



Michiana Area Council of Governments
State of Digital Inclusion

Publication created by the Purdue Center for
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I

INTRODUCTION

As the COVID-19 pandemic made clear, digital exclusion is the number one threat to community and economic development. Access to and utilization of broadband technologies is a must for any community or region. Digital exclusion has significant implications for community, economic, and workforce development as well as quality of life and place. This report provides a “State of Digital Inclusion” snapshot to inform regional stakeholders, help the region continue discussions around this topic, and support any planning or funding future efforts. Multiple sources were utilized, both primary and secondary, including but not limited to the U.S. Census Bureau, Federal Communications Commission (FCC), Microsoft, M-Lab, and others.

The main objective of this report is to provide a digital inclusion snapshot of the region.

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Digital inclusion refers to the adoption and meaningful use of broadband technologies for social and economic benefits¹.”

¹Expanding Internet Access: Bank Financing for Rural Broadband Initiatives | OCC ([treas.gov](https://www.treas.gov))

Digital inclusion refers to the adoption and meaningful use of broadband technologies for social and economic benefits¹. And while broadband infrastructure or connectivity attracts the most attention, there are other components needed for a community to be digital inclusive.

According to the National Digital Inclusion Alliance a digital inclusive community focuses on affordable and robust broadband, internet-enabled devices that meet the needs of users, digital literacy training, quality technical support, and applications and online content that encourage self-sufficiency, participation, and collaboration. In other words, any community attempting to be digital inclusive needs to focus on digital connectivity, devices, and skills.

The Michiana Area Council of Governments or MACOG includes the counties of Elkhart, Kosciusko, Marshall, and St. Joseph. The region’s population was roughly 600,000 and 255,000 housing units as of 2019. About 45% of the region’s population lived in St. Joseph County followed by 34.1% in Elkhart County, 13.2% in Kosciusko County, and 7.7% in Marshall County. The region encompasses close to 1,900 square miles or 5.3% of the state’s land area resulting in a population density of roughly 317 people per square mile compared to the state’s 186 and the nation’s 92. However, this population density varied throughout the region. St. Joseph County had

the highest population density with 590, followed by Elkhart County with 442, Kosciusko County with 149, and Marshall County with 105.

This report is organized in the following way. This first section provides some background and introductory narrative. The second section reviews data from the FCC including the region’s 25 megabits per second (Mbps) download and 3 Mbps upload speeds (current broadband definition also known as 25/3) as well as a faster 100/20 Mbps footprint, technologies available, number of providers, and median advertised speeds by technology. In addition, county-level speed test data from M-Lab as well as the share of people using the internet at minimum broadband download speeds are presented. The third section discusses the findings from the household survey around internet service at home, technology used, cost, satisfaction, speed tests, and other demand aggregation indicators (e.g., work from home, home businesses, children in the home, etc.). The fourth section introduces innovative metrics such as the children and senior gap and the e-learning and remote work vulnerability, among others. In addition, metrics on remote work, digital skills in the workforce, and the share of digital economy jobs are discussed. Lastly, section five presents overall findings and recommendations.



¹Expanding Internet Access: Bank Financing for Rural Broadband Initiatives | OCC (treas.gov)

II

BROADBAND TECHNOLOGY

Broadband is defined by the Federal Communications Commission (FCC) as Internet access that is always on and faster than dial-up. Since different broadband connections offer different speeds, the current definition on what constitutes broadband is set by a speed benchmark of 25/3.

Broadband connections differ by technology, of which the most popular are discussed below:

- **Digital Subscriber Line (DSL):** allows the transmission of data over traditional copper telephone lines. DSL consists of asymmetrical and symmetrical. Asymmetrical typically provides faster download speeds while providing slower upload speeds. Symmetrical provides the same speed, both for download and upload, and are usually available only for businesses.

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Broadband connections differ by technology...”



- **Cable Modem:** allows the transmission of data over the coaxial cables used to deliver cable TV. The telecommunication standard used by this technology is called data over cable service interface specification or DOCSIS. Currently DOCSIS 3.0 provides the fastest speeds.
- **Fiber-optic:** transmits data by converting electrical signals to light and sending it through transparent glass fibers offering speeds significantly faster compared to all other broadband technologies. Fiber to the home or business indicate fiber ends in the end users' facility while fiber to the node or cabinet indicate fiber ends at the node or cabinet. End user is then connected via metallic wires to the node or cabinet.
- **Fixed Wireless:** transmits data using radio links between the end user and the service provider. This does not include mobile wireless. Service is offered from a fixed point requiring an external antenna and a direct line-of-sight. Speeds are comparable to DSL or cable.
- **Satellite (not included in analysis):** transmits data by linking with a satellite in orbit. Satellite packages typically include data limits and depend on the end users' line of sight to the orbiting satellite and weather. Speeds are typically slower than those offered by DSL or cable.
- **Broadband over Power line (BPL):** transmits data over low and medium voltage electric power resulting in connections through existing electrical connections and outlets. This is an emerging technology available in limited areas. Speeds are comparable to DSL and cable.

III

BROADBAND DEPLOYMENT MODELS

While there is no one-size-fits-all model when deploying or upgrading broadband infrastructure, these models are discussed in general terms since the legal, financial, and political complexities of any model are beyond the scope of this report. As the MACOG region considers these models, it is important to balance risk, benefit, and control of assets as well as financial capabilities. These models should not be treated as either/or and although they have been differentiated for discussion purposes, overlaps exist.

- **Private sector:** this model calls for communities and residents in the region to reach out to private broadband providers, including wireless internet service providers (WISPs), to upgrade or expand their footprint. The region can work with federal and/or state agencies to design innovative public policies to help address the challenges of the providers.

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Broadband connections
differ by technology...”

Examples of these public policies include utilizing public facilities to place broadband infrastructure, streamlining or eliminating right-of-way fees, and/or designing and implementing “dig once” policies. Current costs of right-of-way leases per year per mile add quickly to an already expensive investment due to lack of customer density. Local or state agencies can also provide grants to providers to build out broadband infrastructure in unserved or underserved areas. The downside of this model is that if the math simply does not work out for private providers, the region may remain unserved or underserved.

- **Public-private partnerships (P3):** P3 calls for innovative ways in which funding, operation, and control of broadband infrastructure is shared among partners. For example, local government entities can bear the capital cost of building the infrastructure through loans, grants, or bonds while providers agree to lease the infrastructure, operate and maintain it. A P3 can also work to providing access to existing fiber-optic infrastructure (also known as “dark fiber”) to private and other broadband providers. These two examples are also called open access models. Depending on the partnership, local government may end up owning the broadband infrastructure or, like in the private sector model, provide grants for providers to upgrade or deploy broadband infrastructure. The downside of this approach is the complexity of P3. Any P3 involves many moving pieces that requires legal and financial expertise.
- **Municipally owned model:** this model calls for the municipality and/or county to build and operate the network. Unlike the P3 model, municipalities offer a full retail broadband service, just like any other utility (water, sewer, etc.) While research on the success of this model is not definitive, case studies include successes and failures. The key lessons learned from this model is that the municipality or county need to take baby steps or what is called an “I-Net ‘n’ More” approach where the municipality or county begins by connecting community anchor institutions and then expands incrementally. A challenge is that political

support must be in place for residents to support local government incurring in debt or loans to build the infrastructure. In addition, municipalities may not have the expertise in building and managing broadband networks and may face resistance from private incumbent carriers. In fact, the Institute for Local Self-Reliance has identified several states that have prohibited or made it extremely difficult for municipalities to run their own broadband.

- **Co-operative model:** this model calls for local government, businesses, or residents to reach out to electric or telephone co-operatives to encourage them to invest and provide broadband. Since co-ops do not seek profit, the lack of customer density is not necessarily an issue. This model proved highly successful when “electrifying” rural communities in the early to mid-20th century. The downside is that co-ops may not feel comfortable investing and managing a service they are not familiar with and resistance from existing private broadband providers.

Any of these models or combination thereof should be considered when deploying or upgrading broadband infrastructure. Important to not overlook is that any effort designed to expand broadband access should be coupled with an initiative to strengthen digital literacy and broadband adoption efforts. Some providers argue that even when broadband is available, customers do not subscribe as expected. Exposing customers to broadband’s benefits and increasing their digital knowledge is critical. This can be done by collaborating with Cooperative Extension, churches, libraries, nonprofits, and other groups with a strong network of people and “on the ground” capacity.

IV

BROADBAND AVAILABILITY

The Federal Communications Commission (FCC) requires internet service providers (ISP) to file Form 477 twice per year. This form captures data on maximum advertised speeds and broadband technologies available at the Census block level. A block is the smallest geographic area for which the Census compiles demographic information and varies in area between cities (smaller) and rural communities (larger). While this dataset is known to overestimate broadband availability, especially in rural areas, it is the only dataset available². For this report, we looked at fixed broadband technologies including digital subscriber line (DSL), fixed wireless, cable, and fiber-optic. Satellite technology was not included since it typically has high latency and is unreliable³. Data is from June 2020, the latest publicly available.

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Broadband connections differ by technology...”

²FCC Underestimates Americans Unserved by Broadband Internet by 50% | [BroadbandNow.com](https://www.broadbandnow.com)

³Fact Sheet Explains Why “Satellite Is Not Broadband” – Institute for Local Self-Reliance (ilsr.org)



Figure 1 shows the region's 25/3 (left) and 100/20 Mbps (right) coverage footprint (gray). White areas indicate no housing units or population. A darker orange indicates a higher density of housing units outside the footprint. As shown, the region is almost entirely covered by a 25/3 Mbps footprint, except for small areas in the southern portion of Kosciusko County. Again, keep in mind this dataset is known to overestimate coverage mainly because it is provider reported, focuses on advertised versus actual speeds, and a single customer in a Census block considers the entire Census block as served. However, when looking at the 100/20 coverage, a different picture emerges. For example, a significant portion of Marshall County is outside the 100/20 footprint. The 100/20 threshold is increasingly cited as a more appropriate broadband speed, especially during COVID, as many homes required faster upload speeds to accommodate multiple remote workers and e-learners.

▼ **Figure 1** 25/3 and 100/20 Mbps Coverage Footprint in the MACOG Region, 2020
Source: FCC Form 477 June 2020

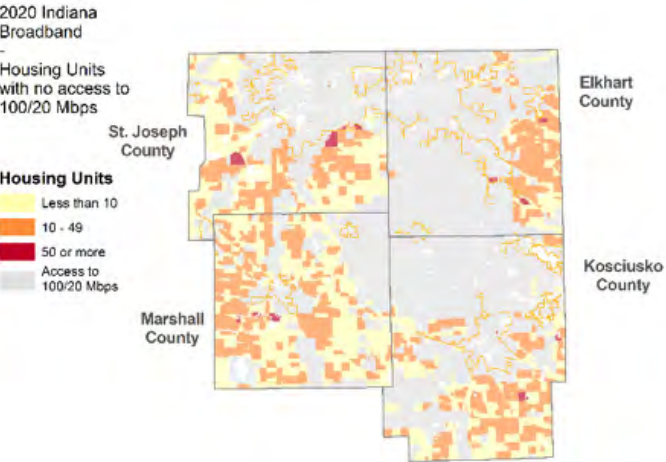
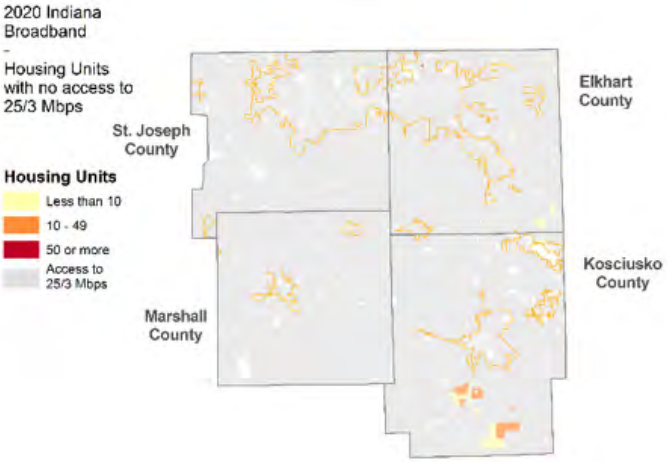


Table 1 shows the percent of housing units outside the 25/3 and 100/20 Mbps footprints. All housing units in Marshall County are covered by the 25/3 footprint while one-third are outside the 100/20 footprint. The region's share of housing units outside the 25/3 and 100/20 footprints is lower compared to the state.

▼ **Table 1**

Percent Housing Units Outside the 25/3 and 100/20 Footprints, 2020

Source: FCC Form 477 June 2020

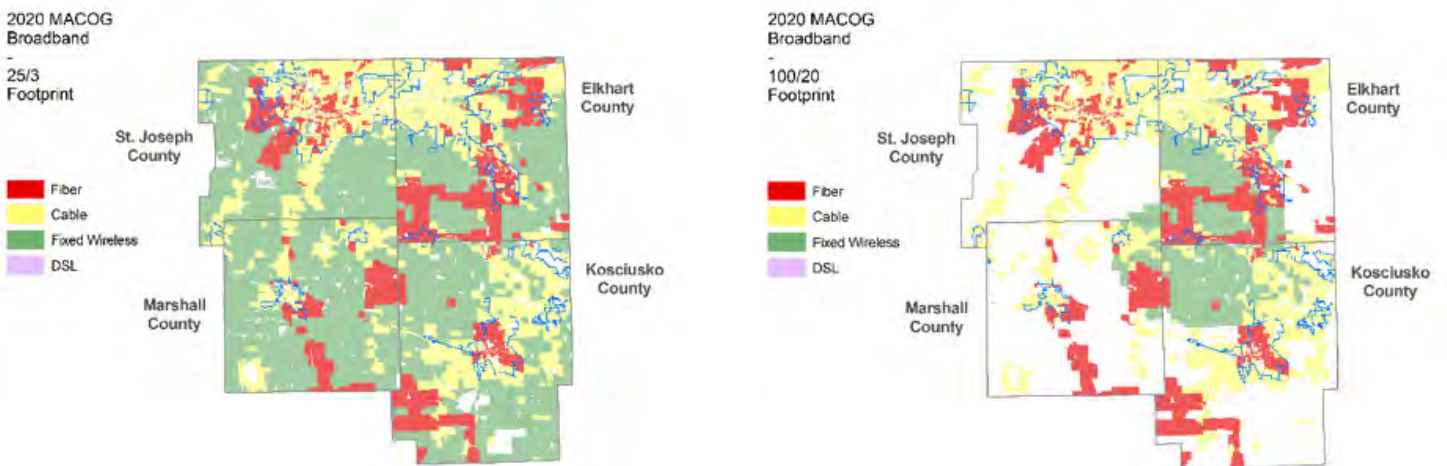
Name	% Outside 25/3	% Outside 100/20
Elkhart	3.1	12.0
Kosciusko	0.5	17.2
Marshall	0.0	33.2
St. Joseph	0.9	7.1
MACOG	1.5	12.2
Indiana	3.8	13.0

Figure 2 shows the same 25/3 and 100/20 footprints by advertised technology. For the 25/3 (left), three of the four technologies are visible with cable and fiber mostly within cities and towns while fixed wireless is in the areas outside cities and towns. For 100/20, fixed wireless in St. Joseph and Marshall Counties almost entirely disappear leaving only cable and fiber.

▼ **Figure 2**

25/3 and 100/20 Mbps Footprint by Technology in the MACOG Region, 2020

Source: FCC Form 477 June 2020



To get an idea of speeds by technology, **Table 2** looks at the median maximum advertised download and upload speeds in the region in Mbps. In general, DSL advertised the slowest maximum download and upload speeds while fiber advertised the highest maximum advertised speeds followed by cable and fixed wireless.

▼ **Table 2**

Median Maximum Advertised Download and Upload Speeds by Technology, 2020

Source: FCC Form 477 June 2020

Name	DSL		Fixed Wireless		Cable		Fiber	
	Download	Upload	Download	Upload	Download	Upload	Download	Upload
Elkhart	12	1	25	6	987	35	1,000	1,000
Kosciusko	12	1	25	6	987	35	1,000	1,000
Marshall	10	1	25	8	1,000	50	750	200
St. Joseph	18	0.768	10	2	987	35	1,000	1,000
MACOG	18	1	25	5	987	35	1,000	1,000
Indiana	12	1	25	5	987	35	1,000	1,000

Table 3 shows the percent of housing units in the region with access to two or more providers for 25/3 and 100/20 speeds. Virtually all housing units in the region had access to two or more providers that advertised 25/3. However, the region fell short of the 100/20 share.

▼ **Table 3**

Percent Housing Units by Number of Providers, 2020

Source: FCC Form 477 June 2020

Name	% Two or more providers 25/3	% Two or more providers 100/20
Elkhart	100.0	65.5
Kosciusko	100.0	72.5
Marshall	100.0	68.7
St. Joseph	100.0	95.3
MACOG	100.0	80.5
Indiana	99.0	89.5

We now shift gears and look at another set of metrics. First, median county-level speed test results from M-Lab, which is an open-source repository of speed tests completed across the country. Second, data from Microsoft that calculates the percent of total population in a county not using the internet at a minimum speed of 25 Mbps download. Microsoft obtains this information from server logs when devices update the Windows or Office programs among other updates.

Figures 3 and 4 show the median download and upload speed tests for the four counties in the MACOG region from 2018 through 2020. More than 10,000 speed tests per county were conducted each year. Median is used instead of average since the latter is susceptible to outliers. Median speeds show that half of the values in the dataset are above the median and half below. Considering Elkhart's median download speed in 2018 tells us that half of the more than 10,000 speed tests completed fell above 5.881 Mbps while half fell below.

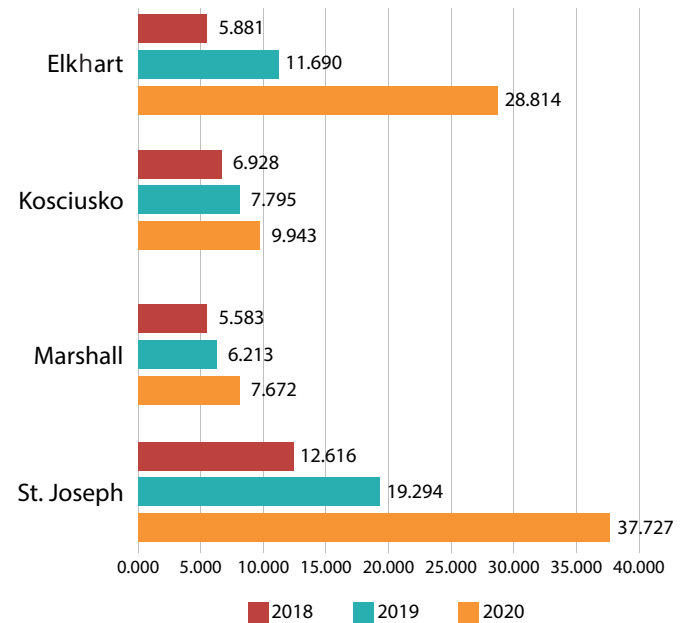
Notice that upload speeds were significantly slower compared to download speeds (y-axis range was kept the same for both download and upload speeds). In other words, the region is served by asymmetrical speeds. This refers to download and upload speeds not being identical. All counties in the MACOG region experienced an increase in their median download speeds though Elkhart and St. Joseph experienced the largest increase. None of the counties in the MACOG region met the 25 Mbps download criteria in 2018 and 2019 (only Elkhart and St. Joseph met this criterion in 2020).

Lastly, we review Microsoft's metric in **Figure 5** showing the percent of population not using the internet at a minimum speed of 25 Mbps download. As expected, Marshall County had the highest share with 82 percent compared to St. Joseph with 60 percent. Two of the four counties in the MACOG region were above the state average and all counties were above the national average. Regardless of the county, these percentages are significantly different than the percentages discussed using FCC data regarding availability. In fact, these percentages align more with the speed test results discussed above.

▼ **Figure 3**

Median Download Speed Test Results (Mbps) by Year, 2018-2020

Source: M-Lab; PCRD



▼ **Figure 4**

Median Upload Speed Test Results (Mbps) by Year, 2018-2020

Source: M-Lab; PCRD

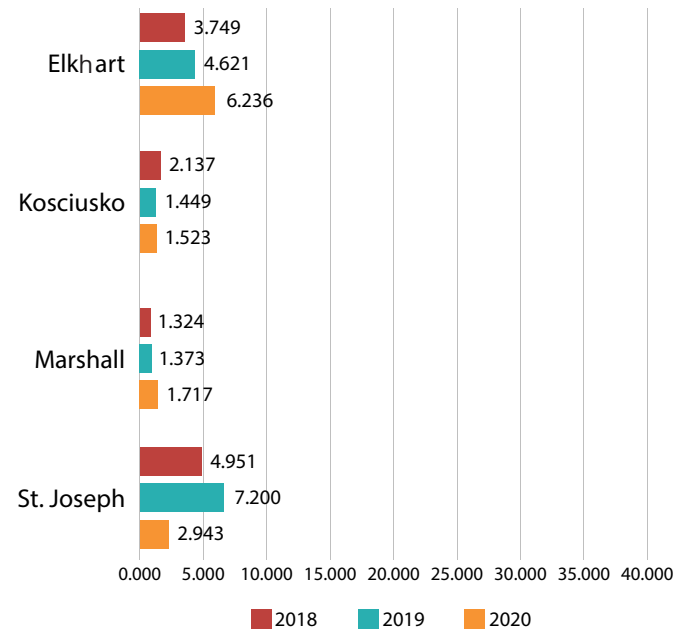
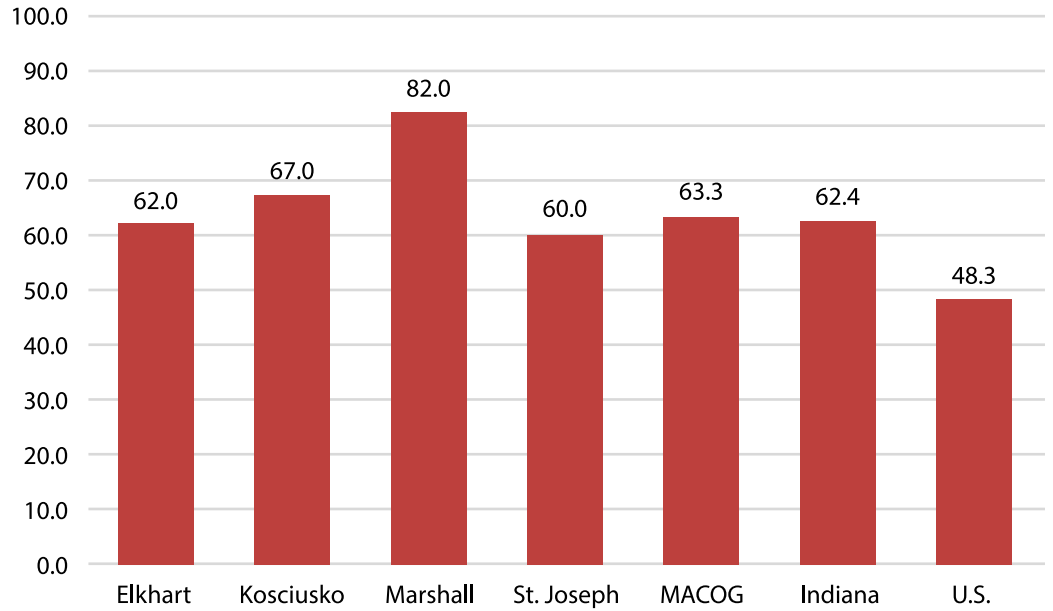


Figure 5 ▶

Percent Population
not using the
internet at 25 Mbps
download, 2019

Source:
Microsoft; PCRD



To conclude, multiple broadband metrics yield different results. Although the metrics analyzed are not necessarily comparing apples to apples, the differences are significant. For example, the FCC data—which shows availability of advertised speeds—shows virtually all housing units in Marshall County served by advertised 25/3 and roughly one-third outside the 100/20 footprint. However, the M-Lab speed test results show that actual usage is far lower—6.2 Mbps download and 1.3 Mbps upload in 2019. This supports Microsoft’s metric that found that 82 percent of residents in Marshall County did not use the internet at a minimum of 25 Mbps. Based on these data points, it seems that the outlier is the FCC data.

These data discrepancies are not new and unique to the MACOG region. To the contrary, these discrepancies are being discussed at the national level as more funding becomes available for broadband infrastructure. For this reason, more granular data is required. The next section discusses the findings of a home survey conducted that provides a more granular view on the state of digital inclusion in the region followed by a section where Census data is analyzed.



V

HOUSEHOLD BROADBAND DATA VALIDATION AND DEMAND AGGREGATION SURVEY

To provide richer and more granular data regarding the state of broadband in the region, PCRD partnered with MACOG to conduct an online survey. The link to the survey was distributed through multiple regional groups including nonprofits, local economic development organizations, chambers of commerce, and libraries to name a few as well as promoting it through radio announcements and social media posts. Paper copy surveys were not distributed since previous experience has shown a decreasing response via paper copies while still capturing responses with no home internet online. A Spanish version of the survey was available online as well. Data was gathered online during June and July of 2021 resulting in a convenience sample of 1,337 valid responses.

Survey asked residents in the region to share if they had home internet service (if not, why not), what type, how much they were paying, conduct a speed test, and their satisfaction level. In addition, participants were asked to document if they were remote working, had children, or were a home business. These demographic indicators strongly predict broadband adoption.

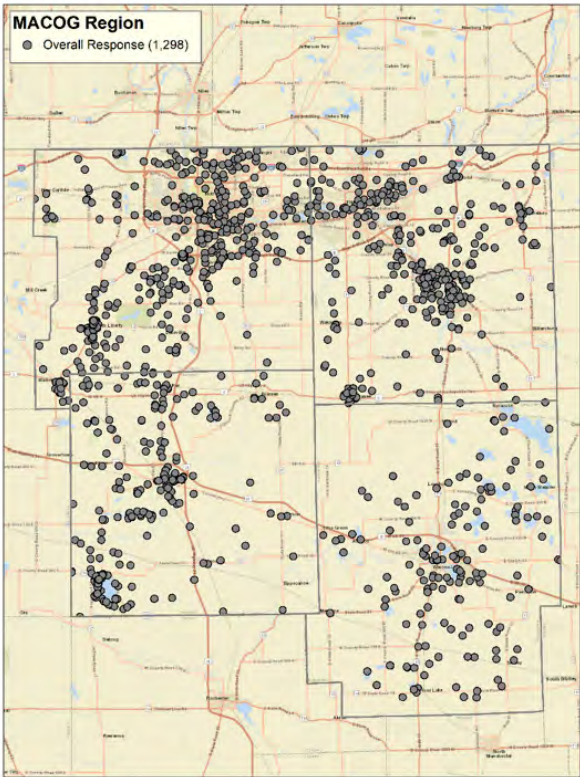
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...although most responses in the region had home internet access, the larger issue is quality since a little less than two-thirds were unsatisfied.”

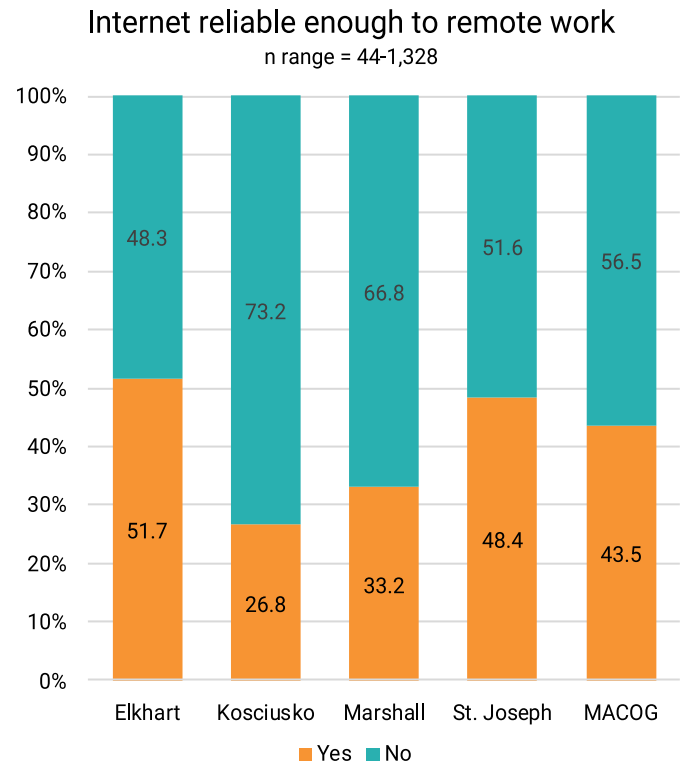
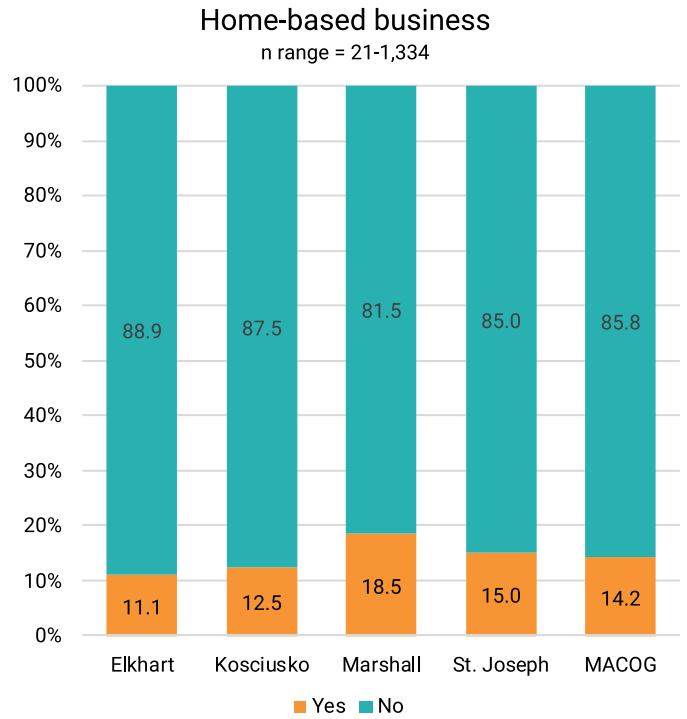
Overall, about 39% of responses came from St. Joseph County, 29% from Elkhart, 19.5% from Marshall, and 12.6% from Kosciusko Counties. **Figure 6** shows a map with the survey responses across the region (2.2% of respondents did not grant permission to geocode their addresses).

As shown in **Figure 7**, there is a wide variety of home-based business and ability to work from home given a reliable connection. About 14% of the region’s respondents said they had a home-based business while more than 56% said their home internet was not reliable enough to work from home. Within the region, Marshall County had the highest share of home-based businesses (close to one-fifth) among survey respondents while Kosciusko County had the highest share of respondents (almost three-quarters) saying their home internet connection was not reliable enough to work from home.

▼ **Figure 6** Survey Responses in the MACOG Region, 2021
Source: PCRD Home Broadband Survey



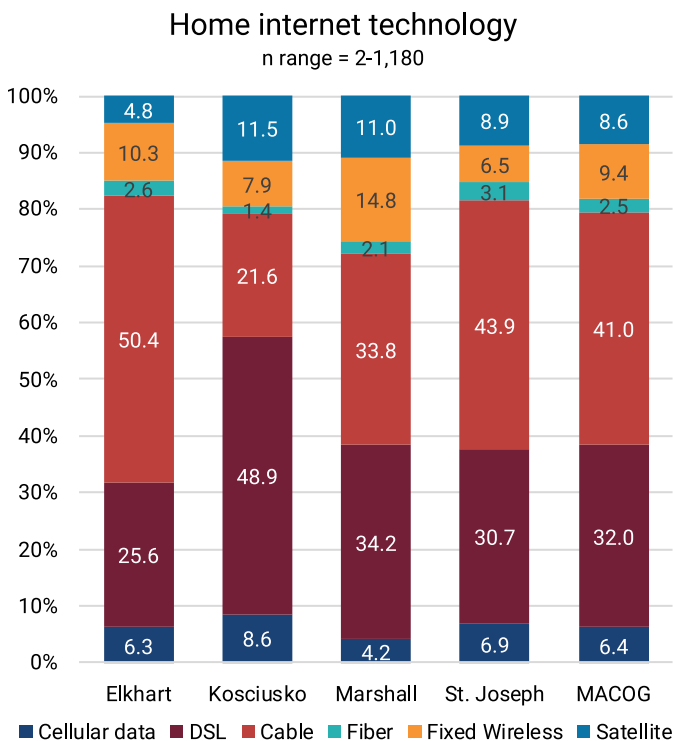
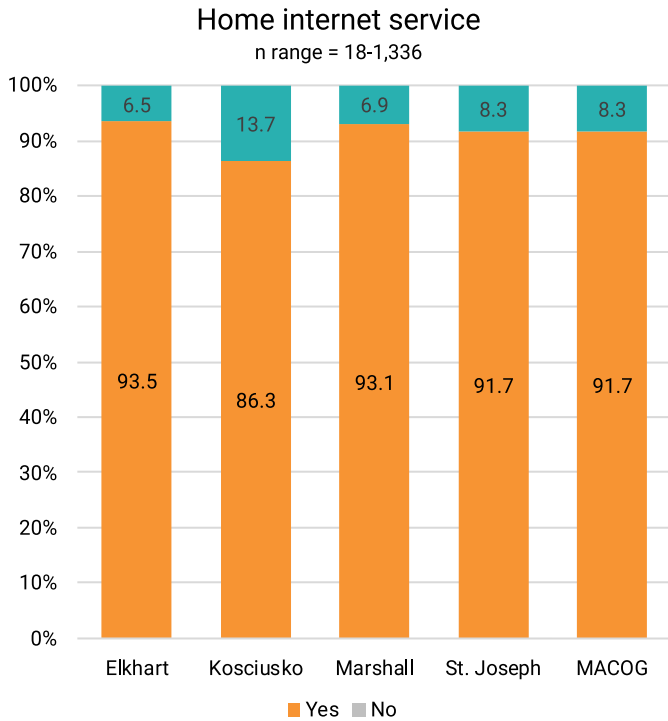
▼ **Figure 7** Percent responses home-based business and work from home, 2021
Source: PCRD Home Broadband Survey



▼ Figure 8

Percent responses home internet service and technology, 2021

Source: PCRD Home Broadband Survey



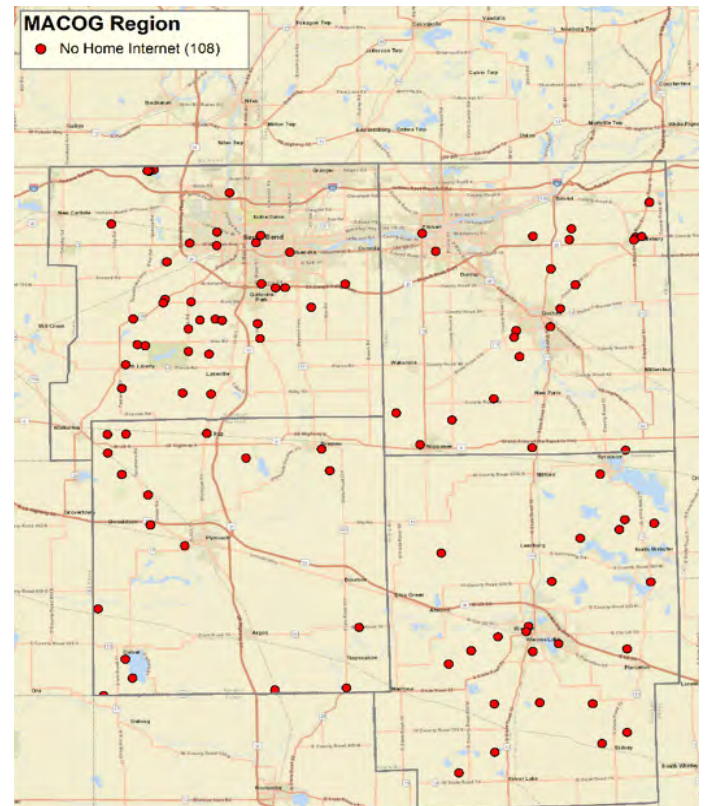
Regarding home internet service and type of broadband technology, **Figure 8** shows that more than 91% of respondents said they had home internet service. Kosciusko County had the lowest share with 86% while Elkhart had the highest with 93.5%. On the other hand, 41% of respondents in the region reported having DSL at home followed by cable with 32%, 9.4% with fixed wireless, and 8.6% with satellite. Note that almost half of respondents in Kosciusko County had DSL (48.9%) compared to one-quarter from Elkhart County. Overall, close to one-half (47%) of survey respondents in the region with home internet relied on satellite, DSL, or cellular.

As seen in **Figure 9**, survey respondents with no home internet service were located all over the region within city limits as well as out in the county. This implies that the issue may not only be availability of quality internet service, but also affordability.

▼ Figure 9

Survey responses with no home internet service, 2021

Source: PCRD Home Broadband Survey



However, solely looking at a binary yes/no access overlooks other critical components of broadband access and use, namely quality of service. **Figure 10** looks at satisfaction levels among those subscribing to the internet at home as well as the reasons for their dissatisfaction. Overall, roughly 64% of respondents with home internet service were unsatisfied or somewhat unsatisfied. But again, satisfaction levels varied across the region. For example, more than 80% of survey respondents in Kosciusko County were unsatisfied or somewhat unsatisfied with their home internet service compared to 53% in Elkhart County.

Moreover, among the strongly agree/agree responses in the region regarding dissatisfaction reasons, too slow was the most common (28.4%) followed by unreliable (26%). Interestingly, no large differences regarding dissatisfaction reasons are seen throughout the region. In other words, too slow or unreliable home internet service are the main reasons why respondents were not satisfied. Also note that the share of respondents agreeing or strongly agreeing cost (too expensive) was an issue was among the lowest cited.

Survey participants completed a speed test as well. This was done in partnership with Indiana Farm Bureau and others behind the Indiana Broadband Strategic Partnership (IBSP). These speed tests results are separate to those discussed in the previous section (Figures 3 & 4).

Table 4 shows the results of the speed tests conducted as part of the home survey. Overall, there were a little more than 1,000 speed tests completed in the region. Of these, a little more than one-third (35.6%) met the FCC’s 25/3 broadband criteria. Also, notice how a home in the region clocked 829 Mbps down compared to somebody also in the region accessing the internet at only 0.01 Mbps. These large discrepancies in speed accessed within the region have significant community and economic development implications.

Survey participants were also asked to provide their monthly cost either as a bundle or internet only. They were also asked to say how much they are willing to pay for adequate and reliable internet at home.

Figure 10 Survey responses with no home internet service, 2021
Source: PCRD Home Broadband Survey

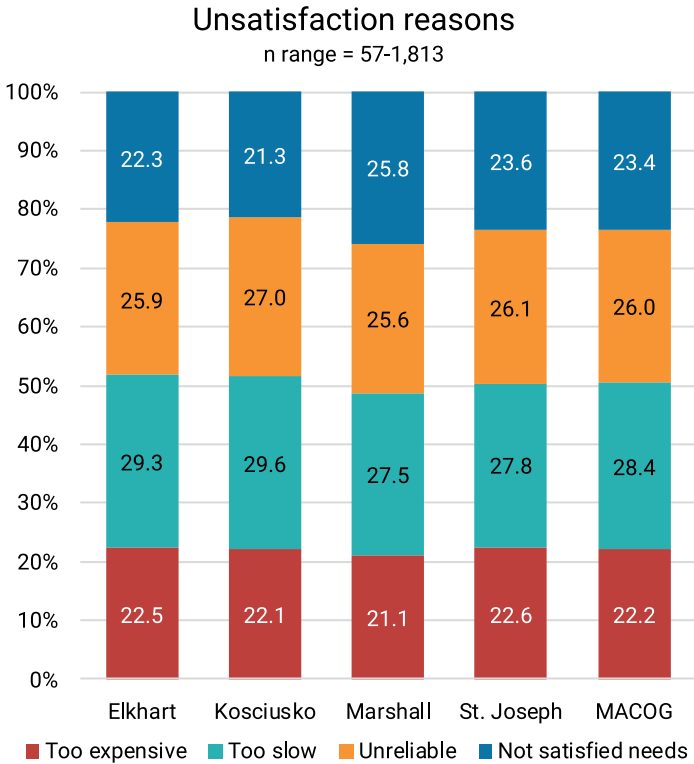
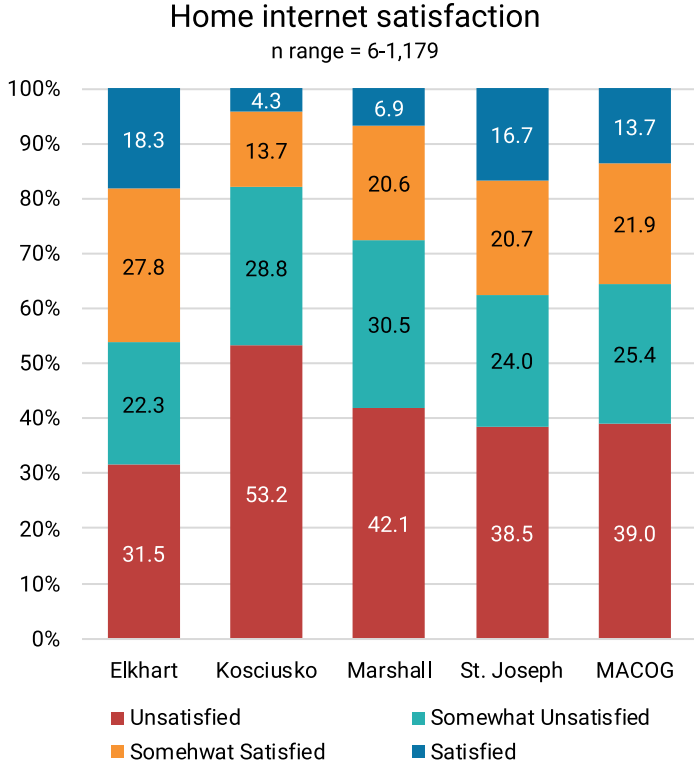


Figure 11 shows the results of internet only monthly costs across the region as well as the breakdown of what they are willing to pay. A little more than one-fifth of survey respondents in the region paid between \$75 and \$99.99 per month. Elkhart County had the highest share in the region of those paying \$100 or more with 36.8% compared to Marshall and St. Joseph Counties with 29.1%.

The sweet spot regarding maximum willingness to pay monthly in the region was between \$50 and \$74.99. This share was highest in Marshall County with almost 40% willing to pay this amount per month for adequate and reliable home internet service. Respondents in St. Joseph County had the highest share (13.8%) willing to pay \$100 or more per month.

Survey Speed Test Results (download left, upload right), 2021

Source: IBSP; GeoPartners; PCRD

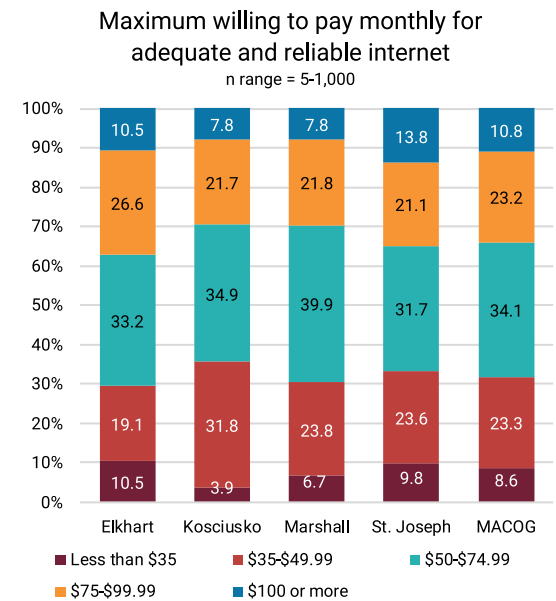
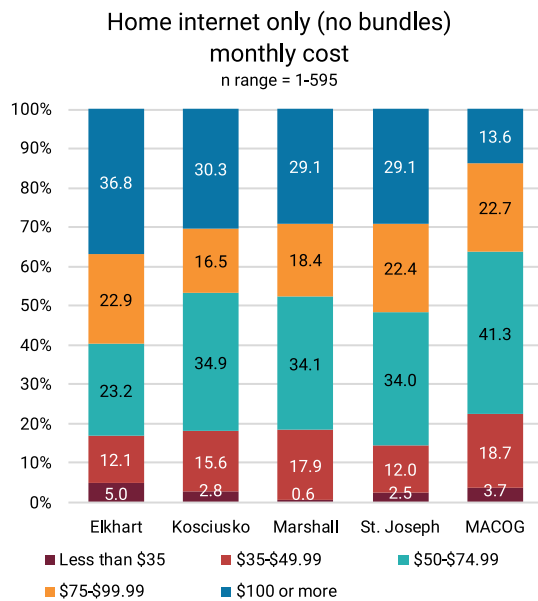
Note: results downloaded as of August 3rd, 2021; for an up-to-date map please go to <https://expressoptimizer.net/projects/Indiana/speedtestmap.php>

▼ Table 4

Speed Tests	MACOG		Elkhart		Kosciusko		Marshall		St. Joseph	
Number	1,106		290		257		191		368	
% Met 25/3	35.6		42.8		31.1		26.7		37.8	
Average (Mbps)	47.7	13.9	52.5	16.6	45.4	10.3	33.0	9.8	53.1	16.6
Median (Mbps)	14.7	3.5	18.3	5.3	12.2	2.1	8.5	2.3	17.1	4.8
Minimum (Mbps)	0.01	0.01	0.2	0.01	0.08	0.08	0.04	0.03	0.01	0.01
Maximum (Mbps)	829.7	893.4	693.2	473.2	829.7	893.4	425.6	213.9	567.8	348.8

Figure 11 ▶
Percent responses home internet monthly cost and maximum willing to pay, 2021

Source: PCRD Home Broadband Survey



Quality of service (measured by speeds) and cost are typically reasons that explain satisfaction levels. To distinguish which is behind satisfaction levels in the region, **Figure 12** shows the average satisfaction level by monthly cost as well as internet home technology. A higher number indicates a higher satisfaction (unsatisfied = 1; satisfied = 4). Responses were sorted in ascending order based on average satisfaction level. Notice how the most expensive monthly costs had the lowest average satisfaction (1.8, 1.9, and 2.0), except for the cheapest and the second cheapest categories. However, the overall difference between the least and most satisfaction was low (1.8 versus 2.2). On the other hand, there is a stronger pattern visible when looking at home internet technology. Notice that the technology with the lowest satisfaction was satellite, while fiber had the highest. The difference between least and most satisfied was larger (1.5 versus 3.5) compared to monthly cost. In other words, it seems that dissatisfaction is driven more by home technology than monthly cost. Indeed, majority of slower technologies (see Table 2, e.g., DSL) have a lower satisfaction level.

To delve deeper into internet access in the MACOG region, survey respondents were asked to include the number of internet users at their home by age groups. **Figure 13** shows the percent of people by age group and specific home internet access categories. These

internet access categories capture individuals or homes that may struggle to use the internet effectively due to no home internet access or rely on satellite, DSL, or cellular connections. As discussed previously, these technologies are slower, are unreliable, and have data limits undermining the technology’s potential aside from having no access at home.

Close to 50% of pre-K through high school children in the region—based on survey responses—did not have home internet or had satellite, DSL, or cellular. In addition, close to 53% of seniors (ages 65 or older) were in the same situation. In other words, based on survey responses, half of school-age children and seniors live in homes that could be considered unserved or underserved. Furthermore, close to half of the working-age population from the survey also were unserved or underserved. This may affect the region’s workforce to upskill and reskill, specifically in digital skills.

Figure 14 shows the share of responses in the MACOG region by internet use. Note that respondents could select more than one internet use. Internet use can be used as a proxy for digital literacy since more digital literate people use the internet in different and productive ways. As seen, there are no significant differences between counties regarding internet use.

Figure 12 ▶
Average satisfaction by monthly cost and home technology, 2021

Source: PCRD Home Broadband Survey

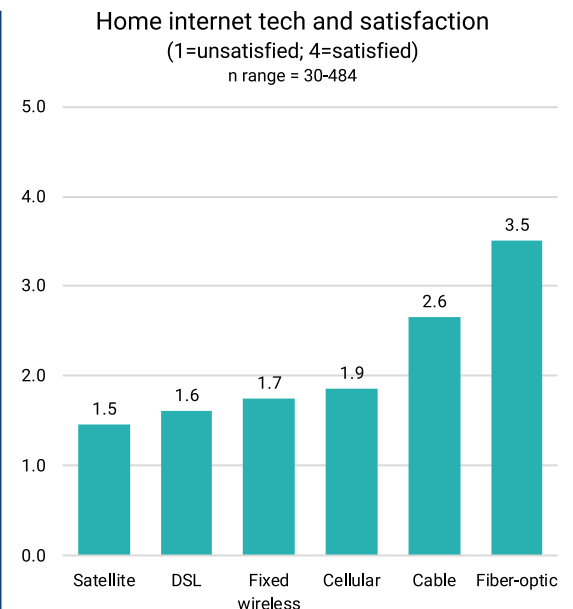
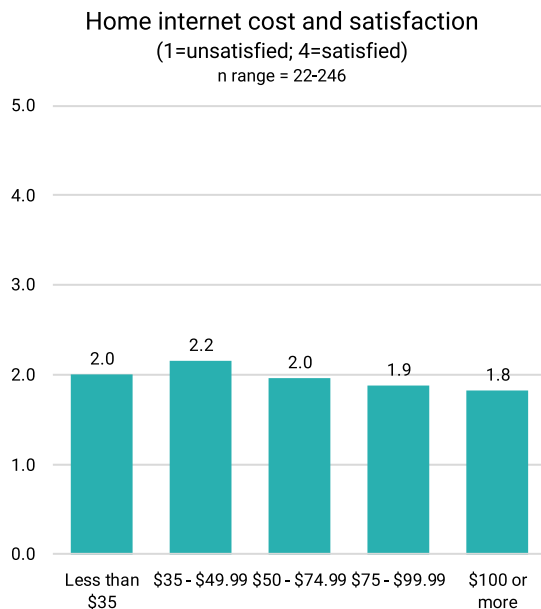
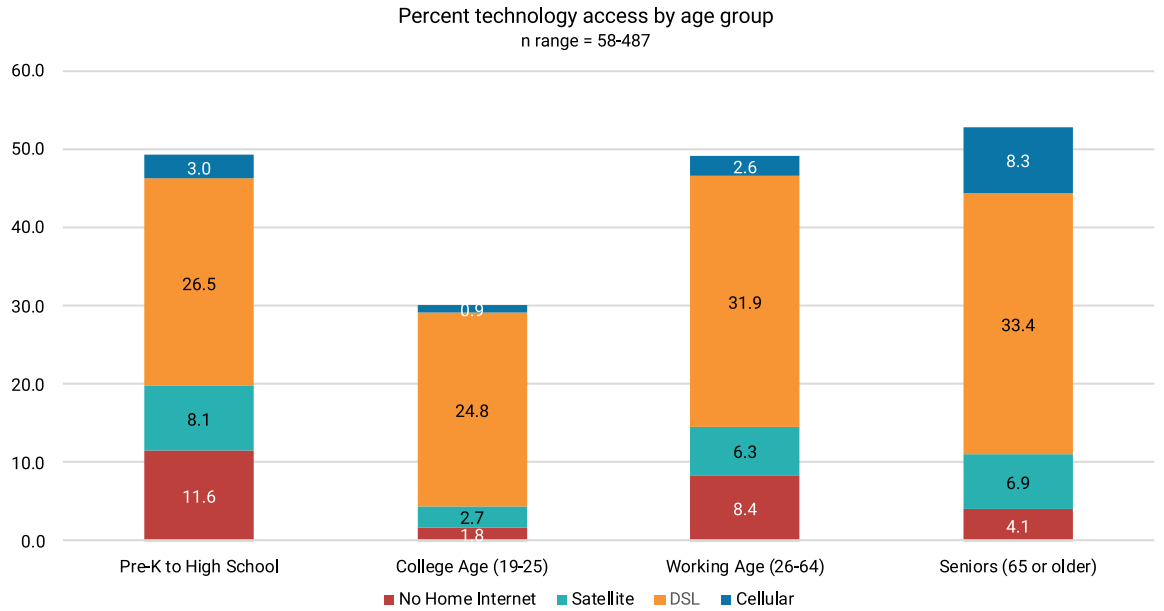


Figure 13 ▶

Percent responses by specific technology access and age groups, 2021

Source: PCRD Home Broadband Survey

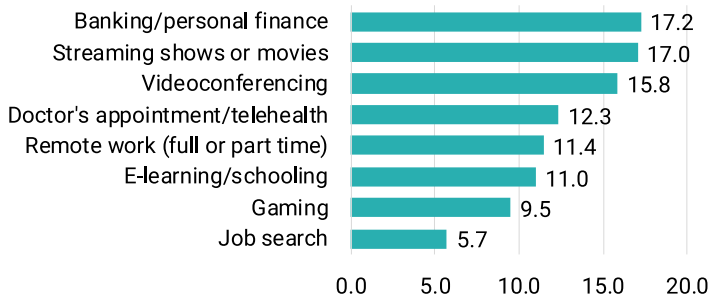


▼ **Figure 14**

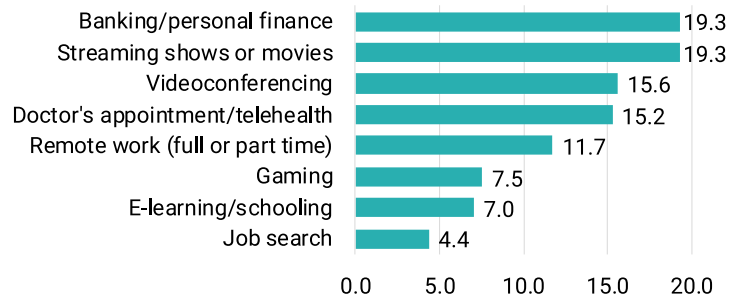
Percent responses and internet uses, 2021

Source: PCRD Home Broadband Survey

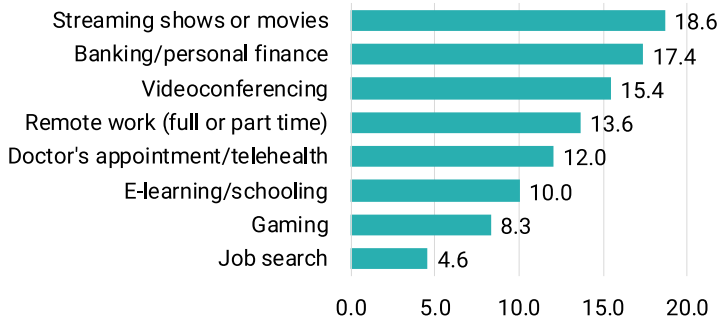
Elkhart County: Internet uses (n = 1,540)



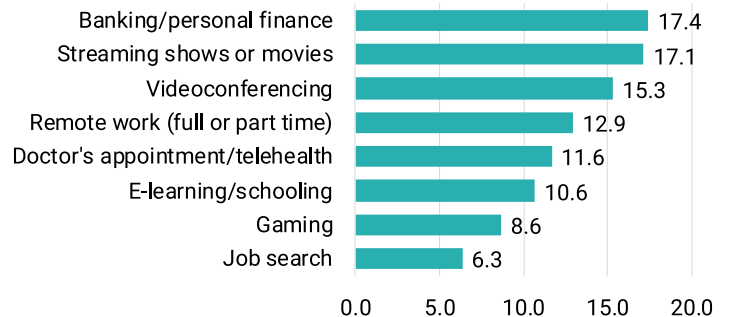
Kosciusko County: Internet uses (n = 597)



Marshall County: Internet uses (n = 939)



St. Joseph County: Internet uses (n = 1,897)



The most popular internet use in the region was online banking/finance followed by streaming shows or movies. The least common use was job searching followed by gaming. At least 10% of respondents across all counties reported using the internet to remote work. Interestingly, e-learning use was the second lowest in Kosciusko County.

To conclude, several key insights from the home survey are worth discussing. First, although most responses in the region had home internet access, the larger issue is quality since a little less than two-thirds were unsatisfied. This unsatisfaction is mostly due to specific home internet technologies known to be slower and unreliable. In addition, locations with no home internet access are scattered across the region and do not follow a specific geographic pattern (e.g., only outside cities or towns), alluding to an affordability issue as well (since cities and towns are better served than areas outside of these). Overall speed test results indicate the region's median download speed did not meet the 25 Mbps criteria. Moreover, significant differences in speeds among homes subscribing to the internet in the region exacerbate inequality.

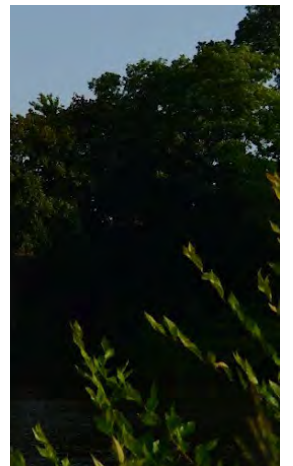
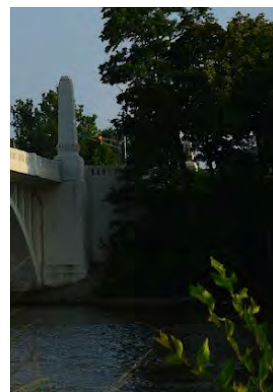
Second, the most popular home internet technology in the region was cable followed by DSL. Collectively, 47% of respondents relied on satellite, DSL, or cellular data for their home internet connection. These technologies undermine broadband's community and economic

development potential. Interestingly, less than 5% of survey respondents with home internet had fiber, the technology offering the fastest advertised download and upload speeds.

Third, more than one-third of survey respondents in the region paid \$75 or more per month for internet only while close to two-thirds were willing to pay up to \$75 dollars per month for adequate and reliable internet at home. This alludes to a mismatch between what the market cost is and what customers are willing to pay.

Lastly, close to 70% of respondents in the region used the internet in productive ways (e.g., videoconferencing, remote working, etc.). In addition, more than 14% were home-based businesses and a little more than 16% had school-aged children at home (pre-K through high school), both strong adoption predictors. Moreover, roughly 50% of school-aged children and seniors in the region either did not have home internet or relied on DSL, satellite, or cellular data. Less than half of respondents said their home internet connection was reliable enough to remote work. Remote work is becoming an economic development competitive advantage and inadequate home connectivity has a negative impact on this competitive advantage.

Next, we look at Census data and other sources to better understand digital economy trends in the region as well as digital equity. These additional data expand on the state of digital inclusion in the region.



VI

DIGITAL ECONOMY TRENDS



The previous sections focused on broadband availability and access, cost, satisfaction, and internet use among other indicators from diverse sources, including a home survey. Next, we analyze Census data on related metrics to provide a more robust picture of the state of digital inclusion in the MACOG region. As the economy and society continue to digitize, it is important to monitor not only broadband access and availability but also trends that may point to advantages and disadvantages in the region regarding the digital economy.

First, we look at two indicators that impact workforce development as well as quality of life in the region. **Figure 15** shows the percent of children and seniors (ages 65 or older) in the region without internet access or computers. In addition to connectivity, devices also play a crucial role when it comes to digital inclusion. Marshall County had the highest homework gap or share of children with computer but no internet as well as no computers in the region. Furthermore, a little less than one-quarter of seniors in Marshall County did not have a computer compared to a little more than one-

fifth in the MACOG region. Overall, in the region, access to devices is a larger issue for seniors than is access to the internet.

Regarding internet adoption, the U.S. Census Bureau

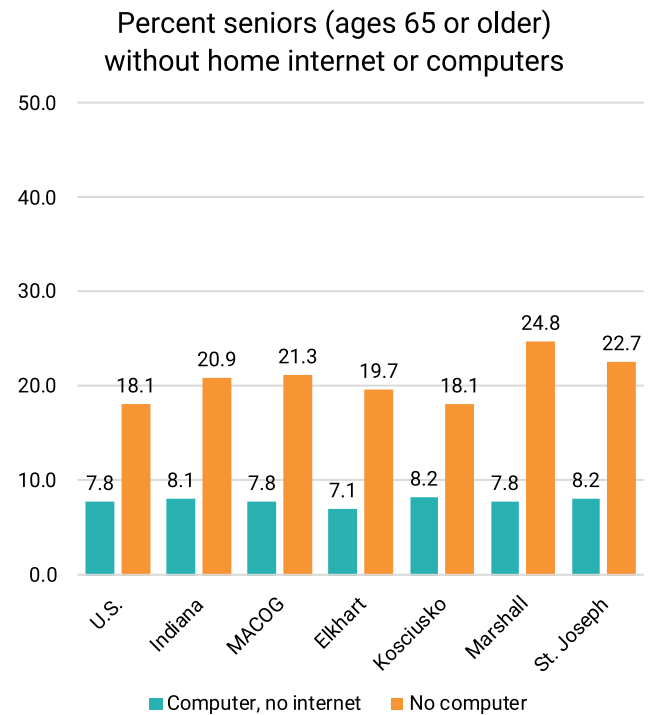
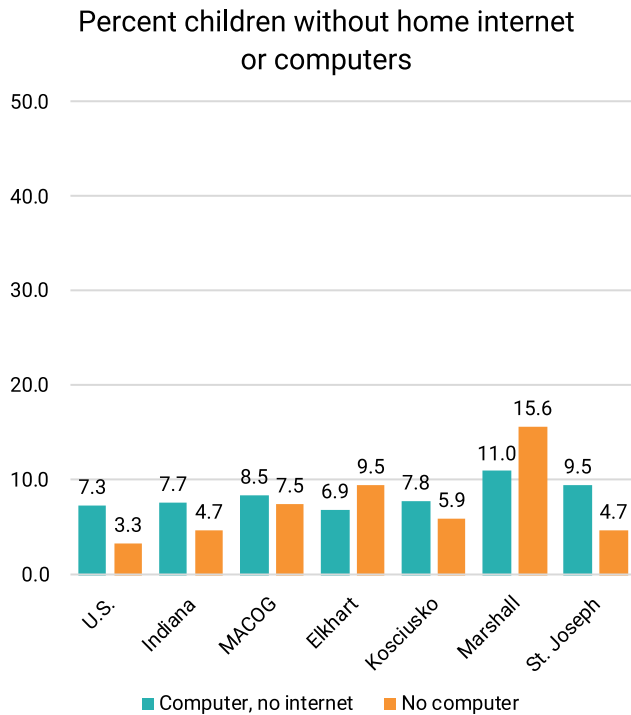
“

...it is important to monitor not only broadband access and availability but also trends that may point to advantages and disadvantages in the region regarding the digital economy.”

▼ Figure 15

Share children and seniors with computer but no internet and no computers, 2019

Source: U.S. Census Bureau American Community Survey 5-Year 2014-2019



gathers data on the share of households with no internet access. While the data does not say why they do not have access (e.g., not available, too expensive, too slow, etc.), it still provides a good sense of home internet adoption. In addition, homes with no computing devices are more likely to not subscribe to home internet. **Figure 16** shows the share of homes in the region with no internet access, compared to the state and nation as well as the share of those without a computing device (no laptop, desktop, mobile, etc.). Once more, Marshall County had the highest share of homes with no internet (almost one-quarter) and no computing devices (17.3%) in the region, followed by St. Joseph County. A potential explanation could be that the service available does not meet their needs, as shown by the speed test results. The region's share was higher than the state or nation on both indicators, resulting in a quality of life and economic disadvantage.

In addition to overall home internet access, differences between income groups also shed a light on the state of

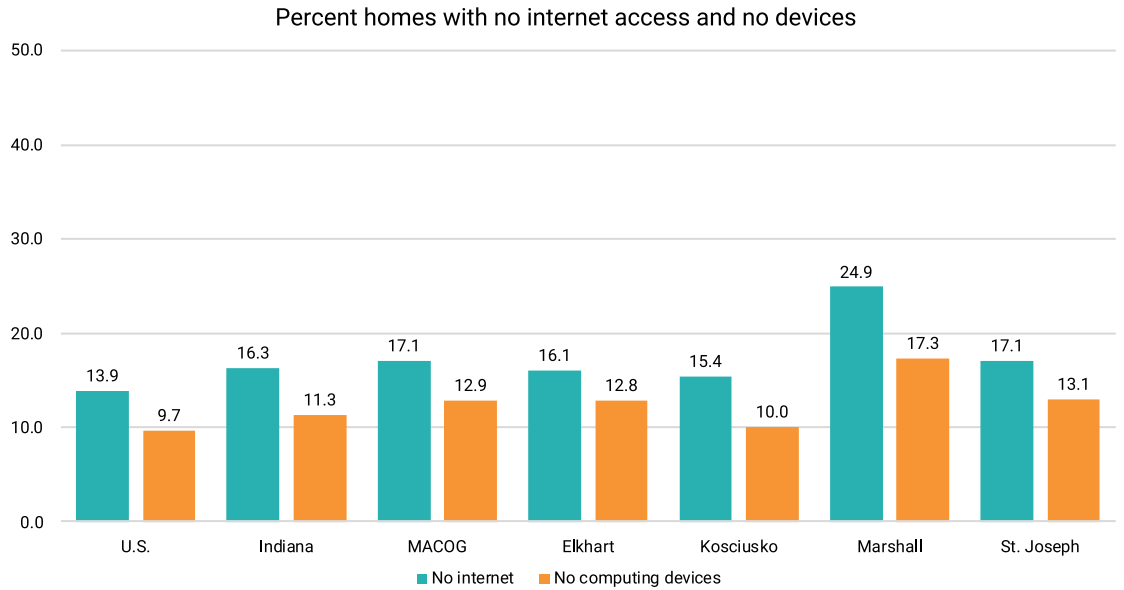
digital inclusion in the region. Higher digital inequality in the region is a disadvantage from a community development perspective. **Figure 17** shows the share of homes without internet access by specific income groups in the region. It also shows what is called the "internet income ratio" or IIR. This ratio is calculated by dividing the share of homes making less than \$35,000 without internet access by the share of homes making \$75,000 or more without home internet. A higher IIR denotes a higher inequality.

Close to 40% of homes making less than \$35,000 in St. Joseph County had no internet access compared to less than 6% of those homes making \$75,000 or more. Elkhart County had the lowest share of poorer homes with no internet and the second highest share of wealthier homes. In other words, the share of poorer homes with no internet access was roughly four times higher than the share of wealthier homes. St. Joseph County, on the other hand, had the highest IIR in the region with a 6.7 ratio.

Figure 16 ▶

Percent of homes with no internet and computing devices, 2019

Source: U.S. Census Bureau American Community Survey 5-Year 2014-2019

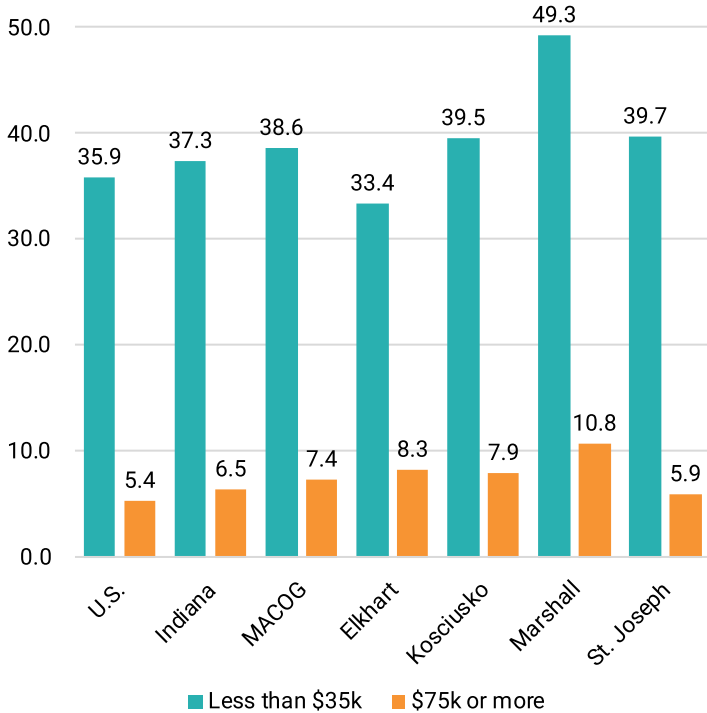


▼ **Figure 17**

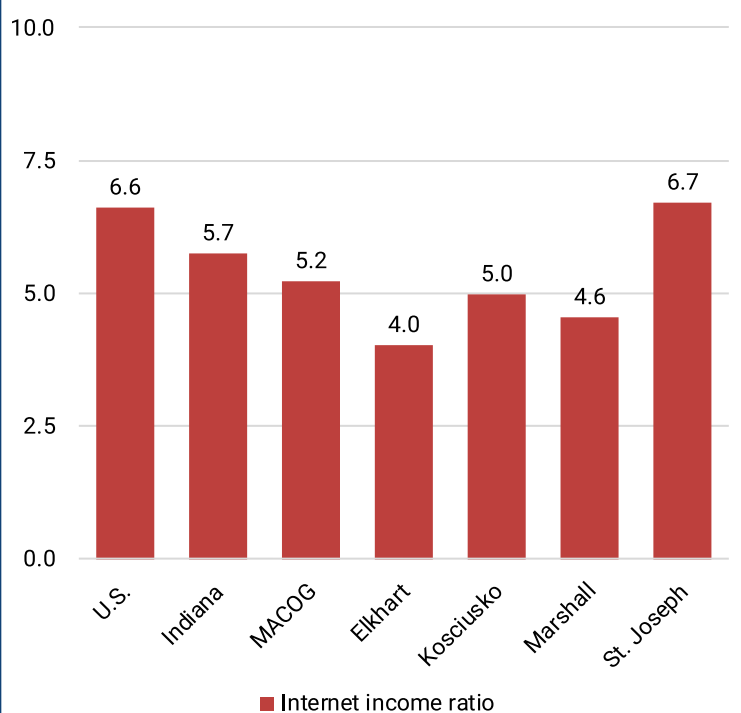
Share of homes without internet access by selected income groups and the internet income ratio, 2019

Source: U.S. Census Bureau American Community Survey 5-Year 2014-2019; PCRD

Percent homes with no internet access by income groups



Internet income ratio in the MACOG region, state, and nation



Next, we look at remote work indicators. Remote work is becoming a feasible economic development strategy, catapulted in part by COVID-19. The region's ability to be remote work friendly is crucial to maintain its competitiveness. **Figure 18** looks at two indicators related to remote work, plotted at the same scale (y-axis). One, is the share of workers ages 16 or older working from home captured by the Census (left). The second is the share of jobs in the region that are remote work friendly (right) as defined by a group of researchers from the University of Chicago looking at occupations and factors that shape the nature of the job as well as the general types of activities associated with the job⁴.

The region had a lower share of workers working from home compared to the state and nation (3.9% versus 4.0% and 5.2%, respectively). Within the region, Kosciusko County had the highest share with 4.2%. However, when removing farmers its share dropped to 3.8%, the second highest in the region. On the other hand, a little more than 30% of jobs in the region were remote work friendly, a lower share compared to the state and nation. St. Joseph County had the highest share of remote work friendly occupations in the region followed by Kosciusko County.

However, the region's remote work potential is underutilized. Assuming that these two indicators are comparable and for discussion's sake, consider that while 30.7% of jobs in the region are remote work friendly, only 3.9% are working from home (including farmers), a gap of more than 26 percentage points! Several reasons may be holding back this potential including a lack of management and/or worker mindset to remote working, lack of remote working or digital skills, and/or a lack of or inadequate digital connectivity or devices (see Figures 7 & 16).

Since digital skills may be holding back the region's remote work potential, we look at the change in jobs requiring digital skills. The Brookings Institution identified the digital skills required for roughly 85% of jobs and grouped them into low (104 occupations), middle (245 occupations), and high (169 occupations).

▼ Figure 18

Percent workers working from home and remote work friendly jobs, 2019

Source: U.S. Census Bureau American Community Survey 5-Year 2014-2019; PCRCD

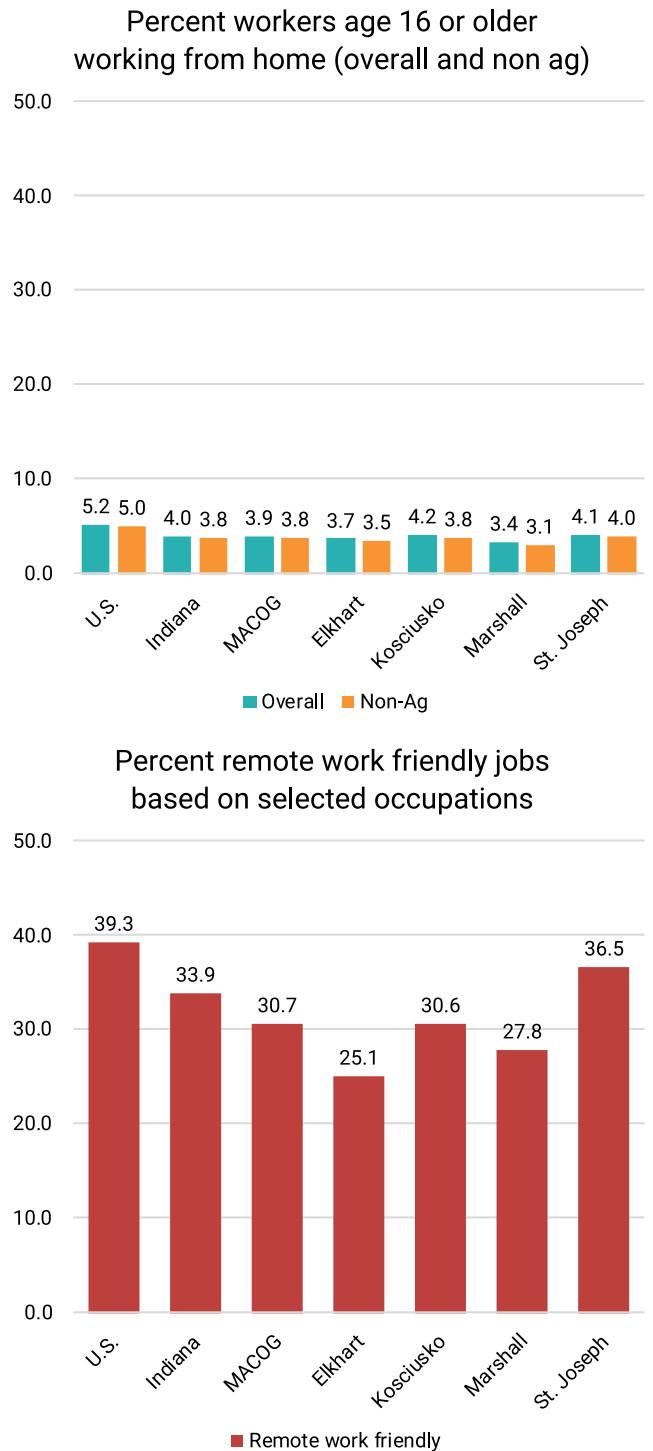


Table 5 shows the 2010-2019 change in these jobs. All counties in the region had a net gain of jobs that required digital skills while the region overall gained roughly 48,216 jobs, of which 41.1% required low digital skills versus 20.5% that required high digital skills. In contrast, the nation also gained jobs that required digital skills but of these, 32.7% required high digital skills versus 37.6% that required low digital skills.

Lastly, we look at the share of digital economy jobs in the region defined by 189 6-digit NAICS code industries shown in Figure 19. While this concept is constantly changing and the metric is updated annually by the Bureau of Economic Analysis, it still provides an idea of a region's level of "digitization". Digital economy jobs pay higher wages and account for an increasing share of the nation's gross domestic product and employment⁵. These jobs fall in industries that range from semiconductors to instruments for measuring industrial process variables to retail industries that rely heavily on e-commerce, including warehousing and distribution. St. Joseph County had the highest share with 15.1% followed by Kosciusko with 13% while

Marshall County had the lowest with 12%. The region's share was lower (13.7%) compared to the state (15.3%) and nation (15.7%).

In summary, the senior gap in the region is larger compared to the homework (children) gap regarding lack of devices. In addition, the share of homes in the region without internet access (17.1%) was higher compared to the share without computing devices (12.9%). The internet income ratio in the region was lower (5.2%) compared to the state (5.7%) and the nation (6.6%). However, this ratio varied across the region with St Joseph County having the highest, even compared to the nation and the state. The remote work potential in the region is underutilized: about 30.7% of jobs in the region are remote work friendly while less than 4% of workers aged 16 or older are working from home. Regarding digital skills and jobs, close to 60% of new jobs in the region during 2010-2019 required middle or high digital skills. Lastly, the share of digital economy jobs in the region was lower compared to the state and nation.

▼ **Table 5**

Change in jobs requiring digital skills by category, 2010-2019

Source: Brookings Institution; EMSI; PCRD

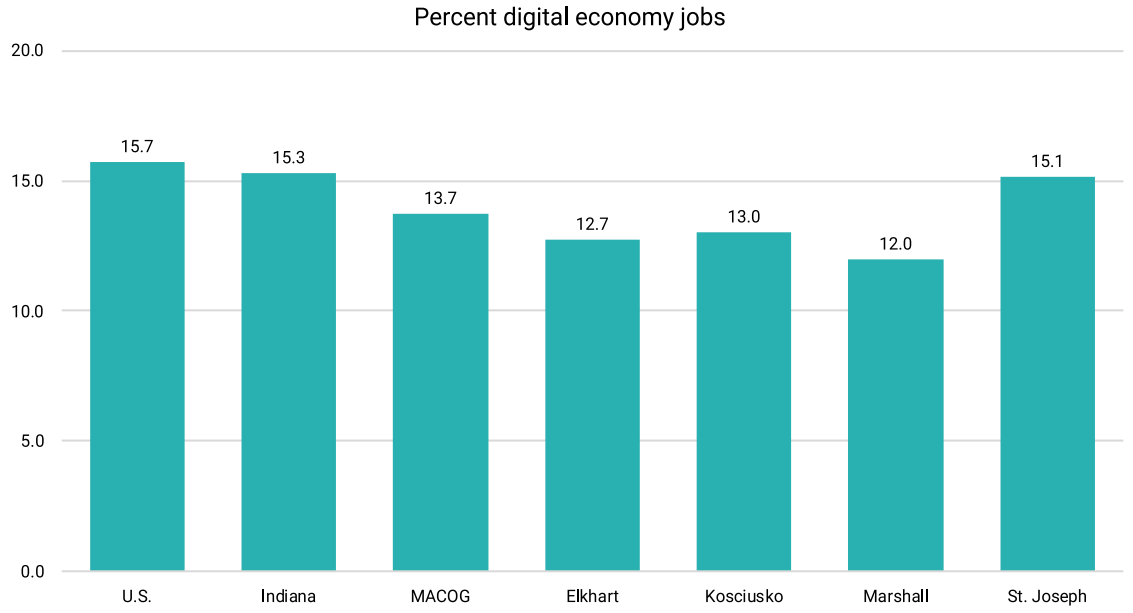
Jobs with Digital Skills Identified	Total			Digital Skill Level Change		
	2010	2019	Difference	Low	Middle	High
U.S.	153.3 m	179.1 m	25.8 m	9.7 m	7.6 m	8.4 m
Indiana	3.0 m	3.5 m	414,204	155,632	158,585	99,987
MACOG	293,119	341,335	48,216	19,800	18,508	9,908
Elkhart	99,968	130,235	30,268	13,771	11,742	4,754
Kosciusko	37,743	43,459	5,716	1,760	2,407	1,549
Marshall	21,023	21,956	932	573	408	-49
St. Joseph	134,385	145,684	11,300	3,696	3,950	3,654

⁵digital-economy-infographic-2019-reduced-size ([bea.gov](https://www.bea.gov))

Figure 19 ▶

Share of digital economy jobs in the region, 2019

*Source:
Bureau of Economic
Analysis; EMSI; PCRD*



VII

CONCLUSIONS

As the digital age continues to unfold, it is important to understand the region's state of digital inclusion to leverage advantages and address disadvantages as the region transitions into a digital society and economy. This report looked at multiple variables from multiple sources, including a home survey, to provide a robust understanding of the state of digital inclusion in the region. The following are some key takeaways:

1 Validate broadband data.

Multiple data sources paint a different picture when it comes to broadband availability in the region. The FCC data show virtually all the region's housing units have access to advertised 25/3 Mbps (see Table 1). However, Census data indicate that roughly 17.1% do not have internet at home (see Figure 16) while the home survey conducted indicated 8.3% of respondents did not have home internet service (see Figure 8). In addition, and according to the home survey, homes without internet service are scattered throughout the region (see Figure 9) and are not located in specific areas (e.g., outside cities and towns).

2 Quality internet is the issue.

When looking at a faster speed threshold of 100/20 Mbps, a wider accessibility gap is visible in the region. On the other hand, data from Microsoft show that a little more than 63% of the region's population did not use the internet at a minimum download speed of 25 Mbps (see Figure 5). In fact, speed data results show that median speeds in the region were well below the 25/3 threshold (see Figures 3 & 4). Furthermore, the home survey found that roughly 64% of respondents with home internet service were unsatisfied due to service being too slow or unreliable (see Figure 10). On top of this, a little more than one-third of speed tests completed as part of the survey did not meet the 25/3 criteria (see Table 4). This is not surprising given that about one-third of survey respondents had DSL service at home (see Figure 8), the technology with the slowest advertised speeds (see Table 2).

3 Disparities between counties and groups in the region affect regional economic and workforce development.

Both the homework (children) and senior gap need to be addressed (see Figure 15) since they undermine workforce development and quality of life in the region. Likewise, efforts to reduce inequality are warranted. For example, although St. Joseph County performed well when looking at several indicators, it had the highest inequality when it came to internet access by household income. In addition, the region's remote work potential needs to be unleashed (see Figures 7 & 17). A way to do this is to improve the region's quality connectivity and affordability as well as digital skills since two-thirds of new jobs required middle to high digital skills (see Table 5).

Based on these key takeaways, three main recommendations are outlined:

1 Establish a regional broadband taskforce.

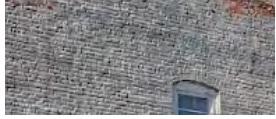
This taskforce will be responsible for working with providers in the region as well as working with regional stakeholders. The taskforce should also coordinate regional efforts when it comes to broadband. For example, the regional taskforce can coordinate efforts for locations in the region that wish to apply for the Indiana Connectivity Program. Or, this taskforce can also work with local governments to streamline permitting, right of ways and/or easements to ensure providers have the same requirements and/or experience throughout the region regardless of county. Lastly, this taskforce can also work with the Indiana Broadband Office to certify the region as broadband ready.

2 Allow communities to validate data.

This can be done by approaching community leaders (e.g., county commissioners, local or regional economic development organizations, etc.) that have a very good idea of where quality internet is available and where it is not. Continue completing speed tests (see <https://pcrd.purdue.edu/speedtest>) throughout the region as often as possible. These data are critical to paint a different picture of the region's connectivity and needs to policymakers. Lastly, a regional approach is a must since it pools resources and streamlines policies that can help improve providers' return on investment.

3 Make other digital inclusion components an economic development priority.

Although connectivity is the most popular issue around digital exclusion, devices and skills are also important to address. Partner with schools and other community anchor institutions to explore ways to not only expand connectivity but also improve digital skills. Document existing business (including moms and pops) around information technology and digital transformation needs as part of business retention efforts. Also, frequently gauge the level of digital skills among the region's population and workers to better inform related strategies. Provide remote work training to managers and employees and renovate existing facilities for co-working spaces, to host or nest remote workers. Also, provide training and technical support to entrepreneurs and micro businesses so their online presence is effective and efficient. Lastly, educate community leaders about the changing social and economic landscape because of the digital age—take advantage of the increase in awareness on this topic spurred by COVID-19—to ensure efforts have the required support and resources but most importantly, visions for the region's digital transformation are established.



VIII



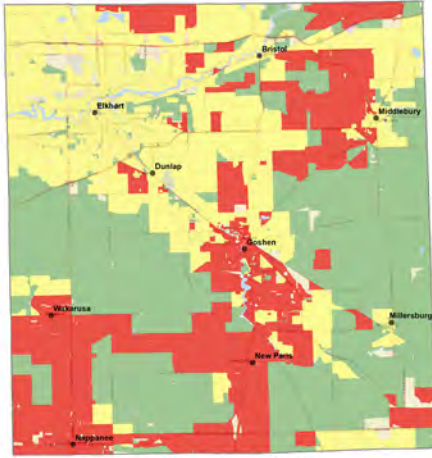
APPENDIX



25/3 Mbps Footprint by Technology in Elkhart County, 2020
 Source: FCC Form 477 June 2020

2020 MACOG Broadband - 25/3 Mbps Footprint

- Fiber
- Cable
- Fixed Wireless
- DSL

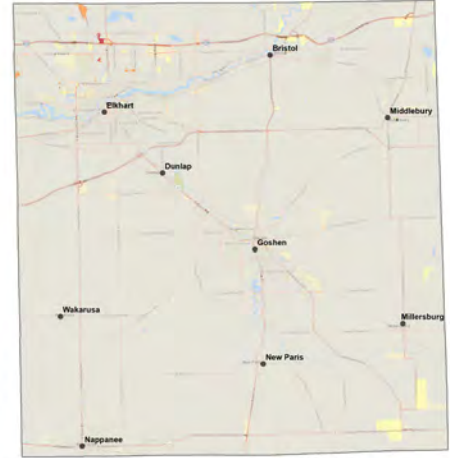


Note: Data are mapped on a census block level. Source: FCC Form 477 June 2020 v1

25/3 Mbps Coverage Footprint in Elkhart County, 2020
 Source: FCC Form 477 June 2020

2020 Indiana Broadband - Housing Units with no access to 25/3 Mbps

- Housing Units**
- Less than 10
 - 10 - 49
 - 50 or more
 - Access to 25/3 Mbps

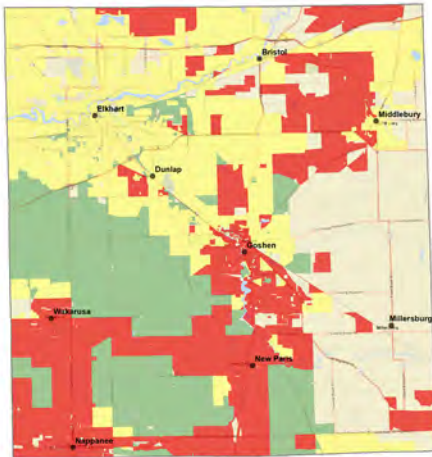


Note: Data are mapped on a census block level; housing units estimates are from 2019. Source: FCC Form 477 June 2020 v1

100/20 Mbps Footprint by Technology in Elkhart County, 2020
 Source: FCC Form 477 June 2020

2020 MACOG Broadband - 100/20 Mbps Footprint

- Fiber
- Cable
- Fixed Wireless
- DSL

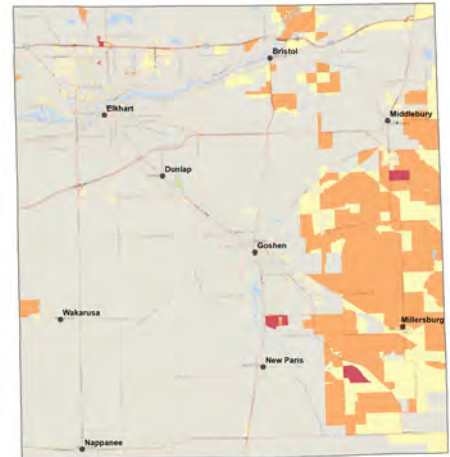


Note: Data are mapped on a census block level. Source: FCC Form 477 June 2020 v1

100/20 Mbps Coverage Footprint in Elkhart County, 2020
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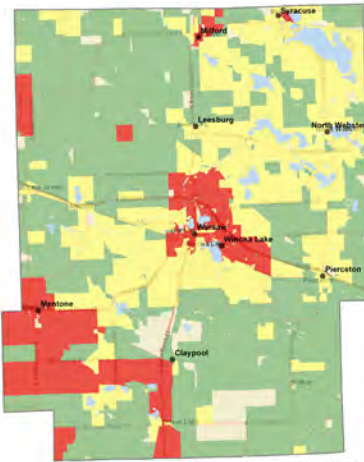


Note: Data are mapped on a census block level; housing units estimates are from 2019. Source: FCC Form 477 June 2020 v1

25/3 Mbps Footprint by Technology
in Kosciusko County, 2020
Source: FCC Form 477 June 2020

2020 MACOG
Broadband
-
25/3
Footprint

- Fiber
- Cable
- Fixed Wireless
- DSL



Note: Data are mapped on a census block level.
Source: FCC Form 477 June 2020 v1

25/3 Mbps Coverage Footprint in
Kosciusko County, 2020
Source: FCC Form 477 June 2020

2020 Indiana
Broadband
-
Housing Units
with no access to
25/3 Mbps

- Housing Units**
- Less than 10
 - 10 - 49
 - 50 or more
 - Access to 25/3 Mbps

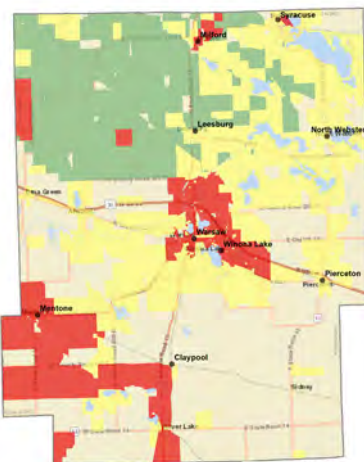


Note: Data are mapped on a census block level.
housing units estimates are from 2019.
Source: FCC Form 477 June 2020 v1

100/20 Mbps Footprint by Technology
in Kosciusko County, 2020
Source: FCC Form 477 June 2020

2020 MACOG
Broadband
-
100/20
Footprint

- Fiber
- Cable
- Fixed Wireless
- DSL



Note: Data are mapped on a census block level.
Source: FCC Form 477 June 2020 v1

100/20 Mbps Coverage Footprint in
Kosciusko County, 2020
Source: FCC Form 477 June 2020

2020 Indiana
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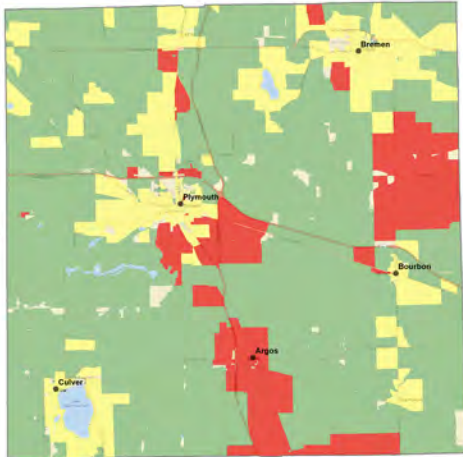
Note: Data are mapped on a census block level.
housing units estimates are from 2019.
Source: FCC Form 477 June 2020 v1

25/3 Mbps Footprint by Technology in Marshall County, 2020

Source: FCC Form 477 June 2020

2020 MACOG Broadband - 25/3 Mbps Footprint

- Fiber
- Cable
- Fixed Wireless
- DSL



Note: Data are mapped on a census block level. Source: FCC Form 477 June 2020 v1

25/3 Mbps Coverage Footprint in Marshall County, 2020

Source: FCC Form 477 June 2020

2020 Indiana Broadband - Housing Units with no access to 25/3 Mbps

- Housing Units**
- Less than 10
 - 10 - 49
 - 50 or more
 - Access to 25/3 Mbps



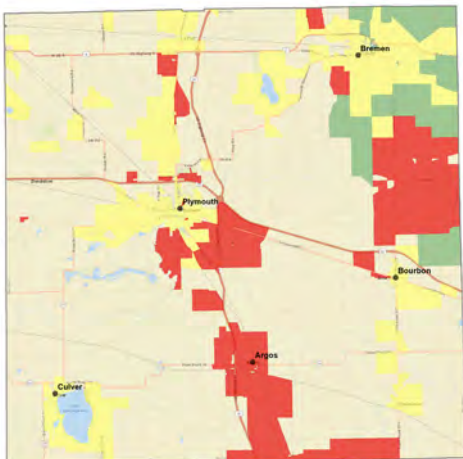
Note: Data are mapped on a census block level; housing units estimates are from 2019. Source: FCC Form 477 June 2020 v1

100/20 Mbps Footprint by Technology in Marshall County, 2020

Source: FCC Form 477 June 2020

2020 MACOG Broadband - 100/20 Mbps Footprint

- Fiber
- Cable
- Fixed Wireless
- DSL



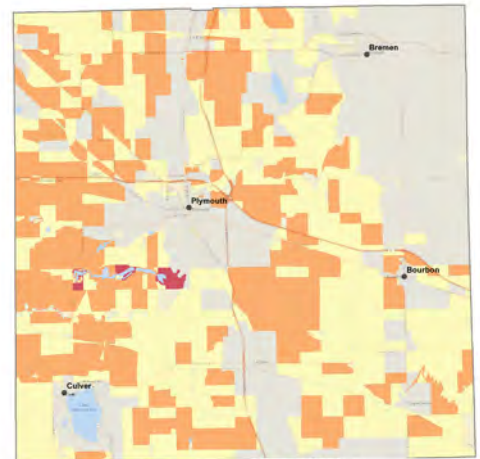
Note: Data are mapped on a census block level. Source: FCC Form 477 June 2020 v1

100/20 Mbps Coverage Footprint in Marshall County, 2020

Source: FCC Form 477 June 2020

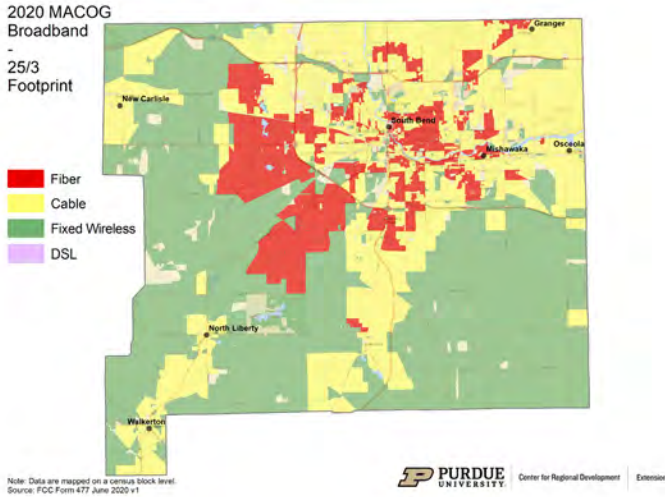
2020 Indiana Broadband - Housing Units with no access to 100/20 Mbps

- Housing Units**
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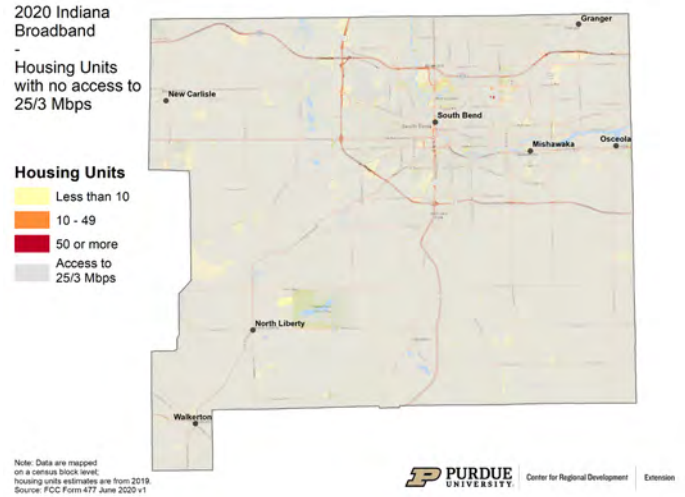


Note: Data are mapped on a census block level; housing units estimates are from 2019. Source: FCC Form 477 June 2020 v1

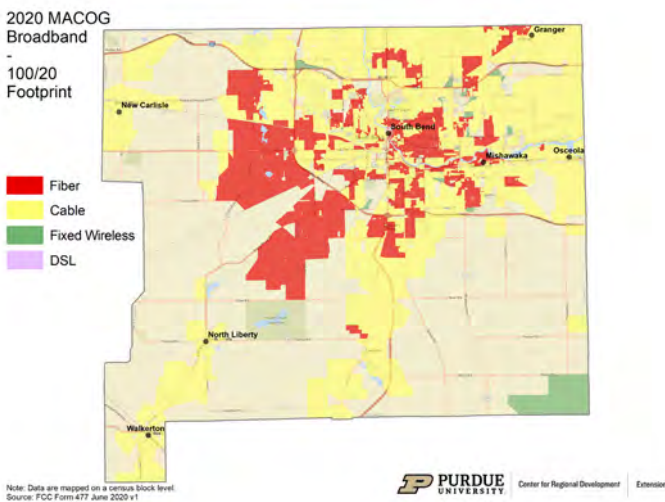
25/3 Mbps Footprint by Technology
 in St. Joseph County, 2020
 Source: FCC Form 477 June 2020



25/3 Mbps Coverage Footprint in St. Joseph County, 2020
 Source: FCC Form 477 June 2020



100/20 Mbps Footprint by Technology
 in St. Joseph County, 2020
 Source: FCC Form 477 June 2020



100/20 Mbps Coverage Footprint in St. Joseph County, 2020
 Source: FCC Form 477 June 2020

