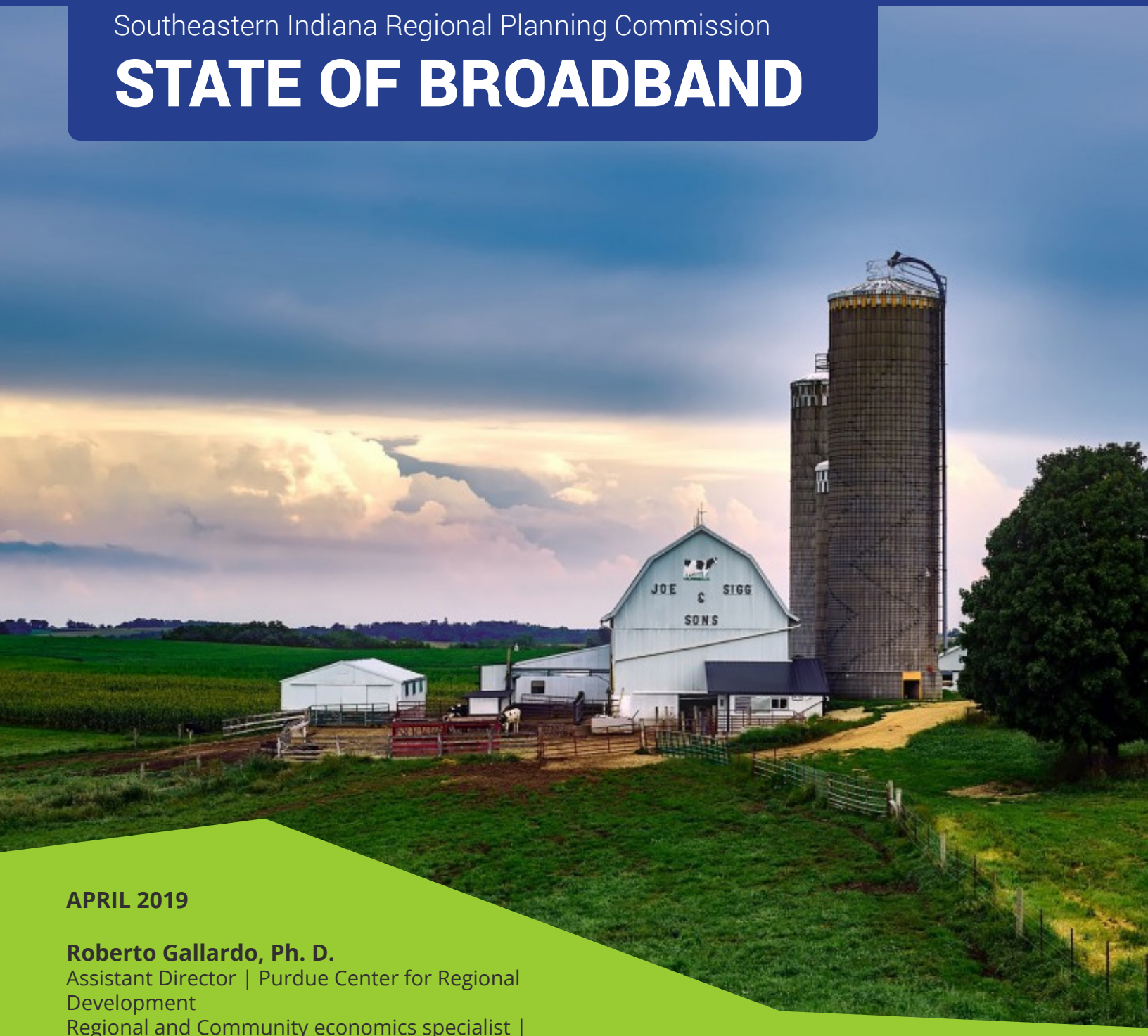
Southeastern Indiana Regional Planning Commission

STATE OF BROADBAND



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The main objective of this report is to increase awareness of the state of broadband availability in the nine counties that are part of the Southeastern Indiana Regional Planning Council (SIRPC) region and its implications. A summary of the most popular broadband technologies is discussed as well as broadband deployment and/or upgrading models that could be considered.

Data for this report were obtained from the Federal Communications Commission (FCC) Form 477 as of December 2017, Microsoft 2018 data, and from the 2013-2017 American Community Survey. The FCC dataset includes only fixed broadband technology (excluding satellite[1]) and those records that met the minimum 25 Megabits per second (Mbps) download and 3 Mbps upload broadband threshold established by the FCC, or 25/3 for short[2]. It is important to note that the data on the cost of broadband service is not available, a key factor that can contribute to, or impede, broadband adoption.

The main findings of the report are outlined below. Next steps and policy recommendations are discussed in the concluding section on page 42:

[1]Satellite has latency, weather, and data plan related issues that undermine its broadband potential.
[2]https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0202/FCC-18-10A1.pdf (speed benchmark is discussed on page 6)

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saw an increase in
DIGITAL ECONOMY JOBS
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DIGITAL ECONOMY JOBS
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Counties had the highest increase in digital economy jobs
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6,600
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5 DAYS
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63%
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of respondents perceived their productivity
INCREASED
due to electronic devices.

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50% OR LESS
of respondents did not often or very often read different news sources from normal or confirm political information.

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10.65
different ways over the past year, at least once monthly

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80%
or more of **SIRPC** homes reported not earning money online.

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or more of **SIRPC** homes said no promotions were obtained due to online credentials/training

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41%
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INTRODUCTION

The main objective of this report is to increase awareness of the state of broadband infrastructure and adoption in the nine counties that are part of the Southeastern Indiana Regional Planning Commission (SIRPC) region. This increased awareness should lead to meaningful discussions regarding broadband in the region and ways to address identified gaps.

This report consists of multiple sections. The first section provides an overview of the most popular broadband technologies. While not meant to be technical, this overview should provide readers a basic understanding of the different broadband technologies available. The following section discusses, in very general terms, broadband deployment or upgrading models the SIRPC region could pursue. These models were differentiated for purposes of discussion but, in reality, they overlap significantly.

Publicly available data were utilized to analyze the state of broadband in the region in the next section. Data for this report was obtained from the Federal Communications Commission (FCC) Form 477 as of December 2017 (v1), the 2013-2017 American Community Survey and a recently released dataset from Microsoft. While the FCC dataset includes all fixed broadband providers (excluding satellite[3]) and/or reported advertised speeds, the analysis included only those that met

[3]Satellite is not included since it has latency, weather, and data plan related issues although it is considered a fixed broadband technology.

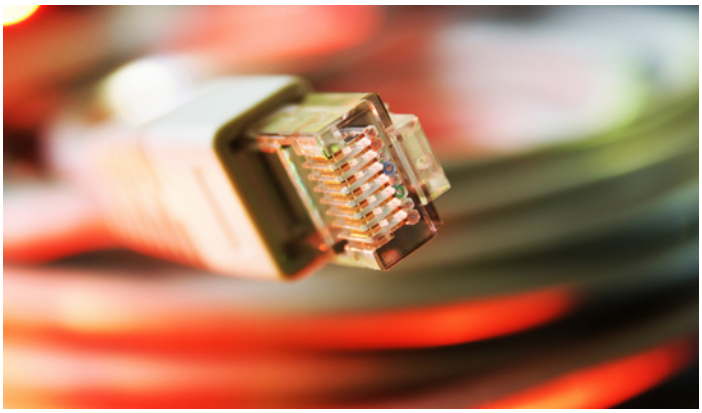
BROADBAND TECHNOLOGY

the minimum 25 megabits per second (Mbps) download and 3 megabit per seconds upload, or 25/3, FCC broadband threshold.

Next, results from a household digital readiness survey conducted in the region are discussed. This digital readiness includes detailed information regarding device & internet access, digital resourcefulness & internet utilization, and internet benefits & impact among households in the region. This analysis helps identify areas that need improvement as well as how the region is benefitting from the technology. More importantly, it can guide future efforts to improve digital literacy and educational efforts in the region.

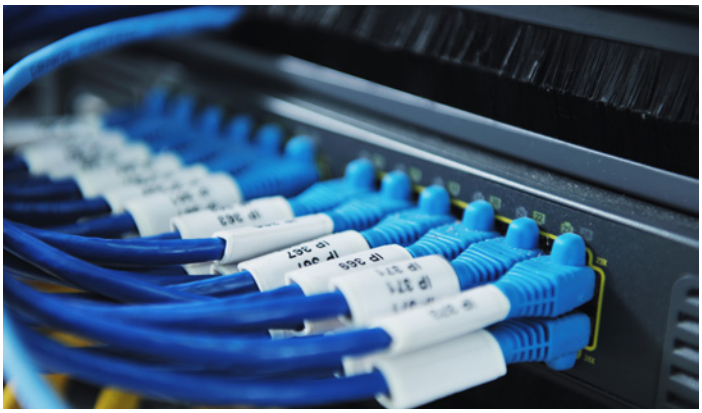
Lastly, a concluding section wraps-up this report where potential next steps and policy recommendations are discussed.

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[4], 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.



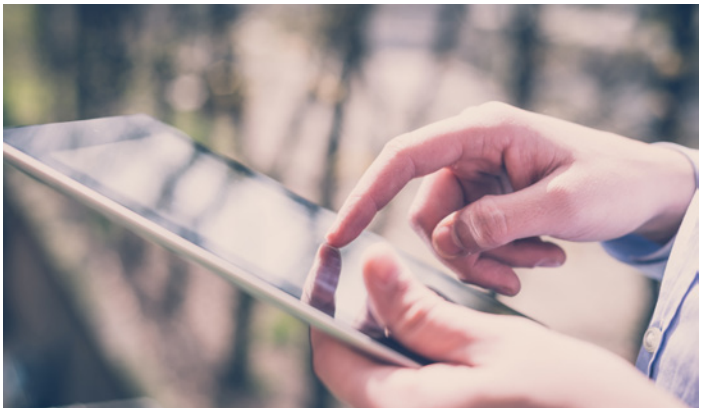
CABLE MODEM:

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.

[4]https://www.fcc.gov/general/types-broadband-connections

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.

BROADBAND DEPLOYMENT MODELS

There is no one-size-fits-all model when deploying or upgrading broadband infrastructure

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 SIRPC 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.

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.

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.

PRIVATE SECTOR:

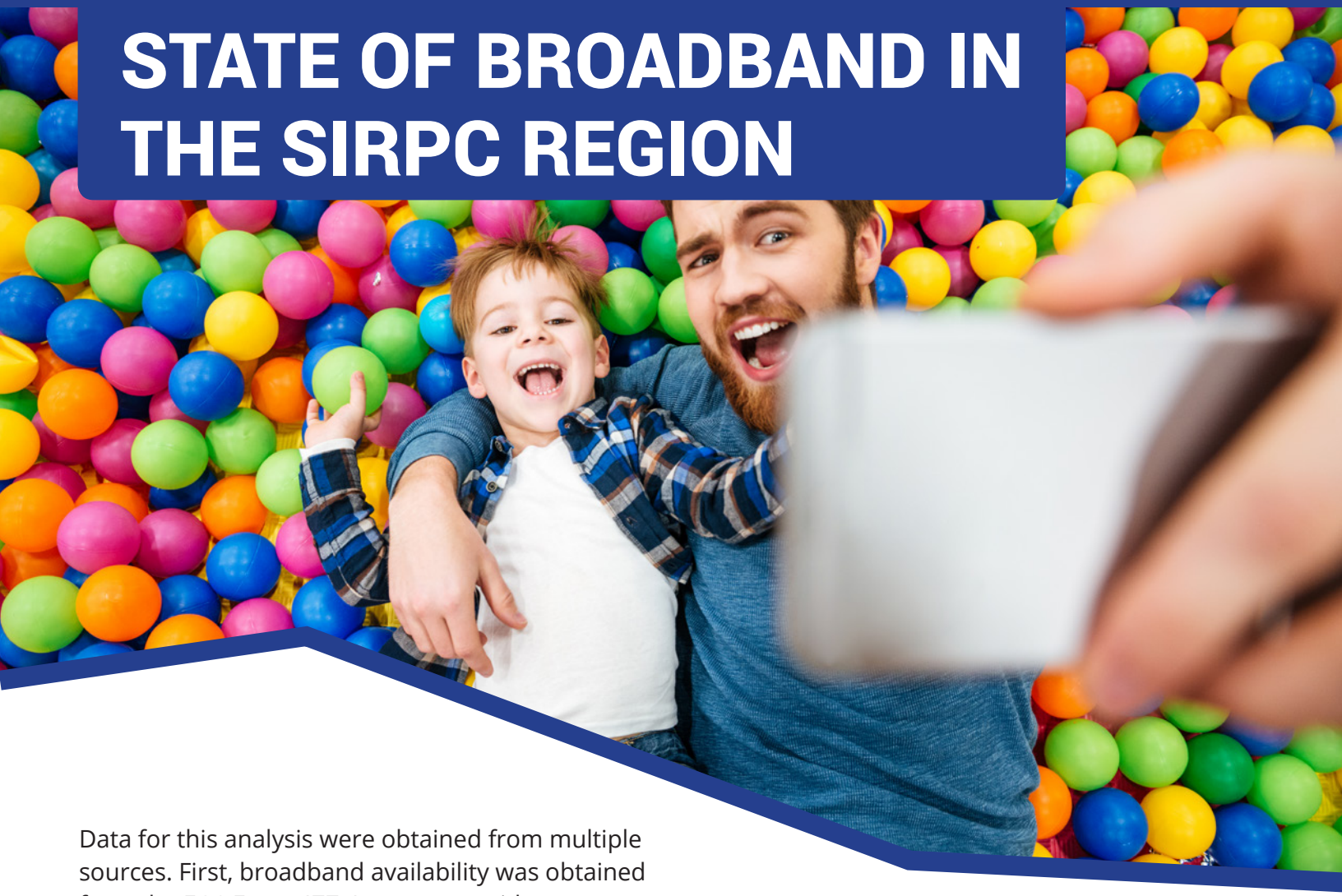
this model calls for communities and residents in the region to reach out to private broadband providers, including wireless internet service providers (WISPs), to upgrade or expand their footprint. The region can work with federal and/or state agencies to design innovative public policies to help address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

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.

STATE OF BROADBAND IN THE SIRPC REGION



Data for this analysis were obtained from multiple sources. First, broadband availability was obtained from the FCC Form 477. Internet providers are required to file their maximum advertised speeds (download and upload) as well as the technologies available twice per year at the census block level using this form. The dataset used in this analysis was the December 2017 v1 and includes fixed broadband only[5]. A couple of disclaimers regarding this dataset is worth discussing.

First, the data is a little over a year old. Additional broadband investments may have occurred over the past year in the region and not included in this report. For this reason, the maps and figures/tables presented here may be inaccurate regarding up to date broadband availability. Second and more importantly, is that this analysis may overestimate broadband availability for three reasons. First, the data were self-reported from carriers and their accuracy was not validated by customers or by third-party entities. Second, geographic granularity is limited to the census block level and if a household or business has access to broadband within that block, the entire block is considered served. Lastly, speeds are maximum advertised speeds. However, especially with DSL, the actual speeds rarely achieve the maximum advertised speeds consistently, influenced by the time of day, the customer's distance from the broadband infrastructure, and the customer's device used to connect to the internet.

[5]Fixed broadband does not include mobile wireless; includes DSL, Cable, Fiber, Fixed Wireless, and others.

Another dataset utilized was one released by Microsoft in late 2018[6]. The Microsoft dataset was obtained from its own records and server logs during September of 2018 when electronic devices downloaded Microsoft Windows and/or Office updates as well as using the Bing search engine and Xbox gaming consoles. With these download records, Microsoft calculated the percent of the population in a specific county using the internet at 25 Mbps or more. Note that this dataset paints a different picture compared to the FCC dataset in one key way: Microsoft data shows actual—not advertised—download speeds (upload speeds are not available). However, it is not clear from the data how many download records were utilized per county nor the time of day these took place. Also, keep in mind broadband infrastructure and network design issues can affect these measurements as well.

Lastly, the U.S. Census American Community Survey (ACS) 5-Year 2013-2017 dataset was utilized. While this dataset is based on modeling and has a margin of error (MOE), this MOE does not affect the analysis discussed since no comparisons over time were conducted.

RESIDENTIAL BROADBAND

Table 1 lists the residential fixed broadband providers identified from the FCC Form 477 December 2017 v1[7] dataset that met the 25/3 criteria. As seen in Table 1, twelve providers in the SIRPC region met this criteria. Remember satellite providers were excluded. Comcast has the largest footprint in the region with a presence in all but two counties.

Table 1. List of residential fixed broadband providers in the SIRPC region as of December 2017

Residential 25/3 Provider Name	Counties served
AT&T Services, Inc.	Shelby
Central Indiana Communications, Inc.	Shelby
CenturyLink, Inc.	Dearborn; Ohio; Shelby*; Switzerland
Charter Communications, Inc.	Dearborn; Franklin*; Jefferson; Switzerland
Cincinnati Bell Telephone Company LLC	Dearborn; Franklin
CMN-RUS, Inc.	Jefferson; Jennings
Comcast Cable Communications, LLC	Dearborn; Decatur; Franklin*; Jennings; Ohio; Ripley; Shelby
Enhanced Telecommunications Corp.	Dearborn; Decatur; Franklin; Ripley
Joink, LLC	Dearborn*
Metro Fibernet, LLC	Jefferson; Jennings
Southeastern Indiana Rural Telephone Coop	Dearborn; Jefferson; Jennings; Ohio*; Ripley; Switzerland
TDS Telecommunications Corporation	Decatur; Shelby

MAJOR FINDING

There were

12

residential providers of

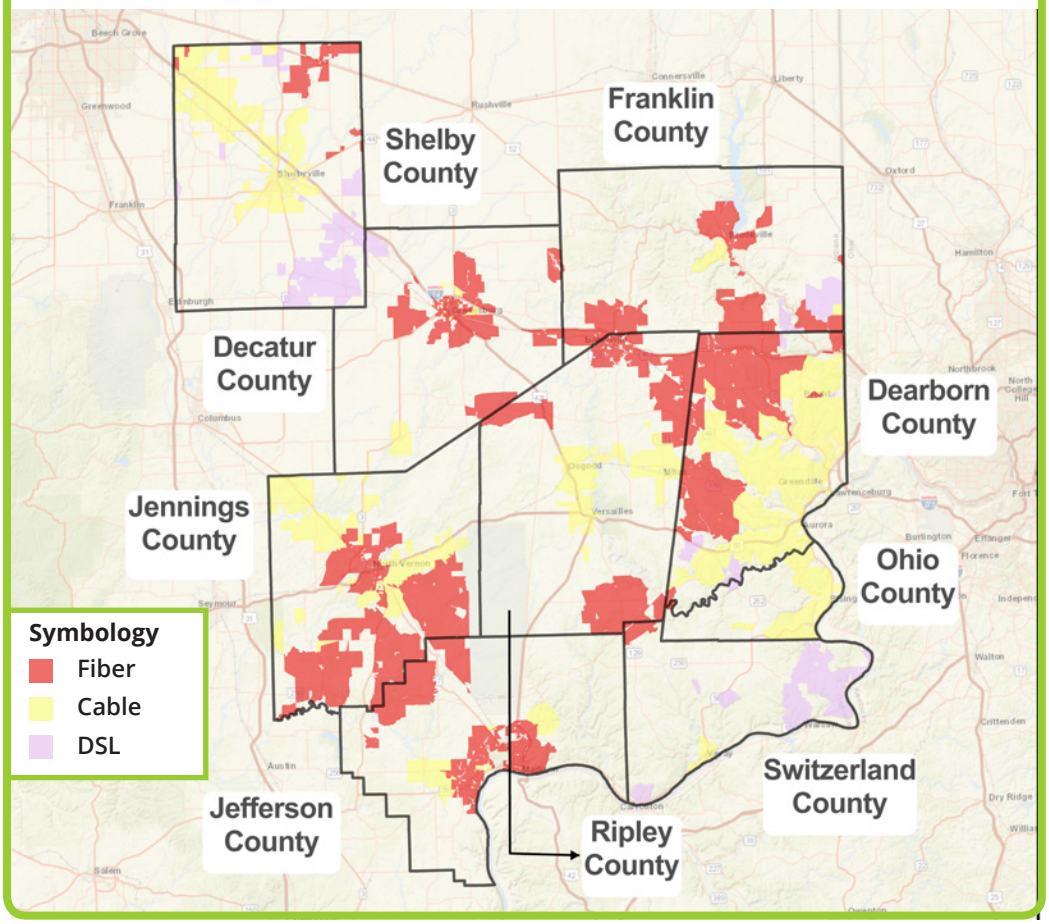
25/3

as of December 2017

Source: FCC Form 477 December 2017 v1; * Note: ten or less records were reported from that provider in that county.

[6]https://news.microsoft.com/rural-broadband
[7]Two providers in the region submitted more recent data from December 2018.

Figure 1.
25/3 residential broadband footprint in the SIRPC region



Source: FCC Form 477 December 2017 v1

Table 2. 2010 Population with access to 25/3 by SIRPC counties

County	Population	No Prov.	One Prov.	Two Prov.	Three Prov.	% No Prov.
Dearborn	50,047	3,521	26,241	19,285	1,000	7.0
Decatur	25,740	9,144	5,568	11,028		35.5
Franklin	23,087	13,205	9,412	470		57.2
Jefferson	32,428	9,154	3,706	197	19,371	28.2
Jennings	28,525	6,909	12,271	782	8,563	24.2
Ohio	6,128	2,136	2,731	1,261		34.9
Ripley	28,818	11,300	17,383	135		39.2
Shelby	44,436	11,077	17,285	16,074		24.9
Switzerland	10,613	6,768	2,110	1,735		63.8
SIRPC	249,822	73,214	96,707	50,967	28,934	29.3

Source: FCC Form 477 December 2017 v1; US Decennial Census 2010

MAJOR FINDING

HOMES in the **SIRPC** region were served mainly by **FIBER & CABLE**

The 25/3 broadband residential footprint in the SIRPC region is shown on Figure 1. The SIRPC region is primarily served by fiber (red) and cable (yellow). The southeastern corner of Shelby and Franklin Counties as well as the eastern part of Switzerland County are served primarily by DSL (light purple). Notice however that areas exist in the region unserved by fixed broadband 25/3.

Table 2 shows that close to 30 percent or about 73,200 residents of the 2010 SIRPC population[8] did not have access to any 25/3 providers. Franklin and Switzerland counties had the highest share while Dearborn County had the lowest with seven percent.

[8]Population at the census block level is only available from the decennial census. Although the population is 2010, the actual broadband footprint is from December 2017.

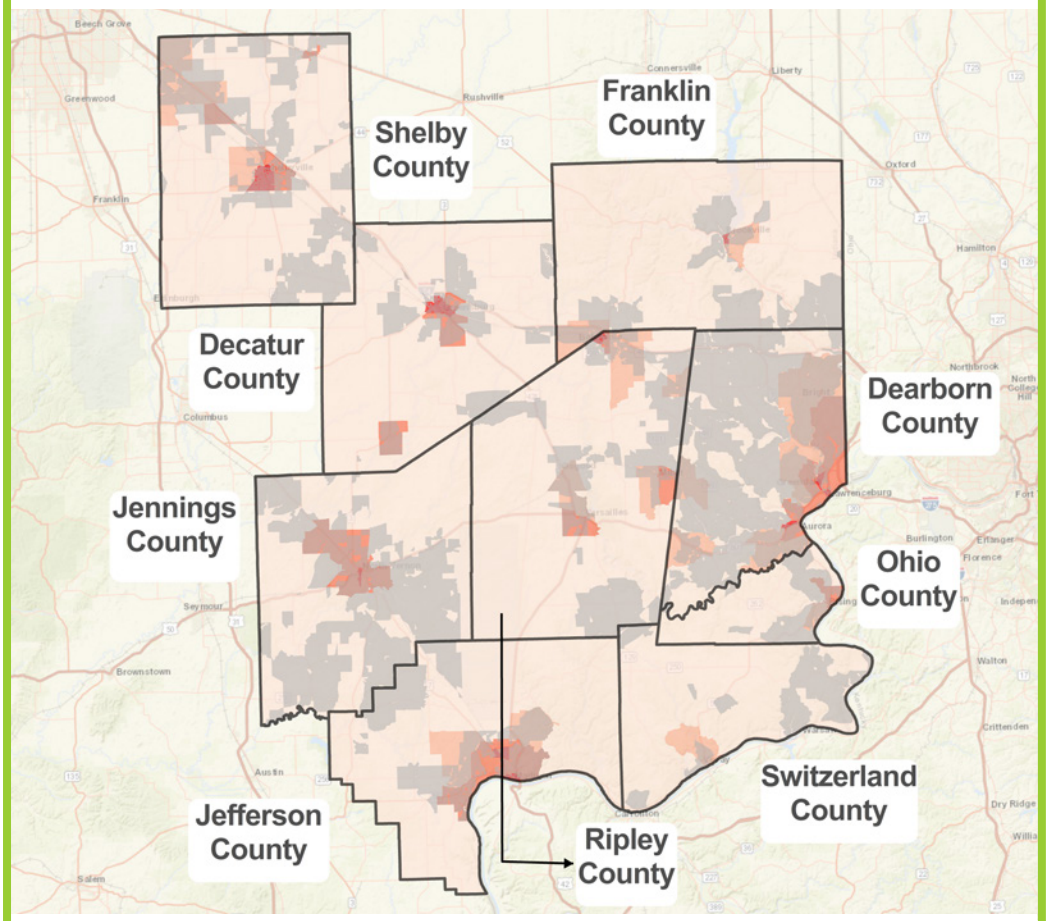
MAJOR FINDING
Figure 1

30%
of SIRPC residents lacked access to
25/3

MAJOR FINDING
Table 2

SWITZERLAND County has the highest share of **UNSERVED POPULATION**

Figure 2.
Household density and residential broadband footprint



Symbology Household Density

Broadband Footprint
1-49
50-99
100-499
500-2,893

Source: FCC Form 477 December 2017 v1 and U.S. Census Bureau

Although the amount of residents in the SIRPC not having access to 25/3 is shy of 30 percent, Figure 2 shows that the densest areas (dark orange) of the region are inside the broadband footprint (gray). What this means is that those without coverage are in least dense areas making it more challenging for providers to serve them. Public private efforts will have to take place to ensure these least dense areas have access to fixed 25/3 broadband.

Table 3. Percent 2017 population not using the internet at 25 megabits per second (Mbps)

County	2017	Population not using internet at 25 Mbps	Percent
Dearborn	49,564	32,960	66.5
Decatur	26,480	19,939	75.3
Franklin	22,835	20,985	91.9
Jefferson	32,293	26,513	82.1
Jennings	27,840	23,915	85.9
Ohio	5,911	5,131	86.8
Ripley	28,372	23,038	81.2
Shelby	44,339	31,392	70.8
Switzerland	10,617	9,736	91.7
SIRPC	248,251	193,609	78.0
Indiana	6.6 million	4.3 million	64.7
U.S.	321 million	162.9 million	50.4

Source: Microsoft; US Census ACS 5 Year 2013-2017

Now, let's take a look at the Microsoft data. Remember that the Microsoft data showcases the percent of the population that did not use the internet at 25 Mbps. According to Microsoft and shown in Table 3, more than three-quarters (78 percent) or about 193,600 residents in the SIRPC region did not use the internet at 25 Mbps speeds.

MAJOR FINDING
Table 3

78%

of SIRPC residents did not use

25 Mbps

MAJOR FINDING
Table 3

More than **90%** of residents in **FRANKLIN & SWITZERLAND** Counties did not use

25 Mbps

MAJOR FINDING
Table 3

SIRPC residents experience different **DOWNLOAD** speeds than what is **ADVERTISED**

Notice a significant contrast to the FCC data that shows broadband access based on maximum advertised speeds, not actual speeds. Dearborn County, which also had the lowest percent of population without access to 25/3 according to the FCC data, had the lowest percent of its population not using the internet at 25 Mbps download speeds with 66.5 percent while the SIRPC's region figure was 78 percent, higher than the state's 64 percent and the nation's 50 percent. Franklin and Switzerland counties had the highest share of their population—more than 90 percent—not using the internet at 25 Mbps download and both also had the highest share of their population without access to 25/3 per FCC data.

These discrepancies exist because it really depends on how broadband is measured—advertised speeds versus actual use speeds—resulting in vastly different pictures. For this reason, it is critical that the region validate and assess the broadband footprint. Ways to do this can include household surveys, focus groups, town halls, social media engagements, etc.

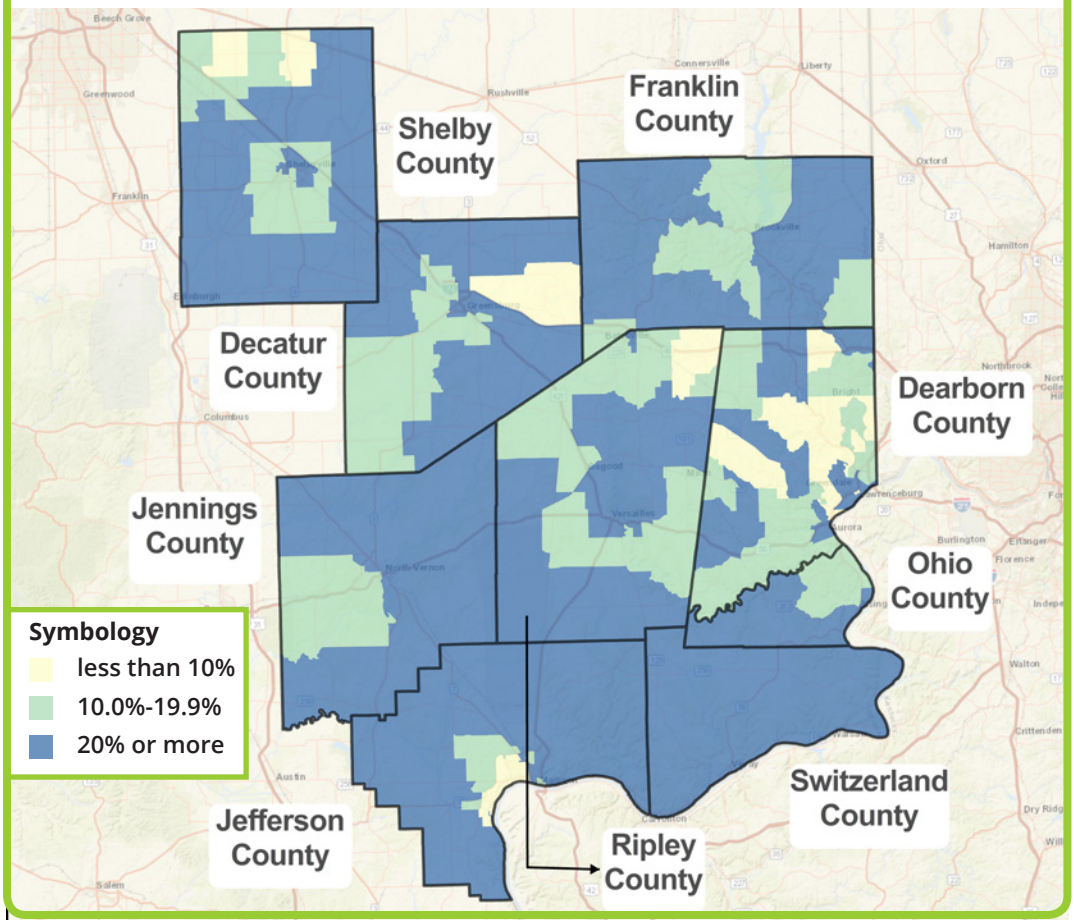
DIGITAL INEQUALITY

It is important to remember that the digital divide not only consists of infrastructure, but also broadband adoption (measured as subscribing) and computing device ownership. Adoption is critical because the quality of life improvement potential of this technology does not play out if it is not adopted and used. Likewise, type of computing devices owned along with internet subscriptions are key to understand because certain devices and/or subscriptions augment the technology's potential while others undermine it.

Figure 3 below shows block groups in the SIRPC region divided in three groups based on the percent of households with no internet access (not subscribing). Notice how the majority of the block groups in the southern part of the region had 20 percent or higher of homes not subscribing to the internet (darker color) and all block groups in Switzerland County had 20 percent or more of homes not subscribing.

Not surprising, Switzerland County had the highest share of homes not subscribing with 30.6 percent while Dearborn had the lowest with 17.6 percent. Overall, almost one-quarter (23 percent) of homes or about 22,200 in the SIRPC region did not subscribe to the internet, higher than the state's 20.2 percent and nation's 17.6 percent. Reasons for not subscribing is not available in the dataset but it typically has to do with user's age, cost, quality of service, and/or lack of relevance.

Figure 3.
Percent households with no internet access (not subscribing)

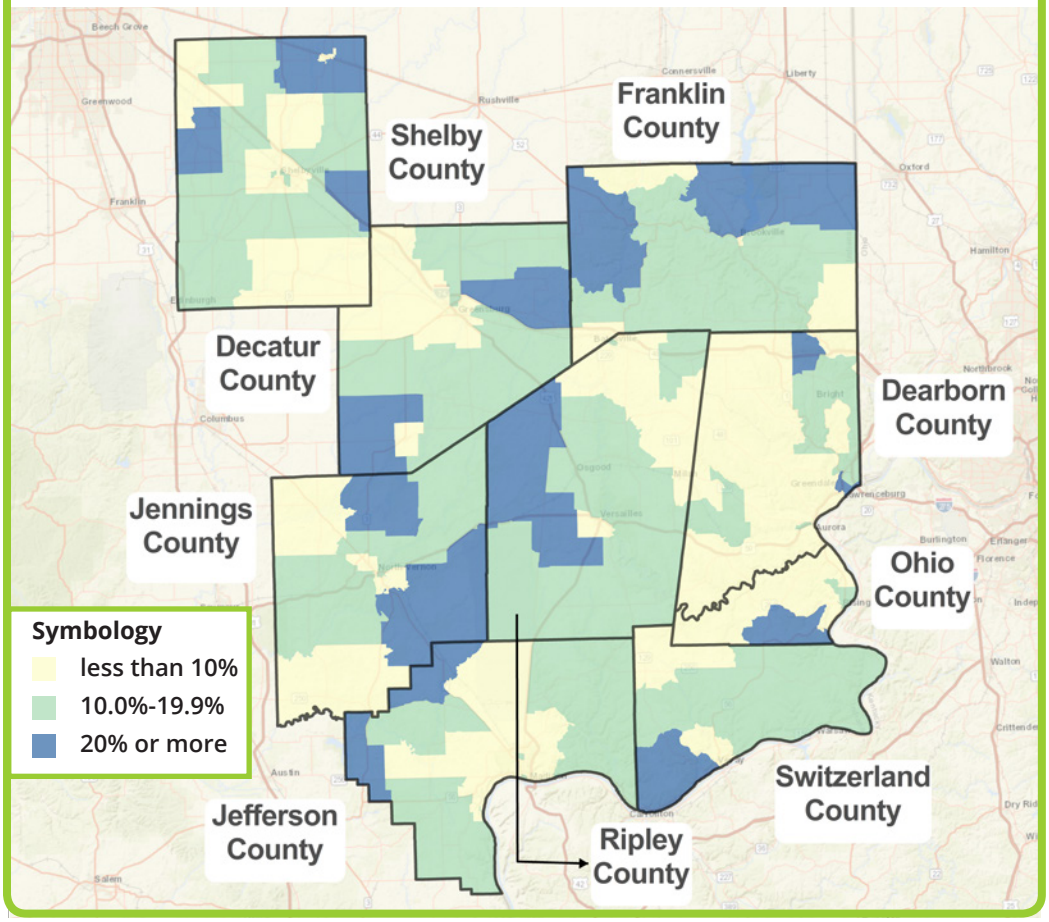


Source: FCC Form 477 December 2017 v1

MAJOR FINDING

1/4 of homes in the **SIRPC** region have no **INTERNET SUBSCRIPTION**

Figure 4.
Percent households with cellular only internet subscriptions



Source: FCC Form 477 December 2017 v1

MAJOR FINDING
Figure 4

10%
of **SIRPC** residents **only** access the internet through their
CELLULAR DATA PLANS

MAJOR FINDING
Figure 4

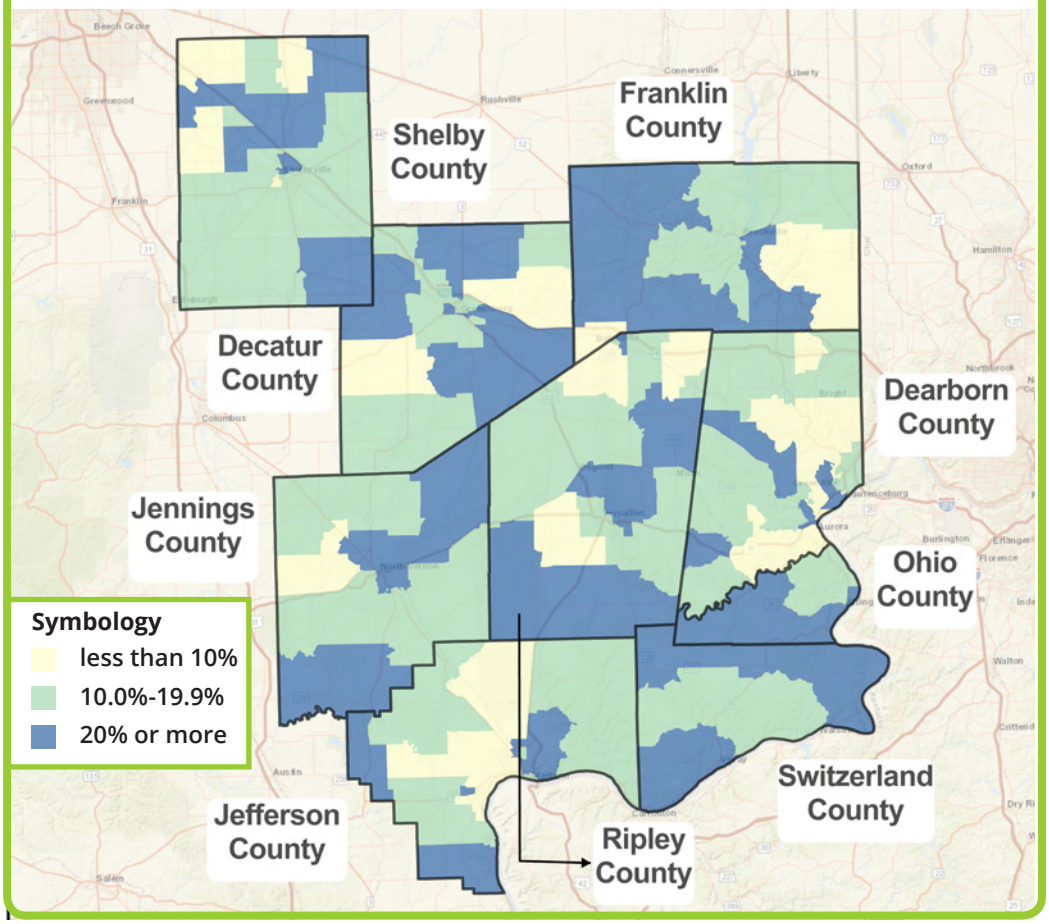
FRANKLIN COUNTY
residents have the highest share of cellular only internet subscriptions at
15%

MAJOR FINDING
Figure 4

DEARBORN COUNTY
residents have the highest share of cellular only internet subscriptions at
6.8%

Further looking into internet subscriptions, Figure 4 shows the percent of households in the SIRPC region that subscribed to the internet via cellular data plans only. This is important to understand because relying solely on cellular data plans to access the internet is problematic because these plans are limited, eroding the internet's potential benefits. This time, Franklin County had the highest share with 15 percent while Dearborn again had the lowest with 6.8 percent. Overall, about 10 percent or 9,800 households in the SIRPC region relied solely on cellular subscriptions to access the internet, again higher than the state's 8.5 percent and the nation's 7.5 percent.

Figure 5.
Percent households with no computing devices



Source: FCC Form 477 December 2017 v1

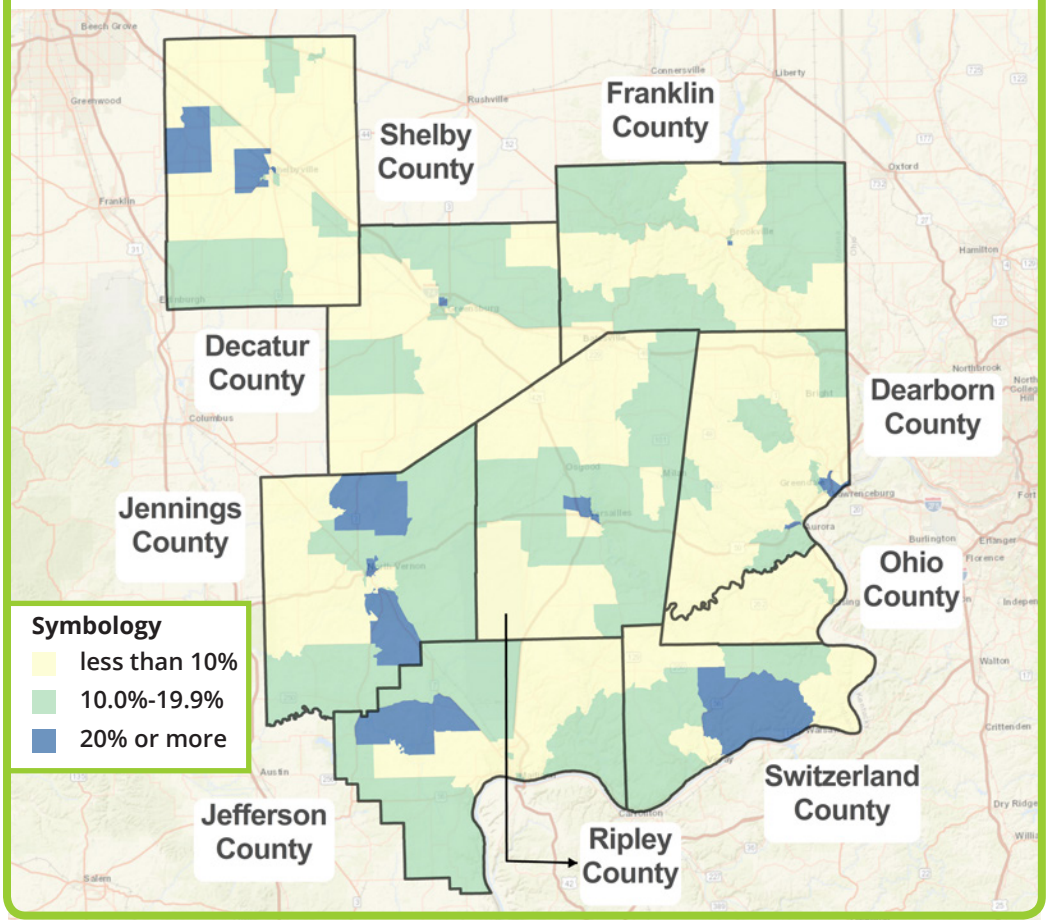
Switching from types of internet subscriptions or no subscriptions at all to computing devices, Figure 5 shows the SIRPC households divided into the same three groups (less than 10 percent; 10 to 19.9 percent; and 20 percent or higher) based on the percent of homes without computing devices. For this indicator, Ohio County had the highest share with a little more than one-fifth or 22.3 percent while Dearborn County had the lowest with 12.3 percent. Overall, about 16.8 percent of households or 16,200 in the region did not own computing devices of any type, higher than the state's 14.5 percent and the nation's 12.8 percent.

MAJOR FINDING
Figure 5
16.8%
of homes in the **SIRPC** region did not own a
COMPUTING DEVICE

MAJOR FINDING
Figure 5
OHIO COUNTY
has the highest share of households without computing devices
22.3%

MAJOR FINDING
Figure 5
DEARBORN COUNTY
has the smallest share of households without computing devices
12.3%

Figure 6.
Percent households with mobile only computing devices



Source: FCC Form 477 December 2017 v1

MAJOR FINDING
Figure 6

more than **10%** of homes in the **SIRPC** region owned only a

MOBILE DEVICE

MAJOR FINDING
Figure 6

SWITZERLAND COUNTY
has the highest rate of households relying on mobile devices at

13.7%

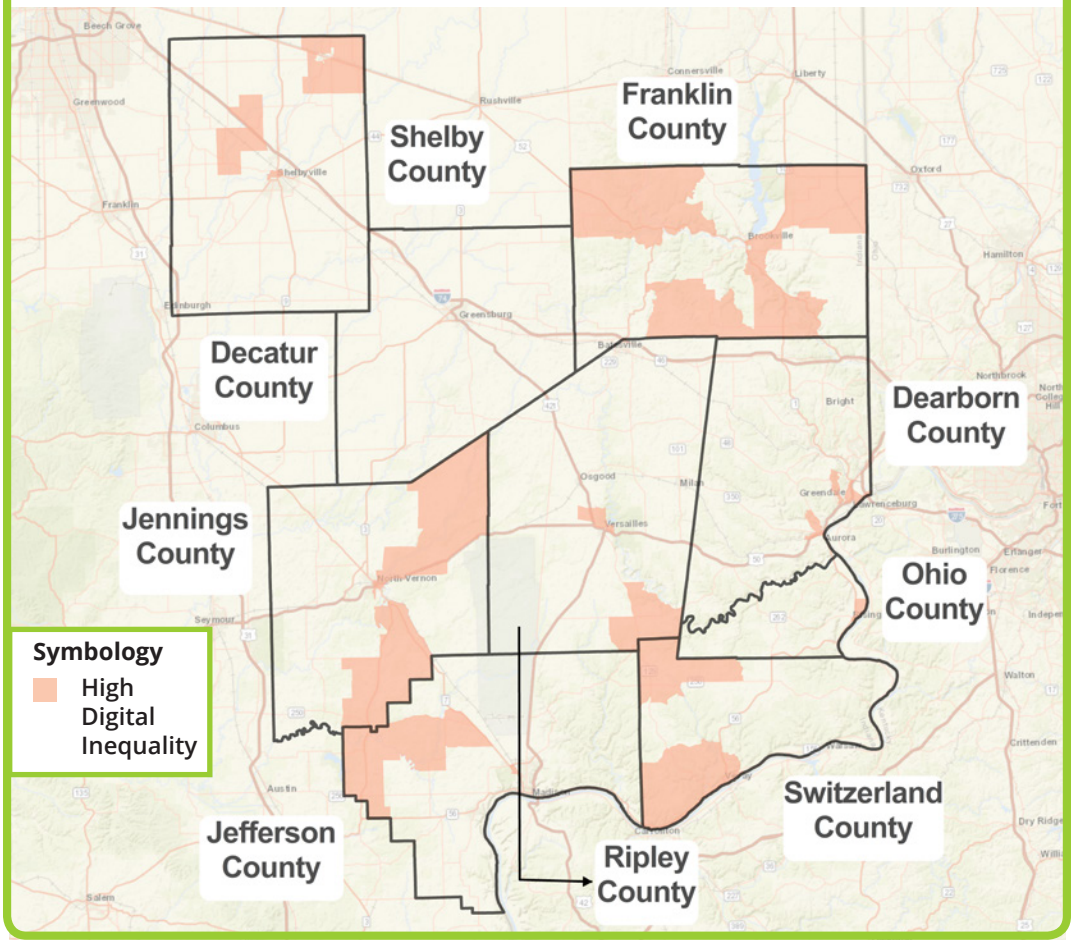
MAJOR FINDING
Figure 6

OHIO COUNTY
has the lowest rate of households relying on mobile devices at

6.5%

Further, Figure 6 shows the percent of homes relying on mobile computing devices only divided into the same three groups (less than 10 percent; 10-19.9 percent; 20 percent or more). Homes that rely solely on mobile devices are also at a disadvantage and may be missing out on the benefits of the technology for two reasons. First, smaller screens make it harder to, for example, write term papers or fill out job applications. Second, these mobile devices more than likely rely on cellular data plans, which have data limitations. Switzerland County had the highest rate at 13.7 percent while Ohio County had the lowest with 6.5 percent. Overall, about 10 percent or 9,900 homes in the SIRPC region relied solely on mobile computing devices, higher than the state's 10.1 percent and the nation's 9 percent.

Figure 7.
High digital inequality areas in the SIRPC region



Source: FCC Form 477 December 2017 v1

MAJOR FINDING
Figure 7

13%
of homes in the **SIRPC** region were in areas of
HIGH DIGITAL INEQUALITY

What does this all mean? In an effort to better grasp these indicators, a digital inequality score was calculated by including the percent of homes with no internet access (not subscribing) or relying only on cellular data as well as the percent of homes with no computing devices or relying on mobile devices only[9]. A higher percentage on any of these indicators denotes a higher digital inequality. Scores were normalized to a range of 0 to 10 for easier comprehension, where a higher number denotes a higher digital inequality. Figure 7 shows block groups whose score was larger than five.

Overall, close to seventeen percent of block groups (31 out of 183) in the region had a high digital inequality, which accounted for 12.7 percent of the region's population and 13.3 percent of households. Table 4 shows the number of households per county that were located in high digital inequality block areas. Franklin County had the highest share of its households in high digital inequality areas with 37.6 percent followed by Jennings County with 30.4 percent.

[9]Digital inequality score was calculated by adding two indicators: first indicator (1) included no internet access and cellular data only percentages while the second indicator (2) included no computing devices and mobile only percentages. Z-scores were then calculated for each of these indicators and added up for a final digital inequality score. This digital inequality score was then normalized to a range from 0 to 10 for easier comprehension.

Table 4. High digital inequality share of households by SIRPC counties

County	2017 Households	Households in High Digital Inequality Areas	Percent
Dearborn	18,667	1,146	6.1
Decatur	10,354	396	3.8
Franklin	8,843	3,321	37.6
Jefferson	12,677	825	6.5
Jennings	10,753	3,272	30.4
Ohio	2,479	354	14.3
Ripley	11,150	638	5.7
Shelby	17,603	1,849	10.5
Switzerland	4,259	1,094	25.7
SIRPC	96,785	12,895	13.3

Source: FCC Form 477 December 2017 v1; US Census ACS 5 Year 2013-2017

Furthermore (not shown), 12.6 percent of households with children in the region were located in these high digital inequality areas. Again, Franklin's County had the highest share with 36 percent of homes with children located in high digital inequality areas followed by Jennings County with 27.9 percent. Decatur County had the lowest share with 3.2 percent.

HOMEWORK GAP

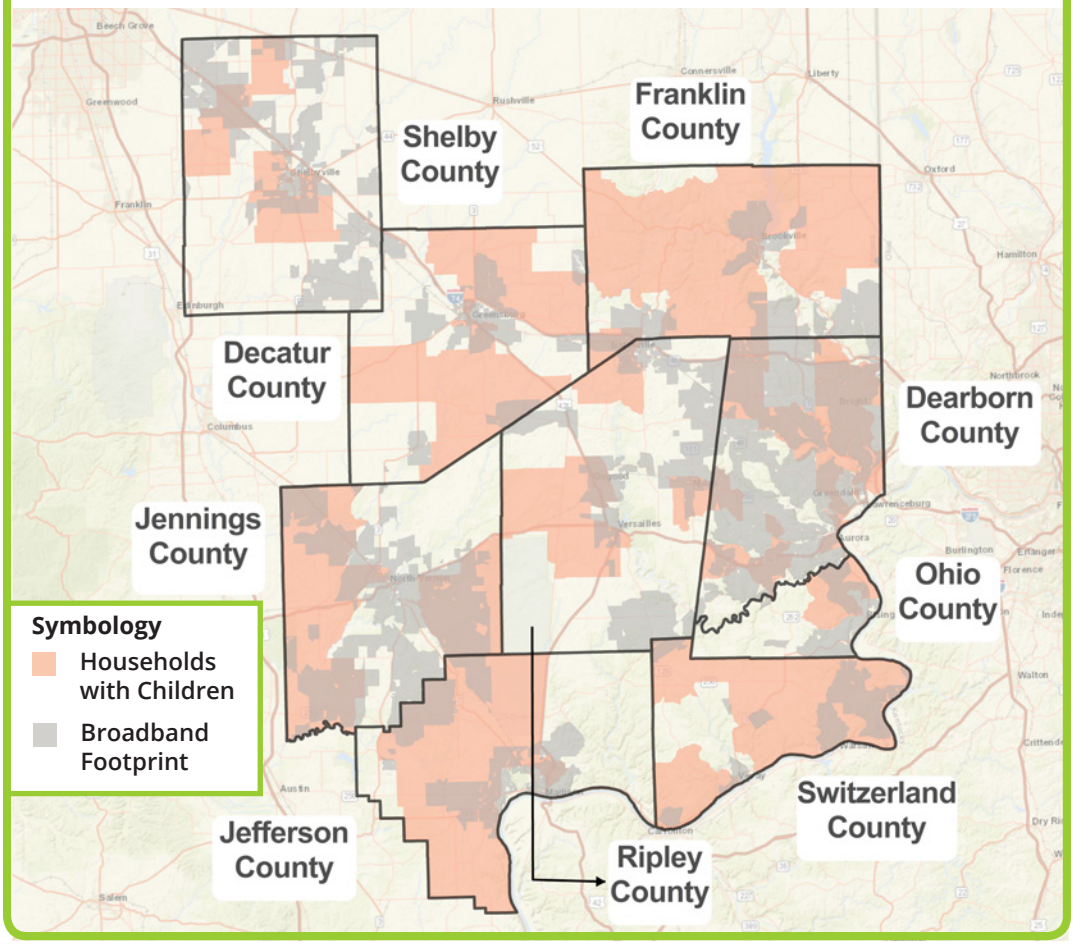
Next, it is worth discussing the "homework gap". The homework gap refers to children not having access to adequate Internet and/or digital devices to complete online homework assignments/ activities at home. Figure 8 identifies block groups in the region with an above average percent of households with children (orange) and the 25/3 residential broadband footprint (gray). According to the 2013-2017 ACS, there were 96,780 households in the region of which about 31,200, or 32.2 percent, had children.

There are multiple block groups with above average percentage of households with children (orange) outside the residential footprint (gray) in the SIRPC region. Note that the majority of the area of Franklin and Decatur County's block groups with above average share of households with children were outside the residential broadband footprint.

As shown in Table 5, a little less than 40 percent of households in the region with children or about 11,900 had no or access to one 25/3 provider. Dearborn County on the other hand, had the lowest share of homes with children with no access or access to one provider with 9.8 percent while Franklin County had the highest with almost 90 percent[10].

Without question, efforts to expand the residential 25/3 footprint are warranted. Low hanging fruit efforts can focus on those areas where an above average share of households with children exist that lack access to 25/3. Households with children

Figure 8.
Residential 25/3 footprint and percent of households with children



Source: FCC Form 477 December 2017 v1

Table 5. Households with children and 25/3 residential broadband providers

County	0 Prov.	1 Prov.	2 Prov.	3 Prov.	4 Prov.	Total	% None or One
Dearborn		591	3,005	2,253	162	6,011	9.8
Decatur	155	907	2,275			3,337	31.8
Franklin	519	2,294	137	198		3,148	89.4
Jefferson	360	494	197	2,679	321	4,051	21.1
Jennings		969	683	1,748		3,400	28.5
Ohio		62	601			663	9.4
Ripley	144	410	410	209		3,690	83.2
Shelby	144	1,251	3,824	100		5,319	26.2
Switzerland		1,115	457			1,572	70.9
SIRPC	1,322	10,610	11,589	7,187	483	31,191	38.3

Source: FCC Form 477 December 2017 v1; US Census ACS 5 Year 2013-2017

tend to adopt the technology at higher rates. In addition, areas outside the broadband footprint with higher household densities should also be targeted when planning to expand or upgrade the residential footprint. Lastly, areas with a high digital inequality should also be targeted to increase subscription rates and/or improve access to computing devices and internet subscriptions that do not limit the technology's potential.

MAJOR FINDING

38%

of homes with children in the **SIRPC** region are part of the **HOMEWORK GAP** meaning they only have access to zero to one broadband providers

[10]Number of providers may differ from population table because household data is only available at the block group level. Therefore, FCC data was aggregated to the block group level while population table utilized blocks.

BUSINESS BROADBAND

Table 6. List of business fixed broadband providers in the SIRPC region as of December 2017

Business 25/3 Provider Name	Counties Served
Agile Network Builders	Franklin
Central Indiana Communications, Inc.	Shelby
Charter Communications, Inc.	Dearborn*; Jefferson; Switzerland*
CMN-RUS, Inc.	Jefferson; Jennings
Enhanced Telecommunications Corp	Dearborn; Decatur; Franklin; Jefferson; Jennings*; Ohio; Ripley; Switzerland
HRS Internet, LLC d/b/a Lightbound	Shelby*
Indiana Fiber Network, LLC	Decatur*
Level 3 Communications, LLC	Dearborn; Decatur*; Franklin*; Jefferson*; Jennings*; Ripley*; Shelby*
Lightower Fiber Networks I, LLC	Ripley; Shelby
MCI Communications Corporation	Jennings*
Metro Fibernet, LLC	Jefferson; Jennings
NuVox, Inc.	Ripley*
Spectrotel, Inc.	Decatur*; Jefferson*; Ohio*
TDS Telecommunications Corporation	Decatur*; Shelby
Transworld Network Corporation	Decatur; Shelby
US Signal Company, L.L.C.	Shelby
Zayo Group, LLC	Dearborn*; Shelby*

Source: FCC Form 477 December 2017 v1;

* Note: less than ten records were reported from that provider in that county.

MAJOR FINDING

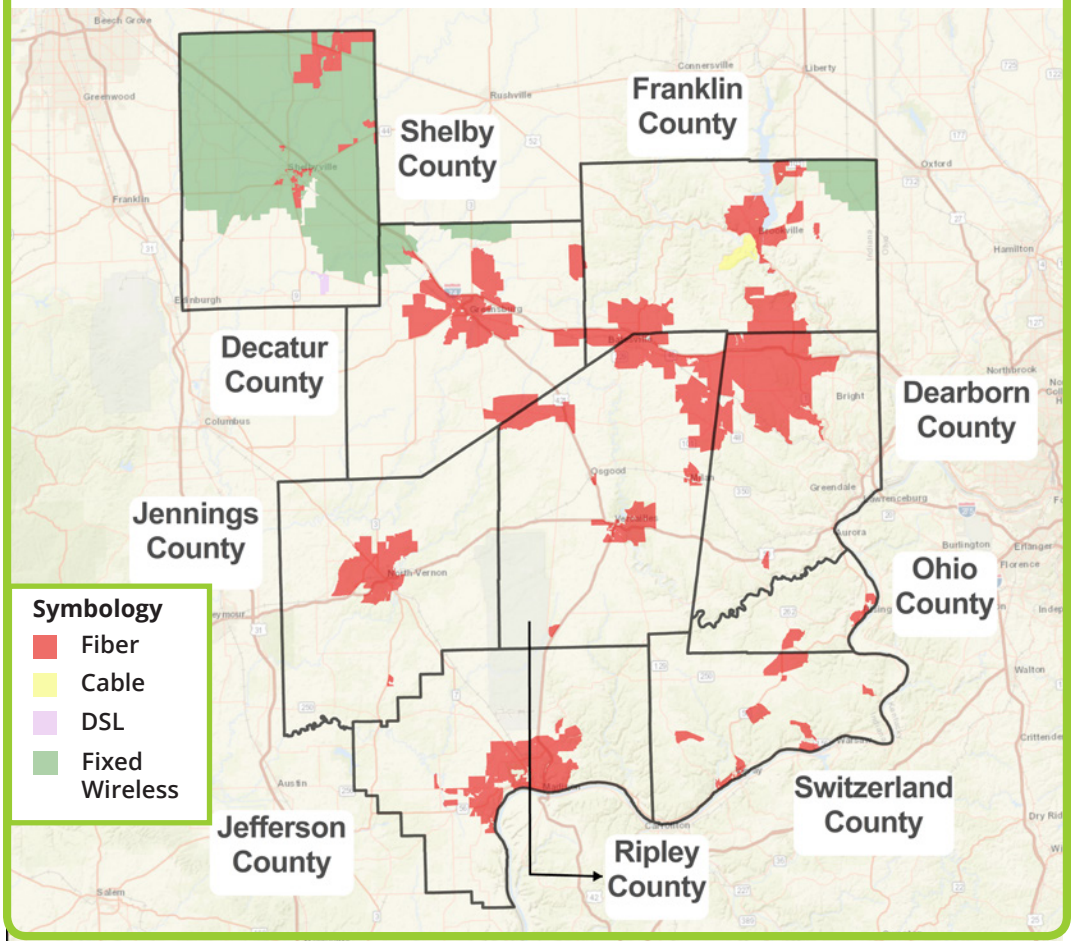
There were **17** business providers of **25/3** as of December 2017

The business broadband footprint is analyzed next. Note that some residential providers also serve businesses. Table 6 lists the names of the seventeen business providers in the region that met the 25/3 criteria (excluding satellite) as well as which counties they serve. Although Comcast is not listed, it does serve businesses located in their residential footprint according to conversations with the provider.

MAJOR FINDING
Figure 9

Businesses in the **SIRPC** region were served mainly by **FIBER & CABLE**

Figure 9.
Business 25/3 footprint



Source: FCC Form 477 December 2017 v1

Table 7. 25/3 business footprint & establishments at the county level

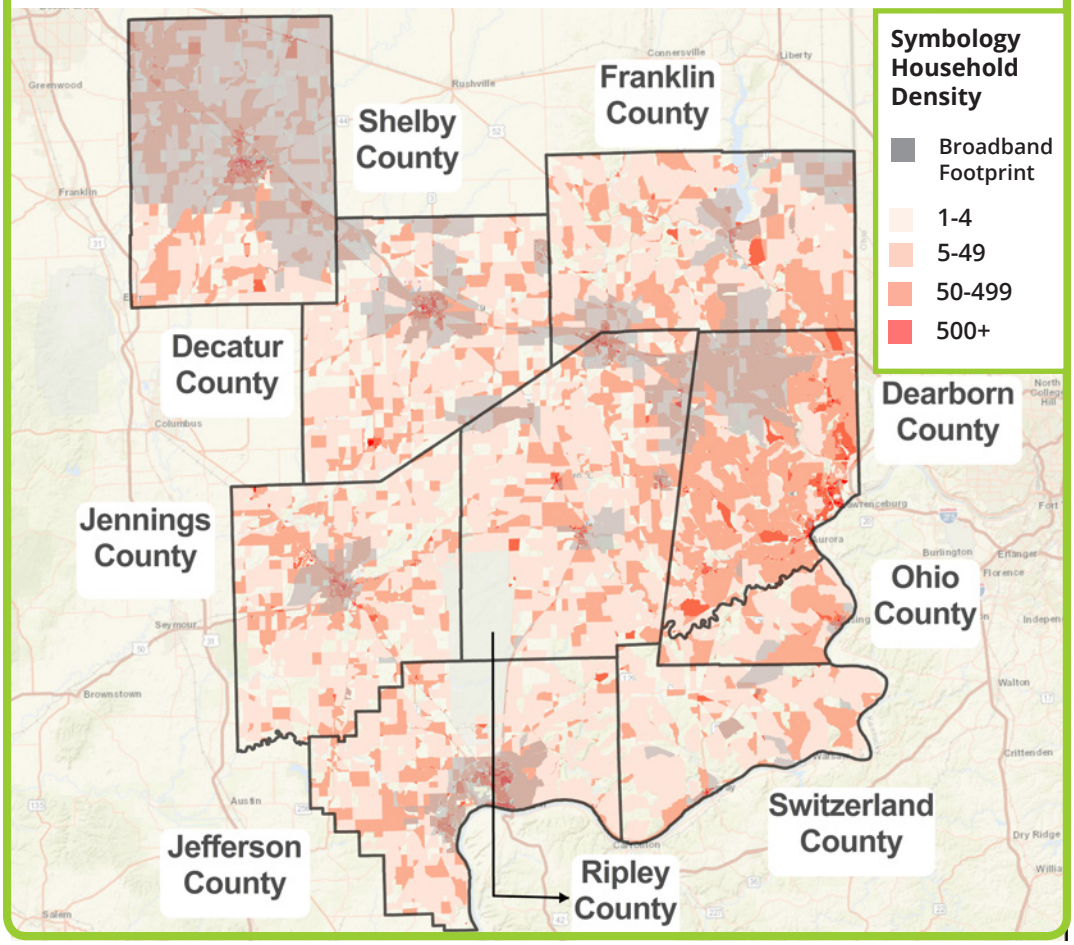
County	25/3 Business Broadband Providers
Dearborn	4
Decatur	6
Franklin	3
Jefferson	6
Jennings	5
Ohio	2
Ripley	4
Shelby	8
Switzerland	2
SIRPC	17

Source: FCC Form 477 December 2017 v1

Figure 9 shows the business 25/3 footprint in the SIRPC region. On one hand, the majority of the business footprint is served with fiber (red). On the other hand, the footprint is considerably smaller than the residential footprint. There was some cable (yellow) available in Franklin County and note also that the majority of businesses in Shelby County were served with fixed wireless (green).

Table 7 shows the number of business 25/3 providers in the region. Shelby County, served primarily by fixed wireless, had the highest number of 25/3 business providers in the region with eight followed by Decatur and Jefferson counties with six. Remember that this does not mean that all providers serve the entire footprint. On the other hand, Switzerland County had two business providers. Overall, there were seventeen business providers listed in the FCC dataset for the SIRPC region.

Figure 10.
Business Density per Square Mile and Broadband Footprint



Source: FCC Form 477 December 2017 v1 and U.S. Census Bureau

MAJOR FINDING
Figure 10

45.4%
of businesses in the **SIRPC** region were outside the **25/3 footprint**

MAJOR FINDING
Table 8

89.6%
of businesses in **DEARBORN COUNTY** were outside the **25/3 footprint**

Utilizing 2012 (latest available) data from multiple sources[vvvv], a business density per square mile (orange) was calculated and meshed with the business 25/3 footprint (gray). As shown in Figure 10, some areas with the highest business density (dark orange) in the region are not inside the 25/3 business broadband footprint. Note how most business dense areas (dark orange) in Dearborn, Franklin, Ohio, and Switzerland counties were not served by 25/3.

Of the approximately 34,000 businesses mapped in the region, 45.4 percent were not in the business broadband footprint (see Table 8). Shelby County had the highest share inside the footprint with more than 90 percent (likely through fixed wireless) versus 10 percent in Dearborn County.

Keep in mind that this does not mean businesses have no connectivity at all given they may be accessing the internet through the residential footprint. Nonetheless, not having adequate business internet connectivity places businesses

[11]Multiple establishment level data sources were evaluated, such as Hoovers (Avention), ReferenceUSA, and National Establishment Time Series (NETS). The challenge was that each source had slightly different counts of establishments. A combination of these sources was utilized to geocode the establishment records, which were aggregated at the census block level.

Table 8. 25/3 business footprint & establishments at the county level

County	No. Businesses	In 25/3 footprint	Out of 25/3 footprint	Percent in 25/3 footprint	Percent Out of 25/3 foot-print
Dearborn	6,816	706	6,110	10.4	89.6
Decatur	3,879	2,696	1,183	69.5	30.5
Franklin	2,848	1,139	1,709	40.0	60.0
Jefferson	4,658	3,481	1,177	74.7	25.3
Jennings	3,235	1,701	1,534	52.6	47.4
Ohio	866	306	560	35.3	64.7
Ripley	4,391	2,511	1,880	57.2	42.8
Shelby	6,193	5,669	524	91.5	8.5
Switzerland	1,156	368	788	31.8	68.2
SIRPC	34,042	18,577	15,465	54.6	45.4

Source: FCC Form 477 December 2017 v1; Hoovers; ReferenceUSA; National Establishment Time Series

at a competitive disadvantage. Efforts need to be made to ensure all businesses in the SIRPC region have access to adequate connectivity.

DIGITAL ECONOMY, SKILLS, & AUTOMATION

Table 9. Digital Economy (DE) Jobs by SIRPC Counties

County	2010 DE Jobs	2017 DE jobs	No. Change	% Change	2010 DE Share	2017 DE Share
Dearborn	405	427	23	5.6	2.1	2.2
Decatur	252	576	324	129.0	1.8	3.4
Franklin	82	77	-5	-6.3	1.2	1.1
Jefferson	99	265	166	168.5	0.6	1.6
Jennings	847	769	-78	9.2	8.6	7.8
Ohio	28	35	6	22.2	1.3	1.8
Ripley	297	369	72	24.2	1.8	2.2
Shelby	910	896	-14	-1.6	4.4	3.8
Switzerland	15	12	-3	-20.1	0.5	0.4
SIRPC	2,935	3,426	491	16.7	2.7	3.0
Indiana	97,764	130,253	32,488	33.2	2.8	3.3
U.S.	6.1 million	7.7 million	1.5 million	25.7	3.6	3.9

Source: EMSI 2018 Q4

With regard to broadband's impact on businesses, it is worth analyzing jobs related to the digital economy[12], which are growing faster than jobs overall[13] and pay twice the median national income[14]. Table 9 shows the change in digital economy jobs between 2010 and 2017 as well as the digital economy share of total jobs. The region as a whole gained 491 digital economy jobs between 2010 and 2017 or an

[12]This paper utilized 52 industries listed as related to the digital economy from four different sources: Bureau of Economic Analysis, Brookings Institution, Progressive Policy Institute and the Internet Association.
[13]https://www.brookings.edu/research/americas-advanced-industries-new-trends/
[14]https://blog.bea.gov/2018/03/15/initial-estimates-show-digital-economy-accounted-for-6-5-percent-of-gdp-in-2016/

MAJOR FINDING
Table 9

6 out of **9**
COUNTIES
saw an increase in
DIGITAL ECONOMY JOBS

MAJOR FINDING
Table 9

DIGITAL ECONOMY JOBS
increased by
17%

MAJOR FINDING
Table 9

JEFFERSON & DECATUR
Counties had the highest increase in digital economy jobs

MAJOR FINDING
Table 9

Digital economy jobs decreased in
FRANKLIN, SHELBY, AND SWITZERLAND COUNTIES

increase of 16.7 percent. The state and nation also gained DE jobs with 33.2 and 25.7 percent increases, respectively. All SIRPC counties but Franklin, Shelby, and Switzerland had an increase in these types of jobs. The digital economy share of jobs increased in five of the nine counties in the region. Overall, the DE share increased in the state and the U.S. from 2.8 to 3.3 percent and 3.6 to 3.9 percent respectively while also increasing in the region from 2.8 in 2010 to 3.0 percent in 2017.

As the workforce becomes more digitized, it is important to understand the level of digital skills required for the jobs in the region. A study from the Brookings Institution categorized up to 90 percent of occupations based on the level of digital skills required: low, medium, and high[15].

As shown in Table 10, 22.8 percent of new jobs in the region between 2010 and 2017 required high digital skills. In fact, slightly more than 40 percent of new jobs in the region required medium or high digital skills. Franklin County's share of new jobs requiring high digital skills was the highest in the region with 38.8 percent. Note that the digital skill percentages do not add to 100 percent because not all occupations were included and if there was a decrease, percentages were not calculated.

Table 10. Percent change in total employment and by digital skills level in SIRPC counties, 2010-2017

County	Number change in total jobs	Percent change in total jobs	Share low digital skills	Share medium digital skills	Share high digital skills
Dearborn	-109	-0.6	---	---	---
Decatur	2,811	19.6	21.4	23.6	9.0
Franklin	245	3.4	21.2	17.6	38.8
Jefferson	874	5.6	33.1	8.3	31.1
Jennings	2	0.0	---	---	---
Ohio	-168	-7.9	---	---	---
Ripley	285	1.7	---	---	---
Shelby	2,757	13.3	27.4	29.1	24.7
Switzerland	-103	-3.1	---	---	---
SIRPC	6,593	6.0	22.9	18.3	22.8
Indiana	381,083	10.9	30.2	24.6	24.9
U.S.	23.3 million	13.5	31.4	24.6	28.8

Source: EMSI 2018 Q4

[15]https://www.brookings.edu/research/digitalization-and-the-american-workforce

MAJOR FINDING
Table 10

The **SIRPC** region gained around

6,600

jobs between 2010 and 2017

MAJOR FINDING
Table 10

40%

of jobs gained from 2010 to 2017 required

MEDIUM TO HIGH DIGITAL SKILLS

MAJOR FINDING
Table 11

DECATUR & SWITZERLAND

saw a decrease in number of jobs requiring high digital skills from 2010-2017

Table 11. Jobs requiring low, medium, and high digital skills in the SIRPC counties, 2010-2017

County	Percent change in low digital skill jobs	Percent change in medium digital skill jobs	Percent change in high digital skill jobs	2010 share requiring high digital skills	2017 share requiring high digital skills
Dearborn	-5.5	-0.8	3.8	18.5	19.3
Decatur	15.1	11.1	10.9	16.3	15.1
Franklin	2.5	1.4	7.7	17.4	18.1
Jefferson	7.9	1.1	9.4	18.7	19.3
Jennings	-3.6	-1.5	0.3	16.2	16.3
Ohio	-2.5	-11.7	-7.6	16.0	16.0
Ripley	5.7	-1.5	4.0	21.4	21.9
Shelby	11.8	10.0	18.0	18.3	19.0
Switzerland	1.0	-3.2	-10.9	15.4	14.1
SIRPC	4.8	2.7	7.6	18.2	18.4
Indiana	12.5	6.7	12.9	20.9	21.3
U.S.	17.4	8.7	15.8	24.6	25.1

Source: EMSI 2018 Q4

Table 11 shows number of jobs requiring high digital skills increased in all but two SIRPC counties between 2010 and 2017, with Shelby County posting the highest increase with 18 percent. Also, the share of jobs requiring high digital skills increased between 2010 and 2017 in six of the nine counties.

Lastly, automation potential of existing occupations and job tasks is also worth discussing. Another recent study by the Brookings Institution calculated an average automation potential—defined as the share of tasks in an average occupation that are potentially automatable in a given industry or place—for all counties[16]. In other words, the higher this percentage, the higher the automation potential on average for any given industry.

They also calculated the share of jobs with a low (less than 30 percent of tasks susceptible to automation), medium (30-70 percent of tasks susceptible to automation), and high (71 percent or more of tasks susceptible to automation) risk. Table 12 shows the overall average automation potential as well as the low, medium, and high risk shares for counties in the SIRPC region. Note that national and regional figures were not available.

[16]https://www.brookings.edu/research/automation-and-artificial-intelligence-how-machines-affect-people-and-places/

Table 12. Average automation potential and level of risk by SIRPC counties, percentages

County	Avg. automation potential	Low risk job share	Medium risk job share	High risk job share
Dearborn	48.9	33.6	37.1	29.3
Decatur	53.6	25.7	39.3	35.1
Franklin	50.0	35.2	31.8	33.0
Jefferson	50.0	33.4	36.5	30.2
Jennings	49.9	34.3	32.7	33.0
Ohio	45.6	35.1	42.5	22.4
Ripley	48.5	35.9	33.2	30.9
Shelby	52.7	30.3	33.3	36.4
Switzerland	50.3	29.2	41.5	29.3
SIRPC	---	---	---	---
Indiana	48.7	35.2	35.8	29.0
U.S.	---	---	---	---

Source: Brookings Institution

While the state of Indiana had the highest average automation potential of all states with 48.7 percent, seven of the nine counties in the SIRPC region had a higher potential compared to the state. Decatur had the highest automation potential with 53.6 percent followed by Shelby County with 52.7 percent. On the other hand, Ohio County had the lowest automation potential in the region with 45.6 percent.

MAJOR FINDING
Table 12

SHELBY COUNTY

had the **SIRPC** region's highest share of jobs at high risk of being automated

MAJOR FINDING
Table 12

OHIO COUNTY

had the **SIRPC** region's lowest share of jobs at high risk of being automated

Regarding the highest share of jobs in the high risk category, Shelby had the highest with a bit more than one-third (36.4 percent) followed by Decatur with 35.1 percent. Higher than the state's 29 percent. In other words, more than one-third of jobs in both Shelby and Decatur counties had a high risk of being automated in the coming decades. These figures emphasize the need for the region to continue to offer training and reskilling programs.

HOUSEHOLD DIGITAL READINESS

As the socioeconomic landscape continues to change, households seeking to adapt and prosper in this digital age need to be digital ready. While research on the impact of broadband continues to increase, a broad understanding of what being digital ready entails is somewhat weak. This study utilized a household internet utilization survey to better gauge how digital ready are homes in the SIRPC region.

This survey gauged three distinct but related dimensions of digital readiness shown in Figure 11. These in turn were quantified into scores ranging from 0 to 10, where a higher number

denotes a higher level of digital readiness, for easier comprehension and comparison. For more information on how these dimensions were quantified, please refer to Appendix A.

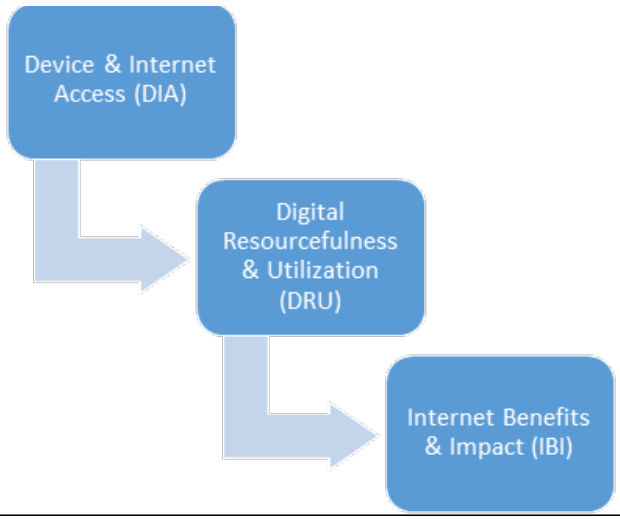
The device & internet access (DIA) dimension refers to device ownership and performance, duration of device and internet downtime, connecting more from home than mobile devices, and variety of devices and frequency when connecting to the internet. In other words, a higher score denotes a more diverse and frequent device use, connecting more from home, less device performance issues, and shorter periods without access to devices or internet.

The digital resourcefulness and utilization (DRU) dimension refers to needing less help setting up new electronic devices, the perception of increased productivity due to electronic devices, trustworthiness of online information (news and politics primarily), consumption of a variety of online information, frequency and diversity of online interactions with community organizations, and diverse internet use and frequency. A higher score denotes a higher digital resourcefulness and utilization.

The internet benefits and impact (IBI) dimension refers to the type and level of earnings and savings due to internet use as well as the magnitude of any promotions (due to online educational credentials or skills learned) obtained or jobs secured found and applied for online. A higher score denotes a higher internet benefit and impact in the SIRPC region.

Last but not least, an overall digital readiness index (DRI) score was calculated using these three dimensions to gauge the overall digital readiness level among households in the SIRPC region. Better understanding the level of digital readiness among SIRPC households can better inform digital literacy and workforce development efforts.

Figure 11. Dimensions of Household Digital Readiness



Source: 2019 PCRD Household Internet Utilization Survey

Results from this survey can also better help tell the story on how the region is benefitting, or not, from digital applications.

The survey was approved by the Purdue University Institutional Review Board (IRB) in the spring of 2018 (IRB Protocol #1802020313). The research design purposefully focused only on online delivery since the intention was to gauge the level of digital readiness. The survey was sent to households in the region through multiple email listservs and social media accounts during February 2019. The SIRPC played a key coordinating role to ensure the link to the survey was sent to as many groups as possible in the region.

The total number of valid responses was 1,656 after weighing the sample by household income, age, and educational attainment to align as much as possible to the characteristics of the region according to the 2013-2017 ACS[17].

[17]Please refer to Appendix B for the sample and population distributions as well as the weight coefficients used.

Table 13. Demographic Characteristics of Household Survey Respondents

County	Responses
Age Groups	
Less than 35 years	25.6%
35-64	53.3%
65 or more	21.0%
n size	1,642
Household Income	
Less than $35,000	32.7%
$35,000-$74,999	36.1%
$75,000 or more	31.2%
n size	1,575
Educational Attainment	
High School or less	54.4%
Some College or Associate's Degree	30.0%
Bachelor's Degree or higher	21.0%
n size	1,642
Primary Occupation	
Management, Professional or Education	30.1%
Sales or Office Support	14.6%
Construction, Installation, or Maintenance	7.0%
Production, Transportation, or Warehousing	7.7%
Agriculture	3.1%
Food service or Personal Care	4.0%
Healthcare support or Public Safety	7.9%
Retired	13.3%
Other	12.3%
n size	1,639

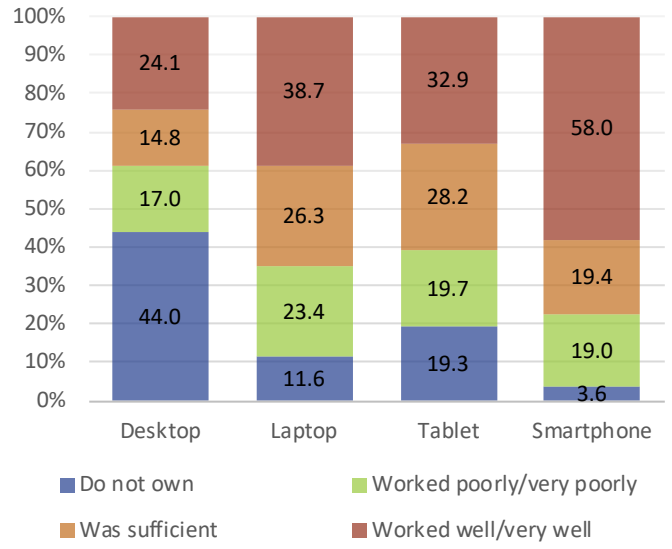
Source: 2019 PCRD Household Internet Utilization Survey

As shown in Table 13, about one-fifth of respondents were age 65 or over while one-quarter were between 18 and 35 years of age. Regarding household income, about one-third of respondents made less than $35,000 dollars per year compared to 31.2 percent making $75,000 or more. More than half of respondents had a high school degree or less while one-fifth had a bachelor's or higher. Lastly, little less than one-third reported their primary occupation to be in management, professional or education, 13.3 percent retired, and 3.1 percent in agriculture to name a few.

Additional demographic characteristics of those participating in the survey not shown in Table 14 indicated that more than 95 percent of respondents were white non-Hispanic while almost half or 48.1 percent said there were children in the household over the past year. Children in the household is typically a great predictor of broadband adoption. Also, roughly two-thirds or 65.7 percent of respondents indicated their household was outside the city or town limits. This is important to keep in mind considering that broadband connectivity is typically not as good outside city/town limits.

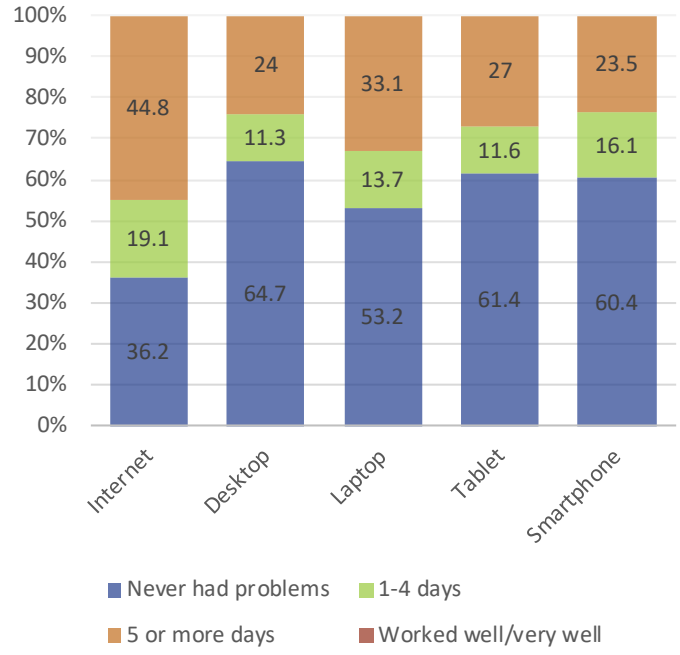
DEVICE & INTERNET ACCESS

Figure 12.
Device Ownership & Performance in the SIRPC Region, Percent Responses



Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,469-1,580

Figure 13. Length of Internet and Device Downtime, Percent Responses



Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,256-1,600

As shown in Figure 12, forty-four percent of homes in the SIRPC region did not own a desktop. One-quarter of homes who did reported the device worked well or very well over the past year. Less than twelve percent of homes in the SIRPC region did not own a laptop with 38 percent of these performing well or very well. Not surprising, less than four percent of homes in the region did not own a smartphone of which 58 percent performed well or very well.

Figure 13 shows that when asked how long SIRPC homes were without a device or internet over the past year due to unpaid bills, broken devices, running out of minutes, etc. about one-third reported never having a problem with internet while more than half had no problems with their devices (desktop, laptop, tablet, or smartphones). However, almost 45 percent reported being 5 or more days over the past year without internet, one-third without laptops, and almost one-quarter without smartphones.

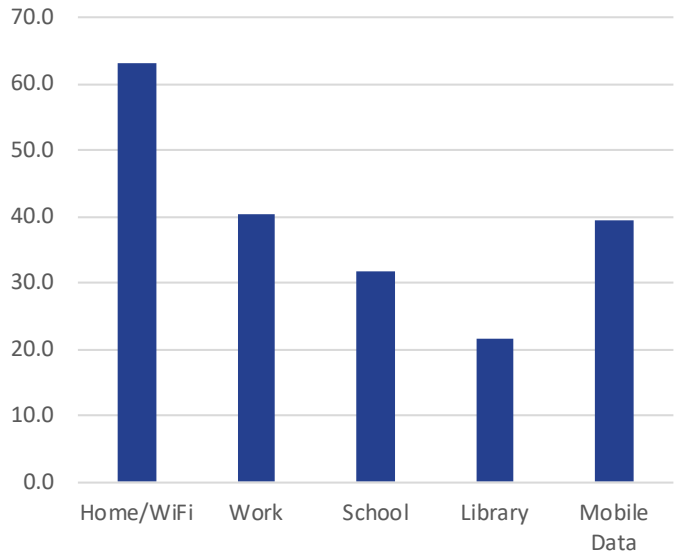
MAJOR FINDING
Figure 12

Homes in the **SIRPC** region owned **SMARTPHONES & LAPTOPS** at a higher rate than desktops and tablets

MAJOR FINDING
Figure 13

45%
reported not having access to internet for
5 DAYS
or more due to unpaid bills, broken devices, running out of minutes, etc.

Figure 14. Average Percent Time Connecting to the Internet by Location



Source: 2019 PCRD Household Internet Utilization Survey; n range: 133-1,364

MAJOR FINDING

Households in the **SIRPC** region connected to the internet from home on average about

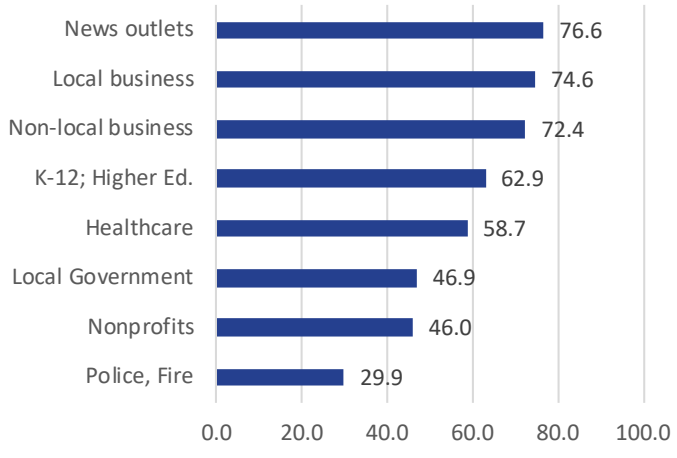
63%

of the time

Regarding location, on average and as shown in Figure 14, homes in the SIRPC region connected to the internet from home a little less than two-thirds of the time (63 percent), a little more than one-fifth of the time from libraries (21.5 percent), and almost 40 percent of the time using mobile data. Remember these averages are not mutually exclusive so they do not add up to 100. The fact that home sin the SIRPC region spent a little more than one-fifth of the time connecting from libraries in the region highlights the need to ensure these community anchor institutions have adequate connectivity. This in turn helps improve digital readiness in the region.

DIGITAL RESOURCEFULNESS & UTILIZATION

Figure 15. Online Household Interactions, Percent At Least Once Monthly



Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,455-1,569

When asked how often and with which community organizations homes in the SIRPC region interacted with, Figure 15 shows that three-quarters of homes in the region interacted online with news outlets followed by 74 percent interacting with local businesses. The community organizations less interacted with online in the

MAJOR FINDING
Figure 15

Homes in the **SIRPC** region interacted online more frequently with

NEWS OUTLETS, LOCAL BUSINESSES & NON-LOCAL BUSINESSES

MAJOR FINDING
Figure 15

Homes in the **SIRPC** region interacted online less frequently with

LOCAL GOVERNMENT, NON-PROFITS, AND FIRE/POLICE ORGANIZATIONS

region were police or fire, with less than one-third of homes (29.9 percent) interacting at least once monthly over the past year.

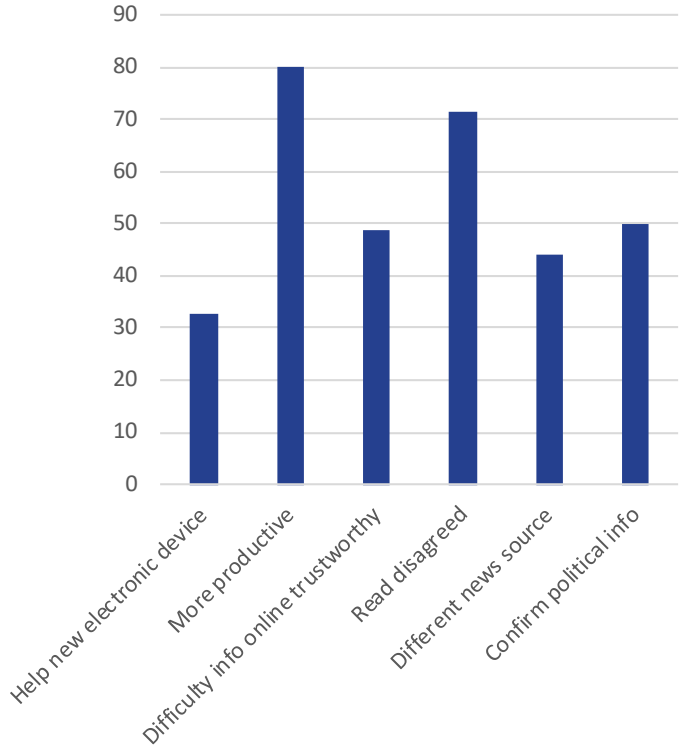
Obviously interacting with police/fire is not suitable, or desirable, to occur at least once monthly explaining in part why less than one-third of homes in the region interacted with these organizations. However, a review of emergency (weather, reverse 911, etc.) and non-emergency (traffic flows, roads closed, etc.) management and communication protocols is warranted to ensure that this information is disseminated digitally and can in turn, increase digital engagement with homes.

Notice also that less than half of respondents (46.9 percent) interacted online with local government at least once monthly over the past year. The reason for this may be due to local government not having an online presence, or at least one that allows two-way digital engagement. It is critical that local government engages digitally with its citizens to improve transparency, responsiveness, and trust.

A majority of respondents (80 percent or higher) in the SIRPC region perceived being more productive thanks to their digital devices while a little less than one-third (32.8 percent) reported needing help when setting up or knowing how to use new electronic devices. This need for help increased to 52.7 percent among those ages 65 or over (not shown), clearly indicating age is a factor. A little less than half of homes (48.9 percent) in the SIRPC region indicated finding it difficult to know whether online information is trustworthy.

A key competency of digital readiness is the ability to minimize or escape online echo chambers—situations where only certain ideas, information, and beliefs are shared[18]. One way is to consume diverse political content, which in turn requires a higher interest in politics as well as the ability to successfully search, find, trust, compare, and consume different political online content. Close to three-quarters (71.4 percent) of homes in the region said they often or very often read something they disagreed with. However, at least half did not often or very often read different news sources from what they normally read (56.1 percent) or tried to confirm political information by searching online for another source (50 percent). Digital literacy and media literacy efforts can help increase the share of homes consuming and digesting diverse political information online.

Figure 16. Digital Resourcefulness, Percent Well/Very well and Often/Very often Responses



Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,527-1,615

[18]Dubois, E., & Blank, G. (2018). The echo chamber is overstated: the moderating effect of political interest and diverse media. Information, Communication & Society, 21(5), 729-745. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/1369118X.2018.1428656

MAJOR FINDING
Figure 16

80%
of respondents perceived their productivity
INCREASED
due to electronic devices.

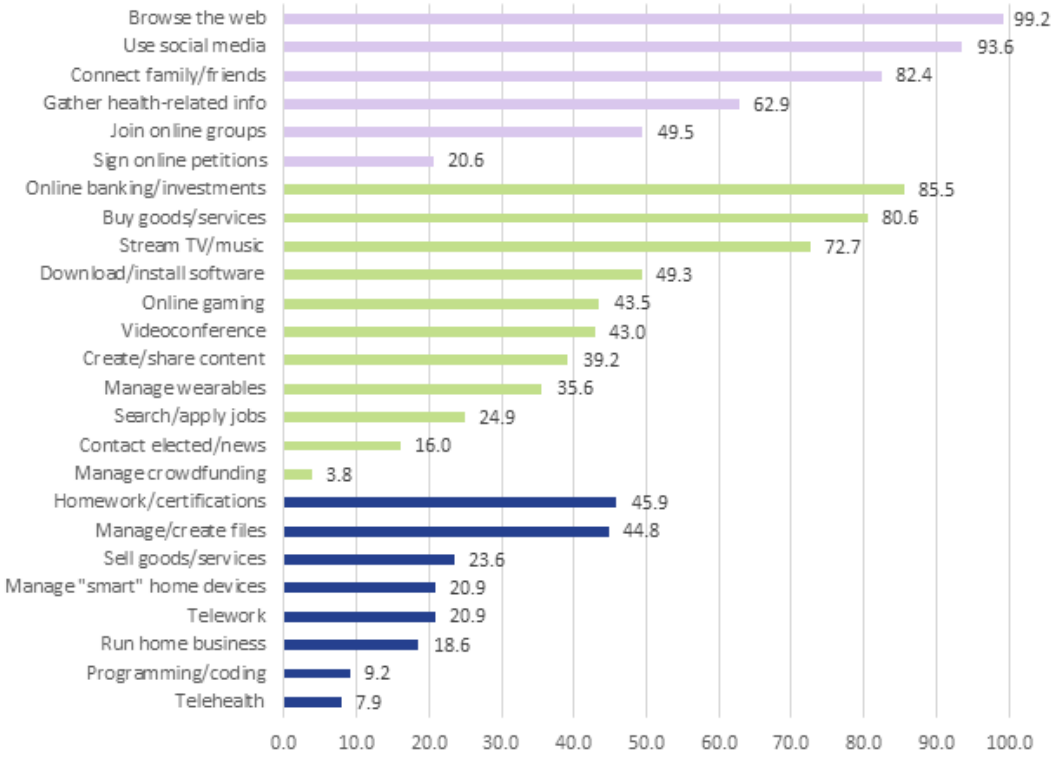
MAJOR FINDING
Figure 16

50% OR LESS
of respondents did not often or very often read different news sources from normal or confirm political information.

SIRPC residents were provided with a list of internet uses as well as how frequently they used these applications. Each of these internet uses were grouped into requiring basic, intermediate, and advanced digital skills using the United Nations ITU digital skills framework[19]. While not all internet uses listed fit perfectly into the categories outlined by the ITU framework, it did provide some guidance on the type of digital skills required.

Figure 17 shows the percent of homes in the region using these applications at least once monthly over the past year. Granted, not all applications are suitable for weekly or even monthly use, such as search/apply for jobs or joining online groups. However, collectively it is clear that applications requiring advanced digital skills (blue) were used less compared to intermediate (orange) and basic (green).

Figure 17. Internet Applications by Digital Skills Required, Percent At Least Once Monthly



Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,580-1,652

MAJOR FINDING

SIRPC homes utilized the internet an average of
10.65
different ways over the past year, at least once monthly

Most internet uses applied by **SIRPC** residents in the last month required
LOW DIGITAL SKILLS

[19]https://www.itu.int/en/ITU-D/Digital-Inclusion/Youth-and-Children/Pages/Digital-Skills-Toolkit.aspx

Not surprising, virtually all homes surveyed in the SIRPC region browsed the web at least once monthly over the past year. Social media and online banking were next with the majority of homes using these online applications followed by connecting with friends/family and buying goods or services. Of these top five internet applications (more than 80 percent of homes used them at least once monthly) in the SIRPC region, none required advanced digital skills and three of the five required basic digital skills.

In addition, only seven of the twenty-five internet uses listed were used by more than half of homes in the region. Of these, four required basic digital skills. In other words, efforts should be made to improve intermediate and advanced digital skills in the region. In fact, this finding is supported by the next section that looked into the benefits and impact of internet in the region.

INTERNET BENEFITS & IMPACT

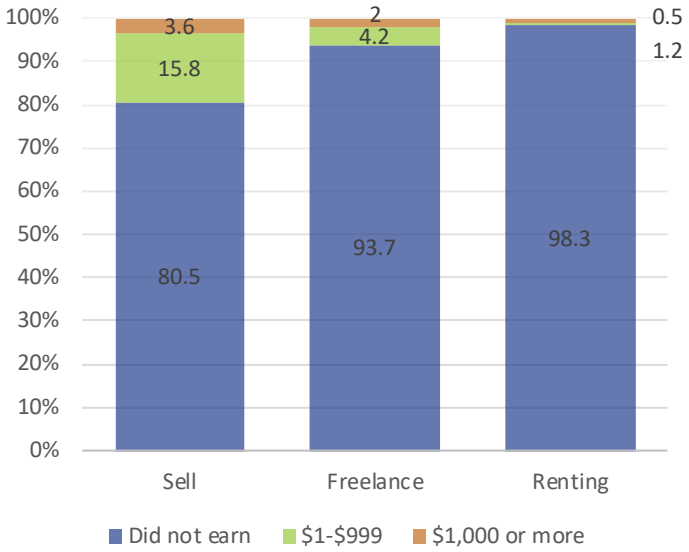
Internet can benefit or impact a home or community in several ways. This particular survey focused on earnings and savings made online as well as promotions obtained or jobs secured. Figure 18 shows that the majority of homes in the region did not earn any money online either selling, freelancing, or renting properties. Less than 16 percent of respondents indicated earning less than $1,000 over the past year by selling online. Efforts need to be made to ensure that homes that have the assets and motivation, can benefit from earning money online. This not only will have an impact in the regional economy, but will also diversity the regional economy.

MAJOR FINDING

80%

or more of **SIRPC** homes reported not earning money online.

Figure 18. Households Reporting Earnings Online by Selling, Freelancing, or Renting, Percent Responses



Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,603-1,615

When it comes to savings, a higher share of homes in the region benefitted from online activity. The greatest savings took place through online bargains followed by price matching and less driving. However, a majority of homes in the region did not save when it came to health insurance or healthcare.

MAJOR FINDING

AT LEAST 50%

of **SIRPC** homes reported saving money online.

A high share of homes in the SIRPC region did not obtain a promotion (93.8 percent) or secured a job (79.5 percent) thanks to online activity as shown in Figures 20-21. While this may partially due to the nature of the regional economy, it nonetheless shows homes in the region are not leveraging digital technology to boost their incomes. Efforts need to be made so that both employers, offering promotions due to skills learned online, and homes, maximize the benefits of the technology.

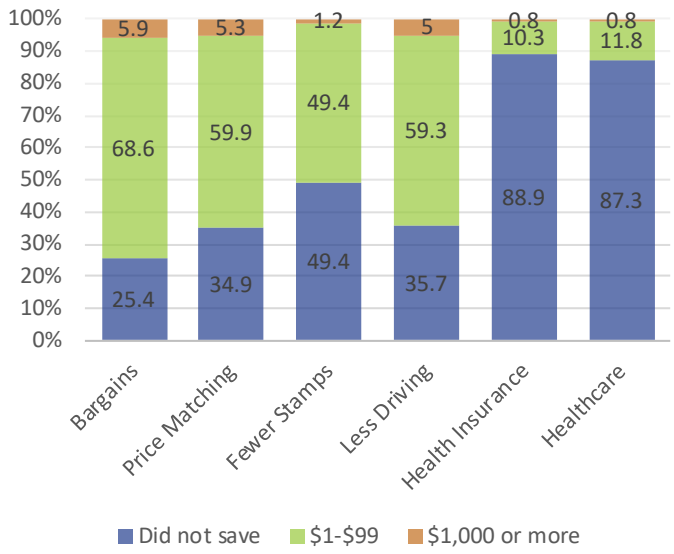
MAJOR FINDING

90%

or more of **SIRPC** homes said no promotions were obtained due to online credentials/training

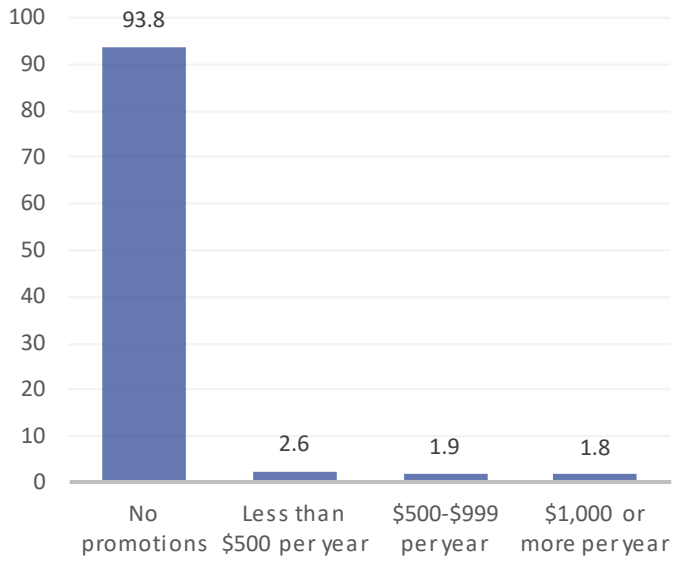
Figure 22 shows the average device & internet access (DIA), digital resourcefulness & utilization (DRU), internet benefits & impact (IBI), and the overall digital readiness index (DRI) scores. Remember scores range from 0 to 10 where a score of ten denotes the ideal level of digital readiness. Regarding device & internet access, the region obtained a score of 6.16, slightly above the median of 5.5. This means that of all dimensions impacting digital readiness in the region, this one had the highest score. This does not mean that efforts should not be made to providing adequate internet connectivity throughout the region as well as improving the inventory of computing devices.

Figure 19. Households Reporting Saving Online by Category, Percent Responses



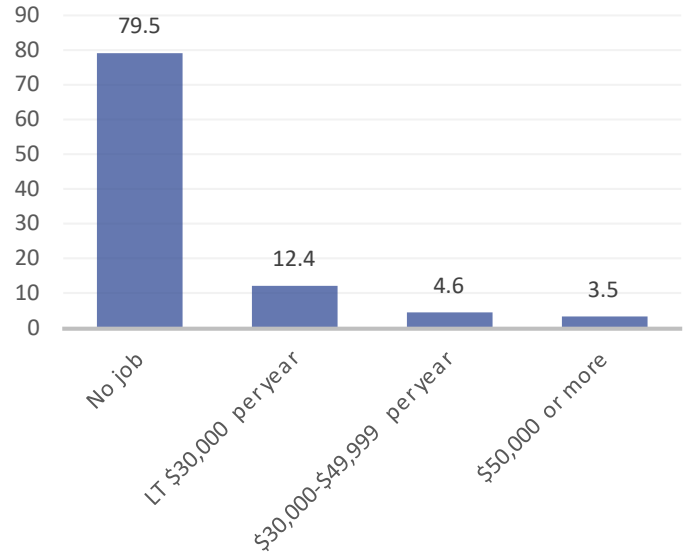
Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,558-1,622

Figure 20. Households Obtaining Promotions Due to Online Resources, Percent Responses



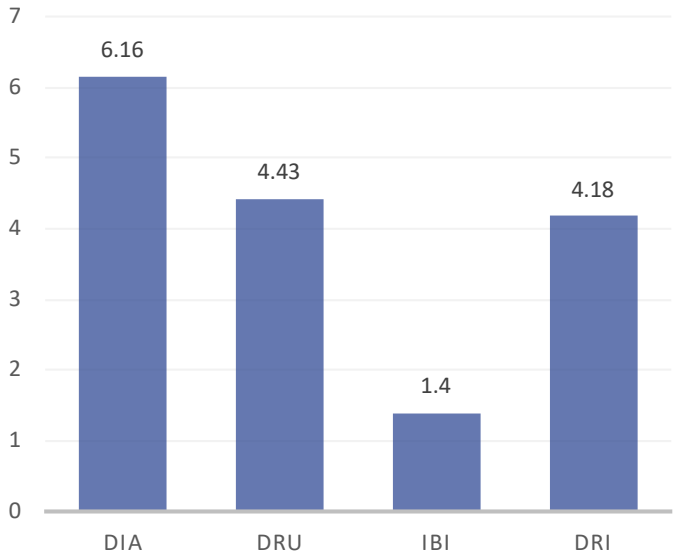
Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,615

Figure 21. Households Securing a Job Online, Percent Responses



Source: 2019 PCRD Household Internet Utilization Survey; n range: 1,612

Figure 22. Average DIA, DRU, IBI, and DRI Scores



Source: 2019 PCRD Household Internet Utilization Survey; n 1,656

MAJOR FINDING

3/4

of respondents reported not securing a job online

Regarding resourcefulness & utilization, the region scored a 4.43 score. This number makes sense given that many homes in the region did not connect to the internet from home more than half of the time and were without devices and connectivity for 5 days or more. Coupled with lack of adequate digital skills, this affects how the internet is used. In addition to the efforts made to improve device & internet access in the region, efforts should also be made to improve intermediate and advanced digital skills as well as educating homes to trust and consume online information from multiple sources.

MAJOR FINDING

The **SIRPC** region is at

41%

of their ideal digital readiness level

Not surprisingly, the benefits and impact of the internet in the region had the lowest score of all three dimensions analyzed. This number will not improve unless device & internet access and digital resourcefulness and utilization improve as well. This dimension, while the lowest, also offers the greatest opportunity. What would be the social and economic impact in the region if this score improved to at least the median of 5.5?

Lastly, the overall digital readiness index score was of 4.18, below the median of 5.5. This means the region's level of digital readiness needs improvement. In other words, the region is running at 41 percent of the ideal digital readiness level as measured by this study. Given the rate of digitization of the society and economy in general, efforts should be made to improve the digital readiness of the SIRPC to unequivocally improve the region resident's quality of life.

CONCLUSION

Broadband infrastructure, without a doubt, is the equivalent of a railroad line or a four-lane interstate highway in this century. Not having adequate broadband infrastructure and an effective digital inclusion strategy will further disadvantage communities in this 21st century global economy.

This report examined broadband infrastructure as reported by carriers and the FCC as of December 2017 as well as data released by Microsoft in late 2018 in the counties that make up the Southeastern Indiana Regional Planning Commission (SIRPC) region. While the region does indeed have 25/3 coverage, gaps exist that need to be addressed. Furthermore a large discrepancy exists—as expected—between the broadband footprints based on advertised speeds (FCC) versus actual speeds (Microsoft).

While this highlights the critical need to validate any broadband availability data, some opportunities exist to address these gaps including targeting areas with a higher percent of households with children as well as high household density block groups near the current 25/3 footprint. Likewise, areas in the region identified as high digital inequality areas warrant actions to reduce this inequality.

On the business side, it is important to increase the 25/3 footprint. Otherwise, entrepreneurs and small businesses located in the region are unable to leverage an online presence, Internet of Things (IoT), and artificial intelligence (also known as business intelligence) systems to increase sales,

expand markets and become more competitive. Dearborn County specifically needs attention given that more than 90 percent of their businesses were outside the business footprint based on the FCC dataset (Figure 10).

Regarding broadband access or infrastructure, the most important challenge for providers to expand coverage is lack of density as are topological barriers and right-of-way costs. Fewer and spread out customers are more expensive to reach. Reducing or eliminating right-of-way fees or easement issues within the authority of the region is a great first step.

On actual speeds reported, efforts should be made to improve the current infrastructure so that SIRPC residents and businesses can utilize the technology at a minimum actual speed of 25 Mbps. Slower speeds affect business performance and undermine the technology's potential to increase quality of life. Also, higher shares of homes not subscribing to the technology require efforts to increase educational and awareness on the importance and benefits of the technology.

Adequate broadband is increasingly necessary to attract, create, or retain digital economy jobs and allow residents to learn or improve their digital skills. Inadequate connectivity places communities at a disadvantage when it comes to participating in the growing digital economy as well as affecting workers and their ability to learn or improve digital skills. In addition, training and reskilling programs need to be strengthened to soften the potential impact of automation in the coming decades.

As the economy and workforce continue to digitize, efforts are needed to ensure workers and homes in the region are digital ready. Findings from the household digital readiness survey found tremendous opportunities to invest in strategies to improve the digital readiness level in the region. Regardless of the broadband deployment model the region decides to pursue to expand and upgrade the current 25/3 footprint for residences and businesses and the ensuing digital inclusion strategy it designs and implements, it is important to consider the following:

- **Focus on low hanging fruit**: target areas with above average percent of homes with children adjacent to the existent 25/3 footprint to start. Proceed incrementally afterwards to avoid potential financial and subscription pitfalls.
- **Federal funding discrepancy**: keep in mind, however, that some state and/or federal programs deem areas with speeds higher than 10/1 ineligible for funding. While this is a serious inconsistency, given that the FCC's broadband definition is 25/3, hopefully it will be resolved soon. In the meantime, keep this in mind when applying for broadband infrastructure funding.
- **Implement a dig once policy for the region**: while a "dig once" policy is about to become federal law and applicable to many federally funded road projects, the region should make efforts to further strengthen this policy and implement a similar policy applicable to county and city roads.
- **Identify federal lands and assets in the region**: President Trump signed an executive order last year to streamline and expedite requests to locate broadband facilities in rural areas. This executive order may make it easier to leverage federal facilities to place broadband infrastructure in an effort to increase access. In addition, it is worthwhile to map assets in the region (water towers, utility poles, etc.) that could be used by providers to lower the cost and make it easier to expand their footprint.
- **Consider additional technologies to deploy**: Microsoft announced a project to utilize TV white space (analog TV frequencies) to expand

broadband in rural areas. Efforts should be made to promote the region for this project.

- **Obtain "Digital Ready" certification for the region**: The SIRPC region should make efforts to get every community in the region "Broadband Ready" certified. This certification may also provide access to additional funding.
- **Consider existent funding programs**: review details concerning the next level $100 million investment in rural broadband by Governor Holcomb as well as the $600 million ReConnect USDA program. Reach out to Indiana Director of Broadband Opportunities Scott Rudd to explore other funding mechanisms available or local community best practices
- **Design & implement a regional digital inclusion strategy**: at a minimum, this strategy should make efforts to continue to increase awareness of why broadband is important and collaborate with community anchor institutions, educational institutions and nonprofits to provide digital literacy trainings and device loan programs throughout the region, to both residents and businesses. Promoting adoption and use is both a complementary and necessary component to make any broadband investment sustainable. A great place to start implementing digital inclusion efforts is in the areas identified as having a high digital inequality.
- **Improve household digital readiness level in the region**: while adequate internet connectivity and device ownership throughout the region are critical, efforts to expand internet use are also warranted. This focused expansion can take place by improving intermediate and advanced digital skills by leveraging regional assets, including community foundations, community colleges, libraries, Purdue Extension, etc. to address this gap in digital skills. Once these skills improve coupled with expanded adequate internet connectivity, a more diverse and productive internet use will ensue resulting in the region capturing more of the technology's benefit.
- **Evaluate existing training and reskilling programs in the region**: these need to be strengthened to soften the potential impact of automation in the region's jobs. While the speed and breadth of automation's impact in the region are unknown, a potential exists and proactive measures need to be taken today.

APPENDIX A

DEVICE & INTERNET ACCESS (DIA):

includes device ownership & performance, duration of device & internet downtime, connecting more from home than other locations (including using mobile data), and variety of devices and frequency when connecting to the internet. A higher score denotes a more diverse and frequency device use, connecting more from home, less device performance issues, and shorter periods without access to devices or internet.

Q2: Which of the following devices do you own and how well did they work over the past year?
Categories: desktop, laptop, tablet, smartphone
Non-response / Do not own = 0
Poorly/Very poorly = 1
Sufficient = 1
Well/Very well = 3

Q3: How often have you been without a device or the internet over the past year due to unpaid bills, broken devices, running out of minutes/data, or other problems?
Categories: internet, desktop, laptop, tablet, smartphone
Non-response = 0
More than 30 days a year = 1
8-30 days a year = 2
5-7 days a year = 3
1-4 days a year = 4
Never had problems = 5

Q4: Over the past year, roughly what percent of the time did you use the following to connect to the internet:
Categories: HomeWiFi
No response / 0% = 0
1<25% = 1
25%<50% = 2
50%<75% = 3
75% or higher = 4

Q5: How often did you or anybody in your household use the following devices to access the internet over the past year?
Categories: desktop, laptop, tablet, smartphone
Non-response/never = 0
Once or several times per year = 1
Several times monthly/once monthly = 2
Several times weekly/once weekly = 3
Several times daily/once daily = 4

DIGITAL RESOURCEFULNESS & UTILIZATION (DRU):

includes help with new electronic devices and their perceived productivity, the trustworthiness of online information, consumption of a variety of online information, frequency and diversity of online interactions with multiple community organizations and diverse internet use and frequency. A higher score denotes higher digital resourcefulness and utilization.

Q6: How often did you or anybody in your household access online information or interact digitally with the following community actors over the past year?
Categories: all (8) but other
Non-response/never/not interested/not available = 0
Once or several times per year = 1
Several times monthly/once monthly = 2
Several times weekly/once weekly = 3
Several times daily/once daily = 4

Q7: Over the past year, how well did these statements describe you …
Categories: all (3)
Non-response/don't know = 0
Not well at all = 1
Not too well = 2
Somewhat well = 3
Very well = 4

Q8: When looking for news or political information online, how often over the past year did you:
Categories: all (3)
Non-response/never = 0
Rarely = 1
Sometimes = 2
Often = 3
Very often = 4

Q9: How often and which applications did you use your internet connection for over the past year? Consider anybody in your household.
Categories: all (25)
Non-response/never/not interested = 0
Would love to but need to learn = 1
Once or several times per year = 2
Several times monthly/once monthly = 3
Several times weekly/once weekly = 4
Several times daily/once daily = 5

INTERNET BENEFITS & IMPACT (IBI):

includes type and level of earnings and savings due to specific online activities as well as promotions and jobs secured with an impact on income. A higher score denotes higher internet benefits and impact.

Q10: Did you or anybody in your household earn money thanks to your internet connection over the past year?
Categories: all (3) but other
Non-response/did not earn = 0
$1-$99 = 1
$100-$999 = 2
$1,000-$4,999 = 3
$5,000 or more = 4

Q11: Did you or anybody in your household save money thanks to your internet connection over the past year?
Categories: all (6) but other
Non-response/did not save = 0
$1-$99 = 1
$100-$999 = 2
$1,000-$4,999 = 3
$5,000 or more = 4

Q12: Over the past year, did you or anybody in your household obtain a promotion thanks to educational courses completed online?
Non-response/no promotions = 0
Yes, promotion resulted in less than $500 increase per year in salary = 1
Yes, promotion resulted in $500 to $999 increase per year in salary = 2
Yes, promotion resulted in $1,000 or more increase per year in salary = 3

Q13: Over the past year, did you or anybody in your household secure a job found and applied online?
Non-response/no jobs = 0
Yes, got a job paying less than $30,000 per year = 1
Yes, got a job paying $30,000 - $49,999 per year = 2
Yes, got a job paying $50,000 or more per year = 3

DIGITAL READINESS INDEX (DRI):

all DIA, DRU, and IBI factors were included. A higher score denotes a higher level of digital readiness considering all factors discussed previously. This measure of digital readiness is the key contribution of this study. This score had a minimum value of 44 and a maximum value of 250.

Since the scales, mean, and standard deviations of each of the three dimensions used to calculate the DRI were different, z-scores for each dimension were calculated and added up given equal weight using formula number four below. This z-score metric was then normalized to a 0-10 range for easier comprehension, discussion, and comparison.

Careful attention was placed to assign a higher value to responses that improved digital readiness. For example, if there were performance issues with internet or a particular device (Q3), the longer the time period, the lower the value while the shorter the time period, the higher the value.

1. Device & internet access (DIA) Score = Q2+Q3+Q4+Q5
2. Digital readiness & utilization (DRU) Score: Q6+Q7+Q8+Q9
3. Internet Benefits & Impacts (IBI) Score = Q10+Q11+Q12+Q13
4. Digital Readiness Index (DRI) Score (z-Scores): DIA + DRU + IBI

APPENDIX B

In order to align the survey sample as much as possible to the 2013-2017 Census ACS population distribution in the region, the survey sample was weighted by household income, age groups, and educational attainment. These three indicators are known to impact technology adoption.

Table B1 shows the survey sample, population distribution, and weights utilized.

Notice how younger age groups, less educated, and lower household income groups were underrepresented in the survey. For example, the 2013-2017 ACS survey showed that 11.1% of people in the SIRPC region were ages 18 to 24 while only 2.1% of those responding the survey reported being in that age group,

Table B1. Survey Sample Weights and Population Distributions

County	Sample	Population	Weight	Sample Weighted
Age Groups				
18-24	2.1%	11.1%	5.274	11.2%
25-34	11.4%	14.1%	1.264	14.4%
35-44	25.5%	15.9%	0.624	15.9%
45-64	43.5%	37.5%	0.863	37.4%
65 or older	17.5%	21.1%	1.203	21.0%
n size	1,649	---	---	1,642
Household Income				
Less than $35,000	11.1%	29.9%	2.691	32.7%
$35,000-$49,999	12.8%	15.4%	1.200	15.7%
$50,000-$74,999	21.1%	21.7%	1.029	20.4%
$75,000-$99,999	19.2%	14.3%	0.744	14.0%
$100,000 or more	35.9%	18.8%	0.523	17.2%
n size	1,576	---	---	1,575
Educational Attainment				
High School or less	13.3%	54.5%	4.101	54.4%
Some College or Associate's Degree	34.7%	28.9%	0.833	30.0%
Bachelor's Degree or higher	52.1%	16.5%	0.318	15.6%
n size	1,655	---	---	1,649

Source: 2019 PCRD Household Internet Utilization Survey; 2013-2017 ACS 5-Yr

resulting in a weight of 5.274. Same dynamic can be seen with homes making less than $35,000 per year (29.9% according to the Census versus 11.1% in the survey) and those with a high school degree or less (54.5% according to the Census versus 13.3% in the survey).

After the survey sample was weighted by these three variables, the column titled "Sample Weighted" shows how the distributions align closer with the Census data. All analysis conducted for this study utilized a weighted survey.

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SOUTHEASTERN INDIANA REGIONAL PLANNING COMMISSION SIRPC

PCRD seeks to pioneer new ideas and strategies that contribute to regional collaboration, innovation and prosperity. Founded in 2005, the Center partners with public, private, nonprofit and philanthropic organizations to identify and enhance the key drivers of innovation in regions across Indiana, the U.S. and beyond. These drivers include a vibrant and inclusive civic leadership, a commitment to collaboration, and the application of advanced data support systems to promote sound decision-making and the pursuit of economic development investments that build on the competitive assets of regions.