

BROADBAND COMMUNITY PROFILE:

# Fiber Anchors Sustained Economic Development Charlottesville, Virginia

JANUARY 2025  
Produced by  
Connect2 Communications



*When fiber leads, the future follows.*

## FIBER'S IMPACT

- Availability of high-speed, low-latency broadband accounted for roughly 35% of Charlottesville's private sector job growth during 2015-2019
- \$4 million per year in increased housing value in the Charlottesville area
- Charlottesville ranks highly in Digital Microbusiness Density – a key indicator of small business health – compared to Virginia cities of similar population size

## EXECUTIVE SUMMARY

Fiber broadband is recognized in all circles as the fifth necessary utility for 21st century life, on par with water, sewer, electricity, and paved roads that households and businesses need for education, entertainment, health care, commerce, employment, the delivery of essential government services, and so much more. The COVID pandemic underlined the need for reliable, high-speed, low-latency broadband for everyone, regardless of geographic location.

But what tangible economic benefits does fiber deliver to homes, businesses, and communities? This case study examines the economic impact of fiber broadband in Charlottesville, Virginia, and the surrounding area, focusing on three key economic indicators: private sector job growth, housing value, and digital microbusiness density, with comparisons made between Charlottesville and similarly sized cities in Virginia.

All three factors describe and are representative of the overall health of the immediate area and surrounding region. Private sector job growth leads to the creation of goods and services used by society and generates the tax revenues necessary for local, state, and federal governments to function. The housing sector is a significant contributor to local economic growth and personal wealth, with rising prices improving both individual households and the regional economy.

It is difficult to overstate the importance of small businesses in the creation and sustainment of healthy growth in the U.S. economy. According to the U.S. Chamber of Commerce, small businesses employ nearly half the American workforce, representing nearly 44% of the country's Gross Domestic Product (GDP).

Digital microbusiness density provides an ongoing measure of startup vitality and entrepreneurship that drives job creation, boosts household income growth, and reduces unemployment. A microbusiness is defined by GoDaddy as those having 10 or fewer employees, a domain, and an active website. Research by GoDaddy Venture Forward shows that every additional microbusiness entrepreneur adds about seven jobs at the county-level.

To microbusinesses, fiber provides manifest benefits, including the ability to sell goods and services on a worldwide basis if they so desire, dramatically opening access to new markets and customers. It also provides the ability to tap into national and global business services to support their operations and efficiently grow by leveraging access to cloud services delivering sales, marketing, and ecommerce tools.

Fiber was first deployed to homes and businesses in Charlottesville by Ting’s predecessor in 2014, with the network steadily growing over time to encompass nearly the entire city. Charlottesville’s decade-long relationship with fiber provides a suitable framework for measuring its economic benefits over time, serving to buffer and smooth the impact of unpredictable macro events, such as the large-scale turmoil introduced by the pandemic.

In addition, Charlottesville provides an example of how an initial entrepreneurial investment into fiber infrastructure by a local business followed by acquisition and supplemental private capital has led to building long-term benefits for the community. Blue Ridge InternetWorks started building fiber to homes and businesses, and its initial work and potential for expansion made it an attractive acquisition. Ting continued to expand Blue Ridge’s network, ultimately delivering fiber coverage for nearly all residences and businesses in the city, as well as edging outside of the formal city limits to adjacent areas.

As fiber became more prevalent in Charlottesville, so did non-profit and government efforts in extending its benefits into the surrounding area. During the course of research for this case study, local and regional economic officials pointed to the recognition by Firefly and others that fiber was a necessary utility for the households and businesses they serve in Albemarle County for its economic and social benefits, including vital access to health care through telemedicine, increased access to state and federal government services, and improved access to educational resources and opportunities.

## THE STIMULUS OF FIBER

Established in 1762, the city of Charlottesville, Va., is located around 100 miles southwest of Washington, D.C., and 70 miles northwest of Richmond, Va., in Albemarle County. Key employers in the area include Booz Allen, the University of Virginia, UVA Health, Crutchfield Corporation, the Department of Defense, and Sentara Healthcare.

A thriving ecosystem of companies supporting biotechnology, defense, and health care sectors has emerged over time, as well as organizations to create and foster the growth of startup companies and the migration of new businesses to the region, such as North Fork Discovery Park. Fiber has been key to supporting the continued growth of large institutions and small businesses within and around the city.

Dedicated fiber broadband connectivity was introduced to Charlottesville by hometown IT service provider Blue Ridge InternetWorks, with Ting Internet acquiring the company and its initial 35 miles of fiber networks in 2014. Ting went on to expand the network throughout the city, eventually reaching 237 miles and passing over 25,000 homes by June 2024. Blue Ridge InternetWorks essentially served as the anchor for continued fiber investment in the city of Charlottesville.



Fiber is good for businesses in general, but we have a very vibrant small startup business environment here. Fiber helps them reach outside the boundaries of Charlottesville in a much more robust way.



— Juandiego Wade, Mayor of Charlottesville

Today, the city and the surrounding region have multiple fiber providers available, including Ting, Lumos, Comcast, and Brightspeed. From an economic development perspective, this provides businesses with competitive access to high-speed broadband at affordable rates.

Ting initially planned to blanket the entire city with fiber coverage. However, Charlottesville's challenging terrain and existing infrastructure present unique obstacles. Overcrowded utility poles made underground fiber deployment a tempting option, but the preference for installation using methods such as microtrenching brought their own complications to the process, with Ting ultimately using a mixture of aerial and underground fiber, based upon a location's available access.

Working with the city, Ting also invested in previously unserved areas and provides reduced-cost plans to eligible households. The service provider is deploying fiber to three affordable housing complexes in the area that have either been announced or under construction and residents of these homes will be able to receive free internet access.

Charlottesville and the region have also benefited from middle-mile fiber construction conducted by FiberLight to support businesses and various Department of Defense facilities, with a significant run made from Charlottesville to Northern Virginia. The middle mile circuit benefited defense contractors, the University, and local businesses, providing additional internet access and broadband capacity.

## FROM CITY TO COUNTY

The proliferation of fiber in the area doesn't end at the city limits but continues to the surrounding area. Albemarle County is around 726 square miles, with most of the population living in 5% of the county around the Charlottesville area. With Ting's private investment, it was able to deliver high-speed broadband to most of the urban population, initially providing services to businesses and conducting residential expansion within the city limits as opportunities became available.

Residents living outside of the immediate Charlottesville area either had access to lower-quality DSL speeds or no broadband access at all. This was not ideal for anyone. Commuters living outside of the Charlottesville city limits wanted the same high-speed quality broadband at home as they had at their place of work, while farmers and others living a more rural lifestyle needed high-speed internet for access to vital resources such as the University of Virginia's telemedicine services.

The recognition of broadband as a necessary utility for the 21st century led the county to initially seek Virginia Telecommunications Initiative (VATI) funding for smaller projects, first bringing DSL to unserved areas of Albemarle and then to steadily build upon those efforts to provide fiber-grade broadband to all households. Albemarle used the VATI FY 22 round of funding in combination of \$2 million with U.S. Treasury ARPA grant funding to provide most of the remaining rural locations in the county with high-speed internet access built by Firefly Fiber Broadband, the internet subsidiary of the electric co-op in the area. By the end of 2025, Albemarle County expects to achieve universal broadband access.

Firefly Fiber Broadband, a subsidiary of Central Virginia Electric Cooperative (CVEC), was created in 2018 and now connects 30,000 customers across 16 counties of the region with over 7,000 miles of fiber in service in rural areas, including providing service to much of Albemarle County. Its operations are complementary to Ting and other providers who do not have the infrastructure or business model to build and support rural locations.

Due to the higher cost of deployment in rural areas, Firefly has sought grants through state and federal programs to steadily extend its broadband coverage, but the majority if not all of Albemarle County is expected to be connected through existing funding by the end of 2025 without having to apply for federal Broadband Equity, Access, and Deployment (BEAD) funding.



Firefly Fiber Broadband President and CEO Gary Wood addresses the Central Virginia Electric Cooperative Board of Directors. **Photo Credit:** Virginia, Maryland, & Delaware Association of Electric Cooperatives.

“

We run pretty close to the city in some areas and Firefly. By supporting the county in the surrounding area, I think we make it a more attractive place to live, which makes it a little easier for people who work in Charlottesville to work remotely from their homes, to live in the area and work remotely for jobs outside of the area, and have some of the other services at their homes when they commute back out of the city, for telemedicine and some of the other things that fiber can provide.

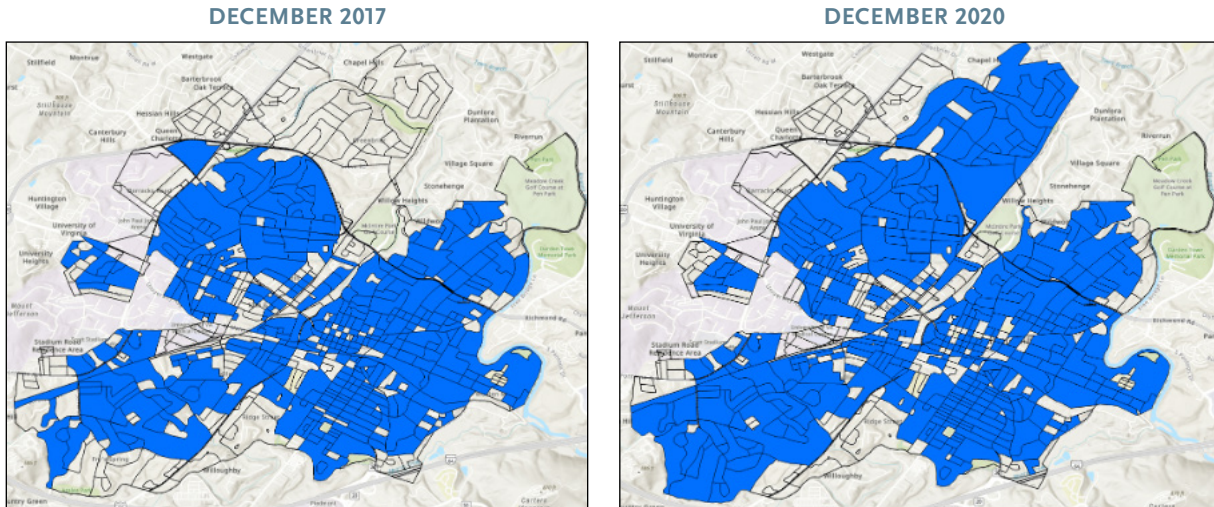
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— Gary Wood, *President & CEO of CVEC and Firefly*



## ECONOMIC IMPACT OF FIBER FOR CHARLOTTESVILLE

Publicly available sources to quantify the economic impacts of fiber over time include FCC Form 477 census block maps, American Community Survey estimates, Bureau of Labor Statistics Quarterly Census information, Charlottesville Area Association of REALTORS® (CAAR) annual reports, and GoDaddy Microbusiness Venture data.



**Ting Charlottesville Service Area: Dec. 2017 vs. Dec. 2020**

Source: FCC Form 477 Data

Data from the FCC’s Form 477 indicates that Ting offered gigabit service to roughly 20% of the Charlottesville population in 2016, and this percentage rose to 77% by 2020. The median download speeds for all Census blocks in Charlottesville increased from 150 Mbps to 1,000 Mbps during that time. This includes speed upgrades from other broadband providers in the area after Ting’s entry.

Some parts of this analysis compare Charlottesville to other similarly populated cities in Virginia. Table 1 compares these cities.

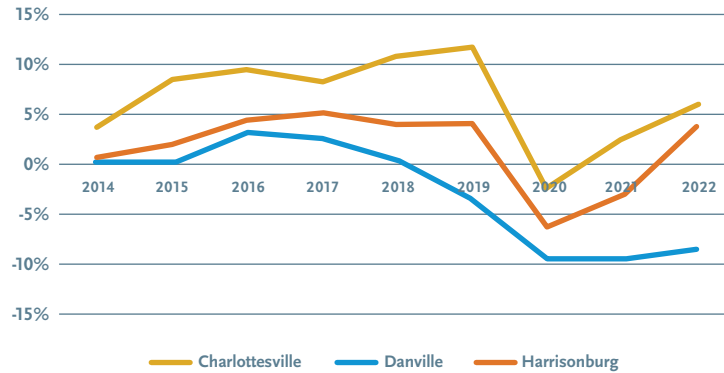
	CHARLOTTESVILLE	DANVILLE	HARRISONBURG
<b>Total Population</b>	46,289	42,507	51,784
<b>Total Population (16+)</b>	39,651	34,209	44,236
<b>% in Labor Force</b>	64.0	51.9	60.1
<b>% Unemployed</b>	3.3	3.0	4.0
<b>Median Household Income (\$)</b>	67,177	41,484	56,050

**Table 1: Characteristics of Charlottesville and Comparison Cities in Virginia**

Source: American Community Survey 2018-2022 Estimates

## Employment Trends

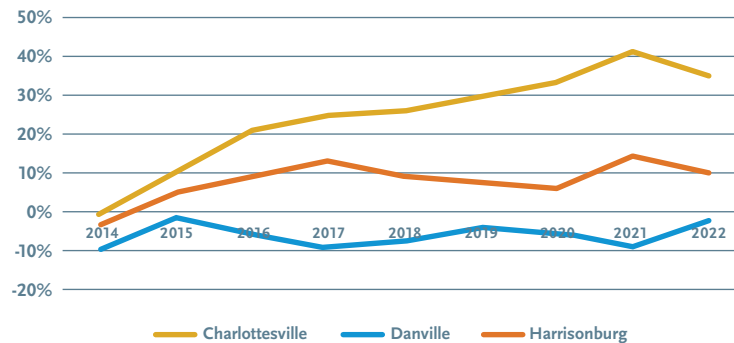
Figure 1 shows the percentage change in private employment since 2013 through 2022 for Charlottesville and its peer cities. Charlottesville has fared relatively well, with stronger growth beginning in 2014 (when the fiber build started). Like the rest of the country, these cities experienced a decrease in employment during COVID-19 (2020). However, Charlottesville’s total employment increased by around 600 jobs between 2014 and 2022, Danville’s 2022 declined by nearly 2,000 over the same period.



**Fig 1: Percent Change Since 2013 in Total Private Employment in Charlottesville and Comparison Cities in Virginia**

Source: Bureau of Labor Statistics Quarterly Census of Employment and Wages

Of particular note are the employment trends for private jobs in the professional, scientific, and technical industries (North American Industrial Classification System (NAICS) Code 54). Figure 2 demonstrates that Charlottesville has seen impressive growth in this industry since 2014 (a nearly 40% increase, adding 796 jobs), while other cities have remained stagnant or even declined. These are typically well-paid jobs, with annual wages of nearly \$100,000 in 2022.



**Fig 2: Percent Change Since 2013 in Total Private Employment for NAICS 54 in Charlottesville and Comparison Cities in Virginia**

Source: Bureau of Labor Statistics Quarterly Census of Employment and Wages

## Fiber Employment Effects

High-speed fiber broadband service has the potential to impact local employment levels in several ways, including from (1) productivity increases as businesses become more efficient and (2) the development of new business applications and services. Two recent studies have attempted to quantify these impacts, with Lobo et al. (2020) estimating the impact of broadband speed on county-level unemployment rates using Tennessee data from 2011-2015, and Wagner and Lee (2024) documenting the relationship between faster speeds and employment growth in Louisiana between 2014 and 2019.

The Lobo et al. study showed that high-speed broadband reduced unemployment rates by 0.26 percentage points and that the early adoption of this broadband has an additional 0.16 percentage point impact. These numbers were applied to the case of Hamilton County, Tenn., (which became one of the first locations in the U.S. with a fiber optic network in 2011) arguing that the number of jobs saved or created during the 2011-2020 period was over 9,500 – roughly 40% of all new jobs in the county during that time (Lobo, 2020).<sup>1</sup> Applying the same methodology to the case of Charlottesville (city only) results in 735 jobs during the 2015 – 2019 period. This is roughly 35% of the total change in private sector jobs during that time (2,064). While some of this employment growth may be attributable to other broadband providers offering higher-speed service, it is not possible to know what types of speeds would have been offered in Ting's absence. Like most cities across the country, Charlottesville's employment dropped notably in 2020 due to COVID-19 (Figure 1). The impacts of broadband in the post-COVID period are still under evaluation, but early efforts have focused on the impact of broadband adoption vs. infrastructure availability (Carvalho et al., 2022).

Wagner and Lee (2020) estimate that a 100% increase in business broadband speeds increased overall employment by 2.5% over a five-year period. However, the Louisiana businesses in their study only saw speed increases of roughly 100% (on average) during the 2014-2019 period, much less than the 600+% that Charlottesville saw between 2015 and 2020. As such, the Wagner and Lee (2020) estimates likely do not scale to gigabit speeds. Instead, the original estimate of 2.5% applied to the 2015 BLS employment estimate of 28,271 suggests an increase of 705 jobs between 2015 and 2020 – very much on par with that suggested by the methodology in Lobo et al. (2020).

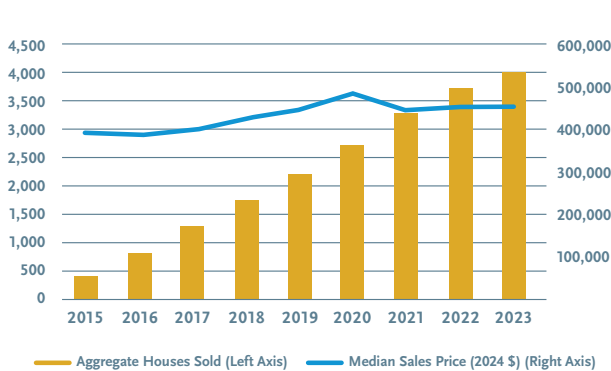
<sup>1</sup> Lobo (2020) uses the formula: Jobs attributable to high-speed broadband each year = county-level working age population x (high-speed broadband effect + early adoption effect)



## Housing Value Increases

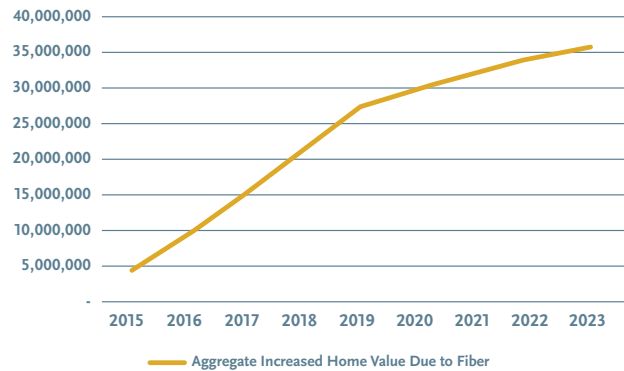
Several recent studies have quantified the impact of fiber broadband availability on housing values. These studies isolate this “fiber premium” by considering many other characteristics that should impact a house’s value (number of bathrooms, housing age, quality of local school districts, etc.). Wolf and Irwin (2024) find a 2% fiber premium for housing transactions in Wisconsin during 2013-2017, while Whitacre (2024) finds a 1% premium across three states (Iowa, Minnesota, and Texas) between 2015-2021. Notably, Whitacre’s approach finds a larger 2-4% impact in the pre-2019 era when fiber was much less available.

To quantify this impact for Ting’s Charlottesville service area, we use data from the Charlottesville Area Association of Realtors (CAAR) on the number of homes sold between 2015 and 2023. The CAAR reports include the number of single-family sales only in the Charlottesville jurisdiction using data from Virginia REALTORS, with each annual update providing information on sales activity and median sales price. The aggregate number of houses sold since 2014 and the median sales price (in 2024 dollars) for this period are displayed below. Note that the slowdown in number of houses sold in the post-COVID period is consistent with national data showing a 32% decrease (from 5.4 million single-family houses sold in 2021 to 3.67 million in 2023) (National Association of Realtors, 2024).



**Fig 3: Aggregate Houses Sold Since 2014 and Median Sales Price in Charlottesville, VA, 2015 – 2023**

Source: CAAR Annual Reports



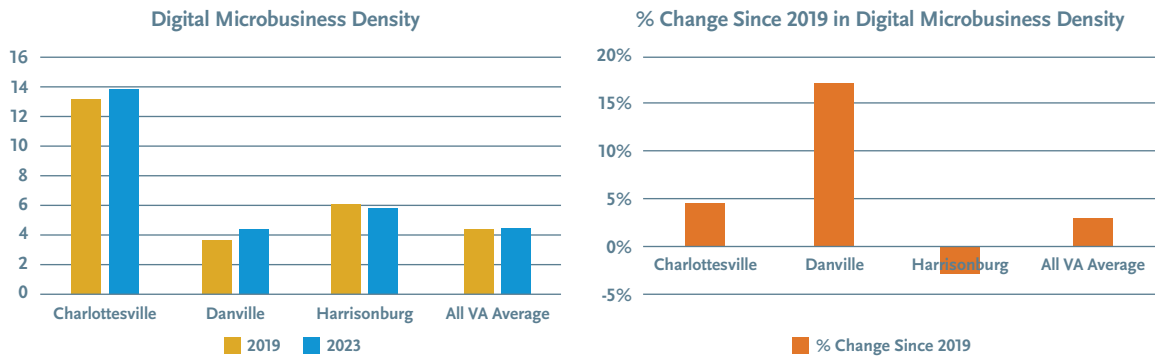
**Fig 4: Aggregate Increases in Charlottesville, VA New Home Values due to Fiber Presence, 2015 – 2023**

Source: CAAR Annual Reports; Fiber Premium Estimates from Wolf and Irwin (2024) and Whitacre (2024)

To quantify the fiber premium for Charlottesville, a 3% premium was applied to the 2015 – 2019 total home values and a 1% premium was applied to the 2020 – 2023 values. This approach resulted in a total of \$35.645 million (FY 2024 dollars) in housing value due to Ting’s presence, most of which accumulated during the earlier period (Figure 4). This is an average of around \$4 million per year.

## Microbusiness Density and Intensity

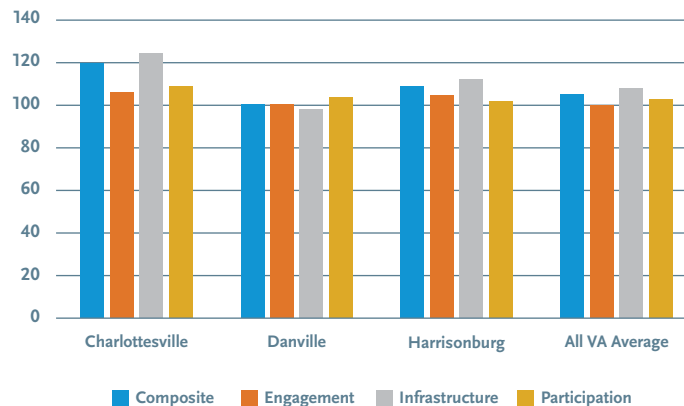
Websites are increasingly important for small businesses and “microbusinesses” (with less than 10 employees) in particular. A recent effort from the domain name provider GoDaddy has attempted to quantify how many online businesses exist for cities and counties and derives a “Microbusiness Density” metric based on the number of active domain names per 100 people (GoDaddy, 2024a). This data begins in 2019, and Figure 5 below demonstrates that Charlottesville has had significantly higher digital microbusiness activity per capita when compared to its peer Virginia cities and the overall Virginia average.



**Fig 5: Digital Microbusiness Density in Charlottesville and Comparison Cities, 2019 and 2023**

Source: GoDaddy Microbusiness Venture data, 2024

GoDaddy has also attempted to develop a “Microbusiness Activity Index (MAI)” with three subcomponents attempting to measure the health of the microbusiness economy (GoDaddy, 2024b). The most recent data (Figure 6; from 2023) shows that Charlottesville outperforms its peer cities, mostly due to the “Infrastructure” portion measuring the “physical infrastructure necessary to access and use the internet.” This metric largely captures local fiber availability.

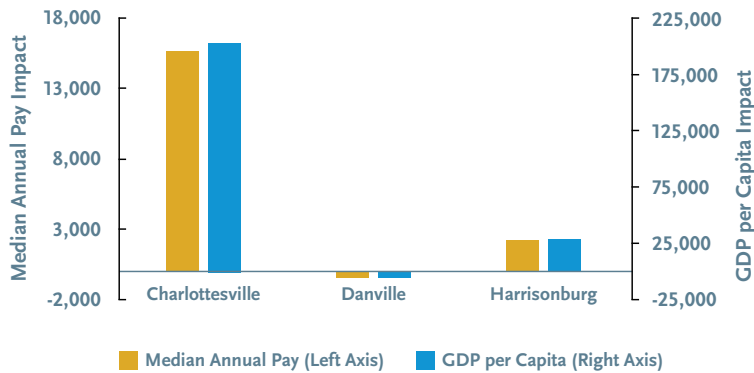


**Fig 6: Digital Microbusiness Activity Index in Charlottesville and Comparison Counties, 2023**

Source: GoDaddy Microbusiness Activity Index, 2024

A 2023 study from Frontier Economics quantified the impact of these digital microbusinesses in the United Kingdom (to our knowledge, no similar analysis exists for U.S. microbusinesses). That analysis found that higher levels of microbusiness density were associated with increases in median annual pay for full-time workers and in overall economic activity (measured by Gross Domestic Product per capita).

Although not directly comparable to the U.S. context, the modeling results suggest that each additional unit increase in digital microbusiness density is linked to a ~\$1,700 increase in median annual pay as of 2021 and a roughly \$22,000 increase in local GDP per capita. Figure 7 demonstrates these annual impacts for Charlottesville and comparison cities. Given that the microbusiness density metric in Charlottesville is over 9 units higher than the Virginia state average, the resulting impacts are over \$15,000 on median annual pay and over \$200,000 for GDP per capita. Even if fiber infrastructure is responsible for only a portion of the higher microbusiness density, it has likely resulted in meaningful increases in pay and economic output.



**Fig 7: Digital Microbusiness Density Impacts on Median Annual Pay and GDP per Capita in Charlottesville and Comparison Counties, 2023**

Source: GoDaddy Microbusiness Activity Index, 2024; Frontier Economics (2023)

Supporting the Microbusiness Activity Index findings, a 2024 U.S. study looked at places across eight states (CO, KS, MO, OK, AK, LA, N.M., TX) that were introduced to faster speed broadband (100+ Mbps) between 2015 and 2020. It found that the availability of higher speeds (250 Mbps or 1 Gbps) encouraged more new business births compared to otherwise-similar areas that only got 100 Mbps service (Biedny et al., 2024).

## CONCLUSIONS

A decade ago, the first miles of fiber were lit in Charlottesville, Virginia, to support key businesses in and around the city. Ting has steadily grown and expanded its footprint in the city, with a current network of 237 miles within the city limits. The network supports and enhances a diverse range of companies, including a thriving start-up ecosystem fostered by the University of Virginia, and fields including biotechnology, defense, and health care.

The deployment of fiber has delivered significant and measurable economic benefits to the city and the surrounding area, creating private sector job growth, increasing housing value, and, perhaps most importantly, creating and supporting the growth of small businesses.

Publicly available data and recent academic research show that fiber has accounted for roughly 35% of Charlottesville's private sector job growth between 2015-2019 and continues to show impressive growth when compared to other major Virginia cities, especially in higher-paying professional, scientific, and technical jobs.

Since fiber arrived, there has been a \$4 million per year average increase in housing value in the Charlottesville area since 2015, leading to higher wealth for homeowners and a larger tax base for the local and state governments. With the proliferation of fiber throughout the city limits and spreading to the surrounding county, the increase in housing value on a percentage basis will not be as dramatic in the future, since fiber will not be a differentiator as nearly all households will have it.

Charlottesville is among the highest-ranking cities in Virginia for Digital Microbusiness Density, a key indicator of small business health. A combination of factors can be attributed to this ranking, but primarily among them is the infrastructure and availability of reliable, high-speed broadband that enables small businesses to make their goods and services available to customers around the world and allows them to tap into labor and services far outside of Charlottesville's geographic boundaries.

Ting's investment into Charlottesville has stimulated the growth of high-speed connectivity within the county, as households outside the city limits sought connectivity to tap into additional educational opportunities, work-from-home, and telemedicine, the latter being a key feature of the University of Virginia health care system based in Charlottesville.

At the end of 2025, Albemarle County expects that all of its households and businesses will be able to access high-speed broadband, a feat that would not be possible without the efforts of Ting as the anchor of connectivity for the region and complemented by efforts from Firefly Fiber Broadband, Brightspeed, and other fiber carriers serving the citizens of the county.

Private-sector investments in fiber as the primary telecommunications infrastructure for Charlottesville will continue to deliver significant dividends to the public and private sectors in the years and decades to come. Fiber is a much more reliable and secure medium than legacy copper pair or coaxial cable and can be easily upgraded to provide increasing speeds, unlocking new and more innovative applications. All other factors being equal, the city of Charlottesville and Albemarle County have a future-proof path to continued economic growth through the availability of fiber.

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## ACKNOWLEDGMENTS

Our thanks to the local and regional Virginia officials who were interviewed for this case study including:

- Helen Cauthen, *President*, Central Virginia Partnership for Economic Development
- Jason Inofuentes, *Broadband Program Manager*, Albemarle County
- Juandiego Wade, *Mayor*, Charlottesville, Va.
- Chris Engel, *Director of Economic Development*, Charlottesville, Va.
- Gary Wood, *President & CEO*, Central Virginia Electric Cooperative and Firefly Fiber Broadband

Private sector assistance provided by:

- Patrick Mulhearn, *Director of Public Policy and New Markets*, Ting Internet
- Kara Chandeysson, *Director of Public Policy, Government Affairs, and Community Engagement*, Ting Internet

## PRODUCTION

Research, analysis, and data illustrations for this paper were conducted and created by Dr. Brian Whitacre, Professor and Jean & Patsy Neustadt Chair, Department of Agricultural Economics, Oklahoma State University.

The contents of this document were collated and organized by Doug Mohney, Director of Content, Connect2 Communications.