2018 Report on the

# Indiana Universal Service Fund & Broadband Deployment in Indiana

Indiana Utility Regulatory Commission Staff

**October 1, 2018**

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# Executive Summary

**Study Requirements**

House Enrolled Act (HEA) 1065 was enacted by the Indiana General Assembly and signed into law by Governor Eric Holcomb on March 21, 2018, as Public Law 177-2018. Section 13 of the Act requires the Indiana Utility Regulatory Commission (IURC or Commission) to conduct a study regarding the Indiana Universal Service Fund (IUSF) and broadband deployment and to issue a final report to the Interim Study Committee on Energy, Utilities, and Telecommunications no later than October 1, 2018. The statute requires the Commission to study the following topics:

(1) The types of service on which the IUSF surcharge is imposed;
(2) The types of service for which disbursements from the IUSF may be used;
(3) The eligibility requirements for service providers to receive disbursements from the IUSF;
(4) Broadband deployment (expansion and improvement of access to broadband services); and
(5) Any other matter concerning universal service reform that the Commission considers appropriate.

To provide for an open process and to meet the required timeline, the Commission delegated the preparation of this report to Commission staff and sought comments from the public and stakeholders regarding access to broadband services in Indiana. Commission staff received comments from many individuals and businesses across the state, as well as several industry organizations and other community groups. The comments are publicly available on the Commission's website at https://www.in.gov/iurc/3010.htm.

**The Indiana Universal Service Fund**

The IUSF was established by Commission Order in 2004 in response to revenue reductions caused by changes to Federal Communication Commission (FCC) rules that affected small rural telephone companies. Compared to Indiana's largest telephone companies that serve more densely populated markets, rural telephone companies generally face higher costs to provide reasonably comparable telecommunications services. The Commission found that the IUSF should be competitively neutral and promote just, reasonable, and affordable rates for telephone services.

The IUSF is funded through an assessment based upon net retail intrastate telecommunications revenue from all telecommunications companies. Carriers that contribute to the fund pass those assessments on to their customers as a surcharge on their monthly bills. Examples of the types of services that are assessed include revenues from local exchange service (also known as local telephone service), intrastate long distance (which is long distance calls to locations within the

state), and wireless carriers' intrastate voice service (wireless calls that are not considered interstate).

The IUSF currently disburses approximately $11.5 million annually to the qualified small rural telephone companies. An IUSF recipient must generally meet three criteria:

(1) Be designated as an eligible telecommunications carrier, which means the recipient is eligible to receive federal universal service support;
(2) Serve rural territories; and
(3) Provide basic telephone services.

IUSF recipients receive a set disbursement amount on a monthly basis. They are not required to demonstrate the funds were spent on specific items. Recipients must offer the universal telephone services identified by FCC rules and adopted by the Commission in 1998. In addition, they must complete a qualifications test every three years to show the support is needed.

*Observations on the Indiana Universal Service Fund*

The IUSF has been operational for over a decade, providing financial support to small, rural telephone companies to provide telecommunications services to high-cost, rural areas in the state. The IUSF is a relatively small fund for a narrow purpose and its funding source does not appear to be sustainable for the long term. Many of the characteristics of the IUSF were based upon federal rules and definitions that were in place in 2004 but are now inconsistent with current federal rules and are outdated due to the pace of technological change and consumer demands. The continuance of IUSF support is vitally important for the companies that receive that support, especially considering potential FCC changes that may alter their financial landscapes in the future. However, with a declining contributions base and limited amount of current funding it receives (approximately $11.5 million annually), the IUSF's current capacity to support additional services, including broadband, is extremely limited. Moreover, deploying and maintaining broadband infrastructure in high-cost or uneconomic areas of the state will require ample, sustained funding over a long period of time.

## Broadband Deployment in Indiana

Broadband has become a vital service in almost every aspect of daily life, from applying for jobs, accessing government services, managing bank accounts, paying bills, doing homework, accessing online entertainment, and staying in touch with family and friends. Hoosier businesses need broadband for communications with customers, such as advertising, taking orders, collecting payment, communication with other businesses, and overall improving the efficiency of their businesses. A lack of access to high-speed internet in homes and businesses can have a major impact for a multitude of reasons.

*Internet Speeds*

Broadband speeds are characterized by both download and upload speeds. While there may be different target speeds, most of the discussions at the state and federal level have centered around 10 Megabits per second (Mbps) download and 1 Mbps upload or 25 Mbps download and 3 Mbps upload, for wired broadband internet access. Broadband download and upload speeds are commonly expressed in a fractional form. For instance, 10 Mbps download and 1 Mbps upload is expressed as "10/1 Mbps" and 25 Mbps download and 3 Mbps upload is expressed as "25/3 Mbps."

The FCC's speed benchmark for evaluating the availability of broadband is currently 25/3 Mbps. However, the FCC uses 10/1 Mbps as the minimum speed that must be deployed for service providers to receive funding from the FCC's Connect America Fund, Phase II (CAF II). The Connect America Fund (CAF) provides financial support for eligible companies to help offset the higher-than-average costs of providing telecommunications services in rural, insular, or other high-cost areas.

In Indiana, HEA 1065 (2018) defined broadband service as a connection to the Internet that provides capacity for transmission at an actual speed of at least 10/1 Mbps, regardless of the technology or medium used to provide the connection.

*Broadband Deployment*

Significant investments have been made, and continue to be made, by telecommunications and internet companies in Indiana. Indiana's deregulation of these industries beginning in 2006 has spurred greater investment and greater innovation. These investments naturally occur in areas of the state that are more cost effective and the most profitable. Rural territories in Indiana, and across the country, however, are much more expensive to serve and have fewer potential customers. As a result, a significant portion of rural Indiana does not have access to 10/1 Mbps and are, by definition of Indiana statute, unserved. See Map 3 on page 26.

There are significant challenges to deploying broadband in the areas of the state that remain unserved. One significant challenge is in developing good maps of the areas of the state that are unserved. Dependence on the data in the FCC's Form 477 can overstate the level of broadband deployment. Additionally, the cost to deploy broadband in some of the state's most rural and least densely populated areas remains a very expensive proposition. Low adoption rates also add to the long payback periods that companies compute when determining whether to take on a project.

There are programs established at both the state and federal level to provide monetary assistance to providers to deploy broadband to unserved areas. The two main federal funding sources for broadband deployment are the federal Universal Service Fund (USF), administered by the FCC, and the Rural Utility Service (RUS) broadband grant and loan programs administered by the U.S. Department of Agriculture (USDA). At the state level, the main provision in HEA 1065 created a

grant program for qualified broadband projects that is administered by the Indiana Office of Community and Rural Affairs (OCRA). While important, these programs have not provided the level of funding necessary for effective rural broadband deployment.

Governor Holcomb's recently announced infrastructure agenda plan, Next Level Connections program, includes a significant level of funding, $100 million, to improve broadband access. Specifically, this program will provide grants to bring high speed, affordable broadband access to unserved areas of the state utilizing a 100/10 Mbps benchmark.

# The Indiana Universal Service Fund

The Indiana Universal Service Fund (IUSF) was established in 2004 by Commission Order as a revenue replacement fund in response to revenue reductions spurred by changes in Federal Communications Commission (FCC) policies. The revenue reductions would have affected small rural telephone companies' ability to maintain their networks and continue to provide reliable telephone service to their customers. The IUSF was not created by state statute, and was designed for a fairly narrow purpose: to support the provision of universal service by rural incumbent local exchange carriers (ILEC). An ILEC is a wireline-based local telephone company that was a regulated monopoly for a given service area prior to the federal Telecommunications Act of 1996, which opened the local telephone market to competitive providers. Under those federal regulations, carriers are required to provide services at rates that are just, reasonable, and affordable, and reasonably comparable to those in urban areas.

After the Commission Order establishing the IUSF was appealed and affirmed, the IUSF was implemented in 2007 to ensure communications networks in Indiana were continually built and maintained. The IUSF is funded by requiring all telecommunications carriers to assess a surcharge on net retail <u>intrastate</u> telecommunications revenue. Recognizing that technological and economic changes would likely occur after the implementation of the IUSF, the parties and the Commission agreed upon a review of the IUSF to be conducted every three years, called the Triennial Review, which is discussed in more detail later.

Importantly, the IUSF is distinct from the federal Universal Service Fund (USF). The federal USF is administered by the FCC and is funded by a surcharge on bills for <u>interstate</u> and international communications services. It funds federal universal service programs including the High Cost, Lifeline, Schools and Libraries (E-Rate), and Rural Health Care programs. (See Figure 9 on page 57.)

## Who Pays into the Indiana Universal Service Fund?

The IUSF is funded through an assessment based upon net retail intrastate telecommunications revenue from all telecommunications carriers. Carriers that contribute to the fund pass those assessments on to their customers as a surcharge on their monthly bills. Examples of the types of services that are assessed include revenues from local exchange service (also known as local telephone service), intrastate long distance (which are long distance calls to locations within the state), and wireless carriers' intrastate voice service (wireless calls that are not considered interstate).

The purpose of requiring the pass-through to customers was to make the cost of the IUSF transparent to all Indiana telecommunications customers. The current surcharge assessment rate is 1.09 percent of net intrastate retail telecommunications revenues. For example, the surcharge

on a customer bill with intrastate retail telecommunications services charges of $50.00 at a rate of 1.09 percent would be $0.55.

The surcharge is recommended by Solix, the third-party IUSF administrator that works in collaboration with the IUSF Oversight Committee. Solix disburses the funds to the eligible recipients, and the Oversight Committee acts as an advisory body to the Commission on the IUSF. The Oversight Committee is comprised of a representative from the OUCC and one industry representative from each telecommunications sector: large incumbent local exchange carriers, rural incumbent local exchange carriers, competitive local exchange carriers, long distance providers, and wireless providers. Together, Solix and the Oversight Committee analyze the IUSF financials and study the state's telecommunications revenue trends to determine the percentage surcharge they believe is needed to bring in sufficient revenue to cover the fund's expenses and keep a reasonable reserve. Based on this collaboration, the Oversight Committee recommends a new surcharge subject to the Commission's approval. The surcharge can be adjusted twice per calendar year pursuant to the order establishing the fund.

The usage of the types of services that contribute to the IUSF is in decline due to consumers' increasing use of communications services that aren't classified as telecommunications services, such as e-mailing and messaging using a broadband connection and texting over a mobile wireless connection and, therefore, do not pay into the IUSF fund. This trend has been occurring for some time at both the state level and on a national level.

Net intrastate retail revenues were almost $3 billion the first year the IUSF was implemented in 2007. In 2017, these revenues declined to $1.6 billion. In response to the declining revenue base, the surcharge has doubled over the last ten years. In 2008, the IUSF surcharge was 0.54%. It has incrementally been increased over the years to 1.09% in 2018.
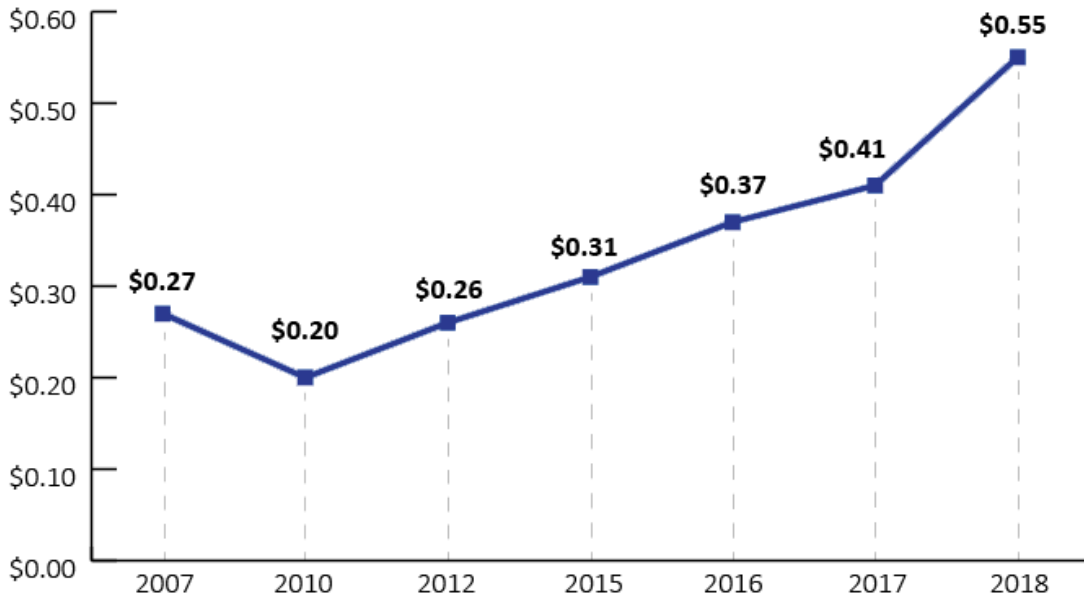
>>>Figure 1: Billed Intrastate Retail Telecommunications Revenue
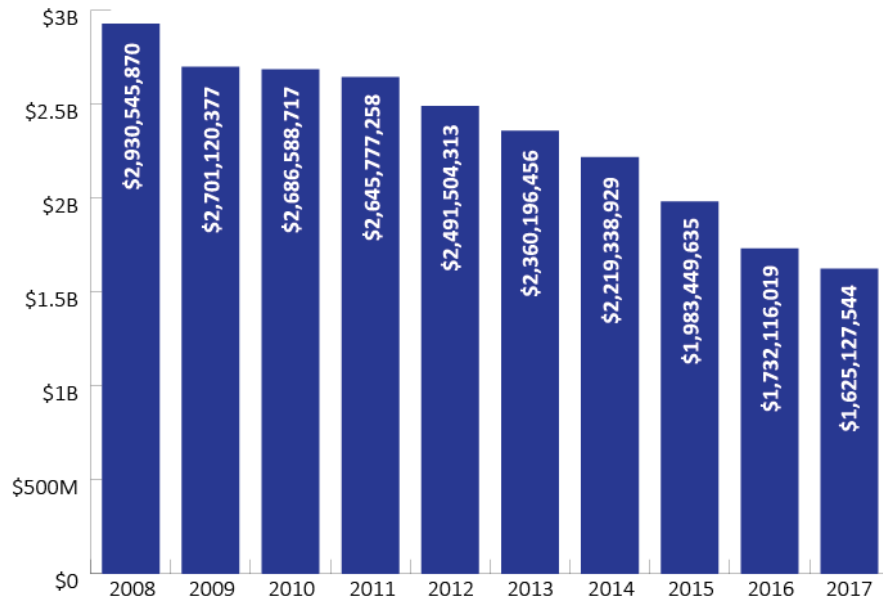


>>>Figure 2: IUSF Surcharge Trends
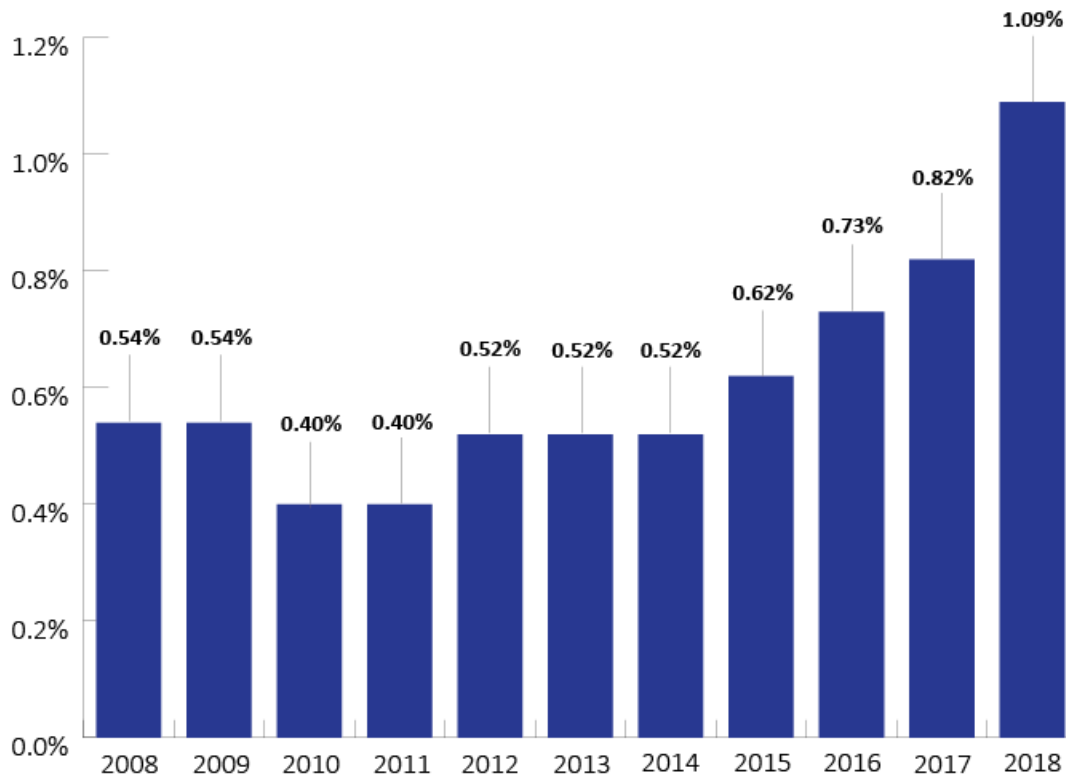
>>>Figure 3: Surcharge Effect on Customer Bill



*Based on a customer bill with intrastate retail telecommunications services charges of $50.00.

## Eligibility Requirements to Receive Indiana Universal Service Fund Support

To be eligible for IUSF disbursements, a telecommunications carrier must first be designated as an eligible telecommunications carrier (ETC). Prior to becoming an ETC, a company must first be authorized to do business in the state of Indiana by the Indiana Secretary of State and have a Certificate of Territorial Authority (CTA) approved by the Commission to provide telecommunications services in the State of Indiana. In addition, eligible carriers must serve rural ILEC territories and offer voice services defined by the FCC's rules as adopted by the Commission in 1998, which are:

1. Voice grade access to the public switch[ed] network;
2. Local usage;
3. Dual multi-frequency signaling or its equivalent;
4. Single party service or its functional equivalent;
5. Access to emergency services;
6. Access to operator services;
7. Access to interexchange service;
8. Access to directory assistance; and
9. Toll control services for qualifying low-income consumers.

Recipient companies are required to pass a qualifications test every three years. The qualifications test uses financial information from year-end statements provided to the FCC. The test compares the three-year average net operating revenue against a net operating income cap determined in

the order and settlement agreement that established the IUSF. Any revenue surplus reduces the disbursement amount for a company. The first qualifications test was given to rural ILECs in 2007. Thirty-seven rural ILECs qualified for support at that time. Since then, three qualifications tests have been conducted by the Commission and 32 rural ILECs continue to receive IUSF support in varying amounts (see list in Appendix 1). Five rural ILECs have ceased receiving disbursements because they no longer satisfy the qualifications test. In 2007, annual disbursements totaled $13,893,545, and as of January 1, 2017, annual disbursements had been reduced to $11,531,004.

## Services Supported by the Indiana Universal Service Fund

Eligible companies receive a payment from the IUSF for their support of telecommunications service in their high-cost, rural ILEC service territories. The support payments are not earmarked for a designated purpose and are provided without restrictions. Companies are not required to use the funds to support the services they are required to provide. Rather, the recipient may use the IUSF support payments to offset costs for other investments and projects, as long as a reliable voice network is maintained. Providers are not required to track information on how they use the funds.

## Triennial Review of the Indiana Universal Service Fund

The Settlement Agreement and Order that established the IUSF also included a requirement that the IUSF be reviewed every three years, called the Triennial Review. The purpose of the Triennial Review is to ensure the IUSF continues to serve its intended purpose. This is important as technologies evolve and consumer demands and needs change over time. Specifically, the scope of the Triennial Review is to:

- Ensure that the operations of the IUSF are meeting the Commission's objectives of preserving and advancing universal service within the state of Indiana;
- Ensure that universal service is continuing to be made available at rates reasonably comparable to rates for basic residential and single-line business local exchange service in urban areas, and that are just, reasonable, and affordable;
- Ensure that the process, funding levels, size, and operation and administration of the IUSF remain adequate and sufficient; and
- Review the operation of the IUSF relative to the federal USF as may be appropriate.

Triennial Reviews of the IUSF were finalized in 2012, 2016, and 2018. Reviews were started every three years but were not necessarily completed in the same years those reviews began. In each review, the parties recommended that the Commission order that the status quo be maintained until the next review because of pending issues and proceedings at the FCC that might affect recipient companies, even though the IUSF fund continues to decline. The Commission approved their Settlement Agreements to maintain the status quo in each Triennial Review. The most recent Triennial Review of the IUSF was initiated on March 21, 2018. The Commission, in an effort to

expedite the review of the IUSF, developed a preliminary issues list and included it in the initiating order. The following is a summary of the issues the Commission sought discussion on:

1. Should the definition of supported services in the IUSF be updated, consistent with the current federal definition of supported services in 47 CFR 54.101 to ensure the operations of the IUSF are "preserving and advancing universal services within the state of Indiana?"
2. Should the IUSF move from supporting high-cost companies to supporting unserved areas (i.e., census blocks) similar to the federal fund?
3. Should the contribution base be expanded to include other types of communications service providers such as Interconnected Voice over Internet Protocol (VoIP) providers?
4. How could the IUSF coordinate with the Office of Community and Rural Affairs to ensure that the definition of an unserved area is consistently applied and any support to unserved areas is not duplicative?
5. Should the IUSF discontinue the requirement of a mandatory pass-through of the IUSF surcharge on retail customer bills to address the diverse types of contributors and customer billing and payment methods in practice today? Are other changes in assessment requirements of the IUSF needed to address the prevalence of prepaid services?
6. Should the IUSF qualifications test be changed to have a rate of return consistent with federal policy?

In testimony filed in support of the Settlement Agreement supporting the status quo, each issue listed above was discussed. Generally speaking, for each issue or each component of the IUSF discussed, the settling parties stated that it was premature to change a specific component of the fund because there are federal policy changes that need to be resolved before the impact of these new policies can be fully understood. The parties also stated that the IUSF was created for a very narrow purpose and, therefore, should not be converted to support broadband services nor be made available to other providers that would deploy broadband in unserved areas.

On May 24, 2018, the settling parties asked the Commission to issue an Order concluding the Triennial Review and maintaining the status quo with respect to the IUSF. The settlement agreement stated that the Indiana Exchange Carriers Association (INECA) and the Indiana Broadband and Telecommunications Association (IBTA) supported the Settlement Agreement and that the remaining parties agreed not to oppose it. On August 29, 2018, the Commission issued an order maintaining the status quo and concluding the Triennial Review. However, the Commission noted in the Order that there are issues with the sustainability of the fund over the long term. The Order does not preclude the Commission from making any changes to the IUSF prior to the next Triennial Review should the Commission determine it appropriate to do so.

## Observations on the Indiana Universal Service Fund

The IUSF has been operational for over a decade, providing financial support to small, rural ILECs to provide telecommunications services to high-cost, rural areas in the state. The IUSF is a relatively small fund for a narrow purpose. The IUSF contribution base is declining, and the fund may not be reliable enough to support voice telephone service, let alone broadband. The continuance of IUSF support is important for the companies that receive that support, especially considering potential FCC changes that may alter their financial landscapes in the future.

Many of the characteristics of the IUSF were based upon federal rules and definitions in place in 2004, but are now inconsistent with current federal rules and outdated from the pace of technological change and consumer demands. The use of the phrases "advancing universal service" and "reviewing the fund relative to the federal fund" indicates that the Triennial Review process was envisioned as a way to keep the fund relevant to the times. Those phrases do not indicate that the fund was intended to stay static in the face of technological evolution, new and growing consumer demands, and changing regulatory landscapes.

For example, the federal definition of supported services (the services that are required to be provided in order to be eligible to receive support from federal funds) has changed since the IUSF was approved. The current federal definition now includes "voice telephony" and broadband services, whereas it only included voice telephone services when the IUSF was approved. It may be appropriate to update definitions that affect the structure of the IUSF to meet the overarching goal of preserving and advancing universal service within the State of Indiana.

Additionally, technological advances have occurred since the fund was established. Our state and our country are undergoing a massive transition from the network designed for voice services (telecommunications) to a broadband network. An example of this is voice communications services being provided using Internet Protocol (IP) (e.g., VoIP). Since the inception of the IUSF, retail telecommunications services are now frequently provided over IP. However, unlike the federal USF, which requires interconnected VoIP providers to contribute, the IUSF does not. The exclusion of VoIP revenues has severely affected the IUSF due to the fact that so many customers are migrating to this new technology. With a declining contributions base and the amount of current funding it receives (approximately $11.5 million annually), the IUSF's current capacity to support additional services, including broadband, would likely dilute the impact of IUSF funds on all services. Moreover, deploying and maintaining broadband infrastructure in high-cost areas of the state will likely require ample, sustained funding over a long period of time.

There are essentially two ways to increase the size of the fund or keep it from further declining. The first option is to continue to raise the percentage of the surcharge as the contribution base declines, which is the method that has been employed over the last few years. This option requires retail telecommunications customers to pay into the fund to support rural telephone networks,

which ultimately benefits other types of services offered by rural telephone networks. It may also further incentivize migration away from telecommunications service.

The second option is to modify the services upon which the IUSF percentage surcharge is assessed to include services like VoIP or other IP-enabled services. Expanding the types of services that contribute to the IUSF would not disadvantage one technology over another and would likely make the fund more sustainable.

Since declining telecommunications revenue is a national trend, one way the federal USF and several other states with universal service funds have increased the contribution base is by requiring VoIP providers to contribute. The FCC has required VoIP providers to contribute to the federal USF since 2006. In 2010, the FCC determined that it is permissible for states to extend their universal service contribution requirements to intrastate revenues for nomadic interconnected VoIP, which is where service can be used at multiple locations. According to a survey conducted by the National Regulatory Research Institute in 2014, Arkansas, Arizona, California, District of Columbia, Georgia, Kansas, Kentucky, Louisiana, Maine, Maryland, Minnesota, Nebraska, Nevada, Ohio, Oklahoma, and Wisconsin all require VoIP providers to contribute to their universal service funds. In addition, other Indiana public interest funds, such as the 911 fund and the Indiana Telephone Relay Access Corporation (InTRAC) fund, are supported by statutes that require VoIP providers to contribute to their funds since federal law states that VoIP customers must be able to access 911 and InTRAC services.

Requiring VoIP providers to contribute to the IUSF is an issue that has been discussed by stakeholders, the OUCC, and the Commission in the past two Triennial Reviews. However, the parties involved in this proceeding have been unable to reach a consensus. Changes to the IUSF dealing with these issues may require policy direction from the Indiana General Assembly.

Currently, pursuant to Indiana Code § 8-1-32.4-4, all ILECs are providers of last resort. This means that, unlike competitive carriers, ILECs are obligated to provide voice services, including access to 911, to all who reasonably request it in their entire service territory. However, provider of last resort obligations can easily be relinquished with notice to the Commission. As more resources are shifted to capital intensive broadband networks, there is a risk of disinvestment in provider of last resort (voice) services. However, if the will of the Indiana General Assembly is to expand the scope of the IUSF to support broadband services, additional policy guidance would be welcomed.

# Broadband Deployment in Indiana

The concept of broadband technology can be described generally as an always-on, fast internet connection used to transmit data at the same time between computers or other electronic devices. In Indiana, broadband and internet services have never been regulated; however, providers of these services are required to obtain a Certificate of Territorial Authority (CTA) from the Commission prior to offering service in the state of Indiana.

Broadband has become a vital service in almost every aspect of daily life including applying for jobs, accessing government services, managing bank accounts, paying bills, doing homework, accessing online entertainment, and staying in touch with family and friends. Hoosier businesses need broadband for communication with customers, such as advertising, taking orders, collecting payment, communication with other businesses, and overall improving the efficiency of their businesses. A lack of access to high-speed internet in homes and businesses can have a major impact for a multitude of reasons.

In preparation for conducting this study, Commission staff sought comment from the public and stakeholders regarding access to broadband in Indiana and received comments from many individuals and businesses across the state, several industry organizations, and community groups. Commission staff received approximately 150 comments from the public, as well as from several organizations and industry associations. The vast majority of public comments described the need for reliable and affordable broadband at adequate speeds. However, several commenters expressed concern about local, state, and federal governments' role in a competitive industry and the effective use of tax dollars. Organizations expressed their support for broadband deployment into unserved areas of the state, and industry outlined their role as a service provider in advancing broadband deployment into unserved areas of Indiana and the challenges associated with broadband deployment.

The following are a small sample of comments received regarding the need for better broadband in rural areas of Indiana:

> "We live in Clay County…Students in our area are at a great disadvantage because they are required to use computers for their homework, as they no longer have books to bring home with them. If our society expects us to conduct business over the internet and our students to do their homework using the Internet, everyone needs to have access to high-speed Internet that is affordable." ~ *Individual comment submitted June 12, 2018*

"A variety of technologies are being utilized to deploy broadband access in Indiana. There is widespread use of DSL, cable modem, fiber-to-the-premises, and fixed wireless to deliver service." ~ *Comments of the Indiana Broadband and Technology Association submitted June 15, 2018*

"We know that broadband is a vital component to economic development. Without adequate broadband service, efforts to revitalize rural Indiana will be hindered." ~ *Comments of Indiana Farm Bureau submitted June 15, 2018*

"As a business owner based in rural Posey County, the lack of decent internet service is severely inconvenient to our Web business. We spend countless hours every week waiting on our Internet, which crashes frequently. This is no way to run a business." ~ *Comments of Frazier Aviation LLC submitted June 8, 2018.*

"Northwestern School Corporation is a 1:1 digital learning district where all students in grades K-12 have an [i]Pad… Many of our students lack viable internet connectivity or have no connectivity at all. It would [be] greatly beneficial for our students to have equitable, reliable, and robust connectivity to access information needed for learning." ~ *Comments of Northwestern School Corporation, Kokomo, IN submitted June 8, 2018.*

## Internet Speeds

To determine what constitutes broadband service, states and the Federal Communications Commission (FCC) have defined criteria for what is considered broadband, which often includes specified broadband speeds. Broadband speeds are characterized by both download and upload speeds:

- <u>Download speed</u> is the rate at which data is transferred from another computer system to your computer. The more speed one has to download files, such as movies, books, or large documents, the less time it takes.
- <u>Upload speed</u> is the rate at which data is transferred from your computer to another computer system. This is used when interacting with web-based applications such as social media (e.g., posting photos) and e-mail.

Broadband download and upload speeds are measured by the number of bits of data transferred per second, typically expressed as megabits per second (Mbps). Additionally, broadband download and upload speeds are commonly expressed in a fractional form. For instance, 10 Mbps download and 1 Mbps upload is expressed as "10/1 Mbps" and 25 Mbps download and 3 Mbps upload is expressed as "25/3 Mbps."

How broadband and broadband speeds are defined and characterized can vary between the state and federal levels.

Different targets for broadband speed have been discussed in many different forums at the state and federal levels. Those targets are used for different purposes. Sometimes, a specific speed is used to denote where broadband internet access is available (and conversely, where it is not), and sometimes a specific speed is used as a criterion for receiving monetary support for deployment. There are different speed targets for different types of technology, but for wired broadband internet access, most of the discussions currently have centered on 10/1 Mbps and 25/3 Mbps.

The FCC gathers information from providers through a document called Form 477 to understand where broadband internet access is available, and at what speeds. Broadband providers are required to file a Form 477 with the FCC twice a year in which they self-report the areas where they provide internet access, the technology used, and the maximum advertised speed at the census block level. Unless otherwise noted, all maps included in the report that use Form 477 data use the most recently released data which is accurate as of June 30, 2017.

Maps 1 and 2 on the next page depict residential broadband availability at minimum speeds of 10/1 Mbps and 25/3 Mbps. At 10/1 Mbps, about 74 % of the state (around 6,095,496 people or 94% of the total population) is considered to be covered by either a wire-based provider or a fixed wireless provider, while only 39 % of the state (around 5,570,226 people or 86% of the total population) is covered with 25/3 Mbps. Business broadband data is excluded from these maps because it is not available to everyone. For this reason, all maps and information pulled from FCC Form 477 data only include residential broadband unless otherwise noted.

>>>Maps 1 & 2: Comparison of Broadband Availability at Minimum Speeds of 10/1 Mbps vs. 25/3 for Wire-Based & Fixed Wireless Broadband
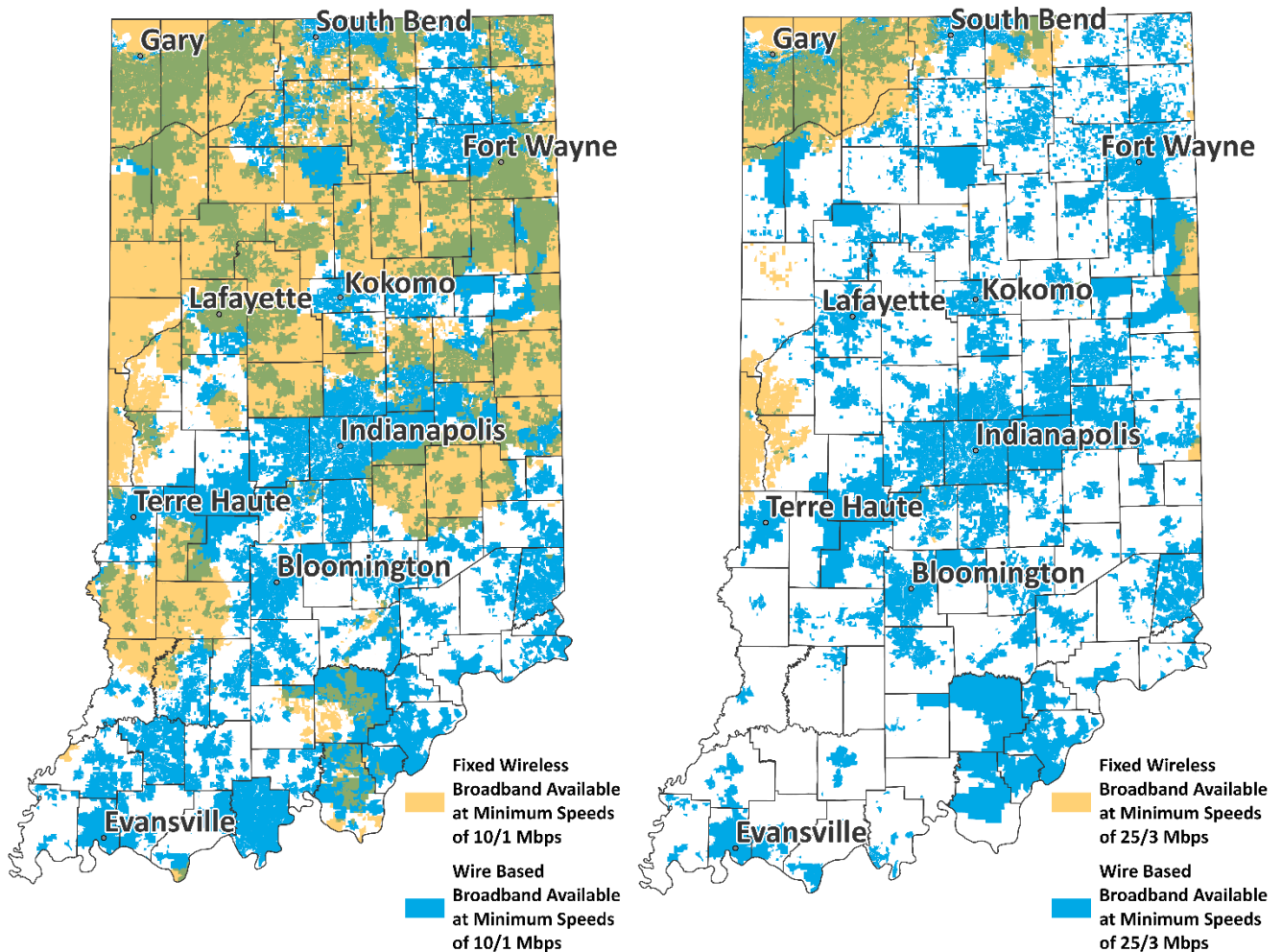


*25/3 Mbps vs. 10/1 Mbps*

It is important to note that the FCC uses 25/3 Mbps to measure the deployment of broadband, but 10/1 Mbps is the minimum speed required to be provided in an area that receives federal support from the FCC's Connect America Fund (CAF). The difference between the 10/1 Mbps standard for CAF eligibility and 25/3 Mbps standard for the FCC's broadband measurement can be attributed to the FCC using two different federal statutes: Section 254 of the federal Telecommunications Act of 1996 (TA-96), which describes the statutory goal of universal service, and Section 706(b) of TA-96, which the FCC uses to set the benchmark at 25/3 Mbps, as discussed below.

To emphasize these differences, the FCC has made it clear that the 25/3 Mbps speed benchmark is not a definition of broadband. Rather, 25/3 Mbps is a standard, used as a goal, to evaluate the availability of broadband services to all Americans, including those who are not in rural, insular, and high-cost areas, which is the main focus of the FCC's universal service programs. The FCC's

speed benchmark for evaluating the availability of broadband has increased dramatically over time to keep up with the rapidly evolving pace of technology. In 2010, the benchmark increased from 200 kilobits per second (Kbps) in both directions (upload and download) to 4 Mbps download and 1 Mbps upload (4/1 Mbps). In 2015, the benchmark increased again to 25/3 Mbps. These various changes in the FCC speed benchmarks were made in recognition of changes in technology, changes in the services being marketed by broadband providers, and changes in customer needs and expectations.

House Enrolled Act (HEA) 1065 (2018) defines qualified broadband service, in regard to broadband grants for unserved areas in Indiana, as a connection to the Internet that provides capacity for transmission at an actual speed of at least 10/1 Mbps, regardless of the technology or medium used to provide the connection.

*How Much Speed Do You Need?*
Determining how much speed you need involves many different factors:
- How many household members use the internet? How many users will access the internet at the same time?
- How many different devices might be used to access the internet? (e.g., cellphones, computers, laptops, tablets)
- Are there other devices in the home that access the internet? (e.g., smart appliances, game consoles, TV receivers, etc.) How do those devices connect to the Internet?
- What different types of online activities does your household engage in?
- What bandwidth is necessary for those activities?

The FCC's *Broadband Speed Guide* (Figure 4 on the next page) provides estimates of the speeds needed <u>for one person to do one thing online at a time</u>. But many people use more than one device at a time to access the web – for example, a laptop and a tablet – and many households have parents, teens, or children online at the same time. If consumers multitask or have several devices running off the same home network, the demand on the system will increase, and a higher speed broadband connection may be needed.

>>>Figure 4: Broadband Speed Needed for Adequate Performance of Typical Online Activities

| Activity | Minimum Download Speed (Mbps) |
|---|---|
| **General Usage** | |
| Browsing and email | 1 |
| Streaming online radio | <0.5 |
| VoIP calls | <0.5 |
| Student use | 5-25 |
| Telecommuting | 5-25 |
| File Downloading | 10 |
| Social Media | 1 |
| **Watching Video** | |
| Streaming Standard Definition Video | 3-4 |
| Streaming High Definition (HD) Video | 5-8 |
| Streaming Ultra HD 4K Video | 25 |
| **Video Conferencing** | |
| Standard Personal Video Call (e.g. Skype) | 1 |
| HD Personal Video Call (e.g. Skype) | 1.5 |
| HD Video Conferencing | 6 |
| **Gaming** | |
| Game Console connecting to the Internet | 3 |
| Online Multiplayer | 4 |

Source: *https://www.fcc.gov/reports-research/guides/broadband-speed-guide*
NOTE: Higher speeds than the minimums in this chart can give you better performance, up to a point. Measuring Broadband America found that the ease of basic web browsing – measured by the time it takes to download a page – improves with higher speeds up to 10 Mbps, but not beyond. However, higher speeds may be beneficial for demanding applications, such as HD streaming video.

For example, a family of four may have all four family members at home on separate, internet-connected devices. One family member is browsing email and performing general web surfing on a smartphone, another family member is streaming a High Definition movie, another is working on homework while streaming music, and the final family member is playing an online multiplayer

game on a gaming console. Based on Figure 4, that family would need, at minimum, a 16 Mbps download speed.

A comment received from an Indiana farmer below outlines the need for a minimum of 50 Mbps to operate their farming business:

> "It is said that each 'device' connected to the internet needs at least 1 Mb[p]s of speed just for the most basic of communication (getting the weather, for example). This is a cumulative number. On the farm, we currently have 7 desktop computers and dozens of handheld wireless devices, including diagnostic devices or data capture and transmission devices - all of which is used with our farm equipment. If each of them requires a mere 1 Mbps of speed just to access the internet, we have - at any one time - more than 50 devices seeking capacity on our farm internet bandwidth."

The factors that influence broadband speed requirements are just as applicable to businesses as they are to residential homes. Therefore, depending on the size of the business and what broadband is being used for, it can add up to significantly higher broadband speed requirements than that of a residential home. For example, a large office based business that has 30 staff either using email or surfing the web, five staff downloading large files, and one on a video conference all at the same time would require, at a minimum, 86 Mbps of download speed.


## Broadband Transmission Technologies

There are currently several types of technologies that provide internet access to customers. Generally speaking, each current transmission technology falls into three categories: wired, wireless, or satellite. Typically, service providers use a mix of wired and wireless services to meet their customers' needs across their service area. It should be noted that broadband delivered over fixed wired technologies, such as fiber or cable modem, typically provide higher speeds and are more reliable than fixed and mobile wireless and satellite broadband technologies. High-quality broadband connections require high speed, low latency (time it takes the data to travel between the source and the destination), high capacity, high reliability, and scalability. Wireless broadband (both fixed and mobile) is limited by factors like lack of spectrum (which affects speed and capacity), weather and physical barriers that affect availability and reliability, and speed, which is dependent on the number of users and the proximity to the tower. In addition to some of those same factors, satellite broadband is also affected by high-latency, which means that even if the speed is high it can seem very slow because of the time it takes the data to travel between the source and the destination via the satellite. For this reason, much of the report focuses on fixed wired broadband data, excluding wireless and satellite deployment data. However, innovations in wireless technology continue, with additional spectrum being made available by the FCC for fifth

generation (5G) wireless facilities and devices. Further, satellite technology has been rapidly advancing with significant increases to speed, capacity, and coverage.

*Wired Technologies*
**Digital Subscriber Line (DSL)** is a wireline transmission that works over traditional copper telephone lines that are likely already installed to a consumer's location. Speeds range from 128 Kbps to 100 Mbps. The distance between a consumer's location and the point where the provider aggregates traffic (often called a "node"), as well as which type of DSL transmission technology is used, will affect speed and availability. Three types of DSL transmission technologies include:

- *Asymmetrical Digital Subscriber Line (ADSL)* – typically for residential customers whose primary use is for surfing the internet. Provides faster download speeds than upload.
- *Very-high-bit-rate Digital Subscriber Line (VDSL)* – runs through existing copper lines and delivers much faster download and upload speeds in comparison to ADSL. VDSL is capable of reaching download speeds of 100 Mbps over small distances. The greater speed is reached via more efficient use of phone lines that reduce the distance that the signal has to travel.
- *Symmetrical Digital Subscriber Line (SDSL)* – primarily for businesses that need significant bandwidth, both upload and download, for services like video conferencing.

**Cable Modem** transmits over the same coaxial or hybrid fiber-coax cables used by cable operators to deliver video services. It uses Data Over Cable Service Interface Specification (DOCSIS) to allow for high-bandwidth data transfer to an existing cable system. Depending on the iteration of DOCSIS the cable modem supports, download speeds range from 20 Mbps to 1 Gigabit per second (Gbps), but can vary depending on the type of cable modem, cable network, and traffic load.

**Fiber** uses fiber optic technology to transmit data over fiber optic cables at speeds far faster than DSL or cable modem. Speed varies depending on how close to your computer the provider brings the fiber, how it is configured, and the bandwidth used.

*Wireless Technologies*
**Fixed wireless** delivers the internet signal to a receiver (or antenna) at the customer's premise via radio waves transmitted by a wireless base station. Wireless Internet Service Providers provide speeds in the neighborhood of 5 to 50 Mbps, often in rural areas not served by cable or wireline. However, one of the biggest limitations of fixed wireless internet is that in most implementations the antenna at the consumer's premises and the ground station of the provider must have a direct line of sight. This can be problematic in different types of terrain (e.g., valleys, hills, and trees), and it also makes fixed wireless connections subject to weather conditions.

>>>Figure 5: Illustration – Line of Sight Limitation Associated with Fixed Wireless Technology
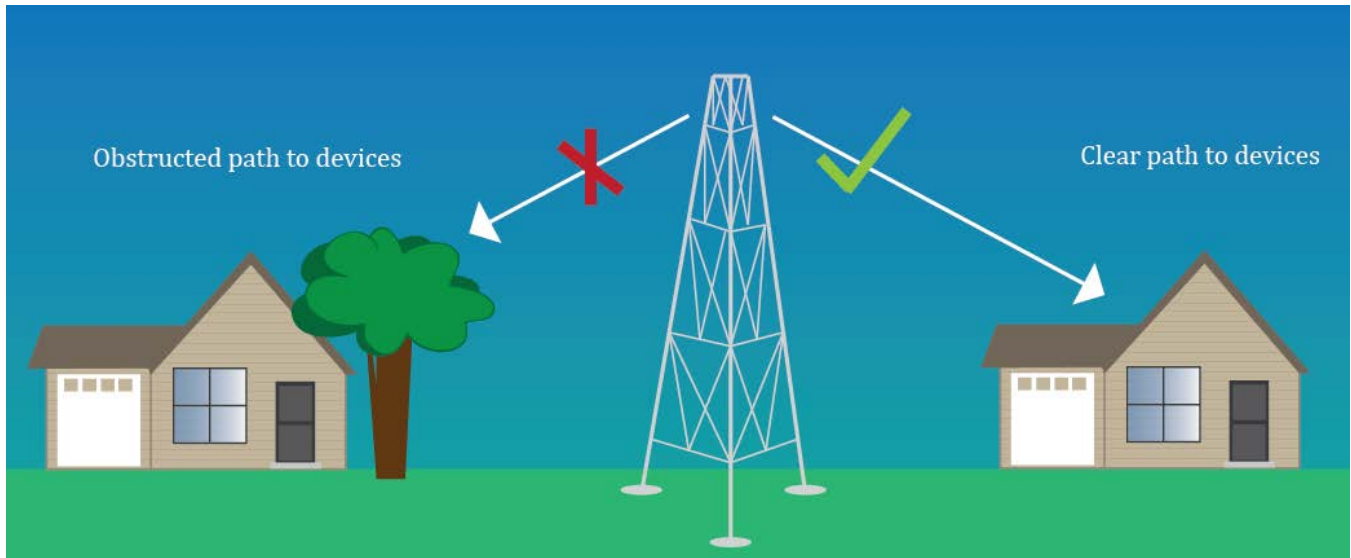


**Mobile wireless** is offered by mobile telephone providers and others for highly-mobile customers and requires a special PC card that can be plugged into a laptop. Typically, 3G provides speeds in the range of several hundred Kbps while 4G mobile wireless provides speed in the range of 5 Mbps to 12 Mbps download and 2 Mbps to 5 Mbps upload. 4G LTE offers download speeds in the 25 Mbps to 35 Mbps range and upload speeds from 10Mbps to 15 Mbps. According to *ECN Magazine*, the end could be near for 3G in the United States. Verizon wireless has stopped activating 3G only devices and will discontinue support for 3G devices on December 31, 2019. 5G mobile wireless is on the horizon. Many articles have appeared in the trade press regarding the coming of 5G; however, there is no specific speed information available because the standards have not yet been fully developed by 3GPP, the organization that governs most cellular standards in the United States.

All wireless communications use radio waves called spectrum. The demand for spectrum is increasing rapidly. Spectrum is made up of different bands that can only be used for certain wireless technologies. There are a limited number of bands that can be used for commercial wireless technologies and as the number of wireless devices that are in use increases, like smartphones and tablets, the more spectrum is needed. In order to meet that demand, the FCC has been working on freeing up additional spectrum.

*Satellite Technology*
**Satellite** is useful for serving remote or sparsely populated areas. Speeds depend on the type of provider and service package purchased, line of sight to the satellite, and the weather. Typical speeds to expect are about 12 – 100 Mbps. The biggest issue with satellite internet, however, is not speed—it is latency, which is the time it takes the data to travel between the source and the

destination. Even if a consumer selects a plan with high download speeds, they might still feel like their internet is slow.

Satellite broadband technology has advanced significantly in recent years with no signs of slowing down. For example, in 2017, ViaSat launched its second generation satellite, ViaSat-2, designed to deliver up to 100 Mbps with a significant increase to its network capacity. The advanced technology provides a coverage area seven times the previous area and has the capability to redirect capacity where it is needed most. Other companies like SpaceX and OneWeb are working on delivering satellite broadband at even faster speeds with lower latency by deploying Low Earth Orbit satellites (LEOs). LEOs are smaller, lighter satellites, that are less expensive to build. Thousands of LEOs would need to be deployed to form working constellations that are significantly closer to earth than traditional satellites.

>>>Figure 6: Illustration – Latency Limitation Associated with Satellite Internet
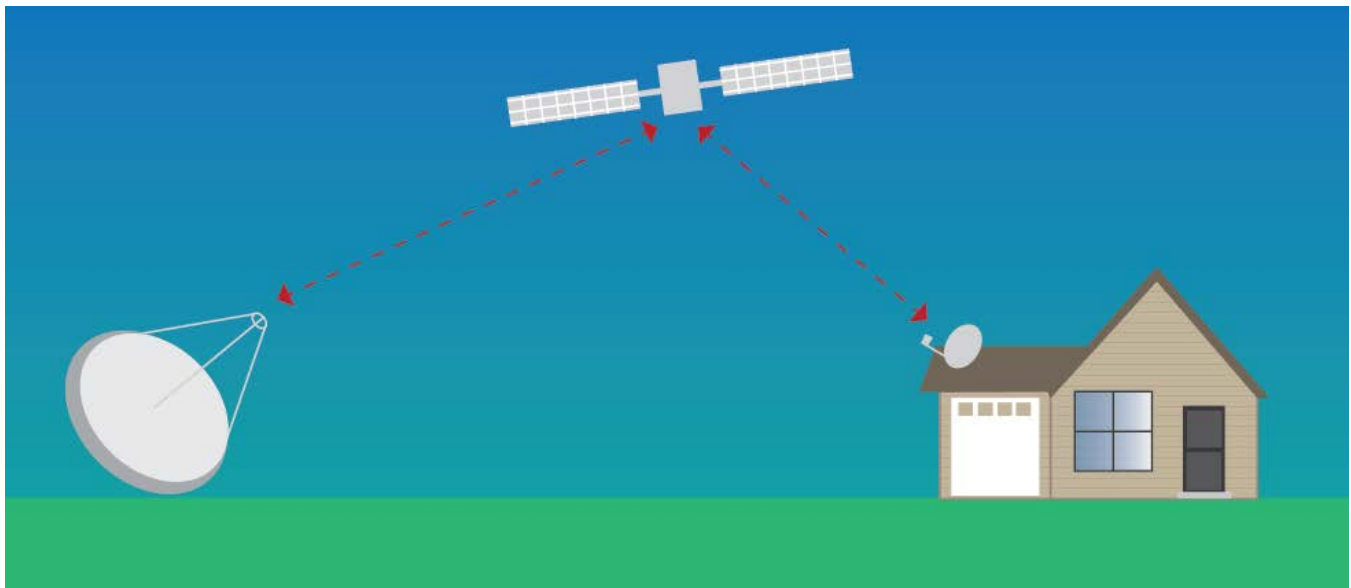


Table 1 on the next page gives a general overview of how much of Indiana is covered by certain broadband technologies as of June, 30, 2017. It also compares the coverage at 10/1 Mbps and coverage at 25/3 Mbps.

>>>Table 1: Percent of the Total Geographical Area of the State Covered by Specific Broadband Technologies & Speeds

| Broadband Technology | % of Area with a Minimum Speed of 10/1 Mbps | % of Area with a Minimum Speed of 25/3 Mbps |
|---|---|---|
| Wire Based | 49% | 34% |
| Fixed Wireless | 45% | 8% |
| Either Wire Based or Fixed Wireless | 74% | 39% |
| Satellite | 100% | 99.5% |
| All Technologies | 100% | 99.5% |

## Broadband Availability—Unserved and Underserved Areas

In regards to broadband grants for unserved areas in Indiana, areas that do not have access to the internet at the speed that is determined to be broadband (i.e., 10/1 Mbps by Indiana law) are deemed "unserved." The term "under-served" is a statutorily undefined term and sometimes used to refer to areas that have poor quality (unreliable) internet access or have access to the internet at speeds that are below the speed designated as broadband.

HEA 1065 (2018) provides a definition for unserved areas for the purposes of receiving broadband grants for broadband deployment. Indiana law defines an unserved area as "a geographic area of Indiana, identified at the census block level, in which there is not at least one provider of terrestrial [not satellite] broadband service offering a connection to the Internet that provides capacity for transmission at an actual speed of at least ten megabits per second downstream and at least one megabit per second upstream."

In contrast, the federal government does not have one definition that explains what constitutes unserved areas for the purposes of broadband services. Instead, it uses different definitions for different programs. However, 10/1 Mbps is a common threshold used to distinguish between areas that need broadband support and those that do not.

Many broadband coverage maps, such as the Indiana Broadband Map (discussed on page 53) depict the areas of the state where broadband is available. However, when looking at ways to solve the digital divide, knowing where broadband is not available is probably more helpful than where it is available.

Map 3 below uses information from FCC Form 477 data, current as of June 30, 2017, and identifies areas of Indiana where broadband speeds of at least 10/1 Mbps are unavailable. The map does not include fixed wireless or satellite data.

>>>Map 3: Areas of the State without Residential Wire-Based Broadband
at Minimum Speeds of 10/1 Mbps
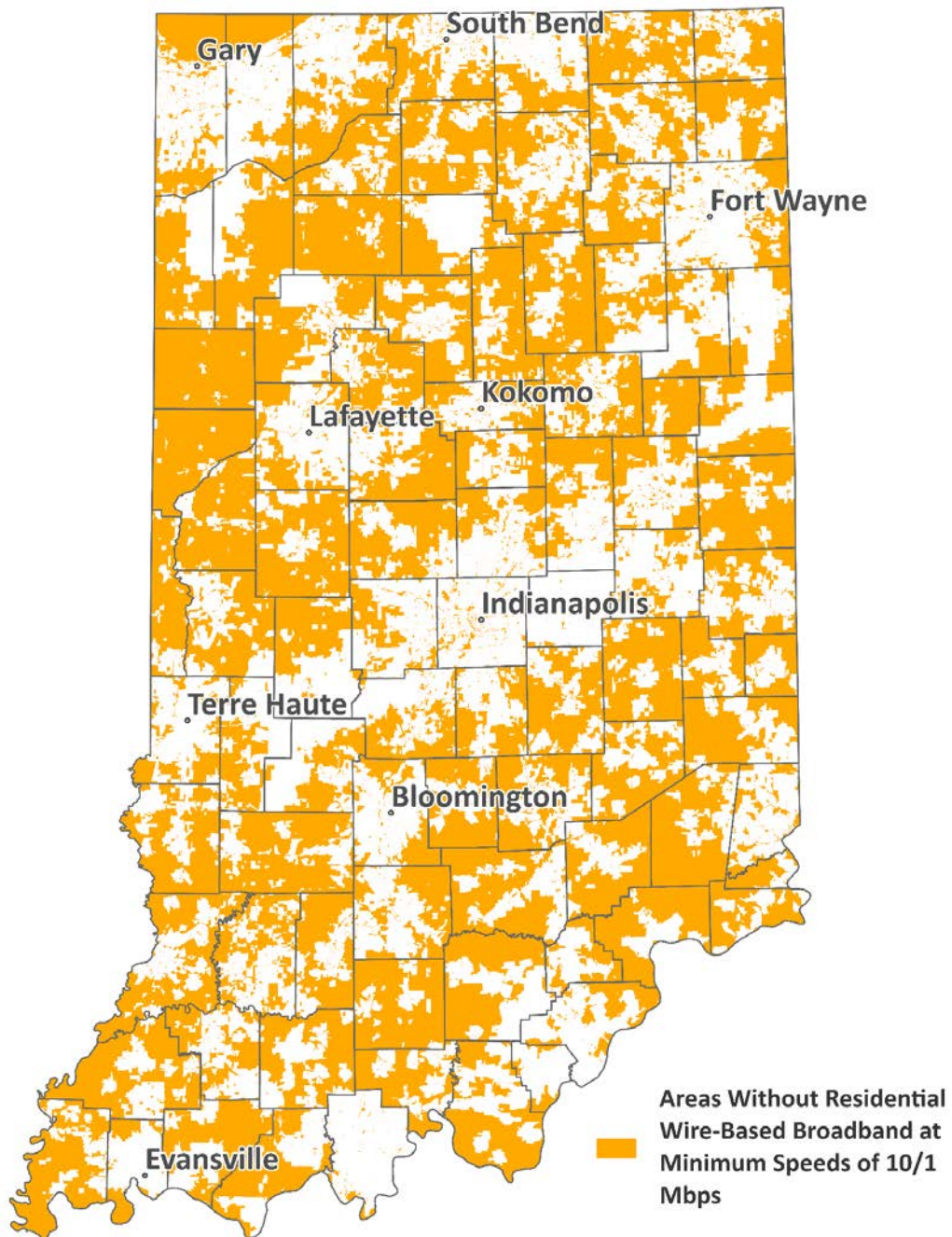
In combination with the 2010 Census Bureau's housing and population counts for each census block, the total number of households considered to be unserved by a residential wire-based broadband provider at the end of June 2017 was 262,729 (which is about 638,278 people). As discussed later, the map likely overstates the number of Hoosier households actually served.

Table 2 provides further information about the percentage of Hoosiers that do not have broadband available to them at minimums speeds of 10/1 Mbps and the percentage of Hoosiers that do not have broadband available at minimum speeds of 25/3 Mbps. It also includes the percentage of the total area of the state unserved at each speed.

>>>Table 2: Percent of Population and Area Unserved by Broadband

| Service Type | Minimum Speed | % of Population Unserved | % of Area Unserved |
|---|---|---|---|
| Residential Wire Based Broadband | 10/1 Mbps | 10% | 51% |
| | 25/3 Mbps | 15% | 66% |

## Data and Mapping

*Importance of Accurate Data and Mapping*

Identifying which areas are lacking broadband is essential to determining how best to allocate resources. For example, under the CAF program, the FCC is allocating funds to a limited number of census blocks deemed eligible due to the high cost of deployment in those particular geographic areas. Funding is limited and its effectiveness relies on accurate data and mapping. It is important that data be up to date in order to identify those areas that need broadband most. Otherwise, grant money may be spent on an area that may no longer need it if broadband was made available within the past year. It is essential to have up to date coverage information when deciding where funding should be allocated. However, as discussed earlier, there are limits to the data that is reported and mapped, which can yield a less accurate depiction of the state of broadband deployment in Indiana and, consequently, has potentially affected thousands of Indiana residents.

In order to understand the importance of accurate data and mapping, it's necessary to have a general understanding of how certain geographic units are defined and how census blocks in rural areas and urban areas differ. A census block is the smallest geographic unit used by the U.S. Census Bureau that is based on a decennial census that collects information from every household with the most recent occurring in 2010. Census block boundaries may be related to streets, roads, or bodies of water and can vary greatly in size and population.

For instance, in city areas, a census block may be a city block where an apartment complex might house several hundred people. Take, for example, Map 4 below depicting a census block in downtown Indianapolis. That census block's boundary is defined by various streets covering only

0.06 square miles. According to housing and population data from the 2010 Census, there are 359 housing units with a population of 570 residents in this census block.

>>>Map 4: Urban Census Block Example
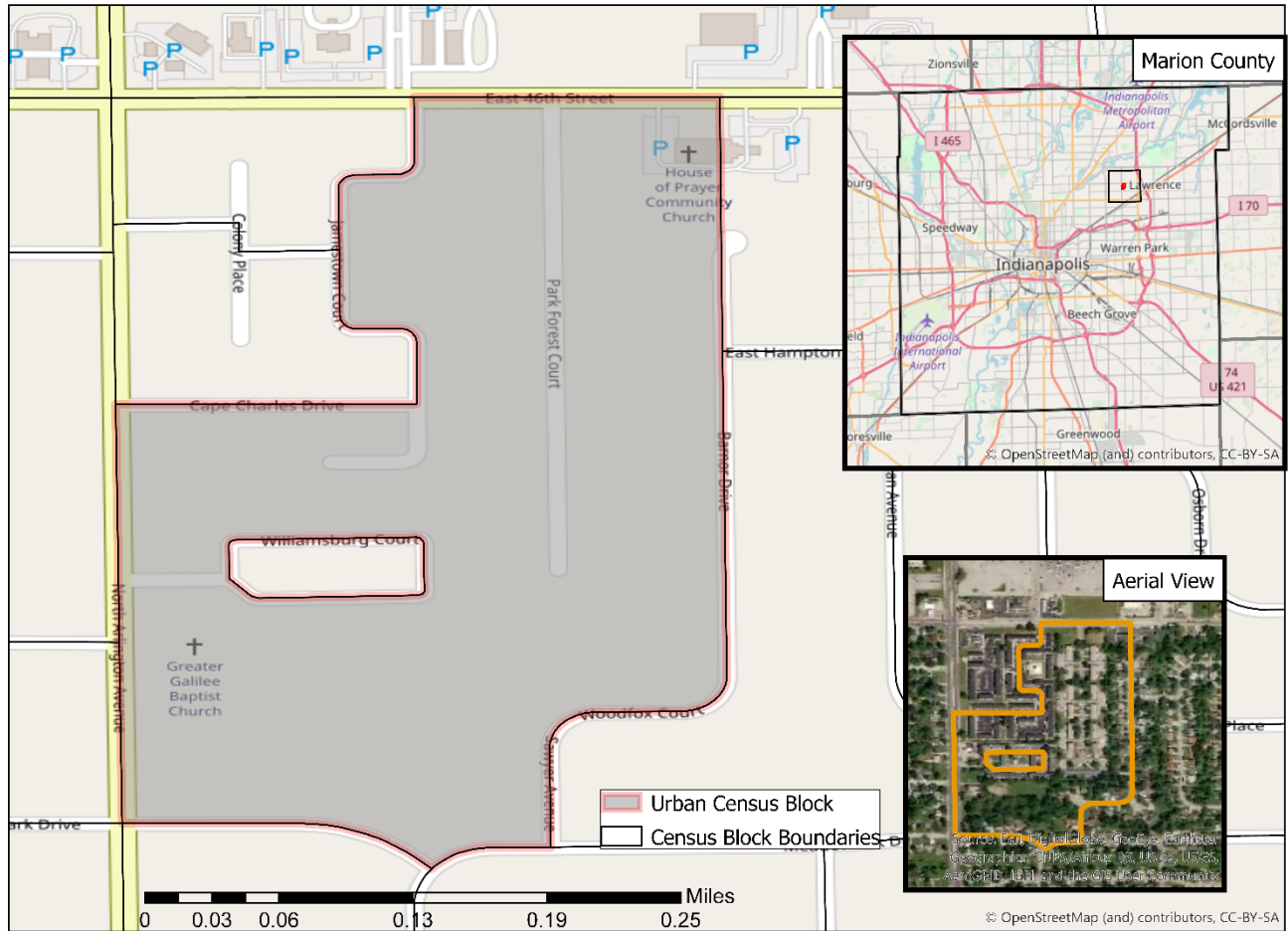


On the other hand, a rural census block can look much different because there are fewer roads and the population is less dense. For example, the rural census block portrayed in Map 5 is located about 4 miles outside of Switz City, Indiana, in Greene County. The number of housing units based on the 2010 Census is only two with a population of five. The block boundary is defined by county roads, which are typically farther apart than roads in urban areas. This block covers an area of 1.75 square miles, over 29 times the size of the urban census block mentioned above, but only contains two homes compared to 359 homes in 0.06 square miles.

>>>Map 5: Rural Census Block Example
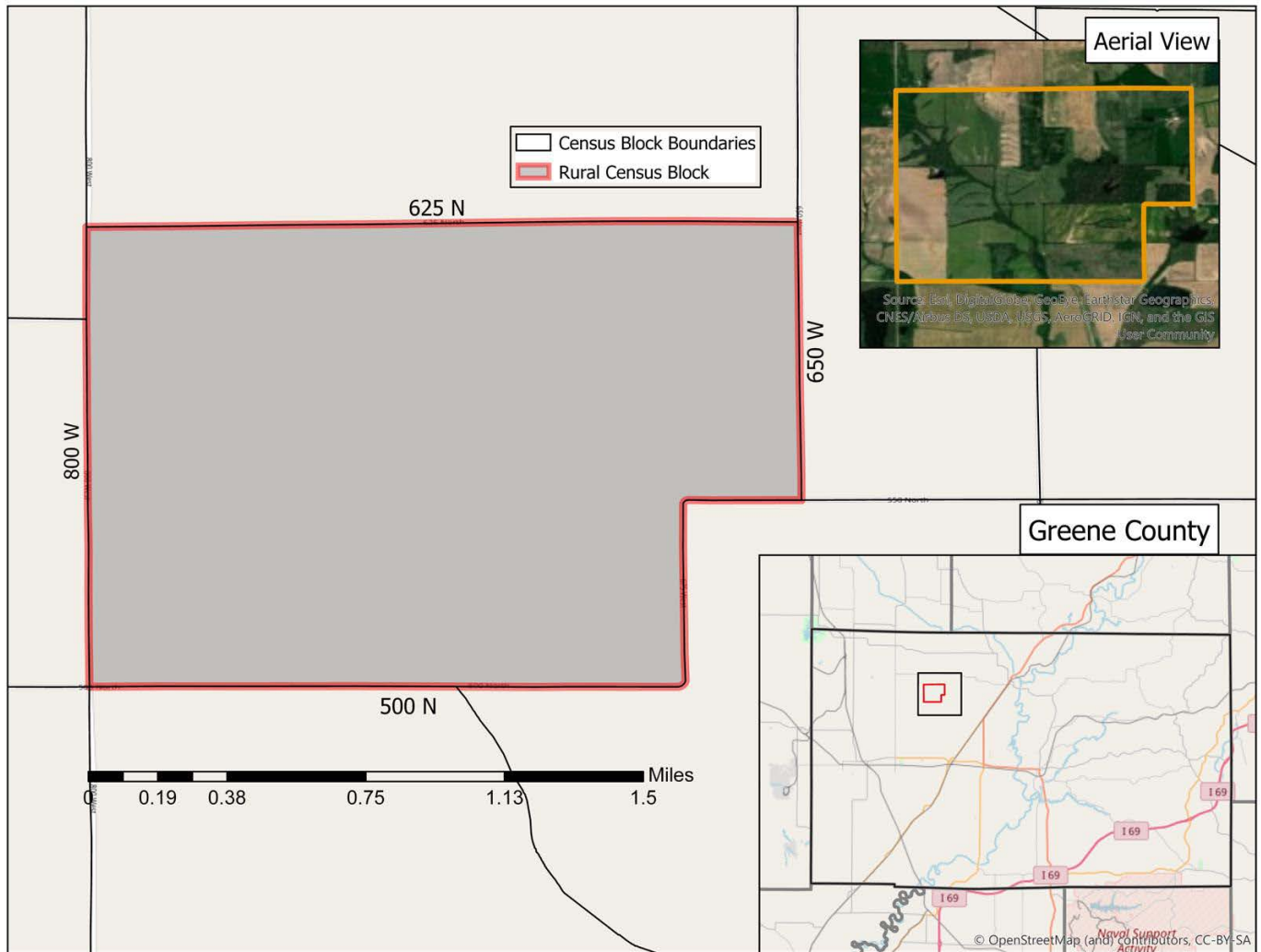


>>>Maps 6 & 7: Rural vs. Urban Census Block Side-by-side Comparison

As shown in Table 3 below, the difference between the two types of blocks is very apparent when comparing all census blocks in the state. The total number of blocks for each is relatively close with there being only 1.3% more rural blocks than urban. Additionally, although rural census blocks account for 93% of the entire area of the state, only 28% of the population resides in those areas.

>>>Table 3: Total Number and Percent Coverage of Indiana Rural and Urban Census Blocks

|  | # of Census Blocks | % of Indiana | % of Population (based on 2010 Census) |
|---|---|---|---|
| Rural | 135,218 | 93% | 28% |
| Urban | 131,853 | 7% | 72% |

As part of this study, we looked at what work has already been done on this topic and reviewed several different reports representing studies done by different entities regarding broadband deployment nationwide and specifically for Indiana. The FCC's Form 477 is a major source of data for each of the reports we reviewed. Identifying areas that are lacking broadband is essential to determining how best to allocate limited resources. Form 477 is currently the best public data available from the FCC, and most, if not all, studies and existing maps utilize that data to examine broadband availability in the state and nation. However, Form 477 data has serious drawbacks that should be understood.

*Drawbacks of Form 477*
Form 477 data has flaws and is not regularly an accurate reflection of broadband speeds and deployment. Form 477 overstates the number of people with access. Specifically, there are three areas that cause the data to be inaccurate, incomplete, and/or not comparable: granularity, timeliness, and what speed is reported.

Issue #1: Granularity
Broadband providers are required to file a Form 477 with the FCC twice a year. In this report, every provider lists each census block in which it offers service, identifies the type of service being offered, and provides the maximum advertised download and upload speeds being offered in each census block. Therefore, if a provider can provide its broadband service at advertised speeds of 25/3 Mbps to a single household in a census block, the entire census block is shown as being covered with broadband service at speeds of 25/3 Mbps, even if all the other households in that census block have no broadband service available to them.

For example, the Commission received the following comment from an Indiana resident stating:

> "Please consider coverage in the area [w]est of Greencastle and [e]ast of Brazil. We have Verizon [wireless] and cannot get reliable cell coverage let alone much of any Internet. This prevents us from being able to do work from home and stay reliably connected to the outside world."

Upon follow-up with the customer, he indicated that "[n]o Internet is currently available except for satellite." Map 8 below uses the Indiana Broadband Map, which is based on December 31, 2016, Form 477 data. As depicted in the map, the resident's address (identified with a yellow dot) is located within a census block (outlined in black) that has been reported as offering broadband over fiber at speeds of 1,000/1,000 Mbps (also known as "gigabit" service) by Endeavor Communications. The red line on the map indicates the exchange boundaries between the Reelsville Exchange, which is Endeavor's service territory, and the Greencastle Exchange, which is Frontier's service territory. The census block is shown as being located mostly in the Greencastle Exchange (served by Frontier) and partially within the Reelsville Exchange (served by Endeavor). Therefore, although Endeavor only offers service to a small portion of the census block, the entire census block is shown to be served with gigabit service due to the way the data is reported in the Form 477.

>>>Map 8: Form 477 Granularity Drawback Example

Another example comes from a comment received from an Indiana resident stating:

> "My current internet service provider is telling me that there are trees growing and interfering with my ability to send and receive a signal. Currently my speed is often less than 1 [M]bps download and [0].5 [Mbps] upload. Not much better than the old dial-up."

Map 9 below was also made using the Indiana Broadband Map which is based on December 31, 2016 Form 477 data. This census block is shown to be covered by broadband at advertised speeds of 300 Mbps download and 25 Mbps upload. However, upon further review, the provider does not serve the commenter's residence.

>>>Map 9: Form *477* Granularity Drawback Example



Providers are allowed to report accurate data in a way that allows incorrect inferences to be drawn. This makes it impossible to accurately depict broadband deployment in Indiana and renders a more optimistic portrayal of broadband availability to the detriment of those areas still lacking coverage.

Satellite providers have a different granularity issue. Because they have the ability to provide broadband over such large areas, the FCC amended Form 477 filing instructions to reduce the burden by giving satellite providers the opportunity to streamline their data under certain

circumstances. Form 477 instructions state, "Satellite providers that believe their deployment footprint can be best represented by every block in a particular state or set of states may abbreviate their upload file by submitting only one block-level record for each state included in the footprint and providing a note in the Explanations and Comments section." This means that satellite providers only have to report the maximum advertised download and upload speeds, regardless of whether that speed is available in all parts of the state.

This does not render an accurate reflection of broadband satellite availability. Factors like weather, topography, trees, and other physical barriers influence satellite speeds and availability. There are also capacity limits to satellite broadband networks, which means that they are not generally capable of serving all potential customers in an area at the same time. The map on the next page depicts broadband availability at 10/1 Mbps. As shown on Map10 on the next page, satellite coverage at speeds of at least 10/1 Mbps has been overlaid on top of wire-based and fixed wireless availability.

>>>Map 10: Form 477 Granularity Drawback Example – Reported Satellite Coverage at Min. Speeds of 10/1 Mbps
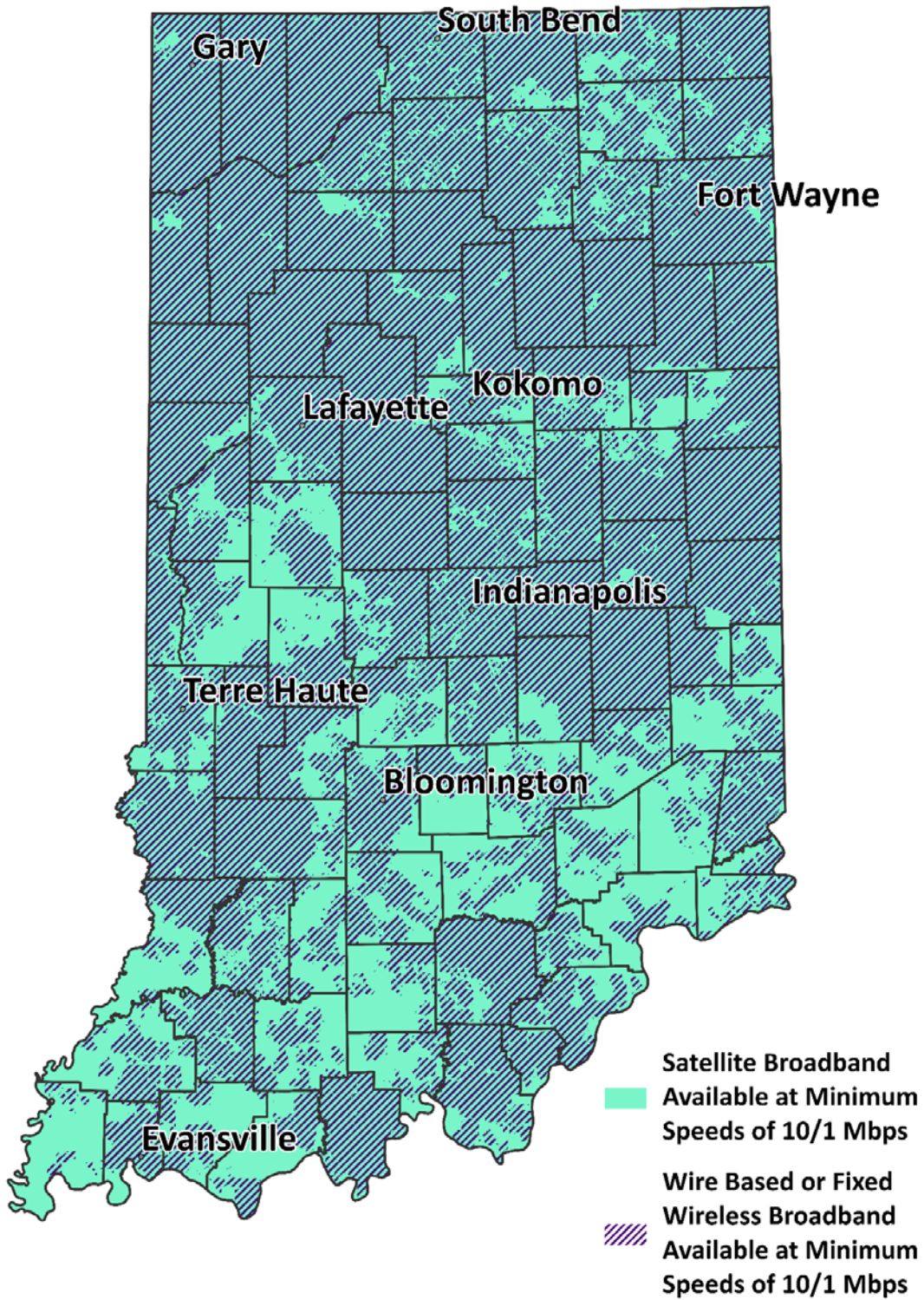
As can be seen from Map 10 and in Table 1 on page 25, when including satellite data, the entire state of Indiana is shown to be covered at speeds of at least 10/1 Mbps. However, based on comments the Commission received, it is apparent that satellite is not always an adequately reliable service nor is it likely available to all Indiana residents:

> "We have satellite internet available to us, but the reception to that is awful. It is a better download speed, but when it is always down there's no point in paying for a service you aren't getting. There are too many things in the country that interfere with satellite service." ~ *Individual comment submitted June 6, 2018*

> "I live on state road three a mile south of Westport in Indiana we have satellite internet (sic). The internet is slower than when I had dial-up internet." ~ *Individual comment submitted June 1, 2018*

Form 477 data is also collected for Mobile Broadband, but this data has its own issues. In many rural areas, cellular signals are not reliable, due to topography and physical barriers, and in some cases are not available. The FCC has acknowledged in its 2018 Broadband Deployment Report that Mobile Broadband is not a full substitute for fixed service. Additionally, the FCC has not set a benchmark for mobile broadband speed due to variability of actual speeds and available data. Therefore, while mobile broadband can at times be an option for service, it cannot be considered a "fix" for the problem.

Issue #2: Timeliness

Providers are required to file Form 477 data twice a year, but the data being filed is based on the prior year. For example, data accurate as of June 30, 2017, was filed in September 2017, and data accurate as of December 31, 2017, was filed in March 2018. However, historically, the FCC has not made the data publically available until months later. For example, the data accurate as of June 30, 2017, was not released until September 10, 2018. Therefore, the most recent Form 477 data was over a year old before it was made available to the public.

One company provided the Commission with its most recently filed Form 477 data for December 31, 2017, which the FCC has not yet made publically available. When compared to the data accurate as of December 31, 2016, it is evident that there has been a significant change to the coverage area within a year. Table 4 uses the Form 477 data in combination with the 2010 census data and includes all technologies with reported speeds of at least 10/1 Mbps.

>>>Table 4: Form 477 Timeliness Drawback Example

|  | Dec. 31, 2016 | Dec. 31, 2017 |
|---|---|---|
| Total Coverage Area Served | 1,461 sq. mi. | 2,771 sq. mi. |
| Total Population Served* | 264,259 | 375,194 |
| Total Housing Units Served* | 115,250 | 163,109 |
| Census Blocks Served | 9,425 | 14,148 |

*2010 population data is used because that is the only block level population data available and the Form 477 data is reported at the block level.*

An additional 135,237 people are now receiving coverage at speeds of 10/1 Mbps by this provider as compared to last year. This shows how important it is that data be up to date in order to identify those areas that need broadband most.

Issue #3: What Speed is Reported

The reported speeds are the maximum advertised speeds in a census block, not the actual speed. There are many things wrong with this methodology. First, it suffers from the granularity flaw. If a provider advertises 100 Mbps to one house in the census block but only advertises 50 Mbps to the rest, then the whole census block is reported at 100 Mbps. Second, many factors influence the actual speed a residence may receive, which oftentimes is less than what is advertised. Speed is affected by the number of people and devices using the network. There are certain times of the day when more users are accessing the network which can cause significant speed fluctuations. Additionally, the distance from certain broadband infrastructure and, as discussed earlier, the topography and other physical barriers affect speed. The Commission received many comments to this effect. For instance:

> "I have received marketing info from [a company] indicating availability of 25Mb[p]s, however, the highest for MY area is 10Mb[p]s…If [a company] advertises 25Mb[p]s, I would like to understand [w]hy [my] area can only get 10Mb[p]s tops."~ *Individual comment submitted June 1, 2018*

> "I have had them out after getting an advertisement that they service my area, but was then told that my area does not have line of sight of their tower." ~*Individual comment submitted June 2, 2018*

> "I am paying for a … 25 [Mbps] DSL line, but its reliability is terrible. The connection (via a [company] bonded router) is quite variable. Sometimes all the speed that we

get, if any, is in the 3 to 6 [Mbps] range. Then after several day[s], it goes back up to the "paid-for" 24-25 [Mbps] range." *~ Individual comment submitted May 25, 2018*

*All Broadband Studies Use Form 477 Data*

A significant amount of data is collected and reported by different sources and entities regarding broadband deployment. The studies that use the data often do not agree on the scope of the problem. In fact, not all studies are attempting to answer the same question. Many studies show how much broadband has been deployed and some discuss the growth that has occurred over the past few years. But the scope of the problem that this study attempts to answer is how many Hoosiers do not have access to broadband service.

In reviewing information gathered for other studies, we looked at the following reports:

- The FCC's 2018 Broadband Deployment Report;
- 2018 Indiana Report on Broadband Progress (sponsored by the Indiana Broadband and Technology Association (IBTA) and the engineering and consulting firm Vantage Point Solutions.)
- BroadbandNow.Com; and
- Purdue's Digital Divide Index

**The FCC's 2018 Broadband Deployment Report** includes several different data sets, but for purposes of comparison and because this report does not provide statistics for access to 10/1 Mbps, we will only discuss the data related to Hoosiers with and without access to terrestrial broadband at speeds of 25/3 Mbps.

**The Indiana Broadband and Technology Association (IBTA)/Vantage Point Report** solely uses census block data. It does not take population into account when determining the percentages. This is the only report that provides a percentage for access to 10/1 Mbps. Part of the study uses statistics from the FCC Form 477 from December 2016 to show that 91% of Hoosiers have access to 10 Mbps. It also shows the increase in the number of square miles served from 56% of Indiana square miles in 2014 to 73% in 2016. This, however, may not be the best indicator of broadband deployment due to the concerns about census blocks being considered served regardless of whether everyone in that census block is actually being served, and the number of people that live in census blocks can vary greatly depending on whether it is a rural or urban area, as discussed earlier.

**BroadbandNow.Com** provides information compiled from the FCC (primarily Form 477), the National Telecommunications and Information Association (NTIA), and other sources, including proprietary data sources. The website states that 86.2% of Indiana has access to 25 Mbps download speeds. It does not, however, provide data on access to 10 Mbps download or any

statistics on upload speeds. And because it uses proprietary data sources, it makes it difficult—if not impossible—to replicate and check the data for comparability and accuracy. Another limit to the site is that users can only search by zip code and not by specific address.

**The Purdue Digital Divide Index** measures primarily physical access/adoption and socioeconomic characteristics that may limit motivation, skills, and usage. As noted by the authors, due to data limitations, it was designed as a descriptive and pragmatic tool and is not intended to be comprehensive. The report uses population data from the 2010 Census. Compared to the 2016 population estimates for each county, there has been significant increases and decreases in multiple counties. This may lead to an inaccurate portrayal of broadband deployment. Additionally, the index aggregates census block data into census tracts and averages the speed across the tract.

<div align="center">

>>>Table 5: Broadband Report Comparisons

</div>

| Report Name | Population Evaluated | Population with Access | Population Without Access | % of Population with 25/3 | % of Population with 10/1 |
|---|---|---|---|---|---|
| FCC 2018 Broadband Deployment Report | 6.626 million | 5.759 million | 867,000 | 86.9% | --- |
| IBTA/Vantage Point study | --- | --- | --- | 86% | 91% |
| BroadbandNow.com | --- | --- | --- | 86.2% | --- |
| Purdue Digital Divide Index | 6,483,788 | --- | 1,066,707 | 83.55% | --- |

For further reading of these and some other relevant reports see Appendix 2.

## Broadband Affordability

Affordability is another important factor to consider in any evaluation of broadband in Indiana. Although there must obviously be a broadband network in place in order for broadband service to be available, if it is not affordable, then customers will likely not subscribe to that broadband service and not receive the many benefits that broadband can provide.

There are several indicators of broadband affordability. Pricing is one such indicator. However, customers are likely to also be interested in other factors, such as whether the service is providing good value for the money, whether or not there is a strong, reliable signal, or the presence or absence of either a guaranteed minimum number of minutes or a data cap on minutes or speeds.

It is important to note that people perceive affordability differently; what one person considers to be affordable may be perceived by someone else as "too high" or even exorbitant. The Commission received several comments related to broadband affordability in Indiana:

"I have used satellite internet for over 15 years. The speed of satellite is okay, however there are many factors that are detrimental to relying on that service for adequate internet services. The cost is horrendous! I pay roughly $150 every month for service that has a cap on the amount of data I can use…. I get an additional amount of bonus data to use between 2 am and 8 am. I find myself getting up at a ridiculous hour… to update apps on our phones and any updating on computers."
~ *Individual comment submitted July 10, 2018*

"We live in southeastern Delaware County, Indiana…. While we have relatively fast internet connection available[, i]t is costly. I pay $60 a month for cellular internet that is limited to 10 gigs[.] I also pay $40 per month for my cellphone which has a limit of 6 gigs…. My husband and I are in our mid sevent[ies], and it is difficult for us to visit the State House. I recently watched the live session of the legislative special session. That sent us over our limit, and I had to pay additional amount. Please help us get reasonably priced faster internet connection." ~ *Individual comment submitted June 2, 2018*

"…I live in an area with high speed internet. I would consider moving to another less populated area of the county if I could access internet at a relatively inexpensive price. Current utility providers may be a reasonable resource in order to see this happen…I live in an area with only one provider for high speed internet. As a result, I have no ability to negotiate the price that the company asks for high speed internet. While I can afford the payment, it is sometimes frustrating when I see that company advertise the same service for a lower rate and will not let me receive the same offer." ~ *Individual comment submitted June 2, 2018*

"I'm all for quality broadband services at a <u>reasonable</u> price." ~ *Individual comment submitted June 3, 2018* (Emphasis in original).

"Dear URC, [i]n studying broadband availability in Indiana, please keep in mind affordability and ease of access; this is especially true for rural areas." ~ *Individual comment submitted June 4, 2018*

"There is a need for affordable, rural, fast internet connection in our state. I pay $92 a month for only internet connection from [a company]. I use the internet for my job and only pay this because there simply is no alternative available in my area. I'm fortunate to be able to pay their cost right now but many cannot and I don't know that I will be able to forever. With all of our technology in today's world, you would think that this could be offered at more affordable price to all in rural areas." ~ *Individual comment submitted June 7, 2018*

## Broadband Deployment

The areas of Indiana that are lacking broadband tend to be located in the rural areas served by the large telecommunications companies. This is not unique to Indiana, as large companies across the country struggle to deploy broadband in their more rural territories.  Rural Hoosiers who are not served by large telecommunications companies are typically served by small rural incumbent local exchange carriers (ILECs). A growing number of rural ILECs are deploying broadband networks to their service areas, often using fiber.

The Indiana Exchange Carrier Association (INECA) is a group of 33 small local exchange companies that serves rural parts of the state. Information provided by the association indicates that of the 33 INECA companies, 14 reported serving a portion of their ILEC service territory with fiber to the home. Of those, five have deployed fiber to the home to between 25% and 50% of their territory, four have deployed to between 51% and 75% of their territory, one has deployed to 96% of their ILEC territory and four provide 100% of their rural ILEC customers with fiber to the home. The other companies are providing at least 5/1 Mbps, using mostly VDSL to their entire ILEC service territories. Several of these small ILECs have crossed their territorial boundaries to provide service as a competitor to consumers who want their broadband service but live in the service territory of other providers.

>>>Map 11: INECA Service Territories
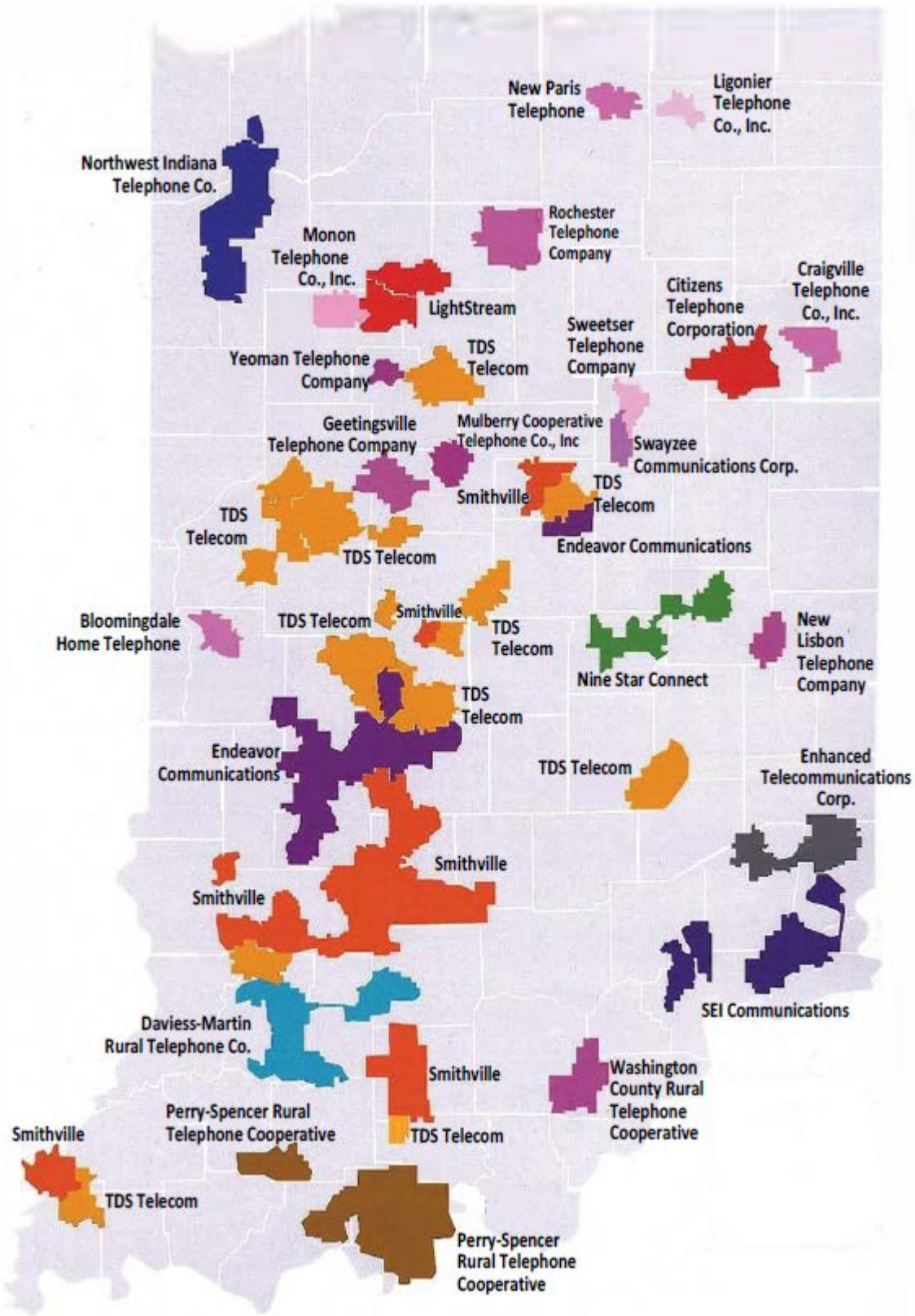
The following are a few examples of INECA companies that have deployed fiber to the home to portions of their ILEC territory:

"[Perry-Spencer Rural Telephone Cooperative (PSC)] has been constructing a cooperative-wide Fiber-to-the-Home (FTTH) network since late 2010. In order to finance this project, PSC relies on federal and state revenue and support mechanisms…federal USF, cost recovery, access, etc. But due to reductions to these revenue streams and support, PSC sought and received funding from the Rural Utility Service (RUS) in the form of a $30M low interest rate loan to pay for the bulk of the project." ~ *Comments of INECA RE: Perry-Spencer Rural Telephone Cooperative, Inc.*

"Citizens Telephone Company has completed its fiber to the home project for the town of Warren, Indiana and about two miles into the surrounding rural. 100% of the fiber is buried, which took $4.5 million to accomplish (total for labor/fiber/ back office/ modems, etc.), and passes about 700 homes." ~ *Comments of INECA RE: Citizens Telephone.*

"In late 2017, Davies-Martin RTC embarked on additional self-funded edge-out projects located in Daviess County. These projects were designed to deploy FTTH to an area within Daviess County that was unserved by a traditional land-based provider. RTC also deployed fiber in an AT&T area south of Plainville, again unserved by a traditional land-based provider. These projects brought fiber to the home to of an additional 54 rural Daviess County residents as well as to one sizable enterprise commercial customer and 5 small business. To date, RTC has connected fiber to nearly 43 residential customers in rural Indiana and to all 6 of the commercial customers, delivering industry leading fiber internet and access to Gig speed service." ~ *Comments of INECA RE: Davies-Martin Rural Telephone Corporation.*

Cable companies have also been active in deploying broadband facilities in Indiana, as they have in other parts of the country. They typically provide highly reliable, high-speed broadband internet service. Although it is true that where there is a cable provider there tends to be broadband, the hurdle of economic feasibility makes it challenging for cable companies to build out facilities to extremely rural or high-cost areas that may be on the outskirts of their current service territories. In addition, unlike telephone companies, cable companies do not tend to seek funding from the federal universal service program, which supports broadband deployment in unserved areas.

Rural Electric Member Cooperatives (REMCs) also have a unique opportunity to reach some of these very rural areas. Recently, several REMCs have indicated that they are or are considering deploying broadband within their electric service territories. In the 1930s, REMCs were formed by

rural citizens who, with the support of the state and federal government, banded together and invested in the infrastructure needed to power their homes, farms, and communities. Some REMCs are actively moving toward adding broadband to the list of services they provide and indicate in filings made to the Commission that they intend to begin offering broadband to their existing electric membership. Other REMCs have called the Commission seeking information regarding how to handle partnering with existing telecommunications providers to make broadband available to their electric customers. Jackson County REMC commented that it is committed "to tackle the issue and provide future-proof high-speed fiber-optic broadband solution to ALL of its members. Unfortunately, the risk of such a venture does put the cooperative at financial risk. But what is the risk to the cooperative, its members and the rural community if we do not do it?"

REMCs often share portions of their electric service territories with small rural telephone companies, and some have partnered with these companies to provide broadband to their customers. Some examples include a partnership between Hendricks Power Cooperative with Endeavor Communications, and NineStar Connect, which is the result of a merger between two cooperatives, Hancock Telecom and Central Indiana Power.

Endeavor Communications is launching Gigabit-speed internet, phone and telephone services over Hendricks Power Cooperative's fiber optic network. According to Hendricks Power's website, the purpose is to enhance the quality of life and business productivity in Hendricks County. They began deploying services to local businesses earlier this year and are now also offering services to residential members.

As reported in the comments submitted to the Commission by INECA, "NineStar Connect began deploying residential Fiber-to-the-Home (FTTH) network to its regulated telecom territory in 2002. Beginning in 2011, NineStar Connect began deployment in its electric service territory, which will be completed by fall of 2018."

The Commission is aware of other REMCs that have or are currently surveying their electric service customers regarding their thoughts about the REMCs deploying communications services over the existing fiber. Below are some examples.

> "In late 2012, Johnson County REMC completed installation of 115 miles of fiber optic cable spanning its entire distribution network. We are currently conducting a residential pilot program to consider the strategic goal of offering a full range of residential fiber optic communication options. If you have interest in Johnson County Fiber Network service, please complete a brief survey by clicking the following link…." ~ *from website of Johnson County REMC*

> "The Fiber project is a big one and will take some time. If you are interested in Fiber Broadband we ask that you please fill out the form below. We will keep you updated on the progress of the Fiber Project and also contact you when your Fiberhood is ready to install!"

Map 12 below shows the areas where REMC service territories and RLEC service territories overlap. Identified in red are census blocks within the overlapping service territories where residential, wire-based broadband service at minimum speeds of 10/1 Mbps is unavailable. Those census blocks that have accepted Connect America Fund Phase II (CAF II) funding and those that are in the CAF II Reverse Auction have been excluded from the map. As made apparent by the numerous red areas, mutually beneficial partnerships between electric and telephone companies in rural areas could be one avenue to help reduce the number of Hoosiers who lack access to reliable broadband service.

>>>Map 12: Unserved Census Blocks in Overlapping REMC and RLEC Territories
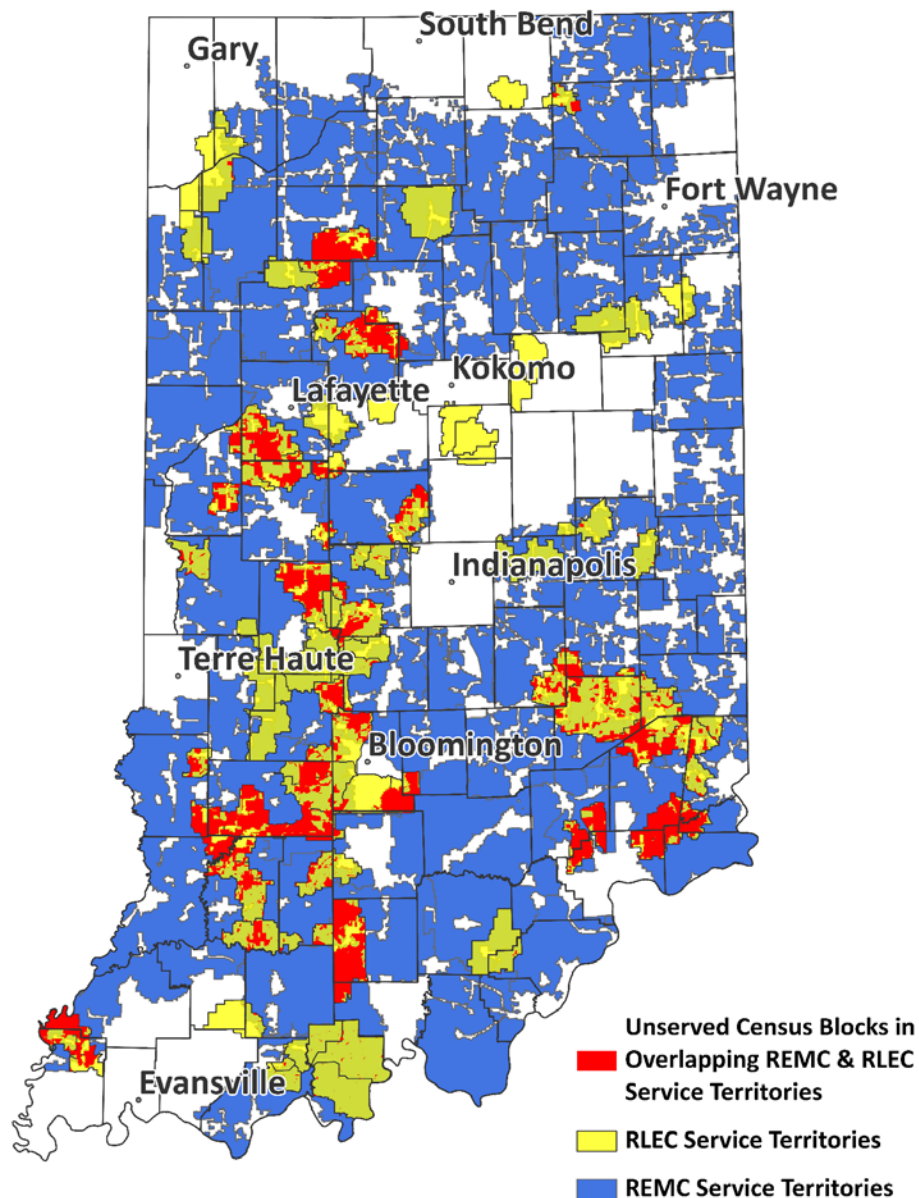
As one rural farming customer in Carroll County, Indiana, puts it:

> "As the pioneers of rural electrification in my grandmother's time, the REMCs have proven to be well-organized providers who have both the reach and the technological capacity to deploy fast broadband internet to rural homes and businesses. Unfortunately, in the 21st Century, they lack the financial resources or government backing (either in funds or facilitation) to make this an achievable goal. Yet, commercial deployment (via CenturyLink, etc.) of reasonable broadband to the rural area is widely considered to be financially infeasible. We need to find a result that pushes adequate speeds to the rural businesses and home so that Indiana Agriculture can continue to be the world presence that it has been for decades. Please consider making rural broadband speeds of at least 50 Mbps to the last mile a priority, and please consider recommendations which would make installation of rural broadband at adequate speeds achievable by our local REMC providers."

*Challenges in Deploying Broadband*

The cost to deploy broadband in some of the state's most rural and least densely populated areas remains a very expensive proposition.

> "It is a very expensive endeavor to get fiber to the home when you have less than eight homes per mile." ~ *Comments of Noble REMC submitted June 13, 2018.*

According to a study by Steve G. Parsons and James Stegeman, Rural Broadband Economics: A Review of Rural Subsidies (2018), due to economies of linear density, three options exist for any network service offered in low-density areas: (1) prices are higher in low-density areas to reflect higher costs; (2) service is not offered in low-density areas because demand is not sufficient to cover the higher costs; and/or (3) the higher costs of providing service are subsidized in some way.

Unfortunately, access to state-level cost information is not available. However, through INECA, some small rural telephone companies provided information regarding their costs to deploy broadband. Much of the data for individual companies is confidential; however, some INECA members shared some deployment costs they have experienced.

| Perry-Spencer Rural Telephone Cooperative, Inc. | New Lisbon | Smithville |
|---|---|---|
| "Perry-Spencer Rural Telephone Cooperative, Inc. has completed approximately 72% of its fiber build at an approximate cost of **$32.5M**. The average cost of connecting cooperative members to date is **$8,430 per drop**. The remaining network build out will cost approximately **$17.5M** at an average cost of **$10,294 per drop**, due to remaining cooperative members residing in higher cost serving areas." | "One of New Lisbon's fiber projects is six miles in length, cost approximately **$266,000 ($44,333 per mile)** to construct, and has the potential of serving 34 customers. New Lisbon estimates cutover costs of **$1,000 per subscriber** (fiber drop, ONT, and labor) and a total cost per customer of **$8,824**." | "Smithville built 8,278 feet of buried 48 fiber through a residential subdivision … that passes 41 residential customers. The project cost **$185,000 or $4,512 per home passed**."<br><br>On another project, "Smithville built 16,592 feet of fiber, of which 12,078 was buried and 4,514 was aerial, and the fiber routes passed 102 residential customers. The project cost **$254,408 or $2,651 per home passed**."<br><br>In another area, "Smithville built 76,550 feet of buried fiber in an area where the terrain is mostly bedrock, and the fiber routes passed 987 residential customers. The project cost **$6,626,800 or $6,715 per home passed**."<br><br>In its last example, "Smithville built 315,674 feet of buried fiber in a very rural area and the fiber routes passed 345 customers. The project cost **$3,937,052 or $11,412 per home passed**." |

There are additional challenges faced by telecommunications companies when attempting to build an economically feasible business case for deployment to unserved areas.

Communication service providers face permitting processes for access to rights-of-ways along roads. For certain state and federal highways, the Indiana Department of Transportation (INDOT) has a permitting process to gain access to those rights-of-way. Communication service providers have discussed that those processes have an effect on their timeline to get certain broadband projects completed. INDOT has two different processes for roads and highways under their jurisdiction. For a highway that is not limited access, INDOT treats installment of fiber for broadband similar to public utility installments, such as telephone, water, electric or gas lines. INDOT has recently created a new process to allow broadband fiber deployment in the rights-of-way of limited access highways. This is a special provision for broadband, because INDOT does not allow public utilities in the rights-of-way of limited access highways. This is because a typical public utility could make an accident more dangerous and extensive, for example, if a gas or water line is damaged. However, INDOT determined that fiber networks do not carry such risk and created a process to allow access to limited access highways for fiber deployment. However, some

communications service providers continue to find INDOT's use agreement, cost per mile, and bonding requirements cost prohibitive.

Additionally, bonding requirements may increase the cost for each project. Typically, communication service providers must get individual surety bonds for each project at a cost of roughly $100 per mile or a blanket bond for all projects in a year at a cost of approximately $17,000. Lastly, there are certain depth requirements that must be met. However, these depth requirements may be infeasible in certain areas due to existing infrastructure. In order to meet the requirements for new deployment, purchases of additional monitoring equipment may be required.

Communication service providers also explained that electric utility "make-ready" pole issues also increase costs of projects. Make-ready generally refers to the process through which non-electric utilities or entities utilize to attach their facilities to existing utility pole space. The FCC regulates the pole attachment fees for investor-owned utilities; however, it does not regulate the pole attachment fees for REMCs and municipally owned utilities. Communication service providers have stated through comments that electric utilities do not always meet the required timeframes for processing an attachment request. This may result in the communication service provider losing a potential bid for a project or adding delays to a project. Lastly, communications service providers shared that additional fees associated with administrative work and inspections can lead to significantly higher make-ready costs.

In addition to the cost of the actual deployment, another important factor when determining whether to take on any project is the payback period. For many for-profit companies, a payback period of more than seven years makes it questionable whether or not to take on the project. It is not unusual for some rural broadband deployment projects to have a payback period of 20 years or more. In addition to deployment cost, that payback period equation includes the projected rate of adoption of the product by consumers.

*Barriers to Adoption and Low Adoption Rates*
Although a strong majority of rural Hoosiers want access to broadband, many companies experience an adoption rate of less than 50%. According to rural ILEC executives, a 30% adoption rate is considered average. However, adoption rates are affected by a variety of things, including affordability and whether residents are aware of the services in their area.

Comments submitted by AARP Indiana outline the benefits that broadband internet access can provide to older adults, allowing them to "to age in place productively and safely with a higher quality of life than would otherwise exist, by supporting access to telemedicine, civic engagement, entertainment, on-line learning, and other internet-based applications that address isolation and health challenges." However, they also point out barriers to adoption that apply specifically to older adults but also could apply to others. Those barriers are:

1. Lack of familiarity with the requisite technology (computers, use of the internet, etc.);
2. Lack of understanding of the relevance of broadband internet access to everyday life;
3. Physical disabilities;
4. Lack of availability of broadband internet access in one's community; and
5. Limited disposable income.

Adoption of broadband in Indiana lags behind the national average. Data published in the FCC's 2018 Broadband Deployment Report shows that the adoption rate for fixed terrestrial service (i.e., a wire-based service) at a speed of 10/1 Mbps is 58.5% for Indiana while the nationwide average is 66.2%. Adoption rates decrease as the speeds increase, with an Indiana adoption rate of 44.2% at 25/3 Mbps and the national average at 53.3%. This could indicate several things, including that some Hoosiers do not believe they need the higher speed for what they want to do or that the price at the higher speeds are not affordable. More research would need to be conducted to determine the reasoning behind this correlation.

The Indiana Broadband Innovation Group discussed in its comments that it continues to work with stakeholders to create "a platform of resources, existing programs, and partnerships with groups…to raise awareness of the benefits of being online." Education about how the internet can be used and can affect a person's life may be a way to increase adoption levels and ultimately lead to additional investments.

## State Initiatives to Address Broadband

*Early Broadband Initiatives*
**Indiana Broadband Working Group** – In the summer of 2014, then-Lt. Governor Sue Ellspermann organized the Rural Broadband Working Group (RBWG) after hearing about broadband challenges in rural areas from her 2013 92-County Tour. The working group represented many areas of interest including government officials, broadband providers, farm and rural advocates, economic development professionals, and university expertise.

The group meetings were structured using a facilitated problem-solving process to identify the major challenges to increasing broadband access and speeds in rural Indiana. The report from the RBWG identified three major barriers to broadband expansion: financial, regulatory, and process-related barriers. After identifying these barriers as guideposts, the RBWG worked through these challenges to ultimately put forward five recommendations to help improve broadband service across Indiana:

1. Streamline permit, zoning, and approval process
2. Increasing Rural Broadband Adoption
3. Return on Investment of The Last Mile
4. Carrier Neutral Access Point Approach

5. Rural Broadband Center

It should be noted that the first recommendation to streamline processes resulted in the Broadband Ready Communities legislation and program. Additionally, this report was created in 2014 and the landscape of the issue has obviously changed in recent years. The report in its entirety can be found at https://www.in.gov/lg/files/rbwg_report.pdf.

**I-Light Network** – The I-Light Network is a statewide fiber optic network that is primarily utilized by higher education institutions for research and collaboration. Members are able to connect to the network with speeds starting at 1 Gbps and up to 10 Gbps. Use of the I-Light Network is limited to 911 service or any other emergency or law enforcement purpose, higher education institutions, and licensees of Indiana Public Broadcasting Stations. These limitations are specified in Indiana Code chapter 8-1-32.7. Map 13 on the next page features the I-Light network, per its website.

>>>Map 13: I-Light Network

*Broadband Ready Communities*

In 2015, the General Assembly established the Broadband Ready Communities Development Center (Center) within the Indiana Economic Development Corporation. The Center was created to encourage broadband development throughout Indiana by certifying local communities as being broadband ready. When the Center certifies a community as an official broadband ready community, it is intended to send a signal to communications service providers that a community has taken steps to reduce barriers to broadband infrastructure investment. Although investment in broadband infrastructure is not guaranteed to follow once a community obtains the certification, the reduction of regulatory hurdles can show that a community may be ready for broadband investment. A local unit of government will be certified as a Broadband Ready Community if it:

(1) Establishes a broadband infrastructure permit procedure that complies with the statutory requirements;
(2) Establishes a procedure to promote broadband adoption after certification of the unit as a broadband ready community; and
(3) Complies with any other applicable requirements established by the IEDC.

According to the Center, 10 local units of government have received certification as Broadband Ready Communities to date. These 10 communities include a mixture of cities, towns, and counties. The Broadband Ready Communities are:

1. Town of Nashville
2. City of Rushville
3. Brown County
4. Town of Richland City
5. Town of Merrillville
6. City of Boonville
7. City of Vincennes
8. City of Cannelton
9. City of Muncie
10. City of Mitchell

*OCRA Grants*

The majority of House Enrolled Act (HEA) 1065 (2018) involved the creation of a grant program administered by the Office of Community and Rural Affairs (OCRA) for qualified broadband projects.

The bill authorized OCRA to award grants to qualified providers to deploy broadband services in unserved areas of Indiana using the rural economic development fund. When awarding grants, OCRA must follow the priorities laid out in statute:

1. Extending Internet to areas that have no Internet connections or have average speeds of less than 10 Mbps.
2. Deploying Internet where the only available Internet connection speeds are between 10 and 25 Mbps.

In addition, OCRA must adhere to three conditions when reviewing and awarding applications:

- OCRA cannot discriminate between types of technology used;
- OCRA must seek assurances that are necessary or appropriate to ensure that the project will be substantially completed within the time period set forth in the grant; and
- OCRA must condition the release of any grant funds on the progressive completion of the project (measured not more frequently than once per quarter) and operational testing (when possible) to confirm the level of service in the grant application.

To date, OCRA has not made any funding available for this grant program as there was no appropriation that accompanied HEA 1065.

In addition to this new grant program, on Aug. 16, 2018, the Lieutenant Governor's Office and OCRA announced, that applications were being accepted for broadband planning grants for OCRA's Broadband (CDBG) Readiness Pilot. The Broadband Readiness Pilot is a part of the CDBG Planning Grants program, which is a U.S. Department of Housing and Urban Development program administered by OCRA in Indiana. OCRA announced five Broadband Readiness Pilot planning grant winners on Sept. 11, 2018:
- Dale;
- English; – in partnership with Marengo. and Milltown;
- Greene County – including Bloomfield, Jasonville, Switz City. and Worthington;
- Marshall County – including Bremen, Culver, and La Paz; and
- Starke County – including Hamlet, Knox, and North Judson.

The maximum grant amount is $50,000; the Purdue Center for Regional Development will provide technical assistance to the grant winners.

*REMC Broadband Statute*
Senate Enrolled Act (SEA) 478, passed by the Indiana General Assembly in 2017, created a more streamlined process for REMCs to install information services (i.e., broadband) through existing electric easements. Generally, most REMC easements were acquired for the purpose of providing electrical service. This new legislation allowed REMCs' easements to also include communications infrastructure so that REMCs would not have to negotiate individual easements with every single property owner. REMCs are required to develop a written plan regarding proposed broadband service areas, draft a timetable for making broadband available in the identified areas, and determine whether the REMC, an affiliated entity, or a third party would provide broadband service in those areas. SEA 478 also requires REMCs that plan to offer broadband service to

maintain a separate accounting system to avoid electric customers subsidizing broadband customers through rates.

*Indiana Broadband Map*

In 2009, the American Recovery and Reinvestment Act provided $7.2 billion to the National Telecommunications and Information Administration (NTIA) and the U.S. Department of Agriculture's (USDA) Rural Utility Service (RUS) to fund projects to expand access to and adoption of broadband services. The NTIA allocated some of the funds to create the State Broadband Data and Development Grant Program, a program that provides grants to assist states in gathering and verifying state-specific data related to broadband services.

In 2009, Indiana was awarded one of the first four grants and received approximately $1.2 million from the NTIA to create a statewide broadband map. The Indiana Broadband Map continued to be updated until 2014 when the federal funding ended.

However, in July 2018, the Lieutenant Governor's office and the Indiana Office of Technology released an updated Indiana Broadband Map using Form 477 data as of Dec. 31, 2016. This map is updated from the last iteration of the Indiana Broadband map, but because it depends on FCC Form 477 data, it suffers the same drawbacks that are discussed earlier regarding Form 477.

*Recent Executive-Level Initiatives*

In August 2018, Lt. Governor Suzanne Crouch named Scott Rudd as the state's Director of Broadband Opportunities. Mr. Rudd was previously the town manager and economic development director for the town of Nashville, Ind., and founded the Brown County Broadband Task Force. The Lt. Governor's press release also stated that Mr. Rudd will work closely with the Indiana State Department of Agriculture and OCRA.

Less than a month later, Governor Eric Holcomb announced the Next Level Connections program, which serves as his infrastructure pillar for 2019. According to a press release issued by the Office of the Governor, the Next Level Connections program will, "commit $100 million to bridge the digital divide in rural areas of the state."

## Federal Initiatives to Address Broadband

Decision makers should be informed where federal Universal Service Fund (USF) funds have already been used for broadband deployment and where broadband deployment is still unfolding in return for receiving federal USF dollars.

Tables 6 and 7 show the various federal programs (administered by the FCC and the USDA) for broadband deployment and the varying speed requirements and definitions of broadband related

to each program. Note that there are different speed requirements for the different programs administered by the federal government.

>>>Table 6: FCC Broadband Programs and Minimum Broadband Speeds

| Program | Description | Minimum Broadband Speeds |
|---|---|---|
| Connect America Fund (High Cost Program) | Program provides support for eligible telecommunications carriers to help offset the higher than average costs of providing telecommunications services in rural insular and other high cost areas. | Requires providers to offer a minimum speed of 10 Mbps (download)/1 Mbps (upload)* |
| Schools and Libraries (E-rate) | Provides discounts to providers offering telecommunications services, internet access, and internal connections to qualifying K-23 schools and libraries. | 100 Mbps per 1,000 users (short term goal); 1 Gbps per 1,000 users (long term goal) |
| Rural Health Care | Provides support to qualifying rural public and nonprofit health care providers for telecommunications and broadband connectivity | No minimum bandwidth requirement for supported services; however, certain types of support are limited to connections that provide actual speeds of 1.5 Mbps (symmetrical) or higher. |
| Low Income Program (Lifeline) | Provides support to assist eligible households pay monthly service charges. Support is not given directly to the subscriber but to their designated telecommunications provider, who in turn charges the subscriber lower rates. | Minimum service standard for fixed broadband speed set at 15 Mbps (download)/2 Mbps (upload). Minimum is 4 Mbps/1 Mbps in cases where the provider does not offer any generally available residential fixed broadband package that meets the 15 Mbps/2 Mbps standard. |

| Program | Funding Type | Program Purpose | FY17 Funds Available | FY17 Obligations | Total Obligations FY09-present |
|---|---|---|---|---|---|
| Telecom Loan Program | Direct cost-of-money loans and guaranteed loans | Construction, maintenance, improvement and expansion of telephone and broadband service<br><br>Rural areas of 5,000 or less | $690 million | $427.4 million | $3.4 billion |
| Farm Bill Broadband Loan Program | Direct cost-of-money loans and guaranteed loans | Construction, maintenance, improvement and expansion of broadband service<br><br>Rural communities of 20,000 or less | $27 million | $24 million | $211.7 million |
| Community Connect Grant Program | Grants with 15% Matching Fund Requirement | Construction and expansion of broadband where service does not currently exist<br><br>Rural communities of 20,000 or less | $34.5 million | $27.5 million | $111.7 million |
| Distance Learning & Telemedicine Grant Program | Grants with 15% Matching Fund Requirement | Equipment to deliver telemedicine service and distance learning curriculums<br><br>Rural communities of 20,000 or less | $23.6 million | $23.5 million | $257.4 million |

Source: USDA

For the fourth quarter 2018, the proposed federal universal service charge is 20.1% of interstate telecommunications and Voice over Internet Protocol (VoIP) revenue, which includes long distance calls between states, international long distance calls, and a portion of wireless and VoIP bills. In 2017, the federal USF collected over $7.8 billion, according to the Universal Service Administrative Company's (USAC's) Annual Report.

>>>Figure 8. Federal Universal Contribution Fund Rates (2000-2017)



Source: Federal Communications Commission
http://www.usac.org/cont/tools/contribution-factors.aspx. Rates are from July
1 of each year.
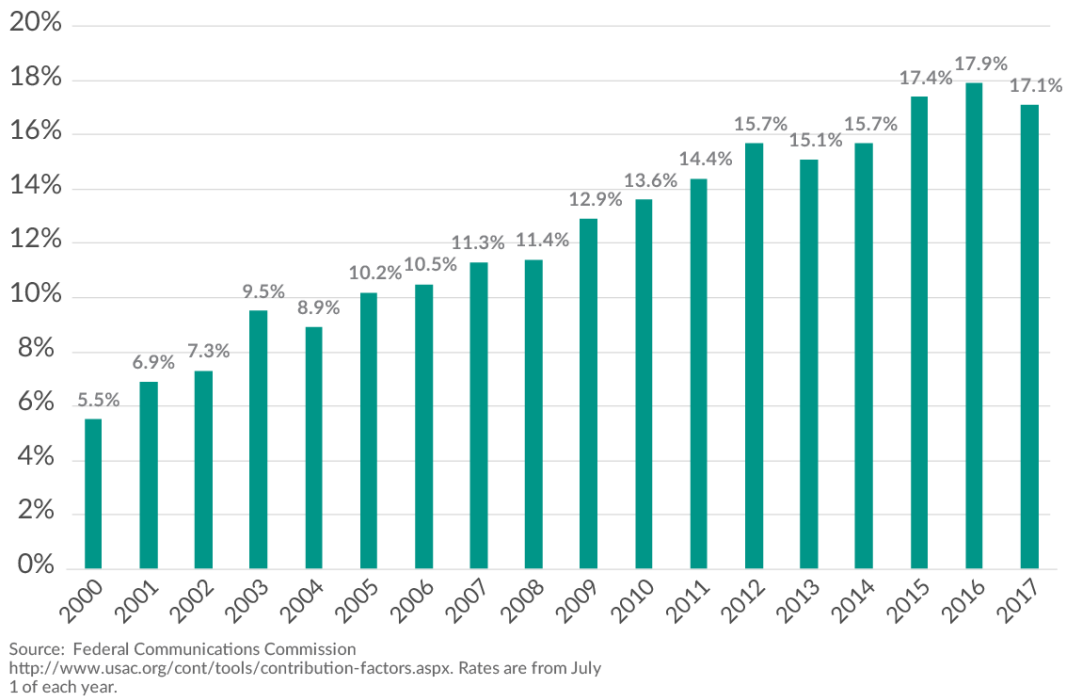
TAX FOUNDATION                                                    @TaxFoundation

There are four main programs that are funded by the federal USF: High Cost, Lifeline, Schools and Libraries (also known as E-Rate), and Rural Health Care. Lifeline and High Cost support are distributed to ETCs. Schools and Libraries and Rural Health Care support is distributed to the eligible facilities to support eligible broadband and telecommunications services. The biggest federal USF program with a focus on broadband deployment in rural areas is the High Cost Program, more commonly known as the Connect America Fund. These four funds are all used to assist with the cost of broadband development in some way. Figure 9 on the next page shows the funding of the four federal universal service programs nationwide.

>>>Figure 9: Funding of Four Main Federal Universal Service Programs



Schools & Libraries $2.6 billion

High Cost $4.7 billion

Rural Health Care $261 million

Lifeline $1.3 billion

2017 Federal USF Disbursements
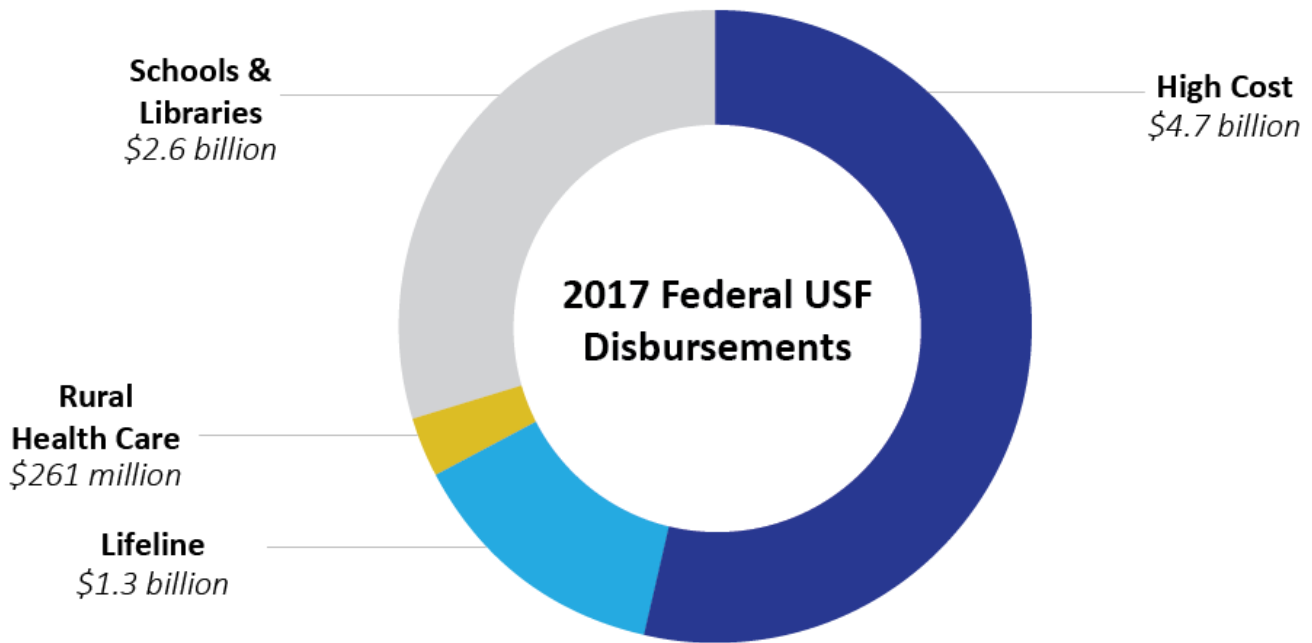
*FCC High Cost Programs Supporting Broadband Continue to Unfold*

As the FCC's definition of universal service has evolved, so have the funding programs and the areas targeted for broadband support. Figure 10 on the next page shows how FCC programs continue to be implemented, due to the reality that broadband deployment takes time. The universal service support amounts shown in Figure 10 generally refer to the amount of support the FCC budgeted or planned for a particular USF program. As discussed in greater detail following Figure 10, however, the actual level of support awarded by the FCC or accepted by particular carriers was typically different than the amount originally budgeted or anticipated.

>>>Figure 10: Timeline of Universal Service



**1996 Telecom Act**
The Telecommunications Act defined Universal Services as an evolving level of telecommunications service taking into account advances in telecommunications and information technologies and services.

**2011 USF-ICC Transformation Order aka CAF Order**
Broadband at speeds of 4 Mbps/1Mbps to support areas became a condition of high cost support; Recognized a need for broadband in large ILEC territories.

**2016 Lifeline Modernization Order**
In the 2016 Lifeline Modernization Order, the FCC added broadband service as a supported service for the first time.

**Voice Telephone Service**
Voice Telephone Service was deemed a supported service; High Cost funding was based on ILEC territories. Larger ILECs that served urban areas did not necessarily receive high-cost support even if they also served areas that were rural in nature.

**CAF Phase I**
FCC provided up to $600 million nationwide divided into two rounds to advance broadband deployment in large ILEC territories.

**CAF Phase II**
FCC provided up to $1.5 billion annually to make broadband available to unserved areas in large ILEC territories; Minimum broadband speed was increased to 10 Mbps/1 Mbps.

**Rate-of-Return Order (small, rural ILECs)**
Provided $2 billion annually for broadband deployment in small, rural ILEC territories at speeds of at least 10/1. Provided 2 paths for RLECs to choose. Deployment must be 40% complete by 2020, and 100% by 2026.

**CAF II Reverse Auction**
Auction for unserved areas where large ILECs did not accept CAF II support; $200 million annually for a minimum of 10 Mbps/1 Mbps service.

**Mobility Fund II Auction**
Wil make available $4.5 billion in new funding over 10 years for expanding 4G LTE mobile coverage across rural America; Specific areas to be supported are not available yet.

**✳ TBD: Remote Areas Fund**
A remote areas fund is planned with support for broadband of up to 100 million annually. The specific timing for this program has not been announced; Indiana may not have areas that will receive this support.

*Connect America Fund*

The FCC created the CAF to get broadband to the unserved areas of the large ILEC (also known as Price Cap Carriers) territories by providing support to large ILECs that elect to participate. CAF support is a type of federal universal service support that falls under the broader category of "high cost support," meaning support for areas that are difficult and costly to serve due to challenging topography or sparse population. The CAF support funding is distributed to eligible

telecommunications carriers (ETCs), not to individual customers or subscribers of those carriers. In return, the ETCs receiving CAF support must offer a minimum level of voice and broadband service to customers residing in those areas for which the carrier receives funding. CAF programs continue to be rolled out in phases.

CAF Phase I - The FCC launched the first phase of the CAF (CAF I) on April 25, 2012, to help connect all Americans to high-speed Internet service. Approximately $300 million nationwide was allocated for the first phase to extend Internet of at least 4/1Mbps to up to 400,000 previously unserved homes, businesses, and anchor institutions in rural America. However, companies did not accept all of the available funds, so an additional $300 million was allocated in a second round of support in the CAF I program. Companies were allowed to amend the locations where they accepted funds, which would alter the amount of funds they would receive. The total amount of USF support funds actually spent for both rounds of CAF I was less than originally projected, both nationwide and in Indiana. For example, in Indiana, taking both rounds of CAF I into account, CenturyLink and Frontier accepted funding totaling just under $3.8 million to deploy broadband to 6,194 unserved locations in Indiana. The deployment under CAF I required a minimum speed of 4/1 Mbps, which is not considered broadband service today.

CAF Phase II - The FCC launched the second phase of the CAF (CAF II) on December 18, 2014, (CAF II model-based support). Approximately $1.5 billion was allocated for unserved areas in large ILECs' territories to deploy broadband with speeds of at least 10/1 Mbps. In Indiana, AT&T, Frontier, and CenturyLink accepted CAF II funds totaling $51.1 million annually. In addition to these three companies, Cincinnati Bell Telephone Company, which primarily serves Ohio, but also serves the Peoria and West Harrison exchanges in southeast Indiana, also received CAF Phase II support. Deployment obligations for the large ILECs accepting CAF II model-based support require 40% completion (build out of at least 10/1 Mbps) by the end of 2017, 60% completion by the end of 2018, 80% by the end of 2019, and 100% completion by the end of 2020.

Map 14, below, identifies the census blocks where CAF II support has already been accepted by a large ILEC. However, this does not mean that those census blocks currently have broadband access, as companies will continue to roll out broadband in these census blocks until 2020. The remaining census blocks considered to be high cost are portrayed in grey and are included in the CAF II Reverse Auction that began on July 24, 2018, and discussed later in the report.

>>>Map 14: Accepted Census Blocks for CAF II Support and Census Blocks Eligible for Auction



Funding Accepted
ILECs
AT&T
CenturyLink
Frontier
Auction
Auction Blocks
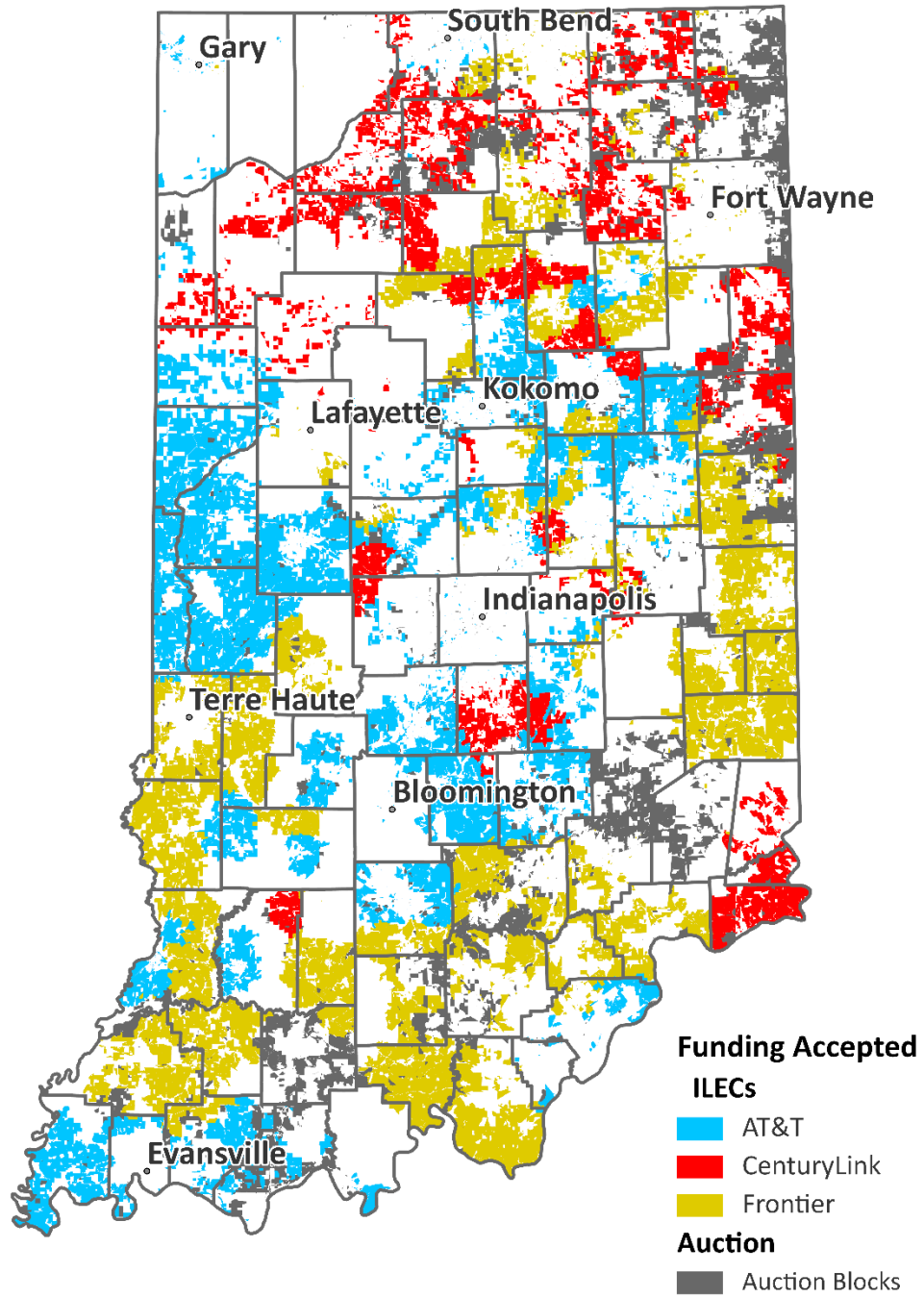
Each year, providers are required to report the locations where broadband has been made available using CAF II funds. This information is available on USAC's High Cost Universal Broadband (HUBB) State Access Tool. Map 15 below gives a general idea of the locations where each provider has made broadband available at speeds of at least 10/1 Mbps using CAF II funds for 2016 and 2017. The number of housing units per location is also reported by the providers. Because a single location can have multiple housing units, the total number of housing units reported has been aggregated at the county level. The aggregated data shows that providers have deployed broadband to the most number of housing units in Clay, Johnson, and Morgan County.

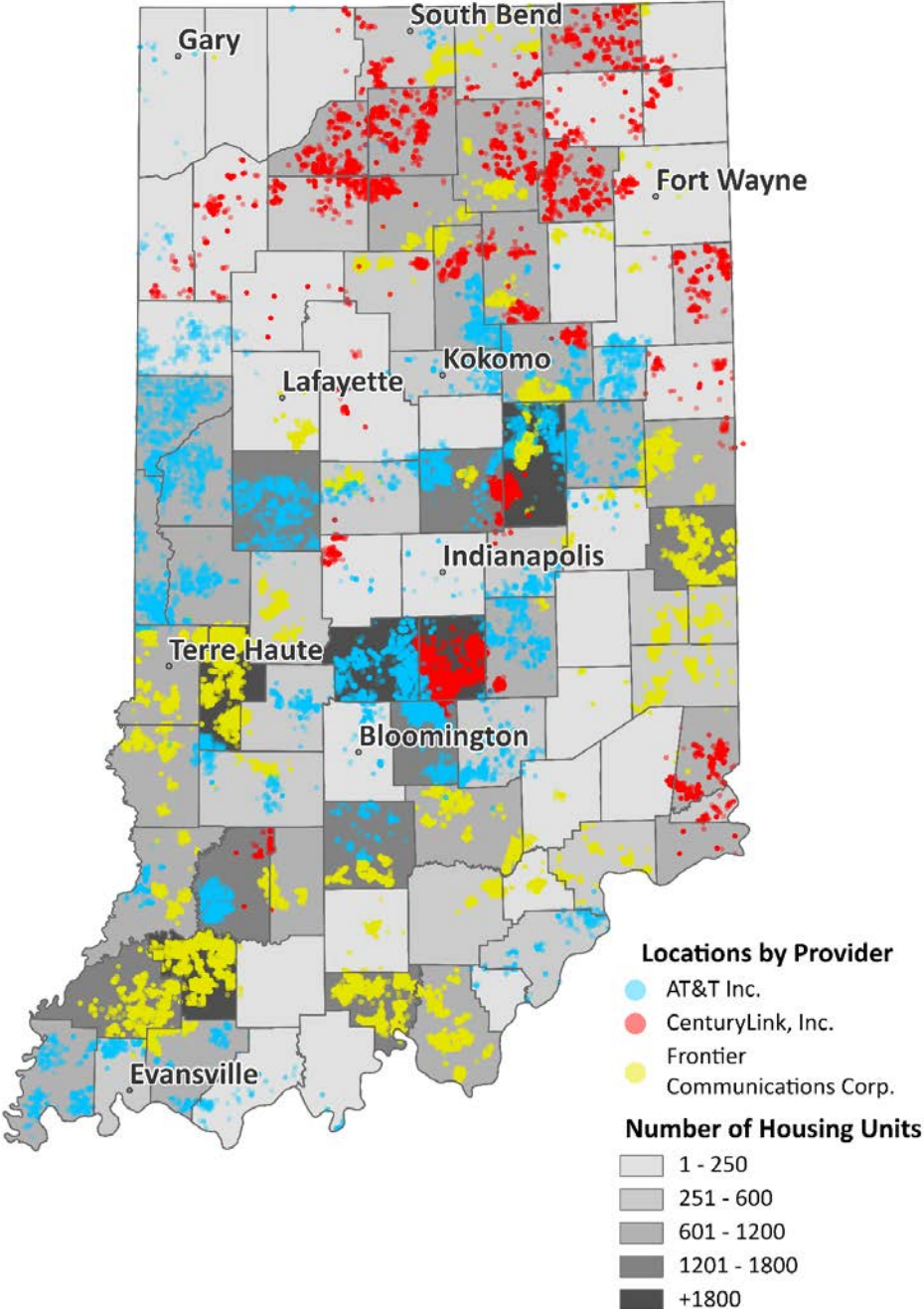>>>Map 15: CAF II Funded Broadband Deployment Locations

Table 8 below uses data pulled from the HUBB State Access Portal and provides an overview of the data for each provider along with the percent completion towards meeting its total deployment obligation as of the 2017 filing deadline. The percent complete was calculated by USAC and pulled directly from the HUBB.

>>>Table 8: CAF II Funded Broadband Deployment

|  | 2016 - # of Units | 2017 - # of Units | Total | % Complete |
|---|---|---|---|---|
| AT&T | 517 | 21,745 | 22,262 | 49% |
| CenturyLink | 4,699 | 10,240 | 14,939 | 49% |
| Frontier | 5,714 | 19,647 | 25,361 | 42% |

*Data provided are locations certified as of midnight May 1, 2018, to account for certifications after the March 1 deadline

Rate-of-Return Order– In 2016, the FCC also implemented a program to encourage broadband deployment in the small, rural ILEC territories. The FCC estimated that, nationally, 20% of the housing units served by small, rural ILECs lack access to broadband of 10/1 Mbps. These carriers were given a choice of two paths for support, the Alternative Connect America Model (A-CAM) or a legacy high-cost support program that includes support for broadband. For companies that selected the A-CAM path, the FCC promised to make available an additional $150 million annually over the next decade. In Indiana, eleven small, rural ILECs selected this path, which includes the ten Telephone and Data Systems, Inc. (TDS) companies and Bloomingdale Rural Telephone Company and totals $ 3,198,873 in support annually until 2026. The remaining 22 small rural companies chose the Legacy High Cost Support path and get some support for broadband called CAF Broadband Loop Support in unserved and unsubsidized areas.

Figure 11 on the next page shows total disbursements to Indiana companies for these FCC universal service funding mechanisms:

- Connect America Fund, Phase 1 (CAF I)
- Rural Broadband Experiments
- Connect America Fund, Phase II (CAF II)
- Alternative Connect America Model (A-CAM)

>>>Figure 11: Total Disbursements of Federal Funding for Broadband Deployment in Indiana
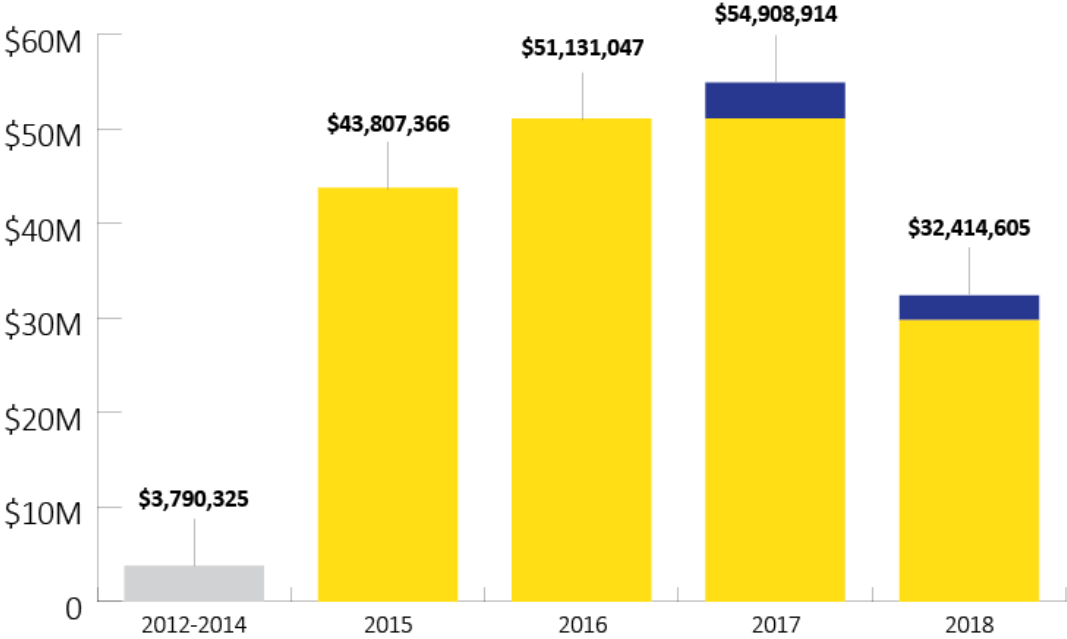


| | 2012-2014 | 2015 | 2016 | 2017 | 2018** |
|---|---|---|---|---|---|
| ▨ CAF I | $3,790,325 | --- | --- | --- | --- |
| ▨ CAF II | --- | $43,807,366 | $51,128,220 | $51,128,220 | $29,824,795 |
| Rural Broadband Experiment (RBE)* | --- | --- | $2,827 | $3,767 | $2,513 |
| ▣ Alternative Connect America Model (A-CAM) | --- | --- | --- | $3,776,927 | $2,587,297 |

*RBE not represented in graph above. **Values as of July 31, 2018.

Connect America Fund Phase II Auction - The purpose of the CAF II Auctions are to address census blocks that the FCC has determined are high-cost to serve, are not being served at the threshold levels by the ILEC or an unsubsidized competitor, and the ILEC serving the area declined CAF II funding to provide the supported services. In 2017, the FCC released its plans for the CAF II Auction "in which service providers will compete to receive support of up to $1.98 billion over ten years to offer voice and broadband service in unserved high-cost areas."

The bidding for this auction started on July 24, 2018, and concluded on August 21 after 18 rounds of bidding, spread out over 19 business days. There were 220 qualified bidders at the start of the auction.

At the end of the auction, the FCC had assigned 713,176 locations to 103 winning bidders nationwide out of 974,223 total eligible locations and 220 qualified bidders at the start of the auction. 261,047 locations remained unassigned nationwide at the conclusion of the auction.

The corresponding Indiana numbers are:
- Qualified Bidders:        21
- Winning Bidders:         6
- Eligible Locations:        33,847
- Assigned Locations:       24,530
- Unassigned Locations:     9,317

It is important to note that none of the six winning bidders in Indiana were assigned any locations in the "Baseline" performance tier. That means that all of the winning bids in the state were for speeds of 25/3 Mbps or higher. Furthermore, the winning bidders accepted minimum usage and maximum latency requirements that were not applicable in the CAF II model-based support program for the price cap carriers.

>>>Map 16: CAF II Auction Results – Assigned and Unassigned Census Blocks



Gary

South Bend

Fort Wayne

Kokomo

Lafayette

Indianapolis

Terre Haute

Bloomington

**Assigned Census Blocks**
**Winning Bidder**

Benton Ridge Telephone Company

Mercury Wireless

Orange County REMC

Perry-Spencer Rural Telephone Cooperative, Inc.

RTC Communications Corp

Wisper ISP, Inc

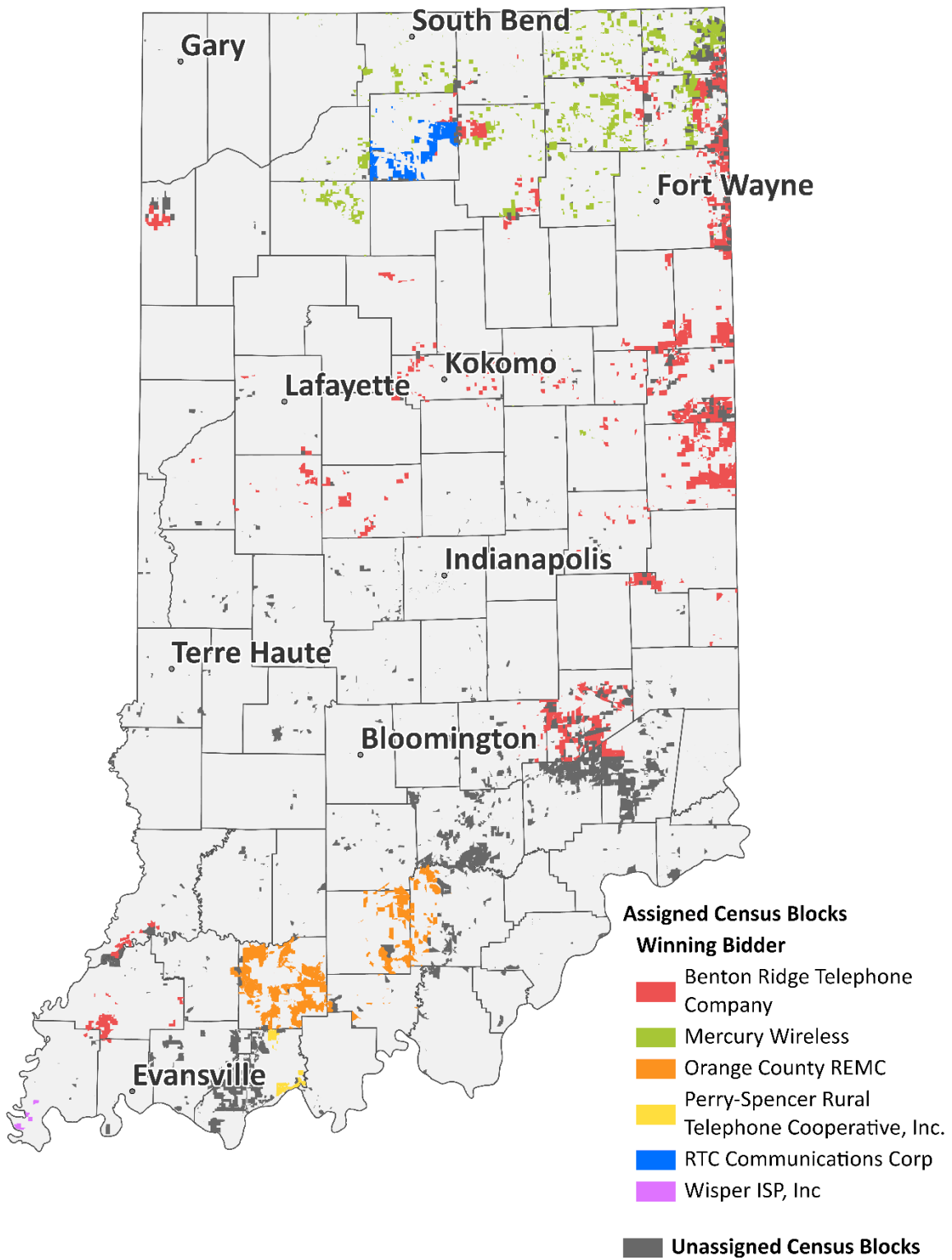Evansville

**Unassigned Census Blocks**

Table 9 lists the six winning bidders for areas of Indiana. In order to receive this support, these six entities committed to extend both broadband and voice-capable network facilities to certain eligible census blocks in large ILECs' territories where the ILEC declined CAF II funding and broadband deployment obligations (but outside of the winning bidders' own existing service territory). In other words, at least some of these six winning bidders could ultimately end up competing against a large ILEC for either voice, broadband, or both. Contrast that potential outcome with CAF II model-based support, in which AT&T Indiana, Frontier, and CenturyLink all received support to serve rural locations in census blocks within their respective local exchange territories.

>>>Table 9: CAF II Reverse Auction: Winning Bidders and Support

| | Winning Bidder | Total Assigned Support, over 10 Years | Annual Support Amount | # Locations Assigned to Winning Bidders | Total Assigned Support per Location |
|---|---|---|---|---|---|
| 1 | Benton Ridge Telephone Company | $14,833,684.70 | $1,488,368.47 | 11,537 | $1,290.08 |
| 2 | Mercury Wireless | $1,400,844.80 | $140,084.48 | 7,371 | $190.05 |
| 3 | Orange County REMC | $10,020,496.30 | $1,002,004.96 | 4,046 | $2,476.64 |
| 4 | Perry-Spencer Rural Telephone Cooperative, Inc. | $1,182,425.70 | $118,242.57 | 359 | $3,293.66 |
| 5 | RTC Communications Corp. | $1,326,394.00 | $132,639.40 | 1,203 | $1,102.57 |
| 6 | Wisper ISP, Inc. | $123,648.00 | $12,364.80 | 14 | $8,832.00 |
| | TOTALS | $29,117,493.50 | $2,911,749.35 | 24,530 | N/A |

The FCC determined the winning bidders based upon a combination of factors, including the bid amounts, the proposed upload and download speeds of the broadband service, commitments to maximum latency rates, and minimum usage allowances.

Mobility Fund II Auction - The FCC also plans to support mobile wireless broadband, via a reverse auction, committing up to $4.5 billion over ten years to support these services in areas that lack unsubsidized 4G LTE mobile coverage. Indiana may not see much impact from this auction because the FCC's broadband map indicates most of Indiana has at least one mobile provider that offers these services. The FCC is finalizing the areas eligible for the reverse auction by allowing interested parties until November 26, 2018 to challenge areas that were not listed as eligible.

**Economic Development**

For businesses to thrive, they need access to reliable, affordable, high-speed broadband – either for their own internal needs, or for interacting with customers or potential customers and engaging in e-commerce, or both. Broadband is needed in businesses for things like research, marketing, communication, business applications and operating systems, and many other business tasks that are made possible or more efficient due to broadband. It would be in a business's best interest to locate to areas where there is available broadband service that meets its specific needs. However, many businesses throughout Indiana are still lacking broadband facilities and services at the speeds they need to operate efficiently, especially in rural areas of the state. Broadband availability directly affects the success of business, which impacts the economic development of communities in these areas.

Below are some comments received from Hoosier small business owners:

> "I live in Brown County and the lack of high speed internet is a serious issue…. We own a business that depends on high speed internet and we have to leave home to find it. Fix this!" ~ *Comment submitted by an individual business owner received May 25, 2018*

> "As a business owner in Posey County, the lack of decent internet service is SEVERELY inconvenient to our WEB business…. We spend countless hours every week waiting on our internet, which crashes frequently. This is no way to run a business." ~ *Comments of Frazier Aviation, LLC. received June 8, 2018)*

> "Both my wife and I have small businesses we operate from within our home. We live in a rural area fairly close to the local municipality of West Lafayette….A simple static web presence…aids advertising for our businesses somewhat, but does not allow either of us to set up or run any sort of online-based catalog or ordering service within which we may easily interact with our customers or potential customers. Our bandwidth is simply too narrow to allow any kind of mature site development or maintenance." ~ *Comment submitted by an individual small in-home business owner received June 11, 2018)*

Additionally, some recent studies have shown benefits from rural broadband could occur in areas such as telemedicine, education, business investment and general economic development, farm income, civic engagement, and property values.

A recent Purdue University study which has drawn a great deal of attention, "projects the statewide net benefits that could be obtained from installation of rural broadband in all of the areas served by REMCs in the state of Indiana." The research focused initially on the area served by the Tipmont REMC and estimated approximately $560 million in net benefits (net present value) for Tipmont REMC over 20 years. The study then expanded its focus to six other electric co-op areas. The study estimated approximately $2.5 billion in net benefits over 20 years for the seven co-ops combined. The costs and benefits were then extrapolated to an estimate of just under $12 billion in net benefits for all 43 electric co-op territories over 20 years.

The Commission has no doubt that the areas currently receiving electric service from these REMCs could receive many benefits if those co-ops were to invest in broadband facilities and start providing broadband services in their respective electric service territories. However, we are not in a position to endorse either the specific cost and benefit estimates nor the methodology used to calculate those benefit estimates, due to a lack of supporting details in the report and/or a lack of time to review the information that was presented. Nevertheless, as stated earlier, it seems logical to assume that rural areas in Indiana could reap many benefits from investment in broadband facilities and provision of broadband services, whether by REMCs or by other types of providers.

A recent Ball State University report (*Assessing Indiana's E-Readiness in the Development of the Digital Society: An Exploratory Study*) found that rural areas of Indiana are often at a disadvantage when compared to non-rural areas on factors such as access to healthcare and educational opportunities, as well as overall standard of living. The Ball State researchers found that lack of access to broadband tends to magnify the inequality between rural and non-rural areas.

In the recent Purdue Digital Divide Index study, also discussed earlier in the report, researchers provided guidance strategies for local governments regarding when to emphasize deployment of broadband facilities to boost broadband adoption versus when to emphasize attempts to boost digital literacy, and to explain and promote the benefits of broadband technologies to skeptical residents as a way to increase broadband adoption.

Purdue University's Center for Regional Development conducted a study for the Southern Indiana Development Commission (SIDC) on the impact of broadband availability in five counties within the SIDC region: Knox, Greene, Lawrence, Daviess, and Martin County. The study utilizes the December 2016 Form 477 dataset, includes fixed broadband only, and uses 25/3 Mbps as the minimum speed benchmark. Table 10 below is pulled directly from the report and shows the data for the number of businesses receiving 25/3 Mbps and the number of businesses not receiving 25/3 Mbps.

>>>Table 10: 25/3 Business Footprint & Establishment 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 footprint |
|---|---|---|---|---|---|
| Daviess | 1,571 | 1,038 | 553 | 66.1 | 33.9 |
| Greene | 1,164 | 1,050 | 114 | 90.2 | 9.8 |
| Knox | 2,149 | 1,648 | 501 | 76.7 | 23.3 |
| Lawrence | 2,192 | 100 | 2,092 | 4.6 | 95.4 |
| Martin | 554 | 49 | 505 | 8.8 | 91.2 |
| SIDC | 7,630 | 3,885 | 3,745 | 50.9 | 49.1 |

Source: Purdue University's Center for Regional Development

Table 11 below provides data on the number of digital economy jobs for each of the 5 counties, the state of Indiana, and the entire United States, and it calculates the percent change in those jobs from 2010 to 2016.

>>>Table 11: Digital Economy Jobs

| County | 2010 Digital Economy Jobs | 2016 Digital Economy Jobs | No. Change | Percent Change |
|--------|---------------------------|---------------------------|------------|----------------|
| Daviess | 100 | 221 | 121 | 120.9 |
| Greene | 106 | 80 | -26 | -24.7 |
| Knox | 299 | 253 | -46 | -15.4 |
| Lawrence | 161 | 190 | 29 | 17.8 |
| Martin | 504 | 283 | -220 | -43.8 |
| SIDC | 1,169 | 1,026 | -143 | -12.3 |
| Indiana | 98,509 | 122,689 | 24,181 | 24.5 |
| U.S. | 6,190,730 | 7,311,954 | 1,121,224 | 18.1 |

Source: Purdue University's Center for Regional Development

Table 11 shows that although Indiana gained digital economy jobs, Greene, Knox, and Martin Counties lost 292 of those jobs. The study compares this to the fact that of the five counties, Daviess County had the most business providers, a substantially higher percentage of providers with 25/3 Mbps coverage than Lawrence and Martin, and the largest increase in digital economy jobs, concluding that adequate broadband is necessary to maintain digital economy jobs. The study also concludes that the region could have a potential future economic benefit of $218 million over 15 years if all unserved areas had access to broadband.

*Impact of Broadband on the Agriculture Business*

Farmers, and rural communities in general, may have special technology needs. The "Precision Agriculture Connectivity Act of 2018" currently moving through Congress (H.R. 4881 and S. 2343) illustrates one way of addressing at least some of those specialized broadband and communications needs – e.g., through deployment of sensors to collect data on soil temperature, water levels, pesticide and herbicide levels, etc., in conjunction with various cellular and wireless broadband facilities to collect and use the data to help farmers and ranchers make more precise and efficient decisions.

The Commission received a comment from an Indiana farmer whose farm is located in Carroll County. The comment states:

> "Our farm is dependent upon reliable and fast internet access. I use internet access to access my bank accounts, pay farm bills, and communicate with vendors. My son uses the internet to track the markets and place orders for seed, fertilizer, etc. We both communicate with each other and share data about the farm operation via DropBox.
>
> However, in order for our farm operation to grow, we need significantly faster internet access. We are currently installing a new scales system for our semi trucks. Each truck will be supplied with a device which automatically communicates with that scales. That communication occurs over our broadband account. We are also installing security cameras and other monitoring equipment both for the safety of the farm and to monitor activity on the farm. Each of these cameras will communicate wirelessly to a central location. Additionally, our ability to share large files, such as field or equipment schematics, is hindered by our slow internet speed.
>
> It is said that each 'device' connected to the internet needs at least 1 Mb[p]s of speed just for the most basic of communication (getting the weather, for example). This is a cumulative number. On the farm, we currently have 7 desktop computers and dozens of handheld wireless devices, including diagnostic devices or data capture and transmission devices - all of which is used with our farm equipment. If each of them requires a mere 1 Mbps of speed just to access the internet, we have - at any one time - more than 50 devices seeking capacity on our farm internet bandwidth."

## Other States' Initiatives to Address Broadband

States have taken a variety of approaches to increasing broadband deployment and adoption. Redirecting funding toward state broadband mapping programs, grants and other incentives, creation of state broadband offices and task forces, encouragement of collaborative efforts like public-private partnerships across state agencies and municipal engagement, legislative actions to reform state USF, and numerous other initiatives and actions are occurring in states all around the nation.

Figure 12 below outlines key broadband initiatives being taken by other states. A more detailed description of each of the state initiatives listed in Figure 12 can be found in Appendix 4.

>>>Figure 12: Other State Initiatives to Address Broadband

| State Broadband Offices and Task Forces | | |
|---|---|---|
| California | Colorado | Maine |
| Michigan | New York | Virginia |
| **Universal Service Funding for Broadband** | | |
| California | New Mexico | Oregon |
| Utah | | |
| **Mapping Initiatives** | | |
| California | Virginia | Wisconsin |
| **Broadband Incentive Programs** | | |
| Alabama | Idaho | Minnesota |
| Tennessee | Wisconsin | |
| **Removal of Barriers/Ease of Deployment** | | |
| Tennessee | Wisconsin | |
| **Public/Private Partnerships** | | |
| Kentucky | Massachusetts | |
| **Tax Credits** | | |
| Tennessee | | |

**Observations on Broadband in Indiana**

Broadband has become a vital service in almost every aspect of daily life from applying for jobs, accessing government services, managing bank accounts, paying bills, doing homework, accessing online entertainment, and staying in touch with family and friends. Hoosier businesses need broadband for communications with customers, such as advertising, taking orders, collecting payment, communication with other businesses, and overall improving the efficiency of their businesses.

Nearly 49% of Hoosiers in rural areas do not have access to wired broadband internet at speeds of 25/3 Mbps, according to the FCC's 2018 Broadband Deployment Report. The lack of access to high-speed internet in rural areas affects Hoosiers who live and work there economically and academically.

> "This is a quality of life issue for our community. Would we offer a rural community a different standard of water sanitation? Would we offer a rural community candlelight instead of electricity?" ~*Comments of Hillenbrand submitted July 2, 2018*

Understanding what constitutes broadband service and having good data that shows where that level of service is and especially where it is lacking is key to solving the problem of getting broadband internet deployed to all Hoosiers.

*Importance of good data*

We have pointed out deficiencies in the data that is currently available. This is the Form 477 data collected by the FCC and self-reported by the broadband service providers. Many different studies have been done, all using Form 477 data as the base information.

The Indiana Broadband Map which was recently unveiled by the Lt. Governor's Office is a step in the right direction. However this map will only maximize its potential if steps are taken to go beyond the Form 477 data to gather more granular, local information regarding unserved areas. It may be possible for the Indiana General Assembly to require address-level information to be gathered for use in the Indiana Broadband Map in areas that are unserved by 10/1 Mbps. This information could come from providers, municipalities and other local sources and could also be a topic for further study. Finally, maps with layers showing, for example, where there are already existing communications service providers well-suited or obligated to provide broadband, and where federal funding and concurrent broadband deployment obligations continue to unfold, could help state policymakers be informed of overlooked areas of the state.

*Challenges in Deploying Broadband*

Costs are the number one challenge to deploying broadband to the most rural and least densely populated areas of the state. This is the reason that most programs aimed at increasing coverage in rural areas involve some sort of monetary incentive. Even with such incentives in place, many projects will never be considered feasible or profitable.

Additional costs that are related to rights-of-way access can add significantly to the cost of deployment. Some of these costs, which arise from state and local governments and other regulated entities, could be considered for modification through legislative action.

*Adoption Rates*

The FCC's 2018 Broadband Deployment Report shows that adoption of fixed terrestrial broadband service at a speed of 10/1 Mbps in Indiana (58.5%) lags behind the national average (66.2%). Low adoption rates add to the problem of high costs in rural areas because there are fewer subscribers over which to spread the cost. Many things lead to low adoption rates: (1) Lack of understanding of how broadband can be used and useful; (2) Affordability; and (3) whether potential subscribers are aware of services being rolled out in their area.

Educational initiatives for consumers about how broadband can be used in their daily lives and better marketing about when and where broadband is deployed could help increase adoption rates.

*Relationships and Tradeoffs*

Policymakers will need to weigh the trade-off between ensuring that rural areas have the desired broadband speeds and competition versus the costs of deploying and maintaining those services. In 2009, the FCC task force working on the National Broadband Plan put the incremental cost for new investment needed to provide 100 Mbps broadband (actual download speeds) to every U.S. household at $350 Billion. The task force added the following caveats: "The cost of providing consumers with a choice of infrastructure providers, and/or ensuring that all consumers have access to both fixed and mobile broadband would be significantly more than these initial estimates." Regardless of the broadband speeds involved, and all other things being equal, the task force also noted, "The cost to provide service in rural areas is significantly higher than in urban areas, and is driven not only by higher capital expenditures, but also significantly higher recurring operating expenses largely driven by transport and transit…."

*Potential Opportunities to Incentivize the Deployment and Adoption of Broadband*

One idea that has been teed up by the Indiana General Assembly is to explore the possibility of using the Indiana Universal Service Fund (IUSF) to help support the deployment of broadband into unserved areas of the state. However, the fund at its current level is likely not large enough to make a significant impact. As we discussed previously, some other states' General Assemblies have used this approach by enacting initiatives and reforms related to the contribution base and use of their state universal service funds for broadband deployment efforts. Oregon, New Mexico, California and Utah have all passed legislation modifying their funds to enable the support of broadband.

Although some stakeholders cautioned expanding the IUSF to support broadband, some Indiana stakeholders that submitted comments supported the use of the IUSF for this endeavor.

"As technology evolves, continued use of the [I]USF should also evolve to assist in deployment of broadband service to all Hoosiers. Indiana must find other mechanisms to support deployment of broadband service. AIC also supports examination of existing assets which can be used in deployment. Specifically, we request the state to examine the potential for use of the I-Light data network as a structure which would further aid in statewide deployment of easily accessible broadband service." ~*Comment of Association of Indiana Counties submitted on June 14, 2018.*

"The Commission should, thus, recommend that the Legislature permit an IUSF surcharge to be imposed on all services that support two-way voice communication, including broadband services. Otherwise, it will be difficult to raise sufficient funds to make a meaningful contribution to broadband funding. Additionally, it is neither reasonable nor appropriate to place the entire burden of supporting broadband on voice wireline customers, and doing so will create artificial incentives for them to shift away from such services." ~*Comments of AARP Indiana submitted on July 13, 2018.*

Entities other than traditional communications providers should be included in the effort to deploy broadband to all Hoosiers. REMCs have a unique opportunity to reach some of these very rural areas. As they did in the 1930s with electricity, several REMCs have indicated that they are or are considering deploying broadband within their electric service territories. Furthermore, REMCs often share portions of their electric service territories with small rural telephone companies, and some have partnered with these companies to provide broadband to their customers. Providing incentives for these types of partnerships may help this expansion happen faster.

Another idea that may be worth considering that is happening in Massachusetts is to incentivize broadband service providers and municipalities to support and co-invest in broadband access projects for towns lacking broadband. It may also be worth considering to incentivize cable broadband providers to extend broadband access to areas of existing cable franchises and to expand the area of their franchises.

*Developing a Plan*
New York, California, Colorado, Maine, and Virginia have all established boards or task forces for the purpose of providing planning and advice on policy and funding priorities in order to expedite deployment and reduce the cost of broadband access. Some also provide outreach to encourage adoption.

Additionally a very recent report, the Michigan Broadband Roadmap, published in August 2018 was conducted by the Michigan Consortium of Advanced Networks. This Consortium was created by Executive Order of the Governor of Michigan and was tasked to create a roadmap for high speed, secure, reliable, and affordable broadband service. The Consortium was made up of 13 members representing various state agencies, higher education, legislators, law enforcement, and

the financial sector. Guidance was sought from two subgroups representing diverse public and private entities.

In light of Governor Holcomb's recent Next Level Connections announcement, we suggest a continued focus on understanding what has already been accomplished, developing a comprehensive plan, and formulating reasonable policies with input from all stakeholders.

# Appendices

**Appendix 1: Rural ILECs Receiving Indiana Universal Service Funds**

1. Bloomingdale Home Telephone Company, Inc.
2. Camden Telephone Company, Inc. d/b/a TDS Telecom
3. CenturyTel of Central Indiana d/b/a CenturyLink
4. CenturyTel of Odon d/b/a CenturyLink
5. Citizen's Telephone Corporation
6. Clay County Rural Telephone Cooperative, Inc. d/b/a Endeavor
7. Communications Corporation of Indiana d/b/a TDS Telecom
8. Craigville Telephone Company, Inc.
9. Daviess-Martin Rural Telephone Corporation d/b/a RTC Communications
10. Frontier of Indiana, LLC
11. Geetingsville Telephone Company, Inc.
12. Hancock Rural Telephone Corporation d/b/a Ninestar Connect
13. Home Telephone Company of Pittsboro Inc. d/b/a TDS Telecom
14. Ligonier Telephone Company, Inc.
15. Merchants & Farmers Telephone Company d/b/a TDS Hillsboro
16. Monon Telephone Company, Inc.
17. Mulberry Cooperative Telephone Company, Incorporated d/b/a Mulberry Telephone Company
18. New Lisbon Telephone Company, Inc.
19. New Paris Telephone, Inc.
20. Northwestern Indiana Telephone Company, Inc. d/b/a NITCO
21. Perry-Spencer Rural Telephone Cooperative, Inc. d/b/a PSC
22. Pulaski-White Communications, Inc. d/b/a Lightstream
23. Rochester Telephone Company, Inc.
24. Smithville Telephone Company, Inc. d/b/a Smithville Communications
25. Southeastern Indiana Rural Telephone Cooperative, Inc. d/b/a SEI Communications
26. Miles Communications Inc. d/b/a Enhanced Telecommunications Corp.
27. Swayzee Telephone Company, Inc. d/b/a Swayzee Communications Corp.
28. Sweetser Rural Telephone Company, Inc.
29. Tipton Telephone Company, Inc. d/b/a TDS Telecom
30. Tri-County Telephone Company, Inc. d/b/a TDS Telecom
31. Washington County Rural Electric Telephone Cooperative, Inc. d/b/a Tele-Media Solutions
32. Yeoman Telephone Company, Inc.

## Appendix 2: Studies/Reports for Further Reading

*Reports and studies referenced in the report*

**2014 Report of the Indiana Broadband Working Group**, chaired by former Lieutenant Governor Sue Ellspermann:  https://secure.in.gov/lg/files/RBWG_REPORT_12.5.14-_FINAL_v.2.pdf

**2016 Purdue Digital Divide Index (DDI)** (pub. Purdue Center for Regional Development) https://pcrd.purdue.edu/signature-programs/digital-divide-index.php

**2018 Broadband Deployment Report and previous Broadband Progress Reports** https://www.fcc.gov/reports-research/reports/broadband-progress-reports

**2018 Indiana Report on Broadband Progress.**  (Sponsored by the Indiana Broadband and Technology Association (IBTA) and the engineering and consulting firm Vantage Point Solutions.) https://drive.google.com/file/d/1GNjDbvB6uONsxiq-8BUh5JMprUInOih0/view

**Assessing Indiana's E-Readiness in the Development of the Digital Society: An Exploratory Study**, by Srikant Devaraj, SushilSharma, Emily J. Wornell, and Michael J. Hicks (Ball State University: Oct. 5, 2017)  **https://projects.cberdata.org/reports/HDTI-IN-20171005.pdf**

**BroadbandNow.Com** broadband information website and interactive broadband availability search tool.  https://broadbandnow.com/Indiana

**Broadband's Impact:  A Brief Literature Review (Purdue University Center for Regional Development**, Publication 001: January, 2018) https://www.pcrd.purdue.edu/files/media/Broadbands-Impact-Final.pdf

**Defining Broadband: Minimum Threshold Speeds and Broadband Policy,** Lennard G. Kruger, Congressional Research Service, December 4, 2017, https://fas.org/sgp/crs/misc/R45039.pdf

**Estimation of the Net Benefits of Indiana Statewide Adoption of Rural Broadband**, by Alison Grant, Wallace E. Tyner, and Larry DeBoer (Purdue Center for Regional Development, Publication 006: Aug. 2018).  https://www.pcrd.purdue.edu/files/media/006-RPINsights-Indiana-Broadband-Study.pdf

**Michigan Broadband Roadmap**, Michigan Infrastructure Commission (August 2018) https://www.michigan.gov/documents/snyder/MCAN_final_report_630272_7.pdf

**Rural Broadband Economics: A Review of Rural Subsidies**, by Steve G. Parsons and James Stegeman, CostQuest Associates, 2018. https://www.ntca.org/sites/default/files/documents/2018-07/CQA-RuralBroadbandEconomics-AReviewofRuralSubsidies_FinalV07112018R2.pdf

**Southern Indiana Development Commission State of Broadband 2018** (pub. Purdue Center for Regional Development) https://pcrd.purdue.edu/media/publications/index.php?category=SIDC

## Appendix 3: Data Sources Used in this Report

*Sources Used for Mapping Data:*

Form 477 June 2017 Data and Related Information: https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477

Census Block and Population Data 2010: https://www.census.gov/geo/maps-data/data/tiger-data.html

*FCC Documents and Webpages*

***In the Matter of Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers,*** FCC 01-304, Federal Communications Commission, Released November 8, 2001.

***Universal Service Administrative Company, 2017 Annual Report,*** *https://www.usac.org/about/tools/publications/annual-reports/default.aspx*

***In the Matter of Connect America Fund, et al*, Report and Order**, FCC 14-190, Federal Communications Commission, Released December, 18, 2014. https://www.fcc.gov/document/fcc-releases-order-increase-connect-america-rural-broadband-speeds

***In the Matter of Connect America Fund, et al,* Report and Order and Order on Reconsideration, and Further Notice of Proposed Rulemaking**, FCC 16-33, Federal Communications Commission, Released March 30, 2016

***In the Matter of Connect America Fund*, Report and Order on Reconsideration**, FCC 17-12, Federal Communications Commission, released March 2, 2017

**In the Matter of Connect America Fund, Universal Service Reform - Mobility Fund, Order, Notice of Proposed Rulemaking, and Memorandum Opinion and Order,** FCC 18-124, Federal Communications Commission, Released August 21, 2018

**Connect America Fund Progress Portal**, https://www.fcc.gov/general/connect-america-fund-progress-portal

**Connect America Fund Phase II Auction** (Auction 903), https://www.fcc.gov/auction/903

**Mobility Fund Phase II (MF-II)**, https://www.fcc.gov/mobility-fund-phase-ii-mf-ii

**2016** *Lifeline Modernization Order***,** the FCC added broadband as a supported service in the federal universal service programs, for the first time (applied to both CAF/high cost and Lifeline). In the Matter of Lifeline and Link Up Reform and Modernization, et al, WC Docket No. 11-42 et al., Third Report and Order Further Report and Order, and Order on Reconsideration at paras. 30 - 35 & Appendix A (FCC 16-38, rel. April 27, 2016).  https://ecfsapi.fcc.gov/file/60001707405.pdf

**CAF II Reverse Auction Results:**   https://auctiondata.fcc.gov/public/projects/auction903

**FCC Public Notice** re:  Post-Auction Procedures and Requirements for CAF II Reverse Auction:
https://docs.fcc.gov/public/attachments/DA-18-887A1.pdf

**FCC Order establishing**: (1) A uniform framework for measuring the speed and latency performance for recipients of high-cost universal service support to serve fixed locations; and (2) reporting requirements for recipients of high-cost and CAF funding to report their speed and latency performance data to the FCC  (released July 6, 2018):
https://docs.fcc.gov/public/attachments/DA-18-710A1.pdf

**FCC "Connect America Fund" Order a/k/a USF/ICC Transformation Order** (released Nov. 18, 2011):  Established many of the initial requirements and policies for universal service (including CAF and broadband, some of which are still in effect today.
https://docs.fcc.gov/public/attachments/FCC-11-161A1.pdf

**FCC Rate-of-Return Order (released June 15, 2016):**   Established two different ways for rate-of-return ILECs (which includes most small local telephone companies) to receive support for providing stand-alone broadband service, including the "A-CAM" program, which is discussed briefly in the report; made other reforms to the universal service programs that support rate-of-return companies.  https://docs.fcc.gov/public/attachments/DA-16-661A1.pdf

**Definition of "voice telephony service",** which is one of the two federally supported services (Dec. 2011), along with broadband:  https://docs.fcc.gov/public/attachments/FCC-11-189A1.pdf

**FCC Pole Attachments Order and Declaratory Ruling**, WC Docket No. 17-84; WT Docket No. 17-79 (FCC 18-11, released Aug. 3, 2018)  This item "reforms the federal framework governing pole attachments with the stated goal of promoting both broadband and 5G/small cell deployment."
https://docs.fcc.gov/public/attachments/FCC-18-111A1.pdf

**Feb. 26, 2016, Letter from former FCC Chairman Tom Wheeler (to Reps. Upton and Walden in response to their questions about why the FCC uses so many different definitions for broadband, etc.**  https://docs.fcc.gov/public/attachments/DOC-338179A1.pdf

*Additional Data Sources and information:*

Indiana specific

Office of the Governor Next Level Connections:
https://www.in.gov/gov/nextlevelconnections.htm

Indiana Broadband Map: http://www.indianabroadbandmap.com/

INECA Map: https://www.ineca.org/members.html

Nationwide

National Broadband Map: https://broadbandmap.fcc.gov/#/

NTIA Grant Info: https://www2.ntia.doc.gov/grantee/indiana-office-of-technology

Form 477 Filing Instructions: https://transition.fcc.gov/form477/477inst.pdf

HUBB State Access Tool:
https://data.usac.org/publicreports/HUBBStateReport/Download/StateReport

Broadband Speeds for Different Federal Programs Chart:
https://fas.org/sgp/crs/misc/R45039.pdf

FCC Broadband Technology Types: https://www.fcc.gov/general/types-broadband-connections

Wireless Spectrum: https://www.nasa.gov/sites/default/files/atoms/files/spectrum_101.pdf

Federal Broadband Programs and Minimum Broadband Speeds:
https://fas.org/sgp/crs/misc/R45039.pdf

Public Notice of Revised List of Census Blocks For Price Cap Carriers Accepting CAF II Funding:
https://www.fcc.gov/files/cameligiblelistupdatefinal021518zip

3GPP a partnership between seven telecommunications standards development organizations.
http://www.3gpp.org/

## Appendix 4: Other State Initiatives to Address Broadband

*State Broadband Offices and Task Forces*

<u>New York</u> – The NYS Broadband Program Office, a division of the NYS Urban Development Corporation, serves as the state's single point of contact for broadband development and deployment efforts and is charged with administering the New NY Broadband Program.[1]

<u>California</u> – California's Public Utility Commission (CPUC) manages the State's Broadband Funding program.[2] The CPUC approves funding for infrastructure projects and works closely with the California Broadband Council, a non-profit organization created through legislation, to provide guidance and support to identify government structures for collocation, increasing literacy and adoption, and increasing availability in tribal areas.[3]

<u>Colorado</u> – The Broadband Deployment Board was established in 2014 to provide grants for last mile broadband access through the Broadband Fund. The State Broadband Office was created in 2017, which included the appointment of an Executive Director to be the primary liaison between state agencies, the Governor's office, state legislature, and private industry.[4]

<u>Maine</u> – Maine's ConnectME Authority is a six-member board and consists of seven voting members that are appointed by the Governor created to facilitate universal availability of broadband and provide outreach to encourage adoption.[5]

<u>Virginia</u> – The Office of Telework Promotion and Broadband Assistance (OTPBA) was established by the Governor in 2006 within the Office of Secretary of Technology. The OTPBA works to promote public and private sector efforts in the deployment of telework policy and to remove barriers to broadband access.[6] The OTPBA is governed by the Broadband Advisory Council, which was established for the purposes of advising the Governor on policy and funding priorities to expedite deployment and reduce the cost of broadband access in the state.[7]

Michigan – In January 2018, Executive Order 2018-2 was signed which created the Michigan Consortium for Advanced Networks (MCAN) for the purpose of developing a plan to improve

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[1] https://nysbroadband.ny.gov/
[2] http://www.cpuc.ca.gov/Communications/
[3] https://broadbandcouncil.ca.gov/
[4] https://www.colorado.gov/pacific/dora-broadband-fund
[5] https://www.maine.gov/connectme/about
[6] https://www.wired.virginia.gov/sites/default/files/Est-Office-of-Telework_35.pdf
[7] https://www.wired.virginia.gov/broadband/advisory-council/
Virginia Code states that as an advisory council it does not serve a regulatory or rule-making purpose. (Virginia Code Title 2.2 Chapter 21 00) https://law.lis.virginia.gov/vacode/title2.2/chapter21/section2.2-2100/

broadband access and adoption in the state. In August, MCAN released its report titled "Michigan Broadband Roadmap" in which it identifies three key recommendation areas: access to unserved areas, increase broadband adoption, and progress Michigan's broadband ecosystem. The report gives various recommendations for short-term and long-term actions for each key area. Some examples include, reviewing the Michigan Telecommunications Act for enhancements to the Lifeline program, investing $20 million to support broadband projects that improve economic development, and working with ISPs to establish a set of standards for residential and commercial development.[8]

*Universal Service Funding for Broadband*

Some states are taking a similar approach to Indiana and focusing on studying and enacting initiatives and reforms related to the collection and use of state universal service funds for broadband deployment efforts.

Oregon – HB 2091 authorizes the Public Utility Commission of Oregon to use state universal service fund money to encourage broadband service availability and to provide support to telecommunications carriers that provide both basic telephone service and broadband service. Oregon removed wireless providers from the types of required contributors, but allows them to receive support by voluntarily contributing to the fund for one year prior to ETC designation.[9]

New Mexico – SB 308 was passed in 2017 and creates a dedicated broadband fund from the state's existing universal service fund. The legislation also creates a more predictable revenue stream for the fund by changing the surcharge mechanism from a percentage-based fee to a flat fee.[10] In addition to including broadband as a supported service, New Mexico also expanded the definition of access lines subject to universal service contribution to include voice-enabled access lines and other functional equivalents. It provides the option of imposing a surcharge on a per-connection charge applicable to wireline, wireless, and VoIP connections rather than a percent of intrastate revenues.

California – In 2007, the California Advanced Services Fund was established creating a dedicated state broadband funding program for the purposes of funding infrastructure projects. It is funded by a surcharge rate, currently .56%, on revenue collected by telecommunication carriers from end-users for intrastate telecommunications services. The program consists of four accounts managed by the CPUC as part of the state universal service program: (1) the Infrastructure Grant

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[8] https://www.michigan.gov/documents/snyder/MCAN_final_report_629873_7.pdf
[9] "Broadband Availability and Adoption: A State Perspective". Sherry Lichtenberg June 2017
[10] http://www.nmsenate.com/2017/03/04/sb308/

and Revolving Loan account; (2) the Public Housing account; (3) the Rural and Regional Urban Consortium Fund account; and (4) the Broadband Adoption Account.[11]

Utah – In 2017, SB 170 amended the state universal service fund to reflect changes in technology. The bill requires each access line or connection provider connecting to the public switched network to contribute regardless of the technology used. The bill also states that the fund shall support networks capable of providing voice and wholesale broadband internet access.[12]

*Mapping Initiatives*

Broadband mapping initiatives have continued in some states even after federal funding ended for the Broadband Technologies Opportunities Program in 2014. Similarly to other states, in July 2018, the Indiana Lt. Governor's office and the Indiana Office of Technology released an updated Indiana Broadband Map using the most recent publicly available Form 477 data.

Wisconsin – In February 2018, the Wisconsin Broadband Office, a division of the state's Public Service Commission, released the Wisconsin Broadband Map. The map uses data solely from the Form 477 that is current as of December 31, 2016.[13]

Virginia – The Center for Geospatial Information Technology at Virginia Tech partnered with the State to develop the Virginia Broadband Availability Map and Integrated Broadband Planning and Analysis Toolbox which, in addition to identifying where broadband service is available, includes downloadable maps and other tools to be used for broadband planning purposes and a policy database that provides information on broadband-related policies for a given location. The website states that the data "comes directly from the providers to the FCC."[14] After federal funding from the State Broadband Initiative ended, the General Assembly allocated funding to maintain the state broadband program.

California – The California Interactive Broadband Map is updated every year using data directly from the broadband providers. The CPUC issues a data requests to California providers once a year. The information collected is geo-processed and validated using a variety of data sets which is then displayed in the interactive map. The data is current as of December 31, 2016 and is similar to the data collected by the FCC in the Form 477. As is the case with the Indiana Broadband Map

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[11] http://www.cpuc.ca.gov/casf/
[12] https://le.utah.gov/~2017/bills/static/sb0130.html
[13] https://maps.psc.wi.gov/apps/WisconsinBroadbandMap/
[14] https://broadband.cgit.vt.edu/IntegratedToolbox/#about

and other state maps that only utilize the Form 477 data, California's state map is based on census-block level data.[15]

*Broadband Incentive Programs*

Alabama – In March 2018, SB 149 was passed establishing the Alabama Broadband Accessibility Act, which authorized the creation of a broadband accessibility grant program to be administered by the Alabama Department of Economic and Community Affairs. Funding is awarded to telecommunication companies, cable companies, and electric cooperatives in rural areas to encourage broadband investment in unserved areas.[16]

Idaho – Idaho created the Idaho Broadband Infrastructure Improvement Grant for funding special construction projects to deploy new fiber for high-speed broadband. Funding is distributed by the State Department of Education to provide state matching funds for projects that follow E-rate program guidelines for internet access or wide-area network connections and must result in scalable infrastructure for long-term broadband capacity targets. Eligible entities for funding are those that receive E-rate funding, which include schools and libraries.[17]

Minnesota – In 2017, the legislature included $20 million in funds for Minnesota's Border to Border grant program. The purpose is to provide grants of up to 50 percent of project development costs for deployment of facilities to deploy broadband to unserved and underserved areas of the state.[18]

Wisconsin – The Broadband Expansion Grant Program was established in 2018 and will award approximately $7 million in broadband expansion grants. Entities eligible for funding include profit and not for profit organizations, telecommunications utilities, or public entities that enter into partnerships with either. The grant requires that broadband infrastructure be constructed in underserved areas of the state.[19]

Tennessee – The Broadband Accessibility Grant Program was established by the Tennessee Broadband Accessibility Act and was allocated $30 million in funding to broadband providers to incentivize broadband deployment to unserved areas by offsetting some of the capital expenses.[20]

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[15] ftp://ftp.cpuc.ca.gov/Telco/BB%20Mapping/2018/About%20the%20Interactive%20Broadband%20Map%20Rel%203.0.pdf

[16] https://governor.alabama.gov/press-releases/governor-ivey-signs-alabama-broadband-accessibility-act/

[17] https://www.sde.idaho.gov/tech-services/broadband/files/biig/BIIG-Overview.pdf

[18] https://mn.gov/deed/programs-services/broadband/grant-program/

[19] https://psc.wi.gov/Documents/broadband/bbFAQ.pdf

[20] https://www.tn.gov/ecd/rural-development/tennessee-broadband-grant-initiative/tnecd-broadband-accessibility-grant.html

*Removal of Barriers/Ease of Deployment*

Wisconsin – In an effort to encourage broadband deployment, the Public Service Commission's Broadband Office developed a model ordinance designed to reduce obstacles to broadband infrastructure investment. Local units that meet the criteria can become certified as a Broadband Forward! Community. Similar to Indiana's Broadband Ready Communities, the list of certified communities is made available to encourage broadband investment by potential providers in these communities.[21]

Tennessee – The Tennessee Broadband Accessibility Act allows the previously restricted electric cooperatives to provide broadband service to reach those areas with lower population densities throughout their service territories.[22]

*Public/Private Partnerships*

Massachusetts – In 2008, the Broadband Act allocated $40 million to support the development of access to broadband service by providing grants and technical support to design and deploy new last mile networks through public-private partnerships. The Last Mile Program provides grants to broadband service providers and municipalities to support and co-invest in broadband access projects for towns lacking broadband. The Broadband Extension Program offers grants to existing cable broadband providers to extend broadband access using existing residential cable franchises that do not cover substantial areas of the town.[23]

Kentucky – The Kentucky Communications Network Authority was created to manage the statewide broadband network. KCNA entered into a public-private partnership with Macquarie Capital to design, build, operate, and maintain the KentuckyWired network for 30 years. KentuckyWired is a fiber optic, middle-mile cable system designed to be an open access network that allows local public and private internet service providers to more easily extend services to local communities. The project, which began in 2015, primarily focuses on connecting university and government sites.[24]

*Tax Credits*

Tennessee – The Broadband Accessibility Act allocated $15 million that gives providers a tax credit on purchases of broadband equipment that is used to provide broadband access to high cost areas of the state.[25]

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[21] https://psc.wi.gov/Pages/Programs/BroadbandForward.aspx
[22] https://www.tn.gov/ecd/rural-development/tennessee-broadband-grant-initiative/tennessee-broadband-accessibility-act-article.html
[23] https://broadband.masstech.org/about-mbi/state-and-federal-legislation
[24] https://kentuckywired.ky.gov/about/Pages/faq.aspx
[25] https://www.tn.gov/ecd/rural-development/tennessee-broadband-grant-initiative/tennessee-broadband-accessibility-act-article.html