March, 2022

LIVINGSTON COUNTY **BROADBAND** DATA COLLECTION

EXECUTIVE FINDINGS REPORT

merit

THE MICHIGAN MOONSHOT™

Introduction

Livingston County has prioritized broadband as essential infrastructure, critical for long-term sustainability and prosperity. The County was aware that broadband connectivity improves educational outcomes, provides public safety benefits and supports robust economic development and agricultural initiatives. It was hypothesized that many homes in the community did not have reliable access or a connection at all to high-speed Internet.

A citizen-driven survey and speed test project was undertaken in partnership with the Michigan Moonshot in order to help identify areas of Livingston County that are unserved or underserved in terms of connectivity. The information gathered from this effort will be used to grasp the scale of the County's broadband gap, to quantify residents' experiences with broadband, to understand the ways in which access, or lack of access, impacts quality of life, and to help plan for access expansion.

The survey assessed access and adoption of digital technology within the county. Respondents also contributed speed test data to a countywide database, helping Livingston County measure broadband coverage (or lack thereof) across the county. This executive summary discusses the results of the quantitative survey and speed test effort undertaken in Livingston County.

What Is Broadband?

Broadband is a very fast Internet connection. Consider this analogy: If a road has one lane and heavy traffic, it will take a long time for drivers and passengers to reach their destinations. If the same road had multiple open lanes, the same group of cars could reach their destinations in a shorter period of time. Similarly, "broadband" refers to high-speed Internet "lanes" or connections that provide someone the capability to upload and download data efficiently. Broadband connections have wide bandwidth and can handle "heavy traffic", other connections such as dial up cannot.

Why Broadband?

High-speed broadband access allows high-quality teleconferencing, video and audio streaming, e-gaming, e-commerce, and large file transfers to function smoothly. High-speed Internet also enables new technologies like thermostats with automatic room temperature control, home security cameras, health monitoring devices, and televisions and speakers with built-in streaming entertainment.

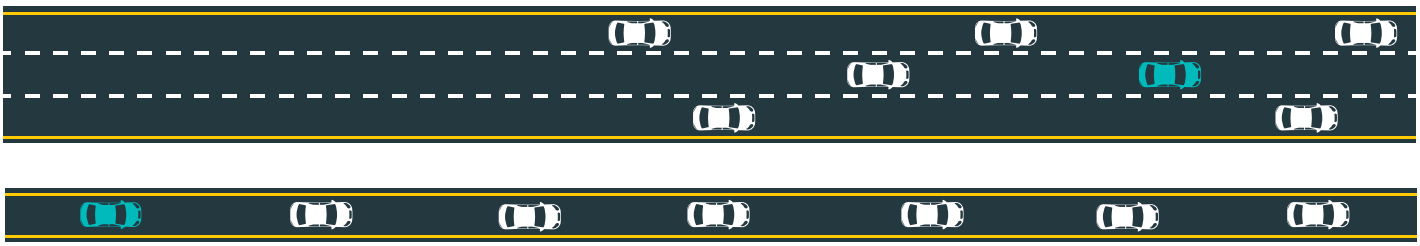
Currently, the Federal Communications Commission (FCC) defines broadband as a connection with 25 megabits per second download speed and 3 megabits per second upload speed. Technology to deliver this connection can include cable, DSL, fiber, wireless, and more.

Broadband Mapping

Funding eligibility for all state and federal grant programs rely upon broadband penetration data. The primary existing source of this data is the FCC Form 477. Form 477 data is self-reported by service providers, and is the basis for mapping broadband coverage in the United States. This data is aggregated, unreliable, and lacks the granularity needed for accurate coverage inferences (Mack et al., 2019, p.6).

Initial results from community speedests throughout Michigan signify greater connectivity issues than identified by the FCC. The magnitude of the problem is much higher than suggested by federal data; in other Michigan counties, as many as 64% of households do not have access to fixed broadband

Figure 1. Cars Along a Road



Impacts of Broadband on a Community

The presence of fiber-based broadband can be associated with a positive effect on property values in a neighborhood (Molnar et al., 2015, p.12).

Broadband access is associated with increased agricultural yields (LoPiccalo, 2020, p. 24).

Middle and high school students with high-speed Internet access at home have more digital skills, higher grades, and perform better on standardized tests, such as the SAT. Regardless of socioeconomic status, students who cannot access the Internet from home or are dependent on a cell phone for Internet access do worse in school and are less likely to attend college or university (Hampton et al., 2020, p. 48).

Internet connectivity, particularly access to broadband, plays an increasingly important role in both healthcare and public health (Bauerly et al., 2019, p. 39).

There is evidence that access to state of the art internet like optical fiber and employment growth are related (Lapointe, 2015, p.25).

It is suggested that improving broadband adoption in rural areas can improve labor productivity (Whitacre et al., 2021, p.181).

Survey Design and Methodology

Livingston County partnered with Merit Network's Michigan Moonshot team to develop and deploy a survey for 18 communities. Survey participants were recruited through printed postcards and direct mail, radio, social media, newspaper advertisements, email, fliers and community partner outreach efforts, among others.

Residents with Internet access at their properties were instructed to complete a survey and Internet connection speed measurement online. Residents without Internet connectivity were asked to complete a mobile-optimized web survey through their cellular phone. Text message surveys were available via SMS, and printed surveys were available upon request. All survey materials, including the informational websites, were available in English and Spanish languages.

After the data were cleaned, 6,112 surveys were eligible for analysis. From this total number, 4,266 surveys indicated they had some form of Internet service in their home. There were 1,856 surveys completed by residents who self-reported that they had no Internet in their home.* Connected residents were asked to complete a speed test after entering their survey. Of these, 2,536 households with Internet access completed a speed test, and 1,730 responding households did not complete a speed test. The overall response rate for the survey is about 8.49% of all households in Livingston County. When accounting for additional data points and survey responses the project margin of error is **1.2%**.

Survey Results

The southeast portion of the county (including the areas around Brighton and Pinckney) and the region surrounding Howell demonstrate deeper broadband density per census block. However, much of Livingston County lacks access, including census blocks within these better served areas. FCC Form 477 broadband penetration data indicates that 98% of surveyed communities have Internet service. **The proportion of households in Livingston County that do not have Internet access is higher: 42% of households in this study report having no access at all.****

The FCC defines broadband speed as Internet service at a minimum of 25 Mbps download and 3 Mbps upload. Survey results indicate that **56% of households overall do not** have access to fixed broadband at the FCC threshold of 25 Mbps download and 3 Mbps upload. In households without children, 45% total experience Internet access at broadband speeds. In households with children, 60% total have access to broadband speeds.

In contrast to the FCC's definitions of broadband, industry experts and members of the US Congress and US Senate assert that broadband should be classified at speeds above 100 Mbps download and 20 Mbps upload. Current FCC data in Livingston County suggest 85% of residents have access at the 100 Mbps/20 Mbps speed. Contrasting federal reporting, **only 7% of respondent households** throughout the County have broadband Internet at speeds above 100 Mbps/20 Mbps. **The citizens of Livingston County indicate that underservice in their communities is much higher than reported by Federal data.**

Satisfaction with broadband options is another factor impacting adoption, and 39% of residents are satisfied with options for competitive choice at their homes. Around 27% of residents had neutral feelings, and 33% of residents are dissatisfied with their provider choices.

The majority of unconnected residents in Livingston County do not have service because they simply do not have availability at their address. An absence of service availability impacts 62% of unconnected homes in the survey. The price of Internet service is another key barrier for unconnected residents; 32% of unserved households replied service costs are prohibitively expensive.

Footnote for Speeds

**We received 4,740 total speed test results. Speed test results that seemed to originate from 1) cellular or satellite Internet connections and 2) from connections originating from an ISP not serving Livingston County or connections over a Virtual Private Network (VPN) were excluded. As a result, a total of 795 survey-based speed test results were omitted from our data analysis. Additionally, some households took the speed test or responded to the survey more than once. From this, the highest recorded speed from an address was used in the calculations and an additional 1,409 speed tests were removed from analysis. There were also 1,730 respondents that took the served survey and either did not take a speed test or there was an error with their speed test. These responses were used in the survey analysis only.*

***Individual household speed test results can vary depending upon time of day and network traffic. All figures and calculations in this report reflect the highest measured speed from a household.*

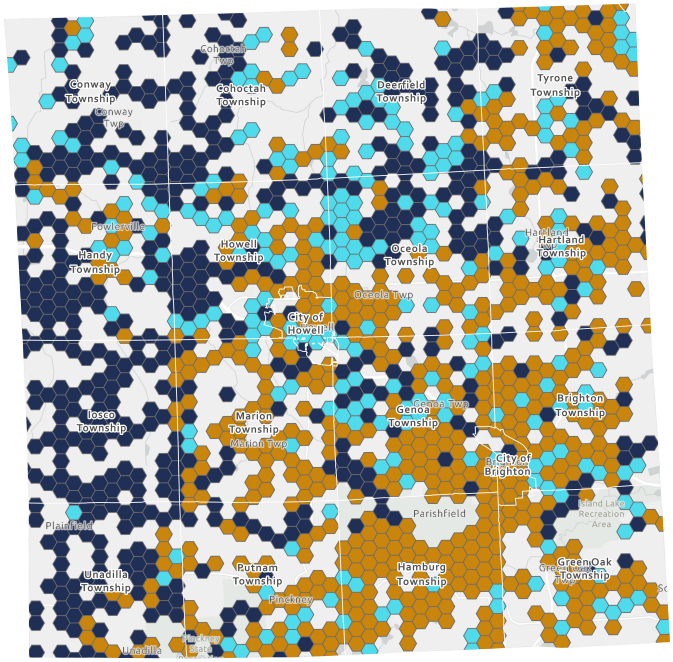
Countywide Heatmaps

25/3 and 100/20 Thresholds

Maps are based on the survey results (and not a census of all the households in the area).

25/3 Threshold:

A Countywide Heatmap

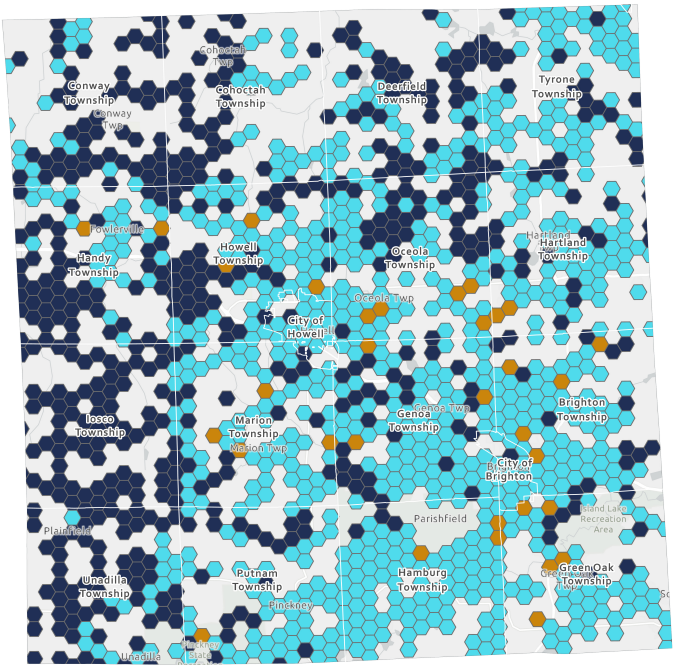


25/3 Threshold

At or Above 25/3 | Below 25/3 | No Internet | No Survey Data Collected

100/20 Threshold:

A Countywide Heatmap



100/20 Threshold

At or Above 100/20 | Below 100/20 | No Internet | No Survey Data Collected

Summary Statistics

Total: 4,392 speed test locations | **Median: Download** - 15.04 Mbps **Upload** - 1.88 Mbps
Minimum: Download - 0.00 Mbps **Upload** - 0.00 Mbps | **Max: Download** - 912.7 Mbps **Upload** - 440.00 Mbps

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The map reflects all served and unserved households aggregated within a 1.5 mile wide hexagonal bin. Using these numbers as indicators of the share of all households (including those who did not respond) that have broadband must take margins of error into consideration, which depend on the total number of responses and the total households in an area. At the county level, the margin of error is in the 1.2% range. For individual municipalities, the margin of error is in the 3%-9% range.

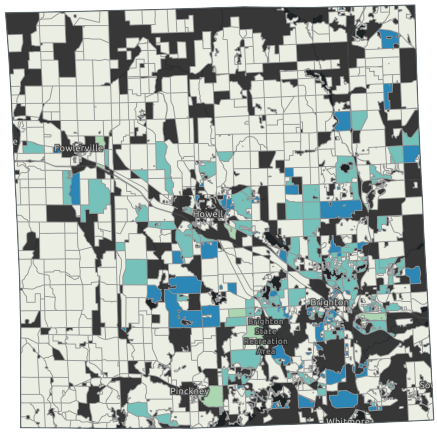
Broadband Density Per Census Block

Survey Results Compared to FCC Data

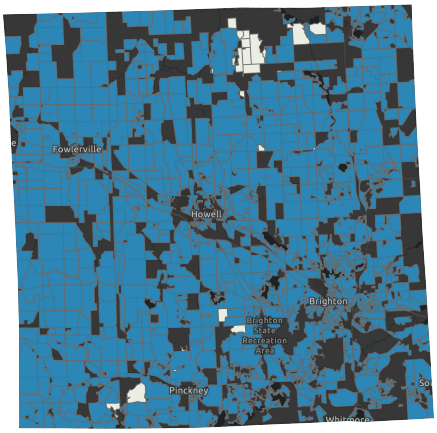
Maps are based on the survey results (and not a census of all the households in the area).

25/3 Threshold:

Survey Responses Per Census Block



FCC Breakdown



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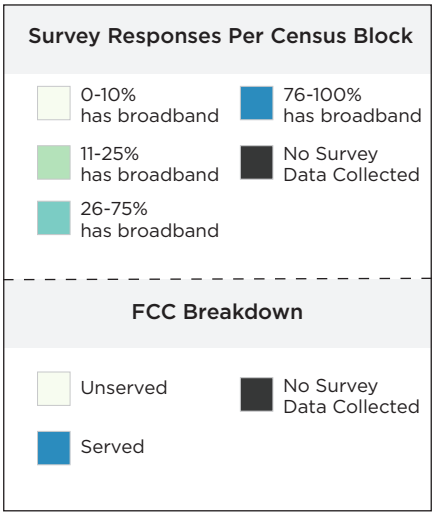
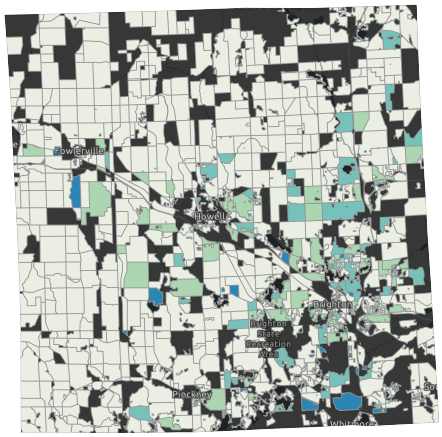
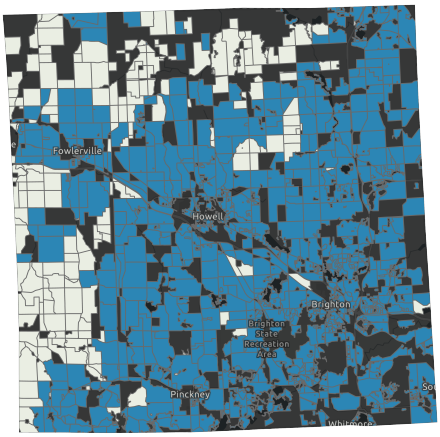


100/20 Threshold:

Survey Responses Per Census Block



FCC Breakdown



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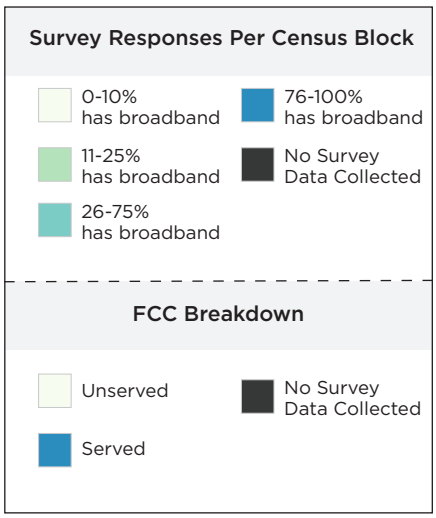


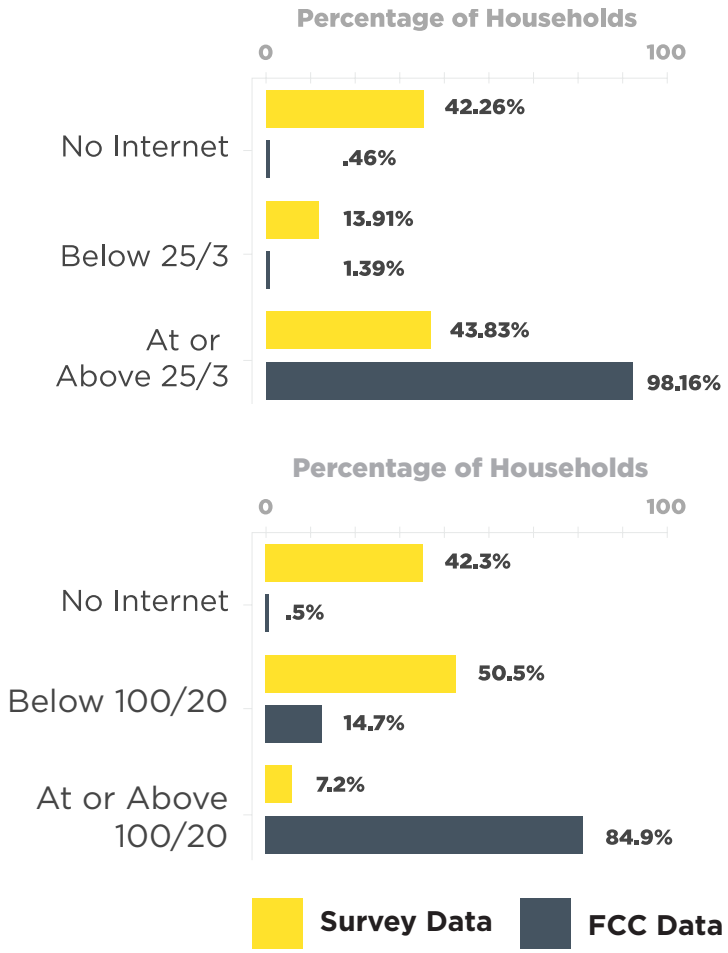
This side-by-side comparison reflects all served and unserved households in order to demonstrate differences between FCC data and respondent data. Using these numbers as indicators of the share of all households (including those who did not respond) that have broadband must take margins of error into consideration, which depend on the total number of responses and the total households in an area. At the county level, the margin of error is in the 1.2% range. For individual municipalities, the margin of error is in the 3%-9% range.

Availability by the Numbers

Survey speed data as well as FCC data on the maximum advertised upload and download speeds per census block were each placed into one of the following categories: 1) No Internet, 2) Below 25/3 Mbps, 3) At or Above 25/3 Mbps, or 4) At or Above 100/20 Mbps. Each survey result was then directly compared to the FCC census block the survey point falls within. There are broad differences between coverage reported by the FCC and data from this survey.

This study suggests that within our sample of survey responses, compared to FCC data:

- 54% fewer homes have access to broadband Internet speeds at 25/3 Mbps
- 78% fewer homes have access to broadband Internet speeds at 100/20 Mbps
- 13% more homes have some connectivity at speeds lower than broadband
- 41% more homes have no Internet connectivity whatsoever



Satisfaction with Home Internet Provider Options:

Satisfied 39% **Neutral 27%** **Dissatisfied 34%**

39% of residents were satisfied with the Internet service provider options at their homes.

Broadband in Households with Children and Students up to age 18:

45%

41% of households surveyed in Livingston County reported having children under age 18. In these homes, 45% have broadband Internet.

60%

60% of households with no children report Internet access at broadband speeds or higher. Internet access at broadband speeds or higher.

Livingston County Resident Sentiment:

62%

Of Livingston County residents that have no Internet access, 62% report that no services are available at their address and 32% state that the price for service is too high.

77%

77% of residents with no Internet access responded that they are willing to pay between $25 and $101+ for service, indicating that the majority of these residents would pay for Internet service at their properties if it was available.

Conclusion

Broadband is critical to a community's ability to thrive and remain competitive in terms of education, economic development, talent retention, employment opportunities and population growth. Much of Livingston County is unconnected or insufficiently connected. Connectivity data indicates a problem more stark than established FCC data suggests. Residents without broadband desire service, and connected citizens believe that more provider options are needed. Data from this study will be used to support grant applications and broadband planning efforts in Livingston County.

Citations

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