

Research & Policy

# *INSIGHTS*

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## Home Broadband Survey Results: Connecting Indiana

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Center for Regional Development

# Home Broadband Survey Results: Connecting Indiana

## Abstract

As the COVID pandemic unfolded, communities, residents, and businesses across the state scrambled to interact almost entirely online. During this time, it became evident that quality and affordable internet access was an issue. To gather more timely and granular data to help communities as they understood their digital landscape and planned accordingly, the Purdue Center for Regional Development in partnership with Purdue Extension, the Indiana Office of Community and Rural Affairs, and multiple local and regional organizations, completed 16,200 broadband home surveys in mostly rural Indiana. Results from this convenience sample indicate that while most respondents subscribed to internet at home, more than half were unsatisfied with their service, mostly due to their connections being too slow or unreliable. Among some of the findings is that there is a discrepancy between what the largest share of respondents are willing to pay (less than \$50) for adequate and reliable service versus what they pay now (between \$50 and \$74.99). Perhaps the main takeaway from this sample is that the digital divide is no longer a binary yes/no issue but rather a quality issue that needs to be considered when bridging this divide.

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## About the Author

Dr. Roberto Gallardo is the Director of the Purdue Center for Regional Development and a Purdue Extension Community and Regional Economics Specialist. He has worked with rural communities over the past decade conducting local & regional community economic development, making use of technology. Dr. Gallardo holds an electronics engineering undergraduate degree, a master's in economic development and a Ph.D. in Public Policy and Administration.

## Key Findings

Survey results show that 88.3% subscribed to internet at home. Close to one-third of homes subscribed to cable technology followed by a little more than one-quarter subscribing to digital subscriber line or DSL. However, of these, 56.3% were not satisfied with their home service mostly because service was too slow or unreliable.

Of the 11.7% that did not subscribe to internet at home, close to 28% said it was because service was not available followed by service being available but too expensive (16.5%) or too slow (16.2%). In addition, close to 15% said they did not subscribe at home because they already use a smartphone data plan.

**88.3%**

of respondents subscribed to internet at home



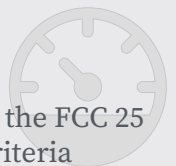
**56.3%**

were not satisfied with their home service because it was too slow or unreliable



**61%**

of speed tests completed did not meet the FCC 25 Mbps download and 3 Mbps upload criteria



**Fiber-optics**

offered the largest “bang for the buck” when it came to cost and download/upload speeds



## Introduction

The COVID-19 pandemic has increased awareness on how important it is to have access to adequate and affordable broadband technology at home. As home businesses, workers, and students scrambled to engage in only on-line interactions, those on the wrong side of the divide experienced disadvantages. At the end of the day, the post COVID-19 world is more than likely to be more digital compared to the pre COVID-19 world, elevating home internet access “can have” to a “must have.”

However, granular data on residential broadband access remains hard to access and understand. The Federal Communication Commission (FCC) has gathered data on broadband access and adoption for several decades but is incomplete (does not include cost of service or satisfaction) and known to overstate access, particularly in rural areas. Other datasets and interactive dashboards have been made available (e.g., U.S. Census, Microsoft, Broadband Now, National Telecommunication and Information Administration, etc.) that show a vastly different picture compared to the FCC’s data leaving broadband stakeholders with confusing—and at many times contradicting—broadband access and availability data.

Inaccurate and incomplete broadband data leaves local communities in the dark, especially when planning to address this issue and more so now that COVID-19 has significantly increased awareness on the digital divide. This survey and the information it gathered (began in 2019 but more than half of responses were gathered in 2021) became a useful tool in the toolbox for local broadband stakeholders. The Purdue Center for Regional Development (PCRD) adapted the survey from an instrument developed by the North Carolina’s Broadband Infrastructure Office after partnering with the Indiana Office of Community and Rural Affairs (OCRA). Back in 2018, OCRA launched a pilot broadband planning program.

The main objective of this survey was to provide community leaders and residents additional, more granular data regarding broadband connectivity in their communities to increase awareness, jumpstart meaningful conversations, and plan accordingly. For these reasons, the survey captured data around the following general themes: 1) home internet adoption, technologies, cost, willingness to pay, and reasons for not subscribing at home; 2) quality of ser-

vice measured through speed tests and satisfaction levels; and 3) characteristics that drive adoption, such as home businesses, remote work, or children in the household.

## Methodology

Data presented in this report were captured from a series of home broadband surveys conducted mostly online in 2019 through mid-2021. The survey was initially designed and implemented as part of the Indiana Office of Community and Rural Affairs’ (OCRA) Broadband Planning program launched in 2018. However, through word-of-mouth and other information channels, PCRD was asked to conduct similar surveys in various other sites in the state. The survey data was gathered in two main waves: the first one took place in 2019 as part of the OCRA broadband planning process while the second wave (containing the majority of responses) took place in late 2020 through mid-2021 by request from community leaders.

Most surveys were distributed online (although some counties distributed paper copy surveys but garnered a very small share of total responses) through multiple community groups, including schools, employers, and libraries. It is important to note that all surveys were based on a convenience rather than a scientific sample. This was deemed as acceptable since the objective was not to conduct a rigorous research study, but rather to gain some inkling of broadband-related issues for awareness and planning purposes. Simply put, the collection of surveys is not intended to be representative of homes in Indiana. However, the sheer number of responses gathered does offer information of value to Indiana broadband stakeholders, leaders, and residents. A total of 16,200 homes were surveyed across 19 counties and one township.

The survey instrument evolved over time, in part to respond to local needs, but efforts were made to ensure most questions remained the same (e.g. home broadband technology, home subscription, satisfaction) for consistency purposes. Questions and response categories that changed slightly over time (e.g., cost and

willingness to pay categories) were harmonized. In addition, questions that were added in later versions of the survey (e.g., internet use) resulted in a lower number of responses. In the end, this harmonized data was aggregated resulting in a large dataset. Data was analyzed primarily by descriptive means, though more sophisticated analyses were also completed to show strength and statistical significance between variable relationships.

To garner more responses, the monthly cost and willingness to pay questions included the following harmonized ranges: less than \$50, between \$50 and \$74.99; \$75 or higher. However, to make the data easier to understand, the median value was utilized to calculate averages. For the less than \$50 range, a median value of \$25 was used. For the range between \$50 and \$74.99 range, a median value of \$62 was used. And lastly, for the \$75 or higher range, a median value of \$75 was used.

Location	Year Surveyed
Crawford County	2019
Town of Dale	2019
Greene County	2019
Marshall County	2019
Rush County	2019
Starke County	2019
Allen County	2020
Bartholomew County	2020
Adams County	2021
Blackford County	2021
Elkhart County	2021

Location	Year Surveyed
Fayette County	2021
Hamilton County	2021
Knox County	2021
Kosciusko County	2021
LaPorte County	2021
Marshall County	2021
Pike County	2021
St. Joseph County	2021
Tipton County	2021
Wayne County	2021

## Results

While an initial analysis of this data was [published](#) in the Indiana Business Review in the spring of 2020, the analysis completed for this report relies on a much larger dataset and provides additional metrics and insights. We begin by discussing certain home characteristics that research identifies as strong predictors of adoption or non-adoption.

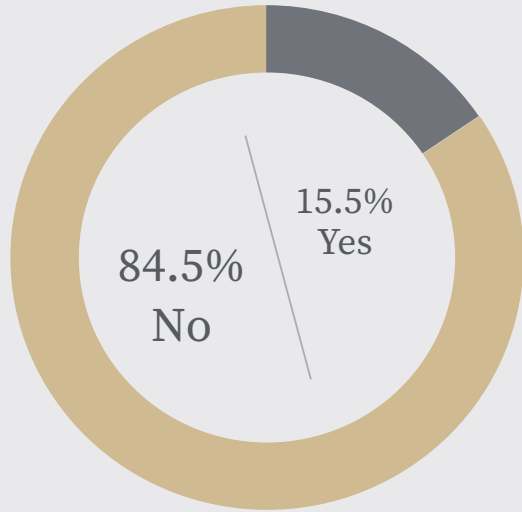
About 15% of respondents indicated that they were a home business as shown in **Figure 1**. Home businesses are more than likely to need adequate connectivity at home compared to non-businesses. In addition, roughly half of respondents indicated that their home internet

was not reliable enough to work from home. As shown during COVID-19, remote workers require fast and reliable connections at home. Close to one-third of respondents said they had children at home (pre-kindergarten through high school) in addition to 9.6% saying they had college-age people in their household. Any sort of student at home, including college, is more likely to require faster and reliable connections when engaging in e-learning. Lastly, 8.4% indicated their home had people ages 65 or older. Older people tend to adopt home broadband at lower levels but when they do adopt, they rely more on telehealth and telemedicine compared to younger residents.

Figure 1

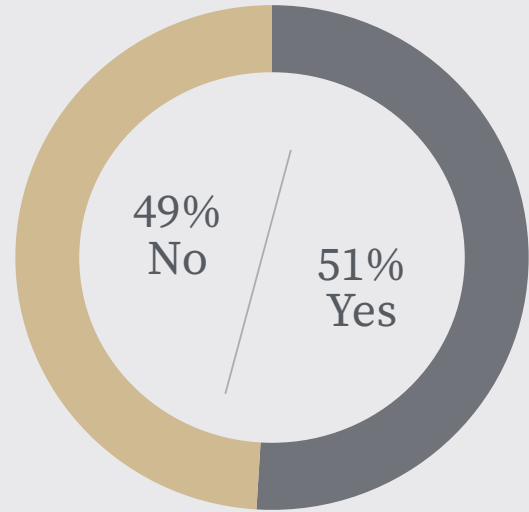
Is this a home-based business?

n=15,801



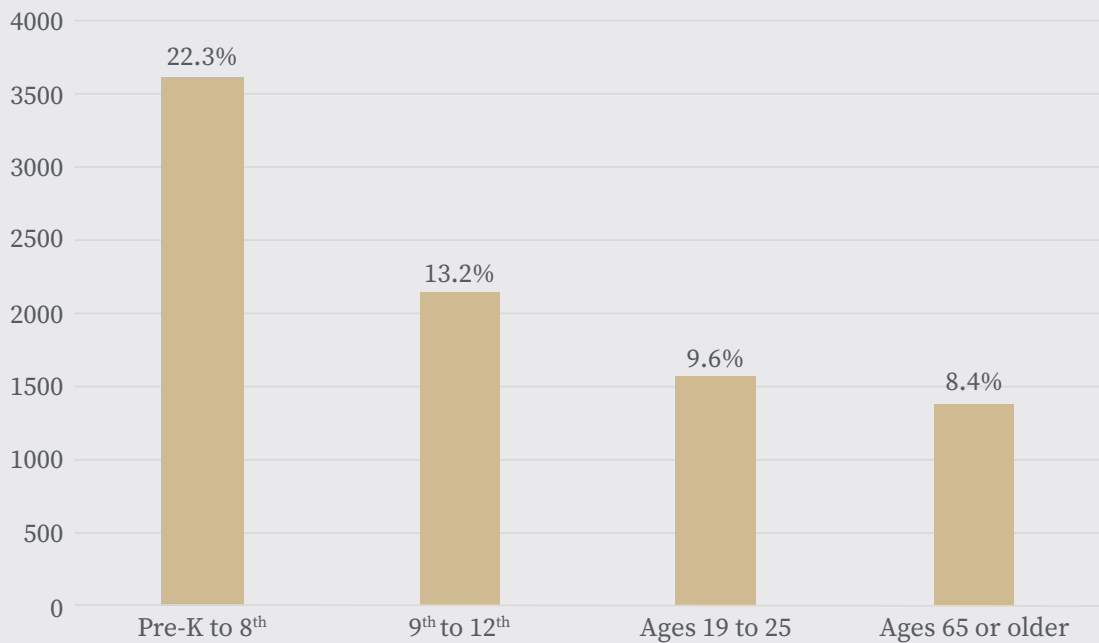
Is your home internet reliable enough to be able to work from home?

n=15,197



Besides the primary owners, what age range are the residents of your home?

n=16,200

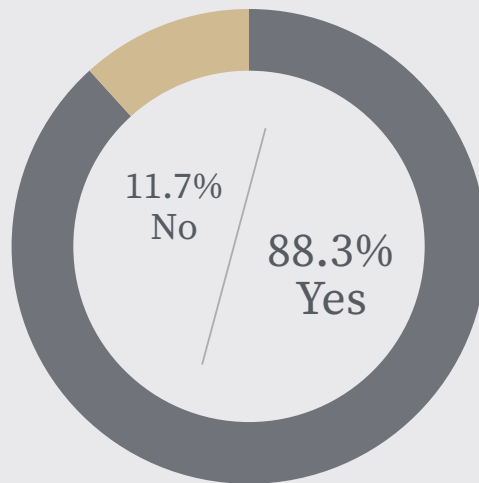


As shown in **Figure 2**, roughly 88% of survey participants reported having a home internet subscription. A little more than one-third (35.9%) reported subscribing to cable followed by roughly one-quarter subscribing to digital subscriber line or DSL. The share of homes subscribing to a cellular data plan, fixed wireless or satellite was between 10-11% each. In other words, close to one-third of homes surveyed subscribed to either cellular data plan, fixed wireless, or satellite. Lastly, about 5.5% of homes subscribed to fiber-optics.

**Figure 2**

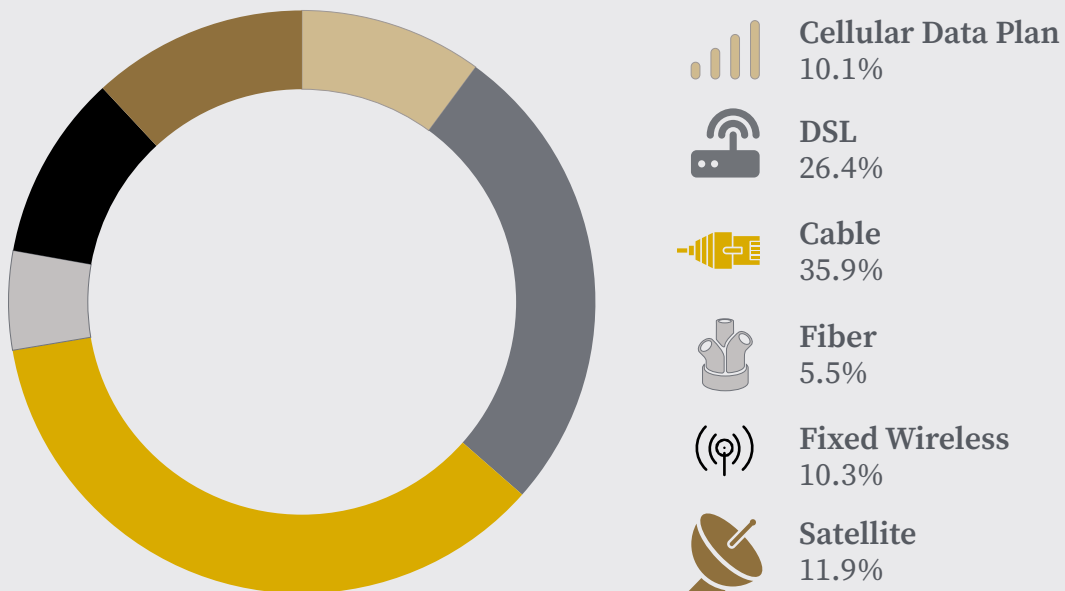
*Do you currently have internet at home?*

n=16,021



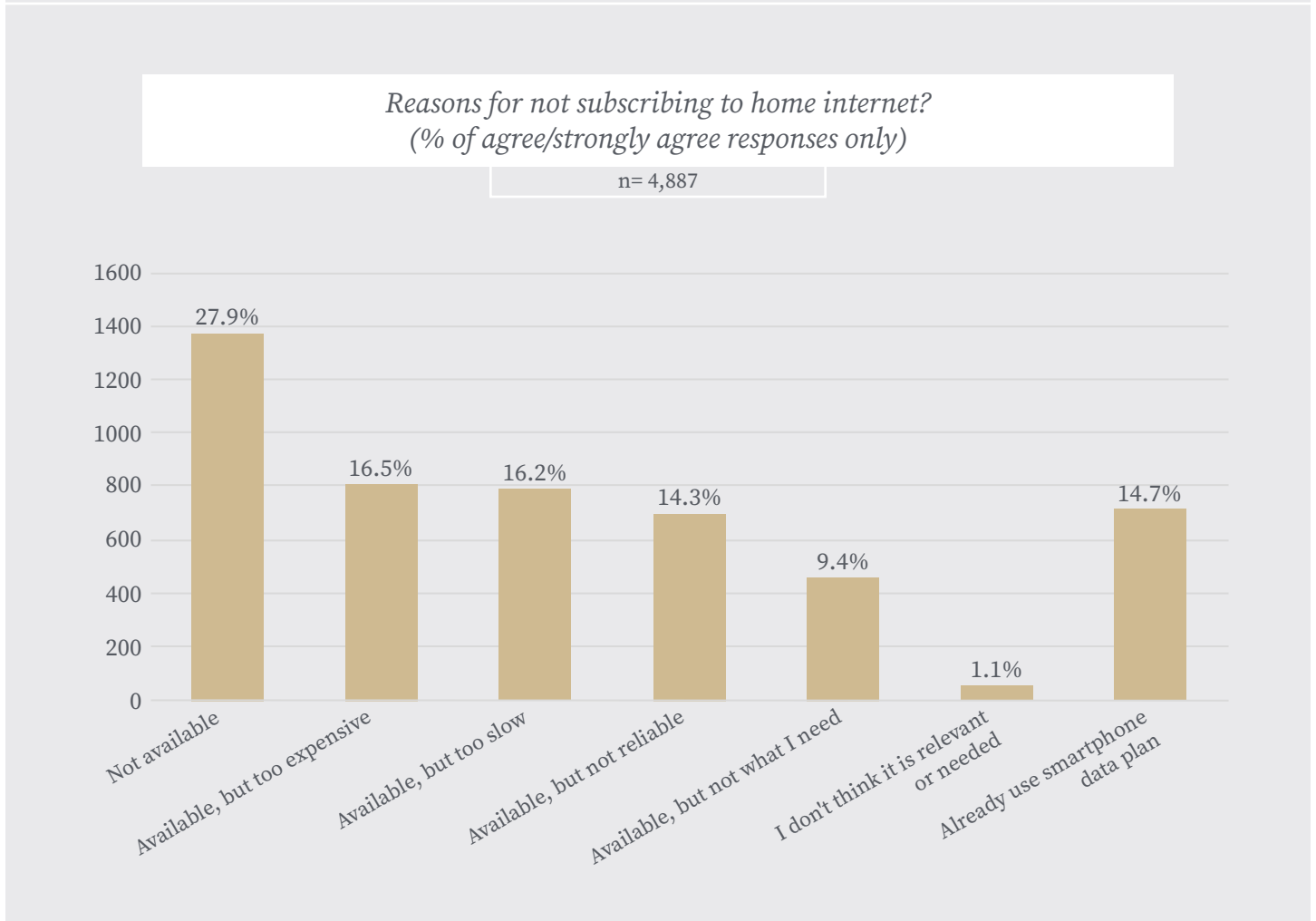
*How do you access internet at home? (select one)*

n=10,071



Among the close to 12% of respondents that did not have a home internet subscription, the main reason they agreed or strongly agreed with was that service was not available (27.9%) followed by the service being available but either too expensive, too slow, or unreliable. More details are shown in **Figure 3**.

**Figure 3**

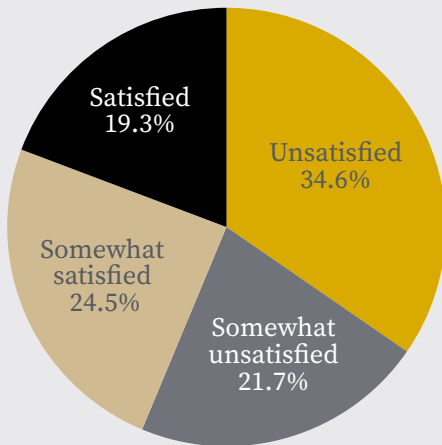


A key aspect of any service is satisfaction. For this reason, we asked survey participants about their satisfaction level regarding their home internet subscription over the past year. Results are shown in **Figure 4**. A little more than 55% of respondents were either unsatisfied or somewhat unsatisfied with their home service. Among those that were unsatisfied or somewhat unsatisfied and that agreed or strongly agreed on multiple reasons listed, too slow was the highest with 27.5% followed by unreliable and not satisfying their needs. Note that the lowest share was for cost (too expensive). In other words, cost was not one of the main reasons cited by survey respondents for their dissatisfaction.

**Figure 4**

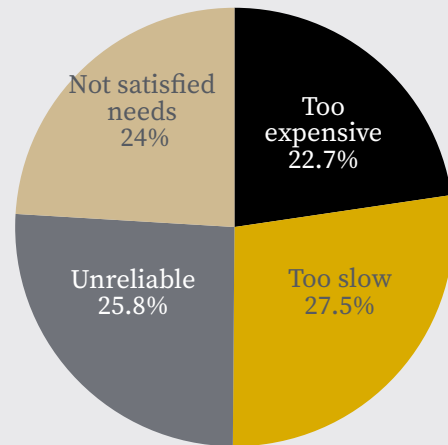
*How satisfied are you with your current home internet access?*

n=10,102



*Unsatisfaction reasons?  
(percent of agree/strongly agree responses only)*

n=12,251

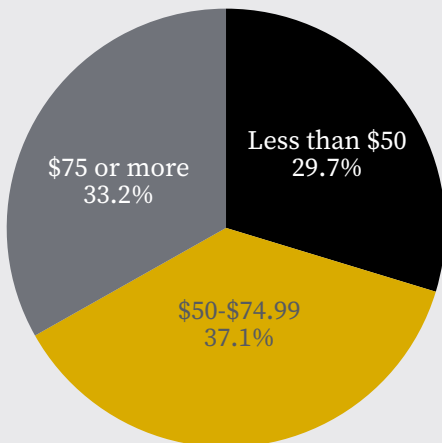


**Figure 5** shows another variable missing from federal datasets regarding broadband is cost. The survey asked respondents to include monthly cost and to distinguish if internet cost was part of a bundle or internet only. About one-third of survey respondents paid \$75 dollars or more per month for internet only. To provide data that potentially affects subscription rates, the survey also asked how much they were willing to pay monthly for adequate and reliable internet. More than one-third were willing to pay between \$50 and \$74.99 per month and close to one-quarter of respondents were willing to pay \$75 or more. However, close to 40% said they were willing to pay up to \$50 per month.

**Figure 5**

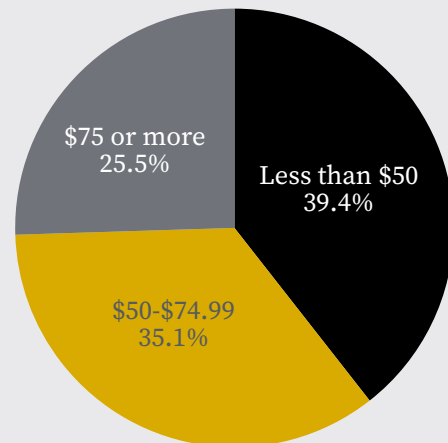
*How much did you pay monthly for internet only (no bundles)?*

n=8,592



*How much are you willing to pay monthly for adequate and reliable home internet?*

n=8,592



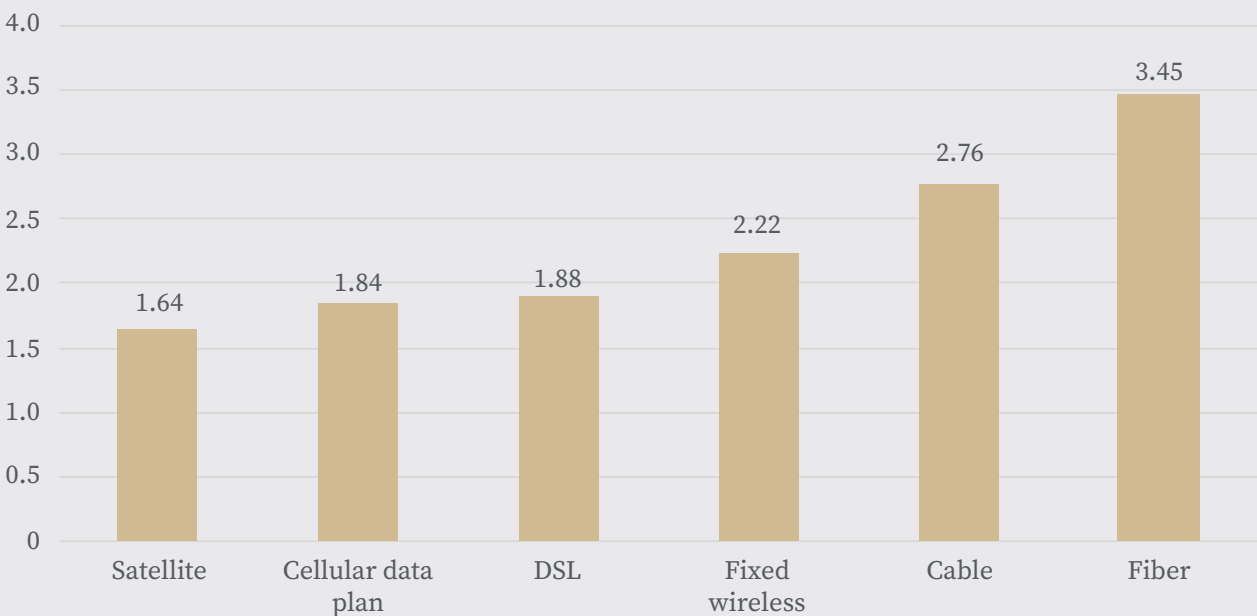


To delve deeper into what could be driving dissatisfaction, the average satisfaction level was calculated for both home technology and monthly cost. The satisfaction scale ranges from 1 (unsatisfied) to 4 (satisfied). Regarding monthly cost, the relationship was statistically significant but notice how the satisfaction level was around 2 or somewhat unsatisfied. However, when looking at technology, the relationship was statistically significant and stronger compared to cost and there is a clearer relationship with satisfaction. In other words, satisfaction levels are explained mostly by technology at home rather than monthly cost as shown in **Figure 6**.

**Figure 6**

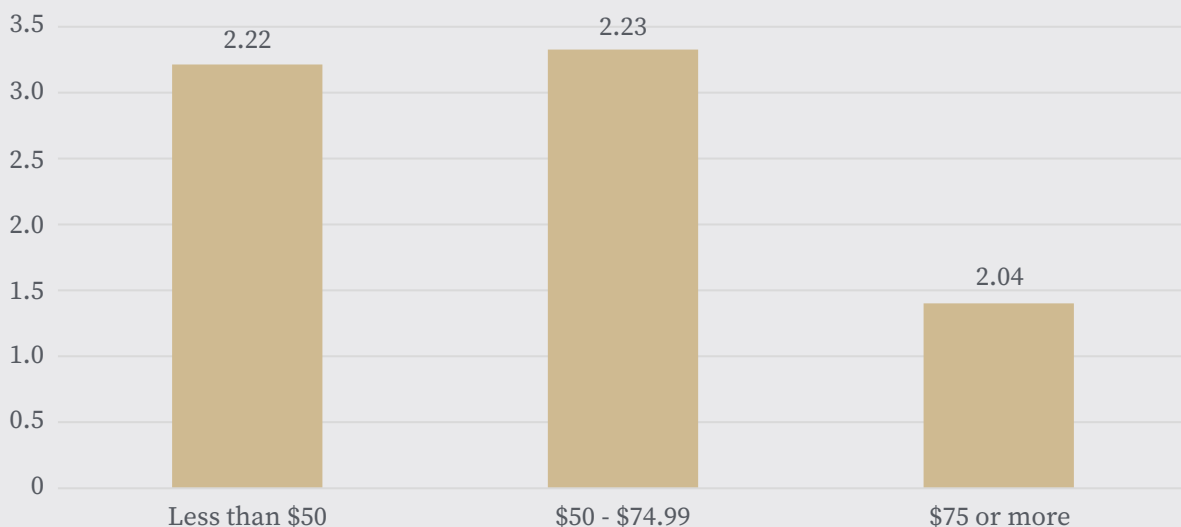
*1=unsatisfied; 2=somewhat unsatisfied; 3=somewhat satisfied; 4=satisfied;  
relationship statistically significant and stronger than cost*

n= 9,782



*1=unsatisfied; 2=somewhat unsatisfied; 3=somewhat satisfied; 4=satisfied;  
relationship statistically significant though weaker compared to tech*

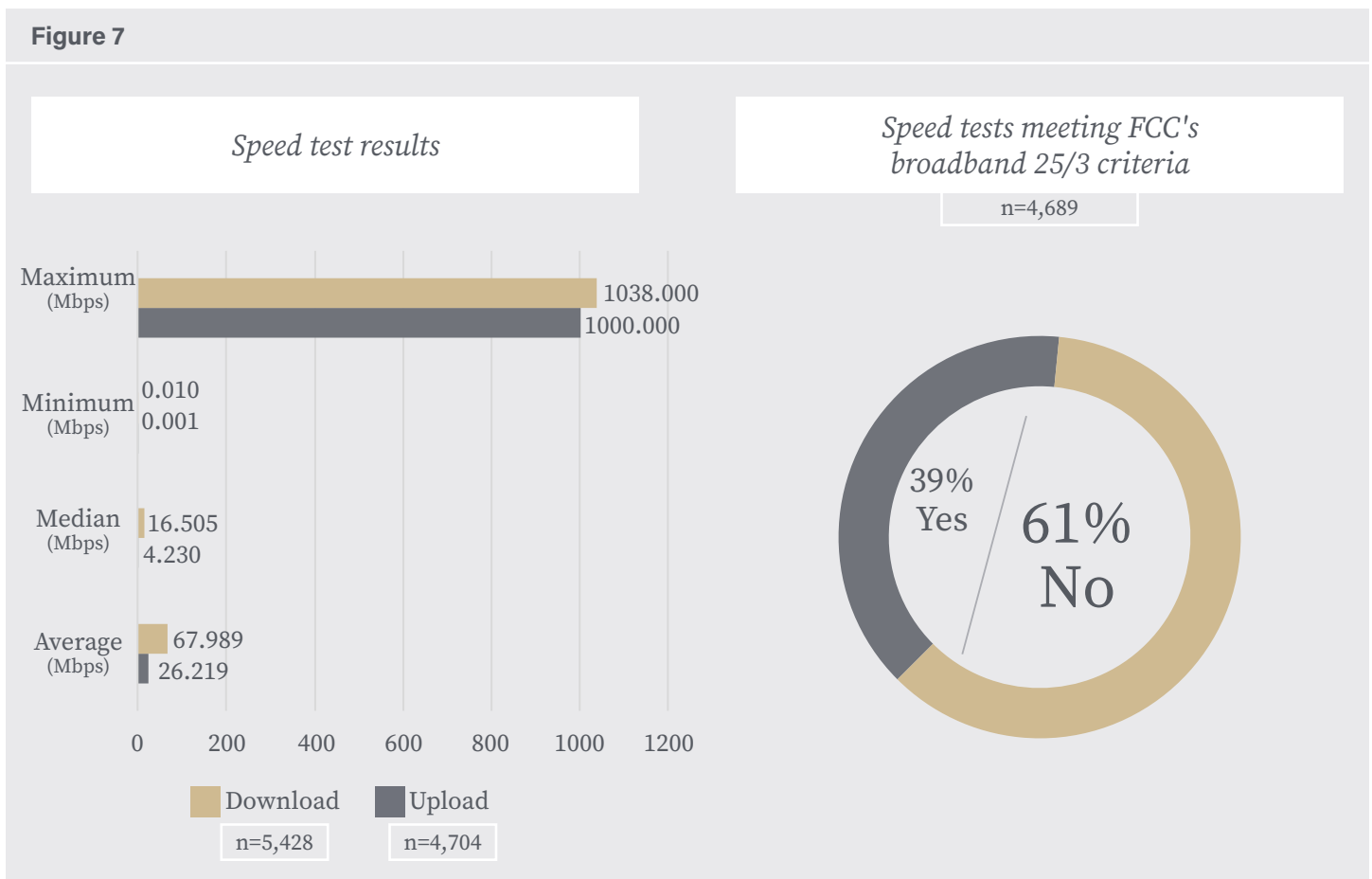
n= 6,515



Related to home internet service satisfaction and quality, respondents were asked to conduct a speed test as part of the survey. While speed tests are not the perfect metric to gauge quality, they do provide additional contextual information around satisfaction and cost.

**Figure 7** shows that the average download speed of the roughly 5,000 speed tests completed was close to 68 Mbps versus 26 Mbps for uploads. However, the median speeds were significantly lower: 16 Mbps for downloads and 4 Mbps for uploads. In other words, the median download speeds were four times faster compared to upload speeds. As more and more homes remote work and e-learn, symmetrical connections are needed—when upload speeds are as fast as download speeds. In addition, half of the speed tests completed fell below the median speeds.

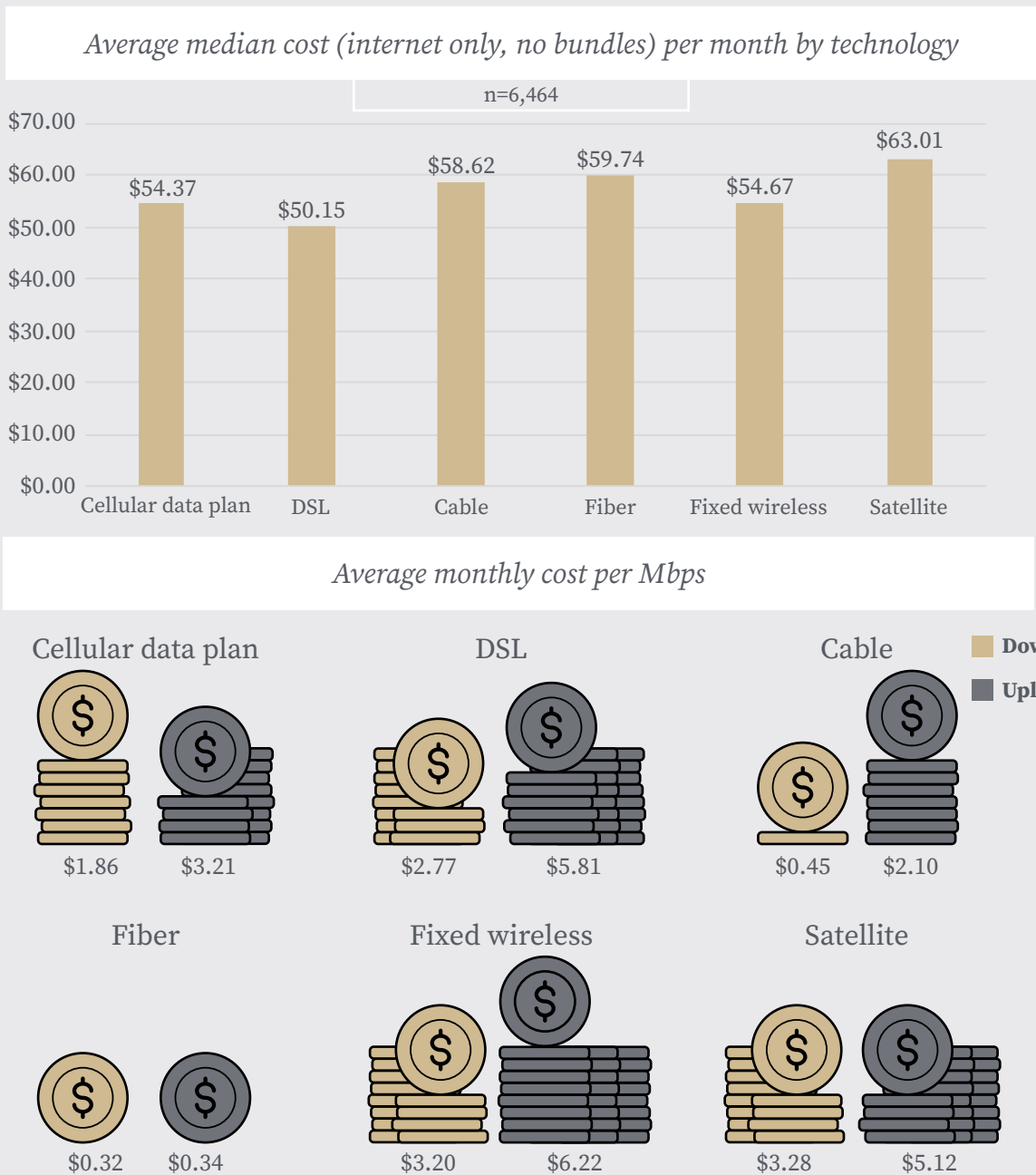
Surprisingly, 61% of speed tests did not meet the current speed threshold for broadband of 25 Mbps down and 3 Mbps up.



To provide more information for communities and providers alike, a series of averages between variables were completed as shown in **Figure 8**. For example, the average median cost (median values were used because ranges and not actual costs were included in the survey) among survey respondents for DSL home service was \$50.15 compared to \$63.01 for satellite. In other words, the cheapest service reported by respondents was DSL while satellite was the most expensive.

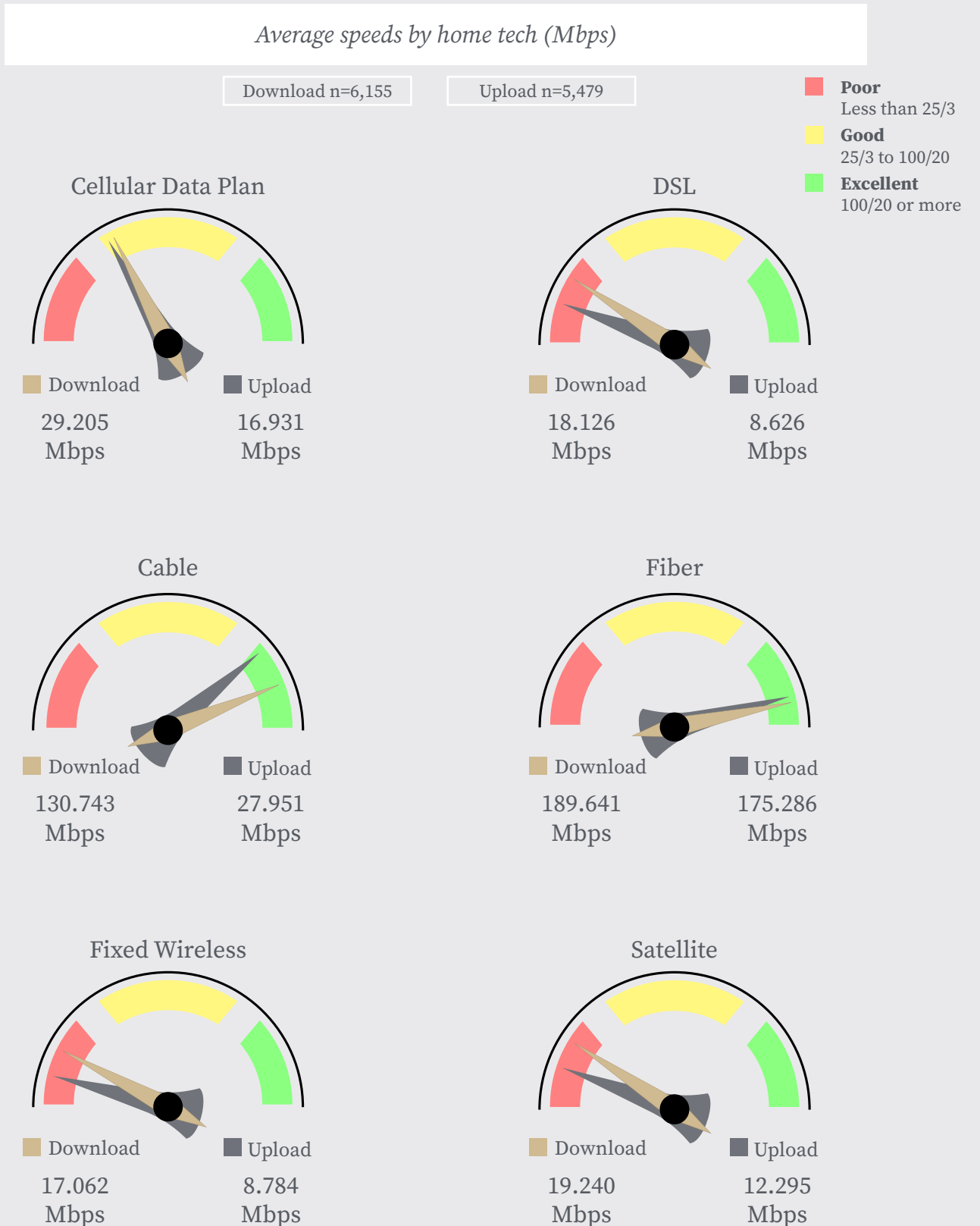
However, when looking at the average cost per Mbps, a slightly different story emerges. Based on an average Mbps cost among survey respondents, satellite is the most expensive technology for download costing on average \$3.28 per Mbps. The second most expensive technology per Mbps download was fixed wireless followed by DSL. On the other hand, fixed wireless was the most expensive for uploads costing an average of \$6.22 per Mbps followed by DSL and satellite. Overall, the cheapest technology for download/upload was fiber, costing 32 cents and 34 cents per Mbps, respectively.

**Figure 8**



**Figure 9** shows the average download and upload speeds by home technology were calculated. Regarding download, fiber had the highest average download with close to 190 Mbps while also having the highest average upload with 175 Mbps. Also note that fiber was the technology offering the closest to symmetrical service among survey respondents.

**Figure 9**



## Conclusion

Please remember this survey is not representative of all Indiana households. Rather, it is based on convenience samples gathered for planning purposes. Regardless, due to the large number of responses, the following conclusions and insights are discussed. The digital divide is a very complex, highly dynamic issue. To solve this issue, it will require an ongoing “all hands on deck” approach where federal, state, and local government work with nonprofits, providers, residents, and businesses. This approach will ensure accurate and timely data is utilized so that the most effective and efficient solutions are identified and implemented. This study has shown that a yes/no access oversimplifies the issue and that quality, affordable, and reliable service needs to be considered as well.

For this reason, the following key insights are discussed based on the findings of this study in an effort to better address the digital divide in the state:

1. It is increasingly clear that the current broadband speed threshold of 25/3 Mbps is no longer sufficient. Areas with maximum advertised speeds at 25/3 Mbps are not eligible for investment per Indiana code. At a minimum, the broadband speed should increase to 100/20 Mbps, as included in the recently passed Infrastructure Investment and Jobs Act (IIJA). And eligibility should be defined by actual speeds (through speed tests for example), not maximum advertised speeds.
2. Give communities more say on where and what networks to build or improve. As has been documented in these surveys, communities have a very good idea of where adequate broadband is lacking in their communities. Communities working with providers can stretch further tax dollars when it comes to improving broadband access throughout the state.
3. Reconsider the definition of overbuilding. A current practice is to avoid overbuilding, but outdated technology should not be included when applying this definition. A majority of homes subscribing to internet are not satisfied with their service because it is unreliable and slow, as documented in this study. However, much needed investment in these areas is not an option for fear of overbuilding. To use an analogy: is it really overbuilding when replacing a dirt road with a six lane highway?
4. Affordability has got to be included when discussing the digital divide. As documented in this study, what respondents are willing to pay is not the same to what they are paying. This is key to increase subscription rates. Moreover, some homes may have access to faster more reliable service but it may be too expensive. Tax dollars should be used to invest in areas and networks with competitive and affordable prices for Hoosiers to subscribe.
5. Take advantage of existing programs such as the Indiana Connectivity Program (for more information go here: [OCRA: Indiana Connectivity Program](#)). Also, take advantage of Indiana’s Farm Bureau speed test initiative to complete as many speed tests as frequently as possible (<https://pcrd.purdue.edu/speedtest>) . More broadband data allows for more strategic investments to be made.

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