Research & Policy INsights

Broadband Data Validation and Demand Aggregation in Indiana

Roberto Gallardo, Ph.D.
Purdue Center for Regional Development
& Purdue Extension

Lionel J. Beaulieu, Ph.D.
Purdue Center for Regional Development
& Purdue Extension

December 2019

Publication 009

PURDUE UNIVERSITY

Center for Regional Development
Advancing Collaboration : Energizing Regions

Background

The Indiana Office of Community and Rural Affairs (OCRA) announced in September 2018 the five communities that were being awarded a pilot broadband planning grant to "help gain an understanding of their current broadband conditions and needs, create a long-term broadband plan in their community, and identify options for achieving that vision." The Purdue Center for Regional Development (PCRD) was tapped to provide technical assistance to these five communities.

While a detailed description of the technical assistance activities provided by PCRD is beyond the scope of this paper, one critical type of support provided was collecting and analyzing data that could shed light on the existing level and quality of broadband service in the community. In particular, PCRD launched a broadband household survey adapted from the North Carolina Department of Information Technology Broadband Infrastructure Office in four of the five OCRA broadband pilot communities. Two additional communities not part of the OCRA pilot broadband program, completed the survey as well thanks to complementary work being undertaken by a team from PCRD and Purdue Extension.

The key objectives of this survey were to 1) validate existing public broadband-related data and supplement it with cost data -- information that is currently lacking in public datasets; and 2) document the "demand" for broadband and the maximum amount individuals would be willing to pay for adequate and reliable service. This information was incorporated then into each community's broadband plan. In the end, data were gathered from six rural Indiana communities.

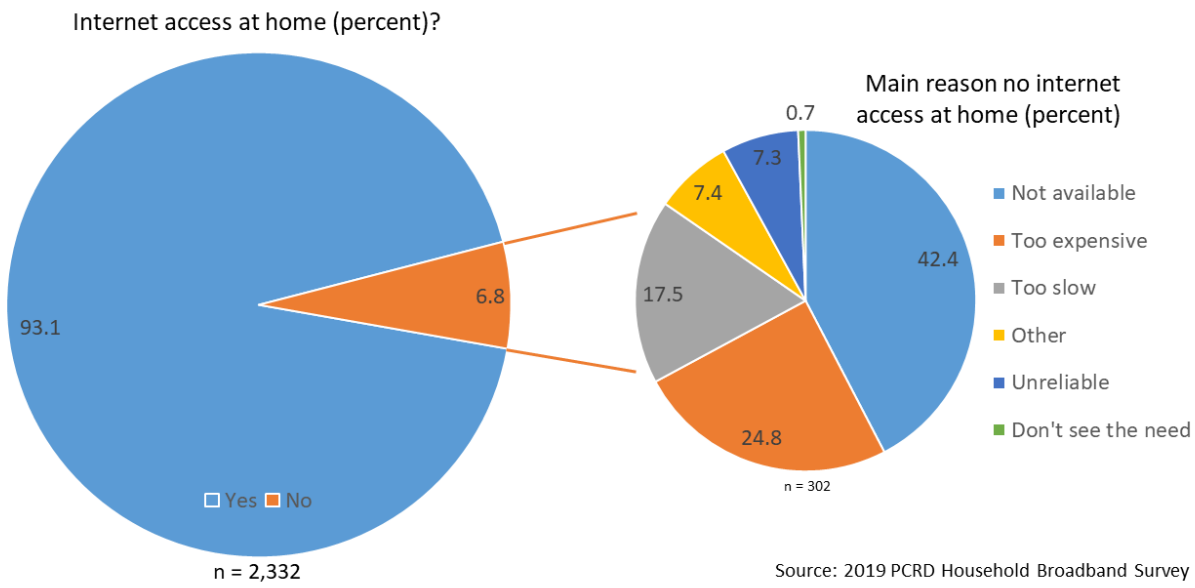
Results

A total of 2,481 respondents took part in the 2019 survey. Data were collected for a period of one month in each of the six communities through online surveys and to a more limited extent through paper copies. The mobile-friendly online surveys were distributed through community email listservs and social media accounts coordinated by either the consultants involved in the OCRA planning process and/or community leaders. The hard work of community leaders, who effectively mobilized their networks to distribute and encourage the completion of the survey, is to be applauded. While conducting an online survey is likely to exclude homes with no internet access, multiple respondents did state they had no access to the internet at their home, suggesting that they were able to participate in the online survey through the use of their smartphones.

Home Access to the Internet

As shown in **Figure 1**, over 93 percent of the respondents said they had internet access at home versus 6.8 percent who did not. Of those without access at home, the top reason was that the service was simply unavailable. The next ranked factors was that the service was too expensive or too slow. Less than one percent of respondents claimed that home internet access was not needed nor relevant to them. This finding suggests that rural communities are well aware of the value and importance of the technology.

Figure 1. Internet access at home and main reasons

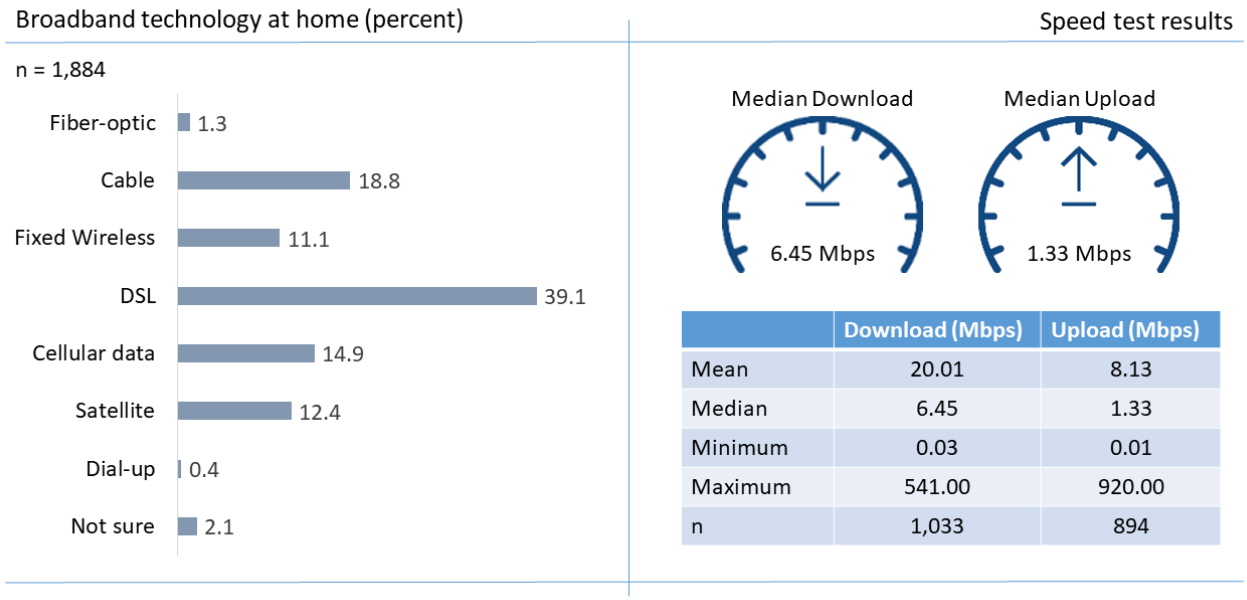


Technologies for Accessing the Internet

Figure 2 reveals that DSL was by far the most common technology used by over 39 percent of respondents, followed by cable by less than 19 percent of the respondents. What is important to note is that more than one in four respondents relied on cellular data or satellite. Both of these technologies can compromise the full potential of the internet since they can affect the quality of life of a household or community due to data limitations and latency issues.

Another important observation is that less than two percent of respondents were able to access the internet at home through fiber optics. Of all technologies listed, fiber optics has the largest data carrying capacity and ability to provide symmetrical (identical download and upload) speeds. While multiple technologies are welcome and needed, limited access to fiber places these communities at a significant disadvantage.

Figure 2. Broadband technology at home and monthly cost



	Download (Mbps)	Upload (Mbps)
Mean	20.01	8.13
Median	6.45	1.33
Minimum	0.03	0.01
Maximum	541.00	920.00
n	1,033	894

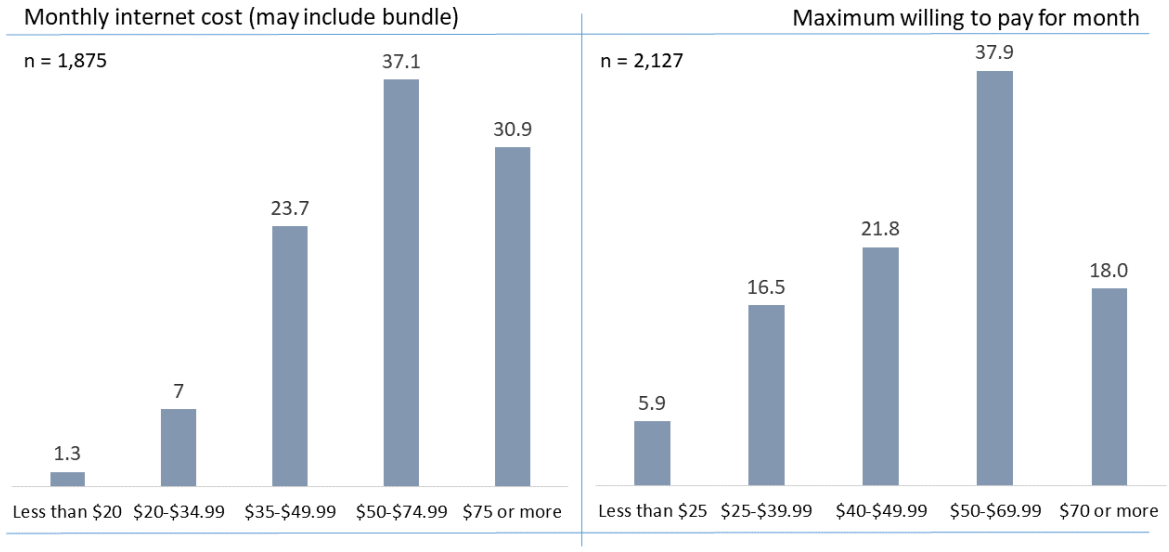
Source: 2019 PCRD Household Broadband Survey

Figure 2 also shows the results of the approximately 1,000 speed tests conducted. While data from speed tests can suffer from technical issues that might affect the results (such as time of day, device used, type of connection), they still provide a good sense of what the respondents are experiencing. In the end, the median download speed was 6.45 megabits per second (Mbps) and the median upload speed was 1.33 Mbps. Both of these are significantly lower than the current broadband definition of 25 Mbps down and 3 Mbps up, or 25/3. Median values were used rather than averages to minimize the impact of highly susceptible outliers.

Cost of Service & Willingness to Pay

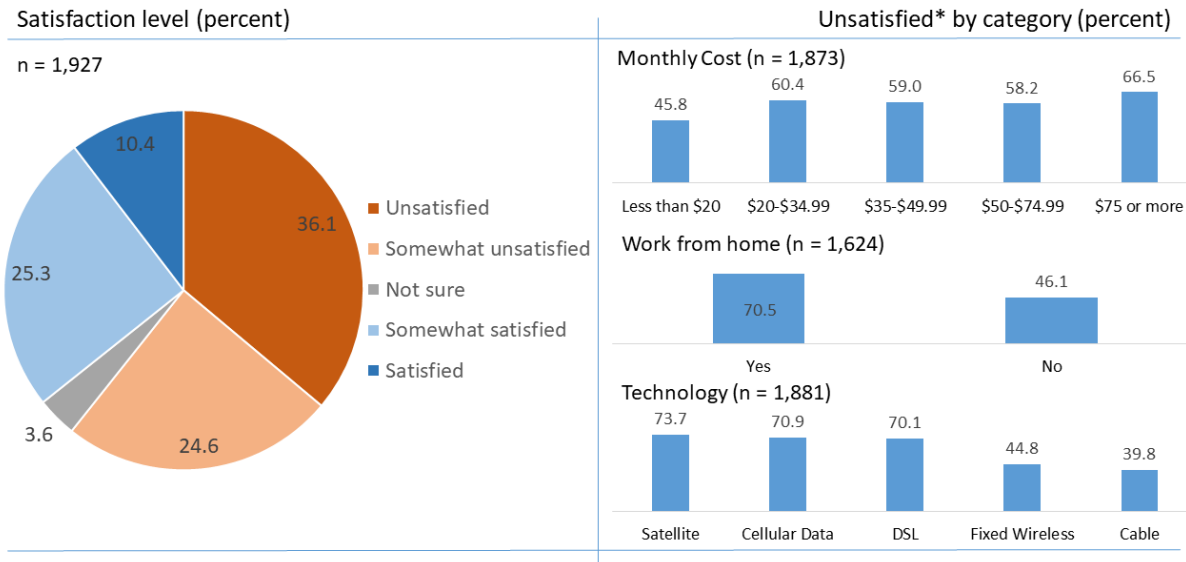
The results presented so far indicate that a majority of respondents had access to internet at home (93.1 percent) mostly through DSL (39.1 percent) and the median download and upload speeds were significantly lower than the broadband definition of 25/3. Now we turn to an examination of the cost of, and willingness to pay for, internet service. According to results presented in **Figure 3**, 68 percent of respondents paid $50 or more per month for internet service (this cost may include television and voice service as well). Furthermore, nearly 56 percent said they would be willing to pay more than $50 dollars per month for adequate and reliable internet. In order to maximize uptake rates, the sweet spot in terms of cost for adequate and reliable internet per month was between $40 and $69.99.

Figure 3. Monthly cost and maximum willing to pay (percent)



Source: 2019 PCRD Household Broadband Survey

Figure 4. Satisfaction levels



Source: 2019 PCRD Household Broadband Survey
*includes somewhat unsatisfied and unsatisfied

Satisfaction Level with Internet Service

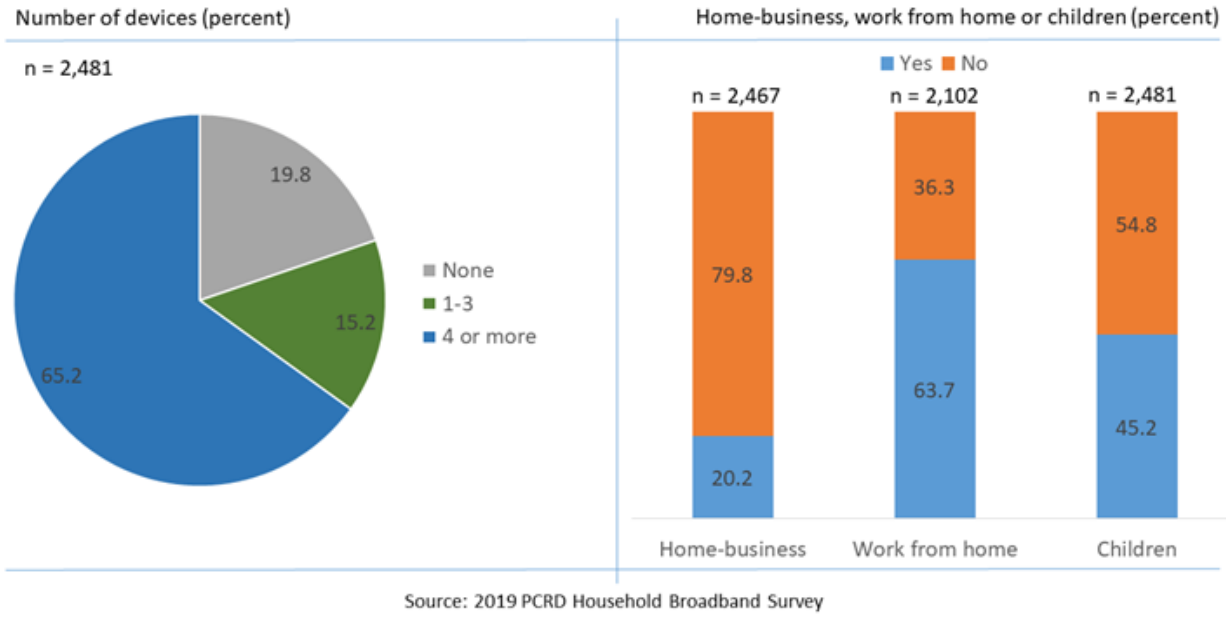
While nine of 10 respondents said they had internet access at home, more than sixty percent were either "unsatisfied" or "somewhat unsatisfied" with their service (see **Figure 4**). Households paying a higher price for service were likely to be more dissatisfied versus those paying less (66.5 percent versus 45.8 percent, respectively). Likewise, those working from home or with the potential to work from home were more unsatisfied with their internet service when contrasted to those not working at home (70.5 percent versus 46.1 percent). Lastly, a strong relationship appears to exist between broadband technology and level of satisfaction. For

example, nearly three of every four respondents with satellite were dissatisfied with their internet service while less than 40 percent with cable were unsatisfied with their internet.

Key Factors Affecting Adoption

Research has identified important factors that are likely to accelerate the demand for broadband. **Figure 5** shows that homes in these communities are fairly sophisticated given that almost two-thirds had four or more devices at home. Homes with more devices are more than likely to require faster speeds and also have an above average level of digital skills to manage. Other factors that shape demand for better and faster connections include the presence of a homebased business, people who could work from home and households with children present. Roughly one-fifth of respondents were homebased businesses, close to two-thirds had the ability to work from home, and almost half had children in the home. Taken as a whole, the six communities have features in place that will necessitate better and more affordable internet service.

Figure 5. Number of devices, home-business, work from home and children



Source: 2019 PCRD Household Broadband Survey

Conclusions

The ability to gather more granular and accurate broadband data is vital to communities engaging in broadband planning efforts. While our survey of six rural Indiana communities does not represent a statistically sound sampling of households, it does provide a mechanism to gather relevant data that can add value to existing public databases, thus resulting in a more robust broadband picture.

Although internet access is nearly universal in these six rural communities, it is worth keeping in mind that the majority of responses were gathered online. In other words, this number may actually be lower and may not capture the true share of homes without internet access. The main point, however, is that despite nearly universal

access in these communities, the data point to a serious quality of service issue—measured by satisfaction levels and median speed test results. In fact, only 13 percent of speed tests conducted met the 25/3 broadband definition.

A wide array of individuals, organizations and institutions will need to come together to solve the broadband quality of service issue noted in this report. Certainly, there are a mix of attributes found in the six communities that would justify broadband investments and improvements, such as the presence of sophisticated users (homes with multiple devices), homes with potential to work from home, households with children present, and the existence of homebased businesses. Moreover, it is clear from the data that these rural communities do value and understand the importance of internet.

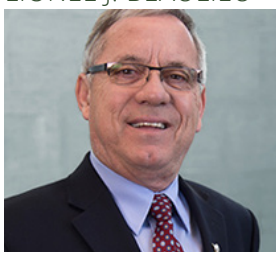
The broadband planning grants being awarded by OCRA is a step in the right direction. So, too, is the State of Indiana Next Level broadband program that is being targeted to unserved areas of the state. The Purdue Center for Regional Development stands ready to lend its assistance to communities and regions in the state that seek to gather data that are more accurate and produce plans that will serve as the blueprint for their broadband future.

Authors

ROBERTO GALLARDO

Roberto Gallardo is the Assistant Director of the Purdue Center for Regional Development and a Purdue Extension Community & Regional Economics Specialist. He has authored more than 70 articles including peer-reviewed and news-related regarding rural trends, socioeconomic analysis, industrial clusters, the digital divide, and leveraging broadband applications for community economic development. He is also the author of the book "Responsive Countryside: The Digital Age & Rural Communities", which highlights a 21st century community development model that helps rural communities transition to, plan for, and prosper in the digital age.

LIONEL J. BEAULIEU



Dr. Bo Beaulieu is director of the Purdue Center for Regional Development and Professor in the Department of Agricultural Economics. He has played a played a major role in the launch of a number of innovative national research and Extension programs across the nation including the National e-Commerce Extension Project, the Stronger Economies Together (SET) program in partnership with USDA Rural Development, and the Food Assistance Research Program in collaboration with the USDA Economic Research Service. More recently, Dr. Beaulieu secured funding for PCRD, in partnership with the University of Kentucky, to spearhead the Rural Economic Development Initiative in the North Central and Southern regions of the U.S. as part of funding from USDA Rural Development. Since joining Purdue in 2013, he has given leadership to the development and implementation of the Hometown Collaboration Initiative, the launch of the Rural Indiana Stats website, and the Rural Opportunity Zones Initiative, all in partnership with the Indiana Office of Community and Rural Affairs.

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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.

Purdue Schowe House
1341 Northwestern Avenue
West Lafayette, IN 47906

Roberto Gallardo
robertog@purdue.edu

765-494-3525
toll-free 877-882-7273
fax 765-496-9676

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