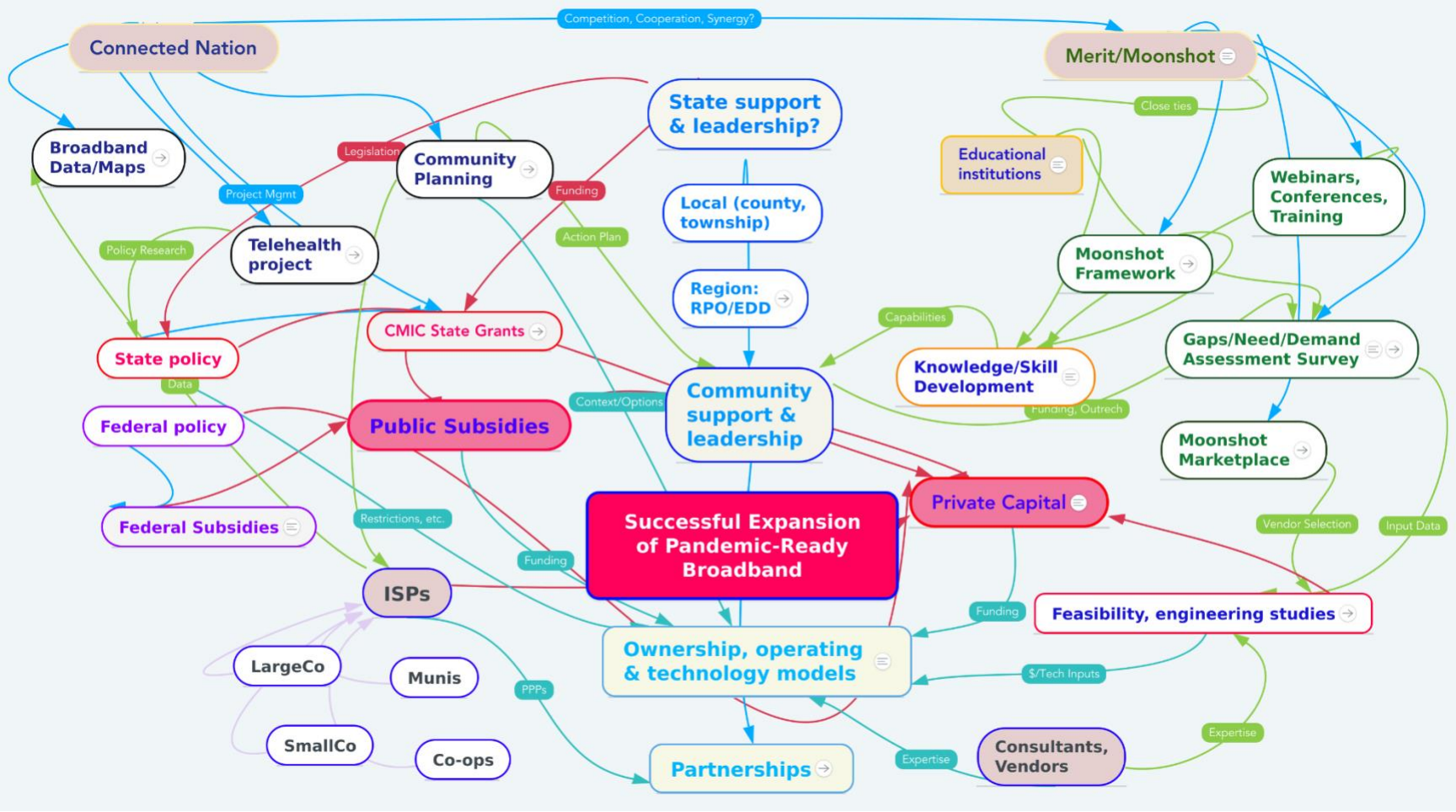
A static version of the diagram is displayed on the following page and is briefly discussed below. Among the key things worth noting is that *"Community support & leadership"* is centrally located in the diagram, reflecting its key role in activating and maintaining the ecosystem of support and developing and executing successful strategies for expanding pandemic-ready broadband. This is especially true in rural areas, where the financial incentives that stimulate proactive private sector investments are often lacking, leaving greater responsibility for achieving success to initiatives launched and guided by local leaders, institutions and stakeholders.

The diagram also illustrates the range of resources and participants involved in developing and implementing broadband strategies. These include private and public sources of capital; project consultants, vendors, feasibility and engineering studies; different sets of ISPs with different motivations, resources and constraints; state and federal policies and, as noted above; data collection efforts to accurately assess the lack of and demand for improved connectivity.

At the base of the diagram's central spine are two other key ecosystem elements: *"Ownership, operating & technology models"* and *"Partnerships."* These reflect the specific strategies that the local or regional planning process, as facilitated by *"Community support & leadership,"* has found to be both feasible and likely to succeed based on the interactions of the ecosystem's other elements (e.g., the availability of private capital and/or public subsidies, the cost of construction, expected demand, state and federal policies, the presence and interests of local ISPs, etc.)

Also worth noting in the diagram are the support services provided by two organizations, Connected Nation Michigan (CNMI) and Merit's Moonshot initiative. As noted earlier, the Moonshot project includes support for broadband planning via surveys and speed tests. It also includes a range of educational services, including the Moonshot Broadband Framework, an in-depth guidebook to support broadband planning, as well as webinars and conferences. Merit has also launched a Moonshot-focused component of its Marketplace service, which pre-screens qualified vendors and negotiates discounts on their services for Moonshot members.

Figure 4: Michigan's Broadband Expansion Ecosystem



CNMI has been supporting local broadband planning for roughly a decade through its Connected Community program. During this same period it has been gathering data on broadband availability to supplement the FCC's data collection program. It has also played a key supporting role in developing and implementing state-level programs and strategies, including the 2016 Broadband Roadmap and the 2019-2020 Connecting Michigan Communities (CMIC) state grant program. In 2019, CNMI, working with AARP and the Michigan Health Endowment Fund, launched a study focused on the challenges and opportunities associated with rural telehealth services. The study's publication in March 2020 was timely in light of the COVID pandemic's impacts on the provision of healthcare.

The role of state leadership

At the top of the diagram's central spine is *"State support & leadership?"* The use of a question mark here has two related meanings. The first is to highlight the lack of strong state leadership in Michigan following the five years of federal financial support for broadband expansion through the American Recovery and Reinvestment Act of 2009. The second is to reflect uncertainty about whether and how that situation will change going forward.

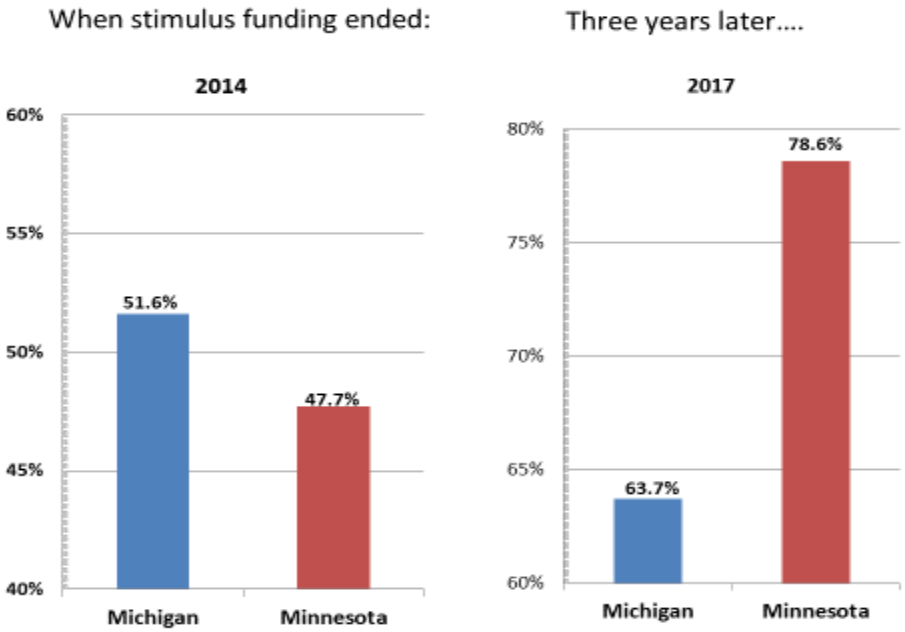
Below we use a comparison with Minnesota to shed light on the nature and impacts of Michigan's approach to state leadership following the 2014 end of federal broadband stimulus funding. We begin by examining data from a Purdue University analysis[8] of FCC rural broadband availability data in in six upper Midwest states, followed by a comparison of the more proactive approach to state policy pursued in Minnesota as compared to Michigan.

The two bar graphs in Figure 4 compare the percentage of rural households with access to 25/3 Mbps broadband service: 1) in 2014, when the stimulus funding ended and; 2) in 2017, after three years in which states had to rely more heavily on their own policies and funding to support broadband expansion.

As the graph on the left shows, after five years of federal stimulus funding, Michigan's percentage of rural broadband availability was nearly 4 points higher than Minnesota's. As the graph on the right reveals, this changed dramatically over the next three years. During that period Minnesota expanded rural broadband availability by almost 31 percentage points, to 78.6%, while the corresponding percentage for Michigan increased by only 12.1 points to 63.7%. This left Michigan trailing Minnesota by nearly 15 percentage points as of 2017.

[8] [8] Gallardo, Robert, An X-Ray of Broadband Access in the Upper Midwest, June 24, 2019, https://www.benton.org/headlines/x-ray-broadband-access-upper-midwest

Figure 5: Rural Broadband Availability in Michigan and Minnesota (2014-2017)



Though further research and analysis is warranted to understand this change in the two states' relative success in expanding rural broadband, Figure 5 suggests factors likely to have had an impact.

Figure 6: Comparing State Broadband Policy in Michigan and Minnesota

Minnesota	Michigan
• Between 2011 & 2014 created broadband office, task force and grant program, all of which remain active in 2020. • Approximately $20M in annual grants, with well designed eligibility and weighting criteria. • MN is home to the Blandin Foundation and the Institute of Local Self-Reliance, both focused on broadband.	• Did not step up to replace stimulus funding in substantial ways. • Ad-hoc task force, Broadband Roadmap and $20M grant program created only late in Snyder term. • Grant program excludes municipal & educational entities and areas with 10/1 Mbps service from eligibility.

As Figure 6 shows, the Minnesota legislature--even before the end of federal stimulus funding--stepped up to create institutions and a relatively well-designed grant program to support broadband expansion in the state, all of which have been maintained fairly steadily since then. In contrast, Michigan's state government largely ignored the state's rural digital divide following the cutoff of federal funds, as reflected in the level of funding and institutional attention it dedicated to this problem. Though the state did create a broadband task force and roadmap late in the second term of the Snyder Administration, there was little to no follow-up to these modest planning steps. And though the legislature finally approved a $20 million grant program during the 2018 lame duck session, that program prohibited grants from being awarded to key categories of institutions with a strong interest in expanding broadband coverage: "governmental entities or educational institutions or an affiliate."[9]

As this fellowship was drawing to a close, signs emerged that the state government's lack of leadership might be changing. One key sign was an alliance between the Michigan Economic Development Corporation (MEDC) and CNMI to: 1) bring together a task force of state agencies to update the 2016 Broadband Roadmap; 2) create a single point of contact for state broadband information and; 3) support local planning via community engagement, data collection, technical assistance and training.

The other question mark in the ecosystem diagram is used to describe the relationship between CNMI and Merit's Moonshot initiative: *Competition, Cooperation, Synergy?* As this report is being written, each of these organizations offered its own suite of services to support broadband planning and network development, a situation characterized more by competition than cooperation in the provision of such services. One benefit of this dynamic is that it provides local communities with two options for obtaining broadband planning support. Another is that it is likely to incentivize CNMI and Merit to improve the value proposition of their services. At the same time, it also seems possible that these two non-profit organizations--which share a mission of expanding broadband and its benefits in Michigan—will, over time, discover productive avenues for cooperation.

[9] Senate Bill No. 601, Sec. 806 (2), pg. 34, http://www.legislature.mi.gov/documents/2017-2018/billenrolled/Senate/pdf/2017-SNB-0601.pdf

Building and Empowering a Better Model

Reflecting the importance of *"ownership, operating & technology models"* in the broadband expansion ecosystem discussed above, a focus of this fellowship has been to explore how innovative technology, ownership, financing and operating models can improve broadband coverage and performance in underserved communities. In this section we review one such model with notable potential to do so, which we refer to as "User Owned and User Controlled Access Networks," or UOAN-UCAN for short.

Perhaps the clearest real-world example of the UOAN-UCAN model is the fiber network deployed in Ammon, Idaho, which received the 2018 Idaho Innovation Consumer Product of the Year award and the 2016 Community Broadband Project of the Year award from the National Association of Telecommunications Officers and Advisors (NATOA).[10] In addition, the October 2019 issue of Fast Company magazine described the Ammon network as the best fiber optic network in America.

The Ammon implementation of a UAON-UCAN network model reflects a combination of innovations briefly summarized below: [11]

- The separation of fiber infrastructure as a public utility from provision of Internet access and other services.
- Funding the capital cost of fiber infrastructure through an opt-in fee to pay off a long-term (e.g., 20 year) bond. This is being done via local improvement districts (LIDs), which allow property owners to avoid this fee if they don't see sufficient value in gaining access to the network. These property owners retain the right to sign up for service after the initial sign-up period, but have to pay their share of capital costs in a lump sum payment when they do so.
- Funding network operating & maintenance costs via per-user monthly fees paid to a public utility; unlike the monthly fee to pay off the bond, these operating fees can be avoided by suspending service at any time.
- An "open access" approach that employs software-defined network (SDN) technology developed by EntryPoint Networks. The technology allows customers to change ISPs and create secure virtual private networks (e.g., for telehealth, education, banking and other services for which privacy and security is especially important) with just a few mouse clicks.

[10] https://muninetworks.org/content/ammon-fiber-optics-declared-consumer-product-year-idaho
[11] A summary of the Ammon network financial model is available at https://550b5478-a490-412c-8099-5ff3fa23cded.filesusr.com/ugd/6d0c6a_90232d9aec5048d1b234a5b7af99faea.pdf. A video describing the project entitled *Ammon's Model: The Virtual End of Cable Monopolies* is available https://youtu.be/tSQVvFY4lPI;

The combination of these features provides multiple benefits tied to improved performance, affordability, usability and healthy competition in the provision of broadband services.

- The separation of a fiber utility from competitive provision of Internet access and other services avoids the problem of ISPs having excessive and anti-competitive market power, a problem network neutrality rules have sought to address with only partial success. This is especially important in rural areas, where market entry by multiple high-performance network providers is rare due to high per-customer construction costs. In Ammon a single fiber network supports healthy competition among multiple ISPs, all of them capable of delivering very high speeds.

- Using an opt-in per-property fee as a funding mechanism avoids a problem faced by some municipal broadband initiatives: resistance to the project by members of the community who don't see sufficient value in it to justify the financial commitment. This situation tends to be most common in situations where parts of a municipality already enjoy decent broadband access. As discussed further below, an example of this dynamic is the experience of several townships in Michigan's Washtenaw County that faced different situations regarding the scope and distribution of their digital divides.

- The three-part funding mechanism provides a clear delineation of costs and treats each one separately. The capital cost of the fiber network (which research has shown increases property values), is levied against any property whose owner agrees to participate in the LID. In contrast to this long-term commitment to support capital costs, property owners can avoid the monthly network operation and maintenance fee by suspending service. ISPs charge separate fees which in Ammon started low by industry standards and have declined even further in response to competition. It's also worth noting that, once the 20-year bond is paid off, property owners no longer pay the associated fees, reducing their monthly costs accordingly.

- The use of EntryPoint's automated open access technology makes it much easier for customers to switch ISPs and to enhance their privacy and security via easy-to-create private networks. It also reduces entry barriers and operating costs for participating ISPs. The result is: a) increased consumer choice and control over their online experience and; b) lower costs for ISP who feel competitive pressure to pass on some or all of these savings to customers via lower prices.

Table 7 summarizes the basic economics of the Ammon network, including the three core cost components: capitalized construction, maintenance & operations, and the services provided by ISPs. Using actual data, it shows a total monthly cost of $47.49 for subscribers to the lowest cost gigabit-speed service provided by one of the network's four ISPs. The table also shows that this amount would fall to just $26.49 once the bond financing construction costs is paid off. This compares to average monthly bills of $93 per month (including data cap overage fees) for much slower 30/5 Mbps service offered by the incumbent ISP based on a survey taken when the city's network was being planned.

Table 7: Economics of the Ammon Fiber Network

Residential take rate	70%
Number of ISPs providing service	4
Infrastructure cost per homeowner	$3,400
Infrastructure finance terms	15 - 20 years
Monthly infrastructure expense	$21.00
Monthly maintenance & operations expense	$16.50
Monthly ISP (current best value for 1,000/1,000 Mbps)	$9.99
Total monthly cost	**$47.49**
Monthly cost after paying off infrastructure cost	**$26.49**
Incumbent monthly ISP offering (30/5 Mbps w/data caps)	***$93.00***

Source: EntryPoint Communications

Empowering property owners to opt-in or opt-out

Unfortunately, current Michigan law restricts the ability of municipalities to use the kind of opt-in financing that is employed in Ammon and central to the UOAN-UCAN model. The real-world implications of these restrictions—and the value of legislation to remove them—is illustrated by the experience of townships in Washtenaw County, which is summarized below.

In Lyndon Township, where poor Internet access was fairly universal in 2017, two thirds of voters supported a 20-year millage to fund a fiber network, which is now being deployed. In other Washtenaw County townships where larger segments of the population already enjoyed at least decent access, the outcome was different, especially if a millage vote was opposed by PR campaigns supported by incumbent ISPs. This was the case in Sharon Township, where a millage was rejected by a majority of voters. The experience of Manchester Township highlights a related issue. While the township's more rural residents tended to be poorly served, those residing in an unincorporated village within the township enjoyed cable-delivered broadband. As a result, an effort to develop a millage-backed project stalled in large part because it was opposed by the village board.[12]

Recognizing the challenges facing millage-backed network projects--which impose financial obligations on ALL property owners if a majority support the millage--state representative Donna Lasinski (who

[12] See: *'The gap grows': Washtenaw addresses rural areas' weak internet access*, https://www.mlive.com/news/ann-arbor/2019/10/the-gap-grows-washtenaw-addresses-rural-areas-weak-internet-access.html; *Village and Township Boards disagree about broadband*, http://themanchestermirror.com/2018/06/18/village-and-township-boards-disagree-about-broadband/

represents rural portions of Washtenaw County) has introduced a bill to empower townships to fund communication infrastructure via Special Assessment Districts (SADs). SADs allow property owners to opt-out if they don't want to be included in a project and also provide more flexibility regarding the basis on which assessments are levied (e.g., they can be allocated on a per-connection basis, which is arguably more fair than basing the allocation on relative property values, as is the case with a millage).

Michigan's SADs are a rough equivalent to Idaho's LIDs, which Ammon uses to finance its network. While current Michigan law authorizes townships to use SADs for other infrastructure, including roads, water and sewer systems, it does not currently include communication infrastructure. Lasinski's proposed bill, HB5673, would remedy that by adding communication as SAD-eligible infrastructure.

Despite SB5673's ability to empower property owners to invest in pandemic-ready communication infrastructure that benefits them without financially burdening those who do not see sufficient value to invest in those benefits, the bill had not made it out of committee as of mid-September 2020.[13]

[13] http://www.legislature.mi.gov/(S(2lxhgpzpesd3t0wxmrdll5ak))/mileg.aspx?page=GetObject&objectname=2020-HB-5673.

Conclusions & Recommendations

The work of this Innovation Fellowship and the Co-Learning Plan (CLP) that preceded it have attempted to shed light on the challenges, progress and opportunities related to the increasingly urgent need to extend what this report refers to as pandemic-ready broadband throughout Michigan.

Among the challenges facing efforts to achieve this goal are the lack of: 1) accurate data regarding broadband availability; 2) proactive state leadership since the 2014 cutoff of federal stimulus funding to support broadband expansion and; 3) state laws that encourage innovative and economically sustainable models for financing and operating pandemic-ready rural broadband networks.

As discussed throughout this report, some progress has been and is being made on these fronts, and pathways toward further progress are becoming more clearly defined. Nevertheless, the work conducted during this fellowship and our state's experience dealing with COVID-19 strongly suggest that more and faster progress is needed. Toward that end, we recommend an "all hands on deck" effort to strengthen, align and mobilize what this report has referred to as the state's broadband expansion ecosystem. As discussed earlier, this ecosystem includes leadership, stakeholders, expertise, financing and other resources at the state, regional and local levels, and in the private, public and nonprofit sectors. While the state government can and should play a key role in making this a reality, so too can non-governmental initiatives like the Michigan Moonshot; planning and network development projects facilitated by RPOs on behalf of their constituencies; and alliances that leverage the ability of RECs to help bring high-performance broadband to some of the state's most rural areas.

Such an effort would benefit from an in-depth examination of innovations in technology, financing and business models. This in turn can inform pilot projects that apply and combine these innovations and document their practical impacts, strengths and weaknesses. By doing so, these projects can inform and improve the prospects for success of network projects in other communities across Michigan and the nation.

Appendix A: Broadband Related Profiles of Michigan's Planning Regions

Region 1: Southeast Michigan Council of Governments (SEMCOG)

Counties included: **Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne**

Contact information:
1001 Woodward Ave., Suite 1400
Detroit, MI 48226
Telephone: (313) 961-4266
E-mail: lomako@semcog.org
Website: www.semcog.org
Kathleen Lomako - Executive Director
Note: Unlike most Michigan RPOs, SEMCOG is not an EDA Economic Development District (EDD)

Connected Nation "Connected" Status
Livingston and St. Clair are "Connected Certified" by CNM.
Washtenaw is "Community Engaged"

Presence of rural electric co-ops
No RECs appear to serve SEMCOG counties.

An initial review of the SEMCOG web site did not find anything substantial about broadband, though a later visit to the site uncovered a link to a SEMCOG-sponsored webinar entitled "The Critical Role of Broadband During the COVID-19 Crisis."

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Region 2: Region II Planning Commission (R2PC)

Counties included: **Hillsdale, Jackson and Lenawee**

Contact information:
120 W. Michigan Ave.
Jackson, MI 49201
Telephone: (517) 788-4426
E-mail: sduke@co.jackson.mi.us
Website: www.region2planning.com
Steve Duke - Executive Director

Connected Nation "Connected" Status
Jackson County is classified as "Past Planning Process"

Presence of rural electric co-ops

- Midwest Energy & Communications (MEC) serves more than 4,500 electric customers spread across nearly all townships in Lenawee county (customer counts by township sourced from online outage map). MEC is currently deploying a FTTH network to these customers.
- Homeworks Tri-County, a rural electric co-op (REC) that has begun deploying a FTTH network to its members, serves a small number (192) of electric customers in the following townships in Jackson County (township-level customer counts, sourced from online outage map): Springport (7); Tompkins (178); Waterloo (7)

Notes

The 2018 update of the 2017-2021 R2PC Comprehensive Economic Development Strategy (CEDS) noted lack of broadband as a potential weakness/threat in the region:

> *[T]the Steering Committee conducted a Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis. The Committee was able to identify much strength in the region due to a variety of factors: its strategic location; a multimodal transportation network, other infrastructure, and natural resources; the existing educational system (i.e., primary, secondary, and postsecondary); and a strong workforce and solid economy. Various opportunities that can enhance those strengths were also identified: natural amenities; various initiatives that can be taken advantage of; a variety of potential economic opportunities (i.e., expanded manufacturing, including automotive technologies; diversification in value-added agriculture; enhanced regional health care; and placemaking); as well as evolution in education and infrastructure (i.e., STEAM and LEED). However, in order to increase the economic resiliency of the Region, the Committee also looked at potential weaknesses and threats.* ***Weaknesses and threats identified include: a lack of widespread high-speed broadband access;*** *impediments to workforce training; threats to manufacturing (i.e., an auto-centric focus, jobs lost to technology, and workforce challenges); infrastructure threats (i.e., a largely obsolete industrial building stock, varied municipal governmental capacities and a lack of development-ready land); insufficient funding leading to limited investment (i.e., capital, public transportation, roadway improvements, business support, and housing options); and the need for additional mental health care.*

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Region 3: Southcentral Michigan Planning Council (SCMPC)

Counties included: **Branch, Calhoun, Kalamazoo, and St Joseph** (Note: Barry county was shifted to Region 8 sometime during the past few years).

Contact information:

300 South Westnedge Ave
Kalamazoo MI 49007
Telephone: 269-385-0409
E-mail: adams@upjohn.org
Website: www.smpcregion3.org/

Lee Adams - Executive Director
Note: Unlike most Michigan RPOs, SCMPC is not an EDA Economic Development District (EDD).

Connected Nation "Connected" Status
No prior engagement, though SCMPC wants to undertake regional broadband plan and has received proposal from CNM to help with that (more detail below).

Presence of rural electric co-ops
Midwest Energy & Communications (MEC) serves electric customers in counties within the SCMPC region as follows (customer counts by township available in table, sourced from online outage map):

Kalamazoo: 3,383 (in 6 townships)
St. Joseph: 4,004 (in 10 townships)

Notes
During my fellowship I talked with Lee Adams, SCMPC's Executive Director and Molly Trueblood, a member of the SCMPC staff, about their plans. During that conversation I suggested they learn more about the Moonshot project, which at that time Lee and Molly were only vaguely aware of. This led to multiple conversations involving Lee, Molly and Merit staff about whether and how services provided by the Moonshot initiative could help SCMPC develop a regional broadband plan.

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Region 4: Southwest Michigan Planning Commission (SWMPC)

Counties included: **Cass, Van Buren, Berrien**

Contact information
376 W. Main St., Suite 130
Benton Harbor, MI 49022
Telephone: (269) 925-1137
E-mail: egelhaafj@swmpc.org
Website: www.swmpc.org/
John Egelhaaf - Executive Director

Connected Nation "Connected" Status
All three counties have "Completed Action Plans"

Presence of rural electric co-ops
Midwest Energy & Communications (MEC) serves electric customers in counties within the SCMPC region as follows (customer counts by township available in table, sourced from online outage map):
Cass: 14,356 (in 15 townships)
Van Buren: 7,532 (in 14 townships)
Berrien 207 (in 4 townships

Notes
During my fellowship I provided John Egelhaaf, SWMPC Executive Director with information and perspective to support his effort to bring together the resources needed to expand broadband availability in Berrien County and potentially the entire SWMPC region. This included facilitating and participating in calls between John and Merit's Moonshot team. I also arranged and participated in a call with John and Bailey White from CrowdFiber, and joined John remotely for a meeting with several Berrien County commissioners who share a strong desire to bridge connectivity gaps in the county. At the end of my fellowship SWMPC and Merit were engaged in planning discussions related to a data collection effort to more accurately gauge the current availability of broadband in the SWMPC region. And shortly before and near the end of my fellowship, John met with MEC to explore possibilities for cooperating in extending fiber outside of MEC's electric service footprint.

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Region 5: Genesee-Lapeer-Shiawassee Region V Planning & Development Commission (GLSPDC)

Counties include: **Genesee, Lapeer, Shiawassee**

Contact information
1101 Beach Street, Room 223
Flint, MI 48502
Telephone: (810) 257-3010
E-mail: dbradshaw@co.genesee.mi.us
Derek Bradshaw - Executive Director
Note: GLSPDC is not a designated EDA Economic Development District (EDD)

Connected Nation "Connected" Status
Genesee classified as "Connected Certified" and Lapeer as "Community Engaged."
Presence of rural electric co-ops
No RECs appear to serve the counties in GLSPDC

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Region 6: Tri-County Regional Planning Commission (TCRPC)

Counties included: **Clinton, Eaton, and Ingham**

Contact information
3135 Pine Tree Road, Suite 2C
Lansing, MI 48911
Telephone: (517) 393-0342
E-mail: jsnell@mitcrpc.org
Website: www.tri-co.org
Jim Snell - Executive Director

Connected Nation "Connected" Status
Clinton classified as "Past Planning Project"

Presence of rural electric co-ops
Homeworks Tri-County, a rural electric co-op (REC) that has begun deploying a FTTH network to its members, provides electric service in the following counties in the TCRPC region (customer counts sourced from online outage map):

Clinton: 2,264 (in 11 townships)
Eaton: 1,961 (in 10 townships)
Ingham: 896 (in 7 townships)

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Region 7: East Michigan Council of Governments (EMCOG)

Counties included: **Arenac, Bay, Clare, Gladwin, Gratiot, Huron, Iosco, Isabella, Midland, Ogemaw, Roscommon, Saginaw, Sanilac, Tuscola Counties, and the Saginaw Chippewa Indian Tribe**

Contact information
3144 Davenport Avenue
Saginaw, MI 48602
Telephone: (989) 797-0800
E-mail: sfortune@emcog.org
Website: www.emcog.org
Susan Fortune - Executive Director

Connected Nation "Connected" Status
Connected Certified: Clare, Gladwin Ogemaw, Roscommon
Completed Action Plan: Arenac
Community Engaged: Bay, Huron, Iosco, Sanilac, Tuscola

Presence of rural electric co-ops
--Homeworks Tri-County, a co-op that has begun deploying a FTTH network to its members, provides electric service in the following EMCOG counties (customer counts sourced from online outage map): Clare: 190 (in 3 townships); Gratiot: 549 (in 7 townships); Isabella 5,182 (in 11 townships); Saginaw: 8 (in 1 township)
--Great Lakes Energy, an electric co-op that has begun deploying a FTTH network to its members, serves 344 electric customer in Clare county (data sourced from online outage map)

--Thumb Electric Cooperative serves more than 12,000 electric customers in Huron, Tuscola and Sanilac counties. Though it is not currently providing broadband Internet access to its members, it has done a network feasibility study and a relatively large portion of its electric service area is eligible for grants in the Rural Digital Opportunity Fund (RDOF) reverse auction scheduled for October 2020. This suggests that it may participate in this upcoming action.

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Region 8: West Michigan Regional Planning Commission (WMRPC)

Counties included: **Allegan, Barry (switched from Region 3, SWMPC) Ionia, Kent, Mecosta, Montcalm, Osceola, and Ottawa**

Contact information

1345 Monroe Avenue, NW, Suite 255
Grand Rapids, MI 49505
Telephone: (616) 774-8400
E-mail: dbee@wmrpc.org
Website: www.wmrpc.org
David Bee - Executive Director

Connected Nation "Connected" Status

Connected Certified: Kent, Mecosta, Montcalm
Completed Action Plan: Barry, Ionia, Osceola
Community Engaged: Allegan, Ottowa

Presence of rural electric co-ops

Homeworks Tri-County, a rural electric co-op (REC) that has begun deploying a FTTH network to its members serves the following counties in the WMPRC region (see tables for township-level customer counts, sourced from online outage map):

Barry: 180 (in 4 townships)
Ionia: 2,877 (in 10 townships)
Mecosta: 5,712 (in 13 townships)
Montcalm: 4,115 (in 13 townships)
Osceola: 65 (in 2 townships)

Great Lakes Energy a rural electric co-op (REC) that has begun deploying a FTTH network to its members serves the following counties in the WMPRC region (data sourced from online outage map)

Allegan: 3,510
Barry: 3,519
Kent: 1602
Mecosta: 1,724
Montcalm: 1,964
Osceola: 7,074
Ottawa: 1,996

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Region 9: Northeast Michigan Council of Governments (NEMCOG)

Counties included: **Alcona, Alpena, Cheboygan, Crawford, Montmorency, Oscoda, Otsego, and Presque Isle.** Also includes **Iosco, Ogemaw and Roscommon** for purposes of Northeast Michigan Prosperity Region.

Contact information

80 Livingston Blvd, Suite 108 PO Box 457
Gaylord, MI 49734
Telephone: 989.705.3730
E-mail: drekowski@nemcog.org
Website: www.nemcog.org
Diane Rekowski - Executive Director

Connected Nation "Connected" Status

Certified Connected: Crawford, Ogemaw, Otsego, Roscommon
Completed Action Plan: Oscoda
Past Planning Project: Cheboygan
Community Engaged: Alcona, Iosco, Montmorency, Presque Isle

Presence of rural electric co-ops

Great Lakes Energy a rural electric co-op (REC) that has begun deploying a FTTH network to its members serves the following counties in the NEMCOG region (data sourced from online outage map)

Cheboygan: 635
Montmorency: 499
Oscoda: 728

Presque Isle Energy & Gas (PIE&G) serves parts of the following counties (no per-county subscriber data is available on the PIE&G web site): Alcona, Alpena, Cheboygan, Mackinac, Montmorency, Presque Isle and Oscoda

Notes

During a conversation early in my fellowship, NEMCOG Executive Director Diane Rekowski cited CNM Community Technology Advisor Tom Stephenson as someone who has been helpful in efforts to address the challenges and opportunities for broadband expansion in her region and other regions in northern parts of the state. She encouraged me to contact Tom, which I did in an email introducing myself and my project. I did not receive a response from Tom, who Diane indicated is also working on CN projects in other states, which highlights the fact that CNM staff is not focused solely on Michigan.

Diane also referenced the Vertical Asset Inventory (and associated online map) that CNM had helped develop for the NEMCOG region with financial support from the state's Regional Prosperity Initiative (a program whose funding was not continued under the state's current budget). We also discussed the

importance of accurate broadband-related data, and the possibility of an EDA grant to help fund a project to develop and pilot a more accurate and useful broadband data/map platform.

A substantial portion of rural areas in the NEMCOG region get their electricity from Presque Isle Electric & Gas Co-op (PIE&G),with others served by GLE. In addition, Allband Communications,one of Michigan's few telecom cooperatives is active in the NEMCOG region, employing FTTH with some wireless network extensions. When I talked to PIE&G CEO Tom Sobeck while researching my 2019 report (see pg. 20), he said there is significant unmet demand for faster (e.g., >25/3Mbps) Internet service in PIE&G's service area, but that the co-op was not at the time in a position to make the necessary investment, which a pre-feasibility study had estimated to be around $120 million. The main reason, he explained, was the co-op's existing investment commitments at that time, including a new HQ and an Advanced Metering Infrastructure (AMI)).

Sobeck did note, however, that the study projected positive income for the project in six to eight years, with payback in 15 years. The study's financial projections assumed penetration would reach 42%, slightly lower than the 45% targeted by other MI co-ops that have launched FTTH projects, and well below the 50-60% (and sometimes >65%) levels achieved in portions of MEC's service area that have had service available for 4-5 years. Sobeck also noted that roughly 13,000 (more than 40%) of his co-op's members are seasonal customers likely to welcome and be able to afford Internet service comparable to what they enjoy at their primary residence, which are typically located in more densely populated and better-served communities. He also said that in the past PEI&G has talked to Allband about broadband issues and possibilities, but that no such discussions were active when I talked to Sobeck in spring of 2019.

Sobeck cited a problem facing RECs seeking government funding. As he explained, much of PIE&G's service area already has access to Internet service at speeds of more than 10 Mbps downstream and 1 Mbps upstream, but often lower than the 25Mbps/3Mbps speed threshold the FCC now uses to define broadband. This means these areas are not eligible for funding through key government programs, which limit eligibility to areas with less than 10/1 Mbps speeds. Sobeck expressed concern that continued use of the 10/Mbps standard to determine eligibility for government subsidies could condemn some rural communities to poor Internet service for many years to come, feeding the negative cycles already draining their economic vitality.

Late in my fellowship I learned that PIE&G had, with help from the Post Road Foundation, undertaken a more recent feasibility study, suggesting it might be more ready to invest in improving broadband access for its members, perhaps by participating in the October 2020 Rural Digital Opportunity Fund (RDOF) auction. Among the notable aspects of this auction are that: 1) unlike an earlier reverse auction, areas with greater than 10/1 Mbps service but less than 25/3 Mbps are eligible; 2) a relatively large portion of PIE&G's service area is eligible for RDOF grants and; 3) the RDOF auction goes a bit farther than the prior auction in favoring bidders planning to deploy fiber optic networks.

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Region 10: Networks Northwest

Counties served: **Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manistee, Missaukee, and Wexford**

Contact information

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Website: networksnorthwest.org
Matt McCauley, CEO - Executive Director

CNM Connected Status

Certified Connected: Antrim, Charlevoix, Wexford
Completed Plan: Benzie, Leelanau, Manistee, Missaukee

Presence of rural electric co-ops

Great Lakes Energy a rural electric co-op (REC) that has begun deploying a FTTH network to its members. It currently provides electric service to the following counties in the Networks Northwest region (electric customer counts sourced from online outage map):

Emmet: 11,981
Antrim: 11,304
Grand Traverse: 651
Kalkaska: 10,054
Manistee: 512
Wexford: 487
Missaukee: 53

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Region 11: Eastern Upper Peninsula Regional Planning & Development Commission (EUPRPDC)

Counties served: **Chippewa, Mackinac, Luce**

Contact information

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Website: www.eup-planning.org
Jeff Hagan - CEO

CNM Connected Status
All counties have completed Technology Action Plans

Presence of rural electric co-ops
Cloverland Electric Cooperative serves electric customers in the following counties (customer counts sourced from online outage map):
Chippewa: 22,671
Mackinac: 11,225
Luce: 2,496

Notes:
Jason Kronemeyer, EUPISD's Director of Technology is working with EUPRPDC's CEO Jeff Hagan, to develop an EUPConnect project that would extend fiber optic connectivity to a range of community anchor institution (CAI) locations in the EUP region. In an April 14 phone conversation, he informed me that this collaborative effort also includes the region's electric cooperative, Cloverland Electric, its tribal organizations and Lake Superior State University located in Sault Ste. Marie. Kronemeyer also cited Astrea as one of the initiative's potential ISP participants. He also described some of the technical innovations he hoped to see implemented in the project's design and execution, including those related to the sharing of networks by multiple private and public service providers.

During that conversation Jason suggested I might be able to help him move the EUPConnect project forward. With that possibility in mind I continued to stay in touch with Jason during my fellowship, sharing thoughts on strategy, grant opportunities, technology, etc. Near the end of my fellowship Jason invited me to provide feedback on an EDA-supported feasibility study that had recently been prepared to support the EUPConnect network planning effort. Though there was not time for me to do so before the end of my fellowship, I hope to continue supporting the EUPConnect project in the future.

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Region 12: Central Upper Peninsula Planning & Development Regional Commission (CUPRPDC)

Counties served: **Alger, Delta, Dickinson, Marquette, Menominee, Schoolcraft**

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Dotty LaJoye - Executive Director

CNM Connected Status

Marquette county is “Connected Certified”
Delta and Schoolcraft counties have completed Technology Action Plans

Presence of rural electric co-ops
Cloverland Electric Cooperative serves (data sourced from online outage map):
Schoolcraft: 5,235; Delta: 759
Alger-Delta Electric serves: (data sourced from online outage map):
Alger: 2,282; Delta: 2,542; Dickinson: 9; Marquette: 2,239; Menominee: 2,492; Schoolcraft: 456

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Region 13: Western Upper Peninsula Planning & Development Region (WUPPDR)

Counties served: **Baraga, Gogebic, Houghton, Iron, Keweenaw, Ontonagon**

Contact information
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Jerald Wuorenmaa - Executive Director

CNM Connected Status
Houghton county is “Connected Certified”
Gogebic and Keweenaw counties have completed Technology Action Plans
Ontonagon, Iron counties classified as “community engaged”
Baraga County: Past planning projects

Presence of rural electric co-ops
Ontonagon County REA serves parts of Houghton, Baraga, Keweenaw, and Ontonagon counties

Notes:
In a phone conversation with Jerry Wuorenmaa, WUPPDR Executive Director, we discussed broadband-related dynamics in his region, including: 1) a pending WISP challenge to a local telco's FTTH ReConnect application; 2) a WISP arrangement w/Merit and a township to expand connectivity; 3) development and future prospects of Northern Michigan University’s Educational Access Network (EAN), which uses fixed wireless technology operating in the Educational Broadband Service (EBS) spectrum band.

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Region 14: West Michigan Shoreline Regional Development Commission (WMSRDC)

Counties included: **Lake, Mason, Muskegon, Newaygo, and Oceana**

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Erin Kuhn - Executive Director

CNM Connected Status

Newaygo: Connected Certified
Lake and Muskegon counties: Completed Technology Action Plans
Mason and Oceana counties: Community Engaged

Presence of rural electric co-ops

Lake: 10,644
Mason: 7,194
Muskegon: 1,630
Newaygo: 8,591
Oceana: 11,532

Notes

Last year, Great Lakes Energy (GLE), Michigan's largest REC, began deploying a last mile fiber network in portions of its northern Michigan service area. GLE also provides electricity to large portions of the rural areas contained within Prosperity Region 4, which encompasses most of the counties within the WMSRDC Region 14 planning region and the neighboring Western Michigan Regional Planning Council (WMRPC) region (Region 8) which, as noted above, is also served in part by another electric co-op, Homeworks Tri-County.