



New York State Comptroller
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Availability, Access and Affordability:

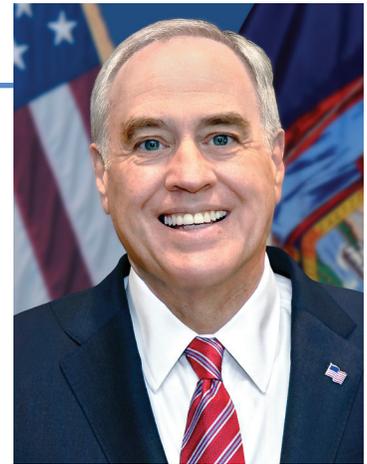
Understanding Broadband Challenges in New York State

September 2021

Message from the Comptroller

September 2021

Three decades ago, home internet access was a cutting-edge innovation for many New York households. Today, reliable high-speed internet is a necessity to effectively work, learn, communicate and play in our society. The COVID-19 pandemic highlighted the importance of having broadband internet connections at home, as stay-at-home orders required millions of New Yorkers to participate in remote learning and work.



Fortunately, New York State has made great progress building broadband infrastructure and ranks second in the country for the share of population with access to basic broadband speeds. However, there are still over 250,000 New Yorkers for whom broadband service is unavailable in their neighborhood, and even more for whom broadband is unavailable in their home or place of business. Deployment to rural areas has lagged in New York and nationwide; however, nearly half of those in the state without broadband available live downstate in New York City, Long Island, and in the Mid-Hudson Valley. New York must do everything it can to advance “last mile” broadband services.

More troubling is that more than 1 million New York households do not have access or a subscription to home broadband as of 2019. Cost is an impediment for many New Yorkers. In 2019, one in three low-income households did not have access to broadband. In addition, large percentages of New Yorkers aged 65 and older and those with low educational attainment do not have broadband subscriptions. These disparities disadvantage these New Yorkers in conducting their studies, working, or applying for employment or government assistance. The disparities also harm communities. Broadband connections are an imperative not only for economic development, but also for equality of opportunity.

As we emerge from the disruptions of the COVID-19 pandemic, we should heed lessons learned over the past 18 months and develop strategies to address these challenges. New federal funding and programs provide a critical opportunity for the State to make broadband available, accessible and affordable to all New Yorkers.

Thomas P. DiNapoli
State Comptroller

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Introduction and Executive Summary

Since entering American homes in the early 1990s, the internet has fundamentally changed the way people work, play, learn, transact business and conduct their lives. In 2021, 85 percent of U.S. adults reported using the internet at least once per day.¹ As commerce, recreation, services and other facets of life have moved online, reliable high-speed internet connections have grown in importance. Research finds that access to broadband internet can have positive effects on individuals and communities.²

The COVID-19 pandemic accelerated trends in home internet use, with large numbers of households engaging in school and work from home. The monthly weighted average of internet data consumed at the end of 2020 was up 75 percent from the start of the pandemic in March 2020.³ In New York State, over 70 percent of adults in households with children in school reported to the U.S. Census Bureau that student classes had shifted to distance learning at least partially by the end of March 2021. Among working households, 41 percent had at least one adult shift their work to a teleworking environment.⁴ It has not been uncommon for all members of a household to be online simultaneously to complete work or schooling, and high-speed connections have been necessary to operate unhindered by delays or disruptions in connectivity.

New York has made great progress in making high-speed connections available across the state. Using the speed standard for basic broadband service, New York currently ranks second among states in the percentage of the population with broadband available at home.⁵ Importantly, at least one provider offering broadband of at least 250/25 Mbps speeds is available to more than 98 percent of New York's population, according to the Federal Communications Commission (FCC).⁶ (See "Broadband Internet 101" for discussion of broadband speed measures.) Nevertheless, in some predominantly rural counties, deployment has lagged, and the share of the population without broadband is as high as 23 percent in these communities.

More revealing is the fact that more than 1 million, or 13.8 percent of, New York households do not have subscriptions to broadband internet, and many of these households earn less than \$20,000 annually. One in three low-income households lacks access. While some use smartphones with robust capabilities to address their needs, cost is commonly cited as a top reason for not having broadband at home. For low-income households, a home broadband subscription might stretch budgets too thin and force trade-offs with other household essentials. As a result, the "digital divide" caused by these access disparities disproportionately impacted low-income households during the pandemic and may generally present a disadvantage for these New Yorkers and their communities.

Recent developments in federal policy — particularly the flexible funding provided under the American Rescue Plan, new federal programs geared at improving affordability for low-income households, and the potential for additional infrastructure dollars earmarked for broadband — provide an important opportunity for New York to craft an ambitious and detailed strategy to:

- Accelerate universal availability of the highest-speed connections in every part of the state, including in rural areas;
- Enhance access for low-income households; and
- Improve affordability, particularly for low-income residents.

Developing this strategy should include: setting concrete goals for each objective; identifying obstacles and barriers; identifying available federal, State, and local funding sources; and establishing interim metrics and a public reporting schedule to ensure accountability for progress.

Broadband Internet 101

Internet speed is defined by download and upload speeds. Download speed is how fast information travels from the internet to the device, such as computer or smartphone. Greater download speeds enable the user to access information faster and with less interruption. Upload speed is how fast information travels from the connected device to the internet. Faster upload speeds enable the user to more quickly put information onto the web, email, or other applications.

The Federal Communications Commission (FCC) defines “broadband” internet speeds as 25 megabits per second (Mbps) of download speed and 3 Mbps of upload speed, often referred to as “25/3.” This speed generally allows for email, web browsing, and streaming a video without interruption and is a speed achieved by most mobile networks; however, modern multi-user demands within a household — say, for multiple simultaneous video-conference calls — require significantly greater bandwidth. Unfortunately, less reliable information is available on higher-speed broadband, which is common at speeds of 250/25 Mbps and even 1000 Mbps in some limited areas. Therefore, this report follows the FCC benchmark and uses a “25/3” standard for broadband, unless otherwise noted.

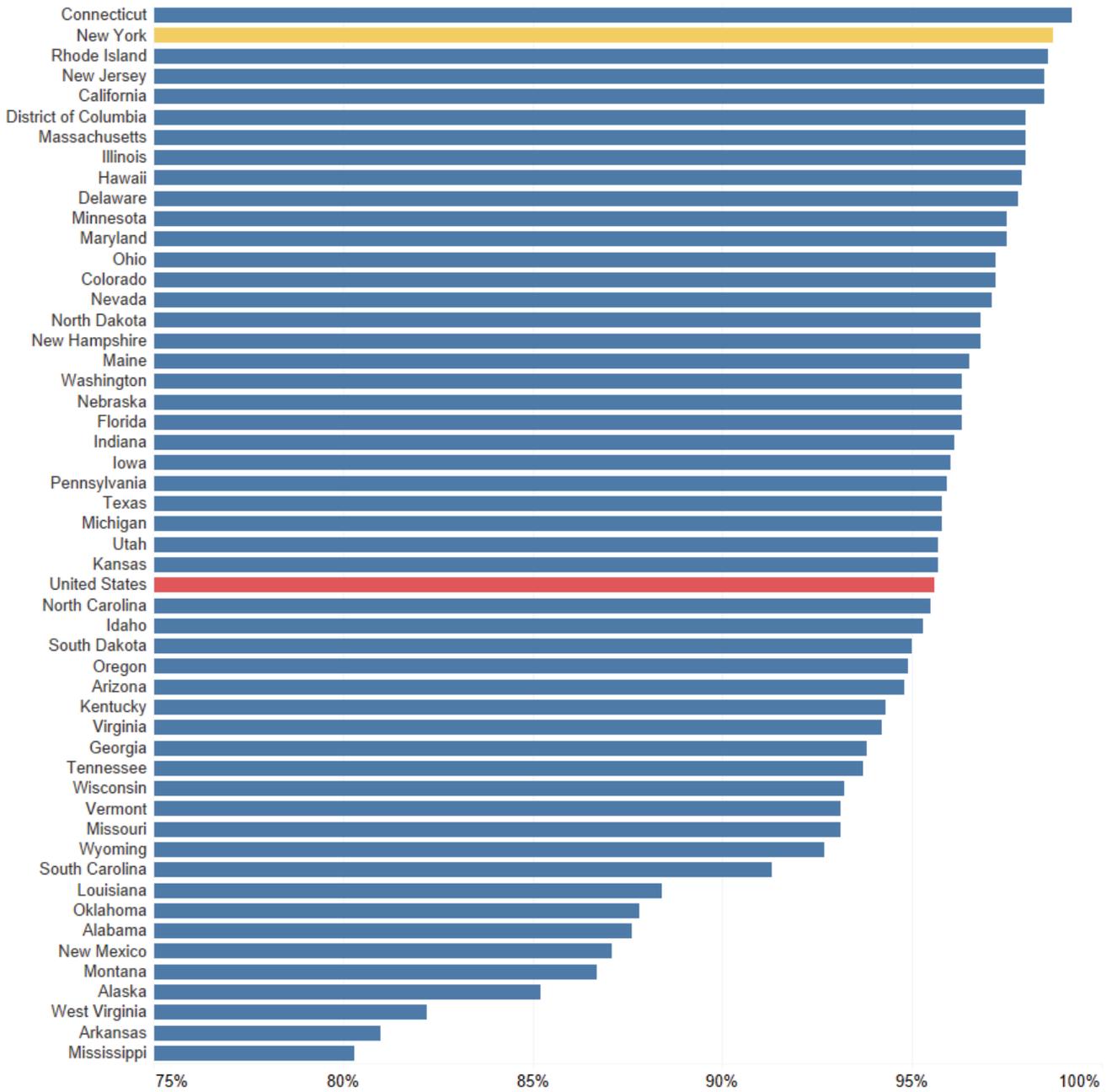
Broadband Availability Across New York State

While the federal government provides funding for state infrastructure projects like road and bridge construction and repair, deployment of broadband infrastructure has largely been the responsibility of states and the private sector.

New York State did not construct a public broadband system, but instead solicited applications to invest in broadband infrastructure projects from private providers and organizations on a competitive basis. The regulatory function of overseeing broadband and service providers is the responsibility of the New York State Public Service Commission. The Empire State Development Corporation oversees the State's Broadband Program Office, which administers the funds allocated for expanding the infrastructure.

According to the FCC, New York has done well in deploying broadband infrastructure at the speed of 25/3 Mbps. As shown in Figure 1, in 2019 New York ranked second in the country with 98.7 percent of the population in areas "served" with broadband compared to a national average of 95.6 percent. In all but nine states, broadband is available to more than 90 percent of the population. The FCC also reports that at least one provider offering high-speed broadband of at least 250/25 Mbps speeds is available to more than 98 percent of New York's population as of June 2020.⁷

FIGURE 1
Percentage of Population with Broadband Available, by State, 2019



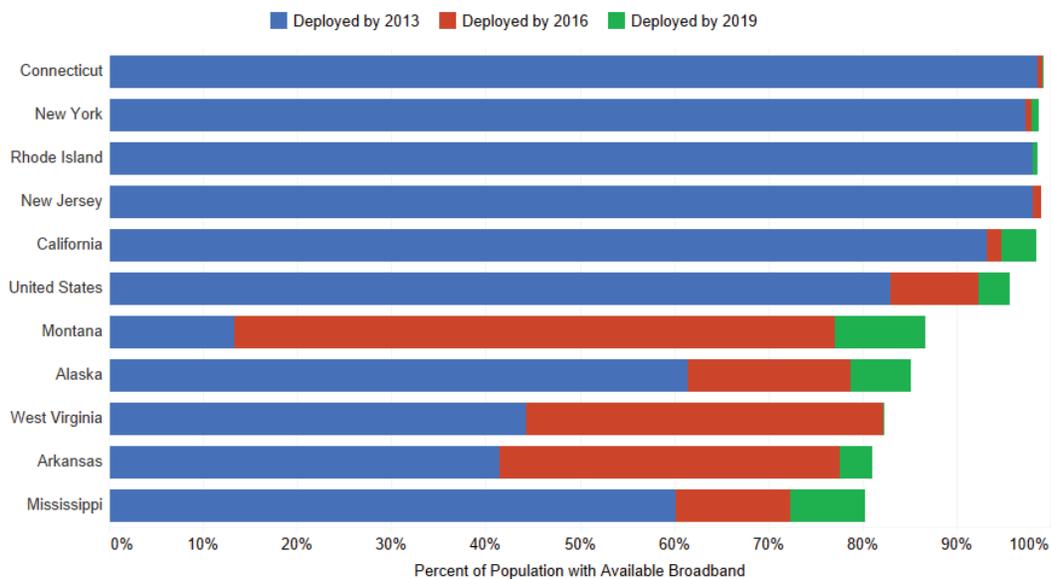
Note: Based on a 25/3 Mbps standard relied on by the Federal Communications Commission.

Source: Federal Communications Commission, *Fourteenth Broadband Deployment Report*, January 19, 2021

The FCC considers an area “served” by broadband if an internet service provider reports that it has made broadband available to a particular census block, even if service is not necessarily available to every location or dwelling on that block. This is a significant limitation. As the FCC notes, this methodology “could overstate the coverage (availability) experienced by some consumers, especially in large or irregularly-shaped census blocks. However, these data nonetheless remain the best and most granular data available.”⁸

In New York and in other leading states, most broadband deployment occurred before 2013, as shown in Figure 2. While broadband availability has lagged in rural areas nationwide, these areas have made significant gains in recent years. According to the FCC, 61.5 percent of the population in rural areas had broadband available in 2015 compared to 96.7 percent in urban areas; by 2019, those figures increased to 82.7 percent for rural areas and 98.8 percent for urban areas.⁹ Figure 2 shows that rural states such as Mississippi, Arkansas, and West Virginia that lagged in deployment have made significant gains since 2013.

FIGURE 2
States with Highest and Lowest Percentages of Population with Broadband Availability, 2013-2019

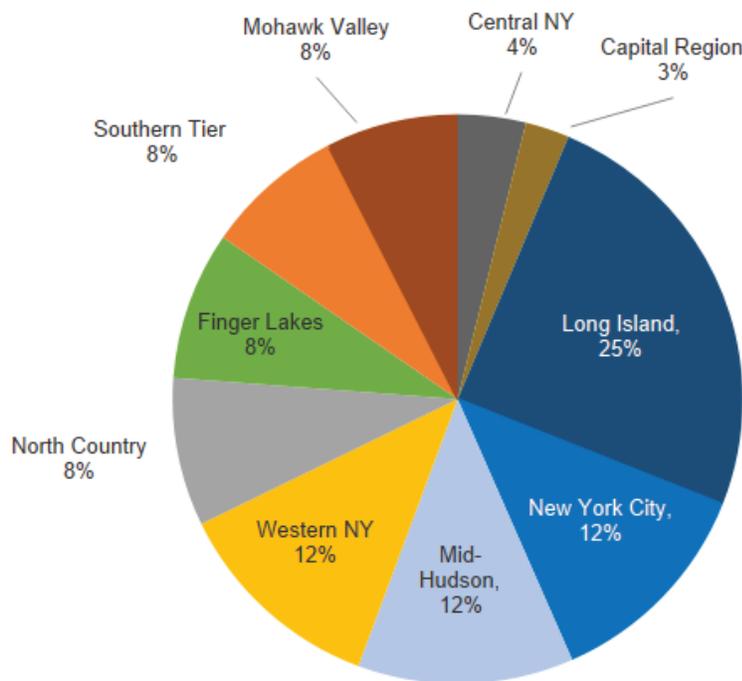


Notes: Based on a 25/3 Mbps standard relied on by the Federal Communications Commission. Figures for 2013 for Rhode Island restated based on 2016 figures.

Sources: Federal Communications Commission, Broadband Deployment and Progress Reports, 2015, 2018, and 2021

According to the FCC, New York’s successful deployment has reduced the number of New Yorkers without available broadband from a reported 518,000 to 253,000 people between 2013 and 2019.¹⁰ As shown in Figure 3, approximately half of those without broadband available are downstate: 25 percent are from Long Island, 12 percent from New York City and 12 percent from the Mid-Hudson Valley. The Capital Region has the lowest number of people in the state without broadband available at 3 percent, approximately 6,000 people.

FIGURE 3
Distribution of People Without Broadband Available in New York State, by Region, 2019



Note: Based on a 25/3 Mbps standard relied on by the Federal Communications Commission.

Source: Office of the State Comptroller analysis of Federal Communications Commission, Fourteenth Broadband Deployment Report, January 19, 2021

According to the FCC, approximately 1.3 percent of New York’s population did not have broadband available in 2019. Regionally, this varied from a high of 5.0 percent in the North Country to a low of 0.4 percent in New York City. As shown in Figure 4, availability rates were lowest in regions with greater shares of population living in areas classified as rural: the North Country, the Southern Tier, and the Mohawk Valley.

FIGURE 4
Broadband Availability Rates by New York State Region, 2019

| NYS Region | Population | Population Without Broadband | Percentage of Population Without Broadband | Percentage of Population Living in an Area Classified as Rural |
|----------------|------------|------------------------------|--|--|
| North Country | 415,678 | 20,914 | 5.0% | 64.2% |
| Mohawk Valley | 483,086 | 18,569 | 3.8% | 47.2% |
| Southern Tier | 628,855 | 19,569 | 3.1% | 47.9% |
| Western NY | 1,377,094 | 30,041 | 2.2% | 20.2% |
| Long Island | 2,833,525 | 61,231 | 2.2% | 1.5% |
| Finger Lakes | 1,200,799 | 20,877 | 1.7% | 26.5% |
| Mid-Hudson | 2,323,774 | 30,349 | 1.3% | 15.5% |
| Central NY | 772,749 | 9,549 | 1.2% | 31.2% |
| Capital Region | 1,081,179 | 6,198 | 0.6% | 28.4% |
| New York City | 7,860,674 | 30,762 | 0.4% | 0.0% |

Note: Based on a 25/3 Mbps standard relied on by the Federal Communications Commission.

Source: Office of the State Comptroller analysis of Federal Communications Commission, *Fourteenth Broadband Deployment Report*, January 19, 2021

The regional perspective masks considerable variation among counties. Figure 5 highlights the New York counties where more than 5 percent of people do not have broadband available.¹¹ In all of these counties, more than 50 percent of the population live in an area classified as rural. Appendix A provides availability rates for all counties in New York.

FIGURE 5
New York State Counties with More than Five Percent of Population Lacking Available Broadband, 2019

| County | Population | Population Without Broadband | Percentage of Population Without Broadband | Percentage of Population Living in an Area Classified as Rural |
|-------------|------------|------------------------------|--|--|
| Allegany | 46,091 | 10,773 | 23.4% | 82.0% |
| Cattaraugus | 76,117 | 13,625 | 17.9% | 63.0% |
| Hamilton | 4,416 | 649 | 14.7% | 100.0% |
| Wyoming | 39,859 | 5,819 | 14.6% | 67.4% |
| Lewis | 26,296 | 3,813 | 14.5% | 87.9% |
| Steuben | 95,379 | 9,538 | 10.0% | 61.8% |
| Livingston | 62,914 | 5,851 | 9.3% | 55.7% |
| Otsego | 59,493 | 4,938 | 8.3% | 73.4% |
| Yates | 24,913 | 1,669 | 6.7% | 72.3% |
| Clinton | 80,485 | 5,232 | 6.5% | 64.5% |
| Herkimer | 61,319 | 3,924 | 6.4% | 53.9% |
| Essex | 36,885 | 2,250 | 6.1% | 76.3% |
| Madison | 70,940 | 4,115 | 5.8% | 59.7% |

Note: Based on a 25/3 Mbps standard relied on by the Federal Communications Commission.

Source: Federal Communications Commission, *Fourteenth Broadband Deployment Report*, January 19, 2021

New Yorkers' Access to Broadband

Broadband *availability* indicates a geographic area has been wired for that service. *Access to broadband* indicates that a household has a subscription for broadband services. While many New Yorkers access broadband through an employer, library or school, the data capture only broadband subscriptions that allow for home use, including cellular service.

Research has consistently demonstrated broadband internet offers benefits to individuals, communities, and larger economies; however, as researchers at Penn State University noted in a report for the National Science Foundation:

Broadband is a net positive good, but its effects are neither uniform nor unqualified.... Individuals, communities, businesses and economic sectors differ in their ability to benefit from broadband, depending on a number of factors related to individual/community characteristics and environmental factors.¹²

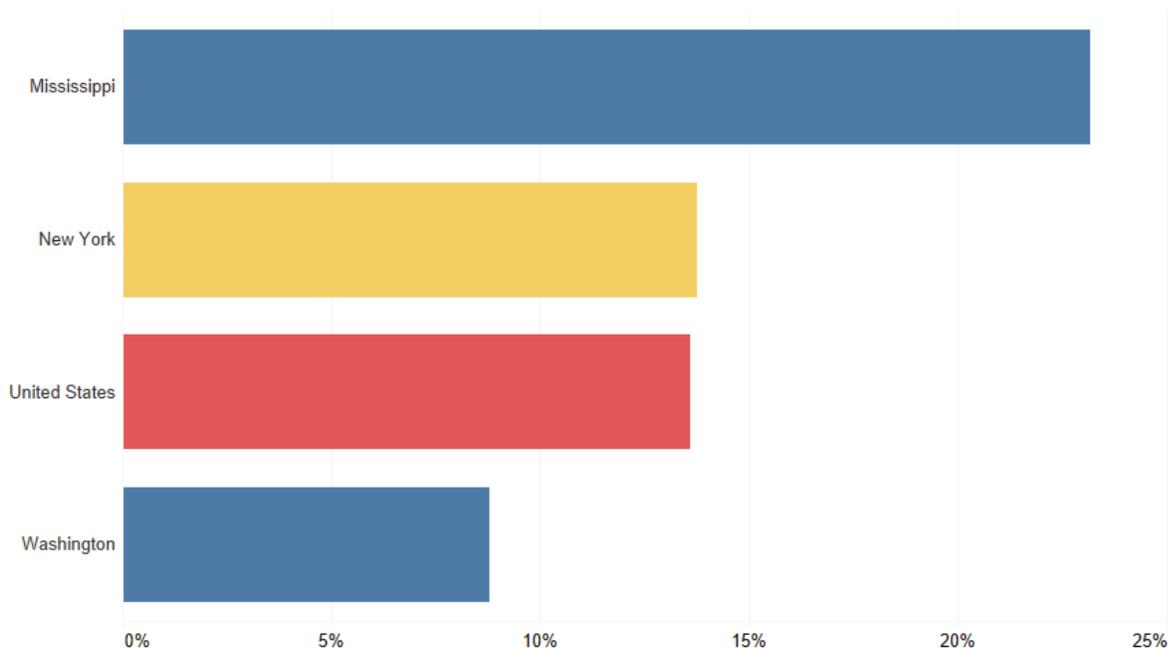
In New York, the gap between availability and access is significant: While only 250,000 *people* do not have broadband available in their neighborhoods, more than 1 million *households*, or 13.8 percent, did not have access or a subscription to broadband in their homes as of 2019, according to estimates from the U.S. Census Bureau.¹³ In New York, those without access tend to have less than high school education; have income less than \$20,000; and/or are age 65 and older.

Furthermore, few households have access to the higher-speed connections that were proven essential during the pandemic. While 86.2 percent of New York households have access to broadband at speeds of at least 25/3 Mbps, only 13.5 percent have home broadband subscriptions of at least 250/25 Mbps.

National Benchmarking

The share of New York households lacking access, 13.8 percent, is nearly on par with the national average of 13.6 percent.¹⁴ New York ranks 24th among states in share of households without access. As shown in Figure 6, Mississippi has the greatest share of households without access (23.2 percent) while Washington ranks the best, with only 8.8 percent of households lacking access.

FIGURE 6
Share of Households Lacking Access to Broadband, Selected States and Nation, 2019



Source: U.S. Census Bureau, American Community Survey, 2019

Between 2015 and 2019, the U.S. Census Bureau reported modest growth in New York households with broadband subscriptions. Compared to national growth of 9.7 percentage points, New York household broadband subscriptions grew by 8.4 percentage points from 77.8 percent to 86.2 percent.

While New York is in the middle of the pack nationwide for access, it ranks well in terms of higher-speed subscriptions. According to the FCC, among large states, New York has the greatest share of households with home broadband subscriptions of at least 250/25 Mbps. The FCC collects data on subscriptions from internet service providers, and calculates an “adoption rate” by dividing these subscriptions by the number of households living in an area where broadband has been deployed at various speeds.¹⁵ New York subscription rates at 250/25 Mbps are 13.5 percent, almost double the median state, North Carolina, at 7.3 percent. Among neighboring states, subscription rates for high-speed 250/25 Mbps service are higher only in New Jersey, at 20.2 percent.

FIGURE 7
New York Compared to Other Large and Nearby States,
Adoption Rates by Broadband Speed, 2019

| State | 50/5 Mbps | 100/10 Mbps | 250/25 Mbps |
|------------------------------------|-----------|-------------|-------------|
| Large States | | | |
| New York | 74.3% | 68.2% | 13.5% |
| Texas | 62.1% | 50.5% | 12.5% |
| California | 70.1% | 51.3% | 6.5% |
| Florida | 75.9% | 63.2% | 6.0% |
| Illinois | 57.8% | 46.1% | 3.4% |
| Median State at 250/25 Mbps | | | |
| North Carolina | 66.1% | 60.2% | 7.3% |
| Near New York State | | | |
| New Jersey | 85.6% | 64.3% | 20.2% |
| Massachusetts | 85.2% | 53.0% | 10.7% |
| Pennsylvania | 68.8% | 43.5% | 9.7% |
| Connecticut | 67.1% | 48.4% | 8.2% |

Notes: Adoption rates are the number of residential subscriptions divided by the number of households in the area where the FCC’s deployment data indicate that fixed terrestrial services of at least the designated speed are deployed. North Carolina is the median state at speeds of 250/25 Mbps; at speeds of 100/10 Mbps and 50/5 Mbps, median states are Michigan (49.2 percent) and Georgia (60.1 percent), respectively.

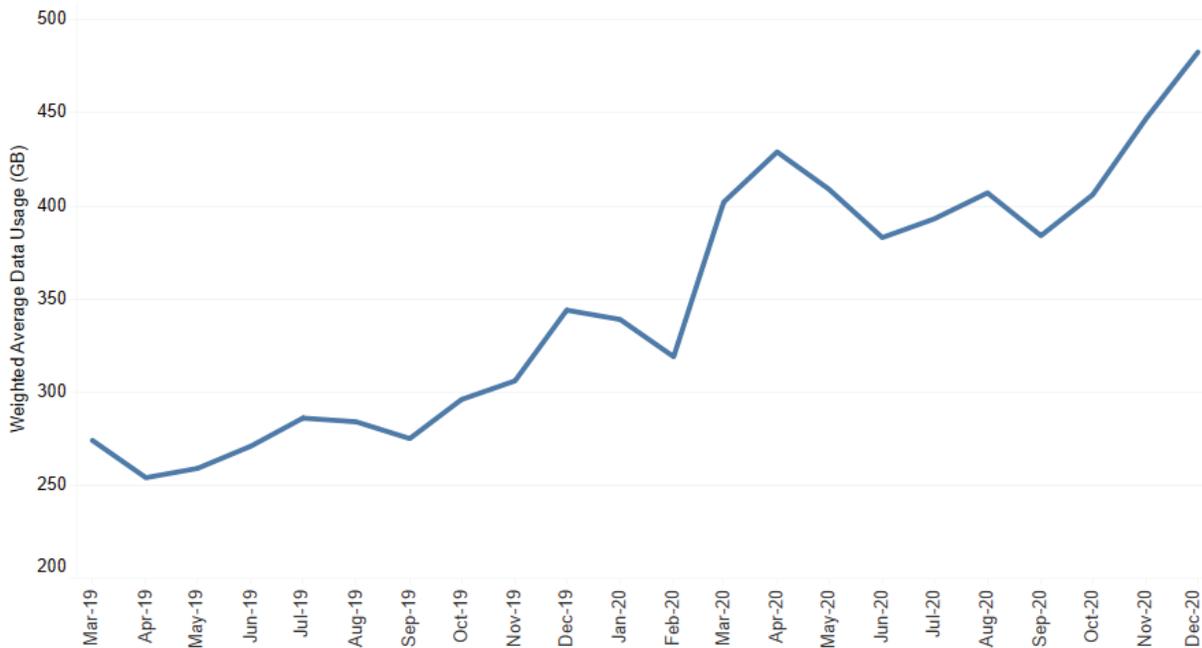
Source: Federal Communications Commission, *Fourteenth Broadband Deployment Report*, January 19, 2021

As shown in Figure 7, subscription rates decline as internet speeds increase; one reason is the price of service tends to increase with the speed of service. Another reason is that not all neighborhoods may have the fastest speeds available.

High-speed broadband has become increasingly important. As noted in the FCC report, even prior to the pandemic, there has been “increased demand for data-intensive services such as telework platforms, distance learning, telehealth and video conferences.”¹⁶ The COVID-19 pandemic has crystalized the demand for home high-speed broadband, as stay-at-home orders have resulted in multiple family members uploading and downloading large quantities of data simultaneously within a household. As shown in Figure 8, weighted average broadband data usage increased sharply in March 2020 to 400 gigabytes (GB) per month, a 26 percent increase from the same month one year prior. It remained above an average of 380 GB through the summer of 2020, and increased sharply again in September 2020 with the start of a new school year. In December 2020, usage grew to more than 480 GB per month on average — an increase of 51 percent from the pre-pandemic baseline in February 2020.¹⁷ Some households upgraded their subscriptions to accommodate increased

demands within their homes during this time; however, other New Yorkers may not have had that option due to a lack of availability of higher-speed connections or due to affordability concerns.

FIGURE 8
Broadband Data Usage by Month
 March 2019 – December 2020

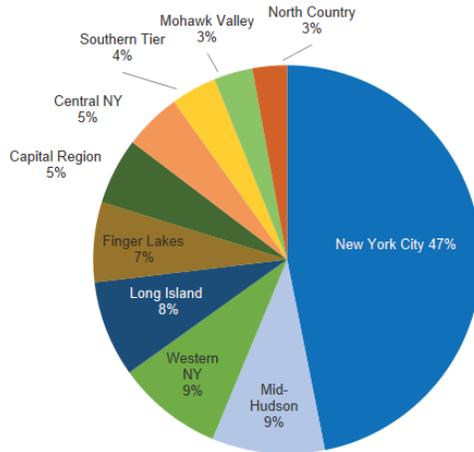


Source: OpenVault, Broadband Insights Report, Q4 2020

Broadband Access by New York State Region

As shown in Figure 9, almost half of all households without broadband access are in New York City. While the FCC reports only 0.4 percent of New York City residents, or approximately 31,000 people, do not have broadband available, more than 513,800 households are without access. In contrast, the availability/access gap is far narrower in Long Island: about 61,200 Long Island residents do not have broadband available and 87,700 households do not have access.

FIGURE 9
Distribution of New York Households Without Broadband Access, by Region, 2019



Source: Office of the State Comptroller analysis of U.S. Census Bureau, American Community Survey, 2019

In 2019, the share of households without broadband access varied from a high of 19.3 percent in the North Country to a low of 9.2 percent in Long Island, as shown in Figure 10. Appendix A shows that more than one in five households did not have access to broadband in 13 counties. The median share of households without broadband access across counties is 16.6 percent.

FIGURE 10
Broadband Access Rates by New York State Region, 2019

| NYS Region | Total Households | Households Without Broadband Access | Share of Households Without Broadband Access |
|----------------|------------------|-------------------------------------|--|
| North Country | 162,690 | 31,387 | 19.3% |
| Mohawk Valley | 194,408 | 35,317 | 18.2% |
| Central NY | 305,678 | 52,369 | 17.1% |
| Southern Tier | 251,445 | 41,790 | 16.6% |
| Western NY | 594,617 | 96,826 | 16.3% |
| New York City | 3,211,033 | 513,812 | 16.0% |
| Finger Lakes | 491,662 | 72,893 | 14.8% |
| Capital Region | 445,346 | 60,586 | 13.6% |
| Mid-Hudson | 831,316 | 103,056 | 12.4% |
| Long Island | 949,542 | 87,730 | 9.2% |

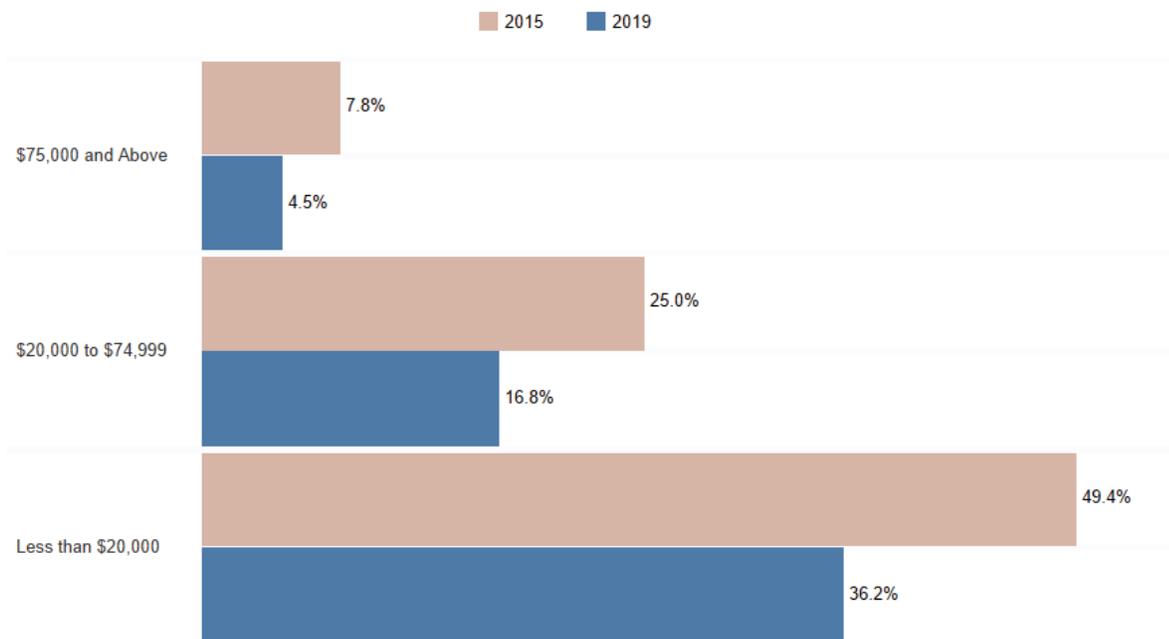
Source: Office of the State Comptroller analysis of U.S. Census Bureau, American Community Survey, 2019

Broadband Access by Demographic Indicators

Access to home broadband differs according to age, educational attainment, race/ethnicity, and household income. Access rates improve as income improves, leading to a wide disparity between households with income less than \$20,000 and those with income greater than \$75,000 — 36.2 percent lacked access compared to 4.5 percent, respectively, in 2019. Access rates improved across all income levels between 2015 and 2019, but gains were greatest for households earning less than \$20,000, as shown in Figure 11.

1 in 3
low-income
households lacked
access to home
broadband
in 2019

FIGURE 11
Share of New York Households Without Access to Broadband,
by Household Income, 2015 and 2019



Source: U.S. Census Bureau, American Community Survey, 2019

A recent Census report notes that low-income households are more likely to access broadband services using a smartphone rather than a fixed home subscription that allows for connections to a computer or other device. In 2018, 11 percent of households with annual income less than \$25,000 accessed internet through a smartphone alone — compared to about 1 percent of households making \$150,000 or more.¹⁸ Today smartphones offer robust capabilities to accomplish many common and important tasks, such as banking, shopping, and videoconferencing, and may be sufficient for some users' needs; indeed, the share of internet traffic from mobile devices has increased from 6 percent 10 years ago to 48 percent in 2021, comparable to the share from desktop computers.¹⁹ However, smartphones are not suitable for activities that require sustained attention and interaction, such as remote instruction or teleworking, nor for transmittal of large amounts of data.

Smartphones vs. Home Broadband

A 2021 survey by the Pew Research Center estimates that 85 percent of U.S. adults owned a smartphone compared to 77 percent with broadband subscriptions and 78 percent with a desktop or laptop computer. The same survey finds 15 percent of U.S. adults are “smartphone-only” internet users (with no home broadband), and the most smartphone-dependent tend to be users under the age of 30 (28 percent of that group) and those with income less than \$30,000 (27 percent). Interestingly, the survey found 71 percent of non-broadband users say they are not interested in having home broadband. The three most commonly cited reasons were: access to internet outside the home (46 percent); robust smartphone capabilities that meet online user needs (45 percent); and subscription costs (45 percent). More than a quarter of respondents cited costs (subscription and computer) as the most important reason for not having broadband at home.

Source: Andrew Perrin, “Mobile Technology and Home Broadband 2021,” Pew Research Center, June 3, 2021

FIGURE 12
Share of New Yorkers Without Access to Broadband by Age, Educational Attainment, and Race/Ethnicity, 2015 and 2019

| | 2015 | 2019 | Change in Share |
|---|-------|-------|-----------------|
| Age | | | |
| Under 18 Years | 15.8% | 8.7% | -7.1% |
| 18 to 64 Years | 14.7% | 8.0% | -6.7% |
| 65 Years and Older | 34.1% | 23.8% | -10.3% |
| Educational Attainment | | | |
| Less than High School | 38.0% | 26.7% | -11.3% |
| High School Degree, Some College, or Associate's Degree | 21.2% | 13.6% | -7.6% |
| Bachelor's Degree or Higher | 8.5% | 4.9% | -3.6% |
| Race/Ethnicity | | | |
| White | 16.1% | 10.4% | -5.7% |
| Black/African American | 24.6% | 13.9% | -10.7% |
| Asian | 10.6% | 7.2% | -3.4% |
| Hispanic or Latino (any race) | 22.8% | 11.7% | -11.1% |

Source: U.S. Census Bureau, American Community Survey, 2015 and 2019

New Yorkers who lack access also tend to be older or to have lower educational attainment. As shown in Figure 12, New Yorkers age 65 and over lack access at almost three times the rate of New Yorkers ages 18 to 64. Nearly one-quarter of older New Yorkers lacked access in 2019, compared to 8.0 percent of those ages 18 to 64 and 8.7 percent of those under 18. However, access improved more for older New Yorkers between 2015 and 2019 than for those in other age groups.

Almost 5 percent of highly educated New Yorkers lacked access in 2019 compared to 26.7 percent of New Yorkers with less than a high school education; however, access rates improved by 11.4 percent for the latter group between 2015 and 2019.

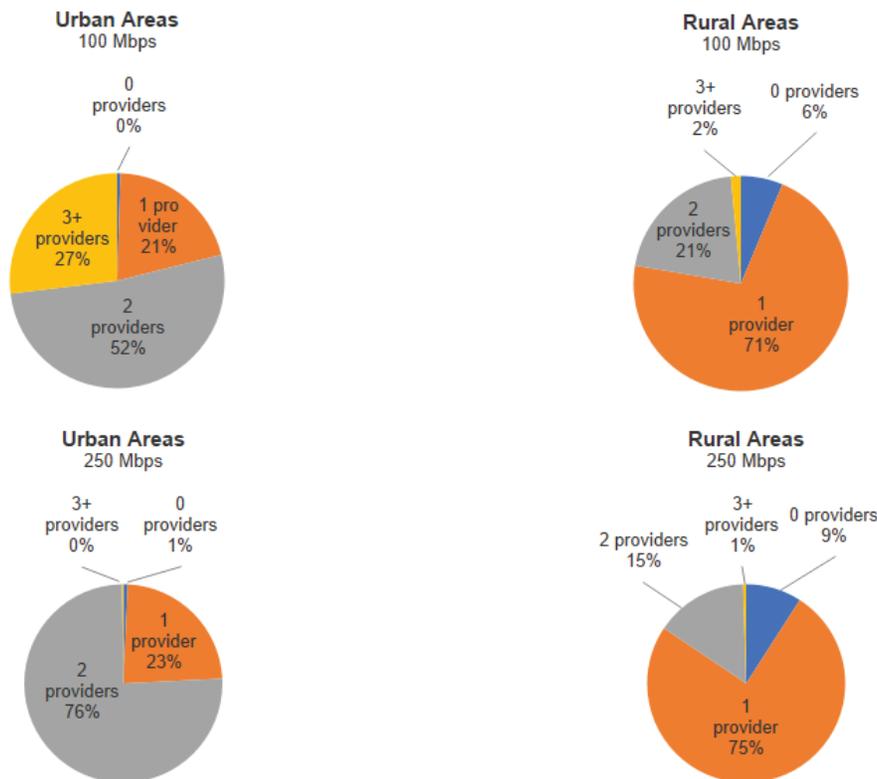
Access rates varied moderately by race and ethnicity in 2019: 7.2 percent of Asians, 10.4 percent of Whites, 11.7 percent of Hispanics, and 13.9 percent of Blacks lacked access in 2019. Access rates improved significantly for Blacks and Hispanics between 2015 and 2019, bringing access rates for these households closer to those of Asian and White New Yorkers.

Given the outsized share of New York City residents without access, Appendix B presents data on access in New York City broken down by demographic indicators and by borough.

Costs of Broadband Access

Prior research has found broadband availability and access rates are driven by factors such as geographical disparities, deployment costs, provider competition, market demand, and socioeconomic factors.²⁰ The experience in New York is consistent with these general findings: deployment lags in rural regions and low-income households suffer from low access rates. Demand in less-dense rural regions may not generate a sufficient revenue stream to support deployment costs from the private sector, while low incomes may make the price of a home broadband subscription unattainable.

FIGURE 13
Share of Urban and Rural New York Population with Broadband Available at 100 Mbps and 250 Mbps by Number of Service Providers, June 2020



Source: Federal Communications Commission, Fixed Broadband Deployment Area Comparison, June 2020 dataset

While public data on deployment costs are not available, the FCC reports on providers serving a given area and the broadband speeds they make available.²¹ Typically, competition is considered robust if there are at least three providers or competitors for a service; robust competition helps keep prices lower for consumers. FCC data show that almost the entire state population has a choice of three providers for minimum broadband service of 25/3 Mbps; however, for faster speeds, fewer options are available. As of June 2020, 23.8 percent of New Yorkers had three available providers offering 100/10 Mbps speeds, and 13.1 percent had three providers offering 250/25 Mbps speeds.²²

As shown in Figure 13, competition is more robust in urban areas. At 100 Mbps download speeds, 79 percent of New Yorkers in urban communities had a choice of at least two broadband providers; in contrast, only one provider was available to 71 percent of New Yorkers in rural communities.

No comprehensive standardized dataset is available on broadband costs to consumers throughout the state or nationally. Similarly, while broadband is becoming a necessity in modern life, there is no widely acceptable benchmark for what constitutes affordable broadband service in the way that, for example, 30 percent of household income is considered an acceptable standard for housing costs and used by the U.S. Department of Housing and Urban Development to set housing policies.

A 2020 survey of 350,000 internet customers across the country conducted by a commercial enterprise found average monthly broadband costs in New York of almost \$47, for an annual cost of \$563. New York ranked fourth lowest in the nation. Vermont ranked the highest at \$82 per month and Arkansas ranked the lowest at \$35 per month, as shown in Figure 14.²³

FIGURE 14
States with the Highest and Lowest Average Monthly Broadband Prices, 2020

| Lowest Cost States | Average Monthly Price | Highest Cost States | Average Monthly Price |
|--------------------|-----------------------|---------------------|-----------------------|
| Arkansas | \$35.00 | Vermont | \$82.00 |
| California | \$45.43 | Delaware | \$76.36 |
| South Carolina | \$45.47 | Maryland | \$70.76 |
| New York | \$46.94 | New Hampshire | \$70.71 |
| Kentucky | \$46.97 | Maine | \$65.62 |
| United States | \$48.25 | | |

Source: Data provided to the Office of the State Comptroller from Highspeedinternet.com

These costs are hard to interpret for several reasons: they are influenced by state and local policies, the number of providers, speeds offered, take-up rates and subscriptions according to speed of service, and other factors. In other words, it is possible states with seemingly high average monthly costs may be providing higher speeds of service and have robust competition that makes prices for those services comparatively lower, essentially offering consumers a higher quality of service for each dollar spent. Similarly, low prices may reflect subscriptions to predominantly low-speed services.

In December 2020, the U.S. Bureau of Labor Statistics reported that the average annual expenditures in 2019 for a four-person household earning between \$15,000 and \$29,999 were about \$38,000. The gap between earnings and expenses is filled by public assistance programs, tax credits, gifts and loans. For these households, approximately \$22,000 annually — almost the entirety of or more than household earnings — is spent on food and housing, including utility costs.²⁴ At an average annual cost of \$563, broadband services would constitute less than 2 percent of household expenses; however, households may have to sacrifice other essential needs to pay for broadband service.

Policies to Support Broadband

By the late 1990s broadband was becoming available in the residential market through dedicated subscriber lines (DSL) or cable lines. Decisions on deployment were largely driven by market conditions and the ability of telephone and cable providers to recoup large capital investments. A 2007 report by the New York State Department of Public Service concluded the uneven economics were resulting in a “digital divide” between urban and rural parts of New York State, and stated: “Should it be determined that the state has an interest in all New Yorkers having affordable access to broadband, reliance on markets may not be enough.”²⁵

State policy goals subsequently focused on improving the strong but unequal deployment that resulted from the market-driven approach. In 2007, Governor Eliot Spitzer formed the New York State Council for Universal Broadband, an advisory group of public, private and academic partners charged with issuing recommendations to achieve universal broadband access, among other objectives. The goals were to achieve 1/1 Mbps speeds statewide and 20/20 Mbps in metropolitan areas by 2010, and 20 Mbps speeds statewide and 100 Mbps in metro areas by 2015.

The Universal Broadband Program Management Office (PMO) was established to administer a new \$5 million Universal Broadband Access Grant Program to expand broadband access and be a single point of contact for the state’s broadband development and deployment efforts.²⁶ Between 2008 and 2011, PMO allocated funding to nine project sponsors across the state, including local governments, internet service providers, nonprofit associations and the New York State Library.²⁷

These efforts were further bolstered by investments made by the 2009 federal American Recovery and Reinvestment Act (ARRA) to expand availability and adoption of broadband. PMO was renamed the New York State Broadband Program Office (BPO) and placed under the Empire State Development Corporation, reflecting in part the importance of broadband to economic competitiveness. BPO facilitated the submission of 263 statewide grant applications which resulted in \$160 million in ARRA funding being awarded directly to New York State project sponsors.²⁸ These projects included grants intended to extend deployment by building out new miles of fiber optic cable, in addition to purchasing equipment and connecting underserved communities. The projects are listed in Appendix C.

With greater resources provided by ARRA, Governor David Paterson issued Executive Order 22 (EO22) in June 2009 establishing the Broadband Development and Deployment Council (BDDC) to replace the Universal Broadband Council. This new Council comprised representatives of State agencies and was intended to improve coordination in order to leverage federal resources, to better understand weaknesses in broadband deployment, and to develop strategies to boost both availability and access statewide and in

distressed communities. EO22 also recognized the importance of broadband to the State’s economy and competitiveness.²⁹ BDDC subsequently released a report in May 2011 which highlighted substantial disparities in access for economically and socially disadvantaged New Yorkers.³⁰

State policies shifted to closing the digital divide and improving available speeds. Between 2011 and 2013, \$19 million was awarded via the Regional Economic Development Councils to 11 projects, and an additional \$25 million was awarded under a Connect NY grant program to 18 projects.³¹ In 2015, the New NY Broadband Program (NNYBP) was launched to allocate \$500 million to incentivize the expansion of broadband access in unserved and underserved areas with the goal of providing 100 Mbps service in most areas and at least 25 Mbps service in remote areas.³² Awards of up to 80 percent of the projected capital project costs were granted to internet service providers offering the lowest bids to upgrade existing services or provide new services to primarily rural geographic areas.

NNYBP provided funding from 2016 to 2018. In January 2017, \$170 million in federal funds provided under the Connect America Funding program were distributed through the program, for a total of \$670 million authorized. As shown in Figure 15, almost \$500 million in State grants were made with total investment of nearly \$735 million and more than 264,000 locations (commercial and residential) served. The North Country and the Southern Tier, predominantly rural regions, received the greatest amounts of State funding. As demonstrated earlier in this report, both availability and access improved during this period; however, it is unclear to what extent gains were made in increased speeds.

FIGURE 15
New NY Broadband Program: Grants, Investment, and Locations Served

| Region | State Grants | Total Investment | Locations Served |
|----------------|----------------------|----------------------|------------------|
| North Country | \$108,141,512 | \$155,916,206 | 53,413 |
| Southern Tier | 96,324,000 | 137,327,605 | 54,285 |
| Capital Region | 96,304,398 | 136,948,887 | 62,648 |
| Western NY | 79,608,128 | 116,278,234 | 36,959 |
| Mohawk Valley | 60,418,225 | 104,805,085 | 22,596 |
| Central NY | 42,239,989 | 62,888,875 | 15,115 |
| Finger Lakes | 9,953,357 | 13,970,875 | 12,138 |
| Mid-Hudson | 3,114,729 | 5,236,657 | 6,175 |
| Long Island | 983,989 | 1,250,828 | 1,087 |
| New York City | 0 | 0 | 0 |
| TOTAL | \$497,088,327 | \$734,623,252 | 264,216 |

Source: NY Broadband Program Office

In addition to direct public subsidies, the State also attempted to use its regulatory powers to achieve broadband goals. In 2016, the Public Service Commission (PSC) approved the merger of two major telecommunications companies, Charter Communications and Time Warner Cable, a deal expected to impact 2.6 million customers across New York State. The merger was approved with several conditions intended to improve availability, access and affordability, including:

- Expansion of existing network to 145,000 underserved households and businesses, phased in with 36,250 new premises each year until May 2020;
- Speed increases to 100 Mbps statewide by 2018 and 300 Mbps by 2019; and
- Free internet to 50 community centers statewide and reduced-price services to 700,000 low-income New Yorkers. After the merger, the PSC mandated the program provide minimum speeds of 30 Mbps for \$15 per month.³³

An audit by the Office of the State Comptroller found that Charter did not meet several of its obligations, including provisions regarding free and affordable internet and network speed increases.³⁴ After a series of rulings that levied multi-million-dollar fines, the PSC revoked approval of the merger in 2018, and ultimately reached settlement terms with the company in 2019 that continued to require the expansion to 145,000 premises by September 30, 2021.³⁵

State action taken around this time may also have discouraged broadband expansion. As part of the State Fiscal Year (SFY) 2019-20 Enacted Budget, the Department of Transportation was authorized to levy fees on telecommunications companies using State highway rights-of-way for fiber optic cables. Projects funded by State grants through the New NY Broadband Program were exempted. The fees were opposed by providers; according to news reports, some abandoned plans for network expansion.³⁶ Several members of the Legislature from the North Country expressed concerns: “This fee does nothing more than disincentivize the expansion of rural broadband and is nothing more than a roadblock for rural broadband expansion.”³⁷ Given the difficult market dynamics of wiring rural areas, the fees may have added to the challenge.

Pandemic-Related Policies

Despite gains made in the last 20 years, the COVID-19 pandemic highlighted how the digital divide continues to impact New Yorkers without access to broadband at home; the stay-at-home orders meant that points of access to broadband in common or community settings, such as the library, school, or workplace, were rendered unavailable. As a recent UCLA study using Census data revealed, low-income households were disproportionately impacted by the switch to remote and hybrid schooling. Furthermore, the study found that African American and Hispanic students were 1.3 to 1.4 times more likely than White students nationwide to experience limited accessibility during the fall 2020 semester.³⁸

Federal, State and local governments launched initiatives to address these inequalities. (See “Recent New York City Broadband Policies” for more detail.) In March 2020, the FCC established a Rural Digital Opportunity Fund to invest \$20.4 billion over 10 years to bring fixed broadband to rural homes and small businesses. The Phase I auction in December 2020 awarded over \$9 billion nationally; New York State had 10 winning bids to serve 46,647 locations and was awarded \$10 million.

In December 2020, the federal Consolidated Appropriations Act of 2021, which included the \$900 billion COVID-19 relief package, earmarked \$7 billion for expanding internet access, including \$3.2 billion for the Emergency Broadband Benefit Program.³⁹ The program was created to assist low-income households and others impacted by the pandemic by providing a \$50 per month subsidy (\$75 for households on Tribal lands) and a one-time discount on a computing device. Eligible households must: have income at or below 135 percent of the federal poverty line; have experienced loss of income due to the pandemic or; be receiving other government benefits.⁴⁰ The Program began in May 2021; as of September 5, 2021, 326,857 New York households had enrolled.⁴¹

The legislation also directed \$1.6 billion to the National Telecommunications and Information Administration to launch three new grant programs intended to expand connectivity, particularly in rural communities; tribal lands, colleges and universities; and at historically black colleges and universities.⁴²

In March 2021, the federal American Rescue Plan (ARP) allocated over \$12.7 billion in relief to New York State; one permissible use for the aid is investment in broadband infrastructure. Federal guidance permits use of funding for: underserved areas; “last-mile” connections that deliver broadband to households and businesses; projects to increase speeds to at least 100/100 Mbps; and projects to improve access and digital literacy.⁴³ Approximately \$350 million was also allocated to New York in capital funding for critical projects, including broadband and other options to improve connectivity.

On July 28, 2021, the U.S. Senate voted to approve an infrastructure package that would include an additional \$65 billion in broadband investments, including grants and private activity bonds for deployment, and funding to support rural areas. The package would also provide additional funding for the Emergency Broadband Benefit Program; the monthly subsidy would be reduced to \$30 per month and the Program extended for five years.⁴⁴ The House of Representatives is scheduled for a final vote on the package no later than September 27, 2021.

The State has not yet announced a strategy or plan to dedicate any ARP relief funds to broadband projects; however, in March 2021, the gubernatorial Reimagine New York Commission released a report that identified four critical objectives for universal internet connectivity: affordability, digital inclusion, competition, and equitable digital infrastructure.⁴⁵ Recommended initiatives included:

- Increase the scale and adoption of affordable access programs;
- Create partnerships providing access to economically disadvantaged K-12 students;
- Explore solutions that leverage wireless technologies to provide free or low-cost access to those who need it;
- Enact policies to enhance information available to consumers and foster competition;
- Enhance data collection on coverage, performance, and infrastructure; and
- Develop and implement a strategy for equitable and universal deployment of infrastructure.

In furtherance of this agenda, the State launched the ConnectED NY program in March 2021 to create a \$10 million emergency fund to provide broadband access hotspots to approximately 50,000 students in economically disadvantaged school districts with private funding. School districts where the share of economically disadvantaged students exceeds the State average are eligible to receive funds from the program.⁴⁶

In an effort to improve affordability of access at home, the Enacted Budget for SFY 2021-22 included the Affordable Broadband Act requiring internet service providers to offer \$15 per month service, inclusive of taxes and fees, to eligible low-income households at speeds of at least 25/3 Mbps and \$20 per month, inclusive of taxes and fees, for speeds of at least 200 Mbps. Prices would increase by the lesser of inflation or 2 percent.⁴⁷ In April 2021, USTelecom, CTIA (a national trade association), the New York State Telecommunications Association and other industry groups filed a lawsuit in U.S. District Court in Brooklyn seeking to block the law on grounds that it violates federal policy to not interfere with internet rates. On June 11, 2021, a federal judge issued a preliminary injunction halting the start of this program.

As previously noted, the average monthly rate for broadband service in New York State is approximately \$47; therefore, a discounted \$15 per month plan is equivalent to a \$32 per month subsidy for eligible households.⁴⁸ For a representative low-income four-person household earning between \$15,000 and \$29,999 (as described earlier), the plan would reduce the cost of broadband to less than one-half of 1 percent of household expenses.⁴⁹ It is unclear what impact the subsidized program might have on rates for other consumers and on the potential profitability of providers.

Recent New York City Broadband Policies

The NYC Internet Master Plan (IMP), released in January 2020, aims to achieve universal broadband access by City residents and to eliminate the digital divide. It is built on five principles: equity (no barriers because of identity or place of residence); performance (fast and reliable internet service); affordability (cost should not be an impediment); privacy (users should have say in use of their personal information); and choice (there should be sufficient competition to allow for a variety of options to users).

In March 2021, the City committed \$157 million for broadband expansion and issued a request for proposals (RFP) from interested providers. The RFP, released jointly by the Mayor's Office of Information Technology, the Department of Small Business Services and the New York City Economic Development Corporation, commits to providing successful bidders with access to more than 100,000 City assets in order to connect 600,000 people.

The City's response to increased demand for high-speed internet during the pandemic was consistent with the IMP. In collaboration with nonprofit and private organizations, broadband was upgraded at community centers at 50 New York City Housing Authority (NYCHA) locations. The City also reached a settlement with a major service provider to extend fiber optic infrastructure to 500,000 additional homes across the City.

In addition, the City partnered with providers to issue Wi-Fi enabled tablets with internet connectivity to students and to elderly citizens (especially from low-income and less-connected neighborhoods). The collaboration included free technology and digital literacy training.

Recommendations for New York's High-Speed Future

New York has made great progress in deploying broadband across the State and reducing gaps in access; nevertheless, there are still significant challenges. Many predominantly rural areas remain underserved. With only one or two providers of high-speed broadband in most parts of the State, robust provider competition is lacking, which in turn tends to make consumer costs higher. One in three low-income households does not have access to broadband, which magnifies disparities in access to opportunities. High-speed connections are an imperative not only for economic development, but also for equality of opportunity.

Recent developments in federal policy—particularly the flexible funding provided under ARP and the potential for additional infrastructure dollars earmarked for broadband—provide an important opportunity for New York to craft an ambitious and detailed broadband strategy. The goals of that strategy should be to:

- Accelerate universal availability of the highest-speed connections, including in rural areas;
- Enhance access for low-income households; and
- Improve affordability, particularly for low-income residents.

Pursue Universal Availability of Highest-Speed Connections

Future State plans and actions on broadband should not be tethered to an increasingly obsolete 25/3 Mbps standard; instead, the State should look to the future and plan for the deployment of gigabit (1000 Mbps) connections. This goal will require upgrades to current infrastructure systems, as well as deployment of new technology. Furthermore, it will require developing solutions to improve sparse deployment in rural areas, where market conditions may be unfavorable for providers and require significant subsidy of capital costs.

New technology may offer some opportunity for innovation and an adaptive approach. Fifth generation (5G) cellular technology began to be deployed in New York in 2019.⁵⁰ While initially reliant on fiber optic cables, technological advancements have expanded the wireless capabilities of 5G, and both telecommunications firms and mobile service providers are investing significant resources into expanding 5G networks, some of which provide gigabit-speed connections.

5G wireless technology may be promising as a “last mile” solution in rural areas. In 2020 the FCC created a \$9 billion 5G Fund for Rural America. Using a reverse auction method similar to the 2016 New NY Broadband Program, the 5G Fund will target rural areas that lack adequate broadband services to support long-term infrastructure investments over a period of up to 10 years.⁵¹ The first phase of fund awards will begin after the FCC completes the Digital Opportunity Data Collection, a program intended to offer more precise mapping of broadband and mobile data connections.⁵² New York should assist the FCC in these efforts and use the data compiled to inform its strategy.

Enhance Access for Low-Income Households

As it has in the past, the State should leverage public dollars and form public-private partnerships to increase the scale of targeted solutions to enhance access opportunities in low-income communities. These solutions should be structured to protect the public interest and to target both residential properties and community institutions, including schools, libraries, and parks. New York City’s experience with nonprofit and private organizations upgrading broadband at NYCHA facilities is one potential model; creating public-private partnerships to provide Wi-Fi services on transit and in parks is another model worth exploring and expanding to other public facilities.

As recommended by the Reimagine New York Commission, these solutions should focus especially on students in underserved communities. In addition to allowing greater use of school computer labs at the end of the day and upgrading school broadband speeds, students could be given computers or tablets with access to high-speed networks for home use. School districts could facilitate such purchases using some of the \$8.2 billion in federal aid that was provided directly to them under ARP or could apply for funding that remains available under the Smart Schools Bond Act approved by New York voters in 2014.

Improve Affordability

According to a large nationwide survey, cost is the most important reason cited by households who do not have broadband access at home.⁵³ In just over three months, more than 5.3 million households nationwide and 326,000 households in New York have benefited from the FCC's Emergency Broadband Benefit Program, which provides a \$50 per month subscription subsidy and a one-time discount on a computing device. The program is well-targeted to offer benefits to low-income households and those who have suffered loss of income during the pandemic, and the Senate has proposed an extension of the program. New York leaders should advocate for it to be extended or made permanent during the ongoing federal infrastructure funding negotiations. It is appropriate for the federal government to assist low-income households with the costs of this essential modern resource in the same way it provides assistance to eligible low-income households for food and housing.

In addition, the PSC should study how best to spur provider competition across the state. The Commission wields significant regulatory power which can be used cautiously but effectively in order to keep prices low and speeds high.

Make New York's Broadband Strategy Actionable and Accountable

To enable all New Yorkers to realize the potential benefits of broadband technology, the development of the State's strategy should include: setting concrete goals for each objective; identifying obstacles and barriers faced to date; identifying federal, State, and local funding sources available; and establishing interim metrics and a public reporting schedule in order to allow accountability for progress.

State leaders must ensure New York does not fall behind in the deployment of high-speed broadband. Reliable, high-speed service has become necessary for businesses to conduct their operations online, for government agencies and nonprofit organizations to serve the public, and for multiple members of a household to work and learn simultaneously. Making high-speed broadband more widely available, accessible, and affordable is essential to maintaining the State's economic competitiveness and to achieving social justice.

Appendix A

Broadband Availability and Access by New York State County, 2019

| County | Total Population | Percentage of Population Without Broadband Available | Total Households | Percentage of Households Without Broadband Access |
|-------------|------------------|--|------------------|---|
| Albany | 305,506 | 0.3% | 128,284 | 14.1% |
| Allegany | 46,091 | 23.4% | 17,265 | 23.5% |
| Bronx | 1,418,207 | 1.8% | 513,890 | 20.4% |
| Broome | 190,488 | 0.9% | 79,309 | 16.5% |
| Cattaraugus | 76,117 | 17.9% | 33,056 | 26.1% |
| Cayuga | 76,576 | 3.1% | 31,489 | 16.7% |
| Chautauqua | 126,903 | 2.2% | 55,345 | 20.9% |
| Chemung | 83,456 | 1.9% | 33,490 | 17.6% |
| Chenango | 47,207 | 4.2% | 20,865 | 19.0% |
| Clinton | 80,485 | 6.5% | 31,422 | 17.6% |
| Columbia | 59,461 | 0.8% | 24,531 | 15.1% |
| Cortland | 47,581 | 4.3% | 18,345 | 16.3% |
| Delaware | 44,135 | 2.4% | 18,185 | 16.8% |
| Dutchess | 294,217 | 2.2% | 110,529 | 10.1% |
| Erie | 918,702 | 0.2% | 398,326 | 14.8% |
| Essex | 36,885 | 6.1% | 16,762 | 20.4% |
| Franklin | 50,022 | 4.7% | 18,927 | 23.5% |
| Fulton | 53,383 | 3.4% | 23,018 | 19.3% |
| Genesee | 57,280 | 4.1% | 24,596 | 14.6% |
| Greene | 47,188 | 1.7% | 16,974 | 18.2% |
| Hamilton | 4,416 | 14.7% | * | * |
| Herkimer | 61,319 | 6.4% | 25,631 | 17.8% |
| Jefferson | 109,834 | 1.5% | 41,214 | 15.1% |
| Kings | 2,559,903 | 0.2% | 978,091 | 17.0% |
| Lewis | 26,296 | 14.5% | 11,533 | 21.2% |
| Livingston | 62,914 | 9.3% | 23,409 | 14.4% |
| Madison | 70,940 | 5.8% | 25,986 | 19.0% |
| Monroe | 741,770 | 0.0% | 305,284 | 14.3% |
| Montgomery | 49,221 | 2.1% | 20,001 | 24.2% |
| Nassau | 1,356,924 | 0.7% | 449,798 | 10.5% |
| New York | 1,628,706 | 0.0% | 768,203 | 12.4% |
| Niagara | 209,281 | 0.7% | 90,625 | 15.0% |
| Oneida | 228,671 | 2.9% | 90,273 | 15.6% |

| County | Total Population | Percentage of Population Without Broadband Available | Total Households | Percentage of Households Without Broadband Access |
|--------------|------------------|--|------------------|---|
| Onondaga | 460,528 | 0.1% | 183,218 | 17.9% |
| Ontario | 109,777 | 0.6% | 46,025 | 12.1% |
| Orange | 384,937 | 1.2% | 131,421 | 13.2% |
| Orleans | 40,352 | 2.5% | 17,298 | 17.4% |
| Oswego | 117,124 | 0.5% | 46,640 | 13.8% |
| Otsego | 59,493 | 8.3% | 23,138 | 20.6% |
| Putnam | 98,320 | 1.1% | 34,470 | 6.5% |
| Queens | 2,253,858 | 0.0% | 784,552 | 14.9% |
| Rensselaer | 158,714 | 0.0% | 65,790 | 13.4% |
| Richmond | 476,143 | 0.0% | 166,297 | 18.2% |
| Rockland | 325,789 | 1.3% | 101,424 | 14.7% |
| St. Lawrence | 107,740 | 4.6% | 42,832 | 21.8% |
| Saratoga | 229,863 | 0.1% | 93,547 | 8.5% |
| Schenectady | 155,299 | 0.0% | 62,534 | 17.9% |
| Schoharie | 30,999 | 0.9% | 12,347 | 21.5% |
| Schuyler | 17,807 | 2.6% | * | * |
| Seneca | 34,016 | 0.4% | 13,898 | 20.3% |
| Steuben | 95,379 | 10.0% | 39,283 | 16.9% |
| Suffolk | 1,476,601 | 3.5% | 499,744 | 8.1% |
| Sullivan | 75,432 | 0.5% | 28,960 | 14.3% |
| Tioga | 48,203 | 3.6% | 19,991 | 15.2% |
| Tompkins | 102,180 | 1.4% | 40,322 | 15.1% |
| Ulster | 177,573 | 0.4% | 69,376 | 13.4% |
| Warren | 63,944 | 3.8% | 29,593 | 13.9% |
| Washington | 61,204 | 2.3% | 24,093 | 14.6% |
| Wayne | 89,918 | 3.7% | 36,634 | 16.7% |
| Westchester | 967,506 | 1.3% | 355,136 | 12.4% |
| Wyoming | 39,859 | 14.6% | 15,872 | 16.7% |
| Yates | 24,913 | 6.7% | 8,646 | 23.9% |

* Note: The American Community Survey does not survey geographies with populations less than 20,000. Therefore this sample does not include data for Hamilton and Schuyler Counties, where the populations according to the 2010 Census were 4,416 and 17,807, respectively.

Sources: U.S. Census, American Community Survey, 2019 Supplemental; Federal Communications Commission, *Fourteenth Broadband Deployment Report*, January 19, 2021

Appendix B

Share of New York City Residents Without Broadband Access by Age, Educational Attainment, Race/Ethnicity and Borough, 2019

| | Bronx | Brooklyn | Manhattan | Queens | Staten Island |
|--|-------|----------|-----------|--------|---------------|
| Age | | | | | |
| Under 18 years | 8.8% | 16.5% | 5.3% | 7.3% | 8.7% |
| 18 to 64 Years | 11.0% | 9.8% | 6.1% | 8.3% | 10.9% |
| 65 and Older | 36.7% | 31.4% | 25.7% | 24.9% | 24.8% |
| Educational Attainment | | | | | |
| Less than High School | 27.7% | 27.6% | 36.1% | 20.4% | 31.2% |
| High School Graduate, Some College or Associate's Degree | 14.7% | 16.7% | 15.4% | 13.6% | 14.4% |
| Bachelor's Degree or Higher | 6.4% | 5.7% | 3.8% | 5.8% | 7.1% |
| Race/Ethnicity | | | | | |
| White | 15.3% | 17.1% | 4.7% | 10.8% | 11.2% |
| Black/African American | 14.5% | 14.3% | 15.2% | 11.7% | 21.5% |
| Asian | 7.2% | 6.8% | 10.7% | 9.1% | 8.7% |
| Hispanic or Latino (any race) | 13.5% | 14.9% | 14.7% | 11.8% | 15.7% |

Source: U.S. Census Bureau, American Community Survey 1-year file, 2019

Appendix C

New York State Broadband Projects Funded by the American Recovery and Reinvestment Act (ARRA)

| Grantee | Grant Amount | Areas Served | Project |
|---|--------------|-------------------------------------|--|
| ION Hold Company, LLC | \$39,724,614 | Upstate NY, PA, and VT | Buy 10 new segments of fiber infrastructure serving 70 rural communities |
| Slic Network Solutions, Inc. | \$32,095,409 | Franklin County | Construct 136 miles of fiber optic cable and purchase equipment to deliver service to unserved homes in western Franklin County |
| NYC Dept of Information Technology and Telecommunications | \$22,162,825 | New York City | Fund NYC Connected Learning to provide computer training, equipment, software, and free broadband access for one year to 18,000 low-income City residents |
| St. Regis Mohawk Tribe | \$11,204,267 | Franklin County | Upgrade public computer centers and provide training to economically vulnerable residents in Franklin County. Run fiber to St. Regis Mohawk tribe community |
| NYS Education Department | \$10,521,150 | Statewide | Fund NY Computer Centers, Broadbandexpress@yourlibrary, and computers for 30 libraries and five mobile training centers across 41 economically distressed NY counties |
| New York State | \$8,875,431 | Statewide | Improve statewide mapping showing available high-speed broadband and support NYS Broadband Program Office |
| Castle Cable TV | \$7,168,559 | Jefferson and St. Lawrence Counties | Extend broadband and other advanced telecom services through Jefferson and St. Lawrence Counties |
| NYC Small Business Association | \$6,000,000 | New York City | New York City will help at-risk students develop skills to graduate and successfully transition to college or a career by providing computer training, refurbished computer equipment, and internet access at home |
| Mid-Hudson Cablevision, Inc. | \$3,473,919 | Mid-Hudson Region | Bring broadband to a 75-mile rural corridor between NYC and Albany |
| Deposit Telephone Company, Inc. | \$3,143,839 | NY and PA | Bring DSL broadband to unserved establishments in NY and PA |
| Wildwood Programs, Inc. | \$845,000 | Upstate NY | Upgrade broadband services and deploy videoconferencing and tools to 75 facilities in Upstate NY |
| Port Byron Telephone Company, Inc. | \$639,218 | Cayuga County | Bring DSL broadband to unserved homes, businesses, and community institutions within rural service territory |

Source: NYS Broadband Program Office, 2011-12 Annual Report

Endnotes

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- 3 OpenVault, *Broadband Insights Report*, Q4 2020, available at https://openvault.com/NEW-SITE-OV3/wp-content/uploads/2021/02/OpenVault_OVBI_Q420.pdf.
- 4 U.S. Census Bureau, Household Pulse Survey, Week 27: March 17 – March 29. Education Table 2 and Transportation Table 1, available at <https://www.census.gov/data/tables/2021/demo/hhp/hhp27.html#tables>.
- 5 Federal Communications Commission (FCC), *Fourteenth Broadband Deployment Report*, January 2021, Appendix A, pg. 60, available at <https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf>.
- 6 FCC, “Fixed Broadband Deployment,” data as of June 2020, accessed June 22, 2021, available at https://broadbandmap.fcc.gov/#/area-summary?version=jun2020&type=state&geoid=36&tech=acfosw&speed=250_25&vlat=42.7615169668494&vlon=-76.13388307124018&vzoom=6.240961419540018.
- 7 Ibid.
- 8 FCC, *Fourteenth Broadband Deployment Report*, January 2021, pg. 13, available at <https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf>.
- 9 Tribal areas continue to lag behind rural areas with broadband available to only 79.1 percent of the population in these areas in 2019, an increase from 57.8 percent in 2015. See FCC, *Fourteenth Broadband Deployment Report*, January 2021, pg. 20, available at <https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf>.
- 10 FCC, *2015 Broadband Progress Report*, pg. 97, available at <https://docs.fcc.gov/public/attachments/FCC-15-10A1.pdf>; and *Fourteenth Broadband Deployment Report*, 2021, pg. 60, available at <https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf>.
- 11 FCC, *Fourteenth Broadband Deployment Report*, January 2021, Appendix D, pg. 234, available at <https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf>.
- 12 Krishna Jayakar, et. al, “Broadband 2021,” op. cit, pg. 5, available at <https://par.nsf.gov/servlets/purl/10061643>.
- 13 U.S. Census Bureau, American Community Survey 1-year Estimates, years 2015-2019, table S2801, available at <https://data.census.gov/cedsci/table?q=S2801&tid=ACSST1Y2019.S2801>.
- 14 U.S. Census Bureau, American Community Survey 1-year Estimates, 2019, table S2801, available at <https://data.census.gov/cedsci/table?q=S2801&tid=ACSST1Y2019.S2801>.
- 15 The FCC collects data from broadband service providers on subscription rates by speed of service. The data vary from the U.S. Census Bureau, whose estimates are derived from a survey of households. The FCC reports a broadband subscription rate of 77 percent of New York households using a 25/3 Mbps standard as compared to 86.2 percent access rate reported by the Census Bureau in 2019.
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- 24 U.S. Bureau of Labor Statistics, Consumer Expenditure Survey, Table 3444, December 2020, available at <https://www.bls.gov/cex/2019/CrossTabs/sizbyinc/xfour.PDF>.
- 25 NYS Department of Public Service, "The Universal Broadband Initiative," pg. 7, available at [https://www3.dps.ny.gov/pscweb/WebFileRoom.nsf/ArticlesByCategory/CBD72962D358074A852572670050E4E0/\\$File/broadband_report_3-12.pdf?OpenElement](https://www3.dps.ny.gov/pscweb/WebFileRoom.nsf/ArticlesByCategory/CBD72962D358074A852572670050E4E0/$File/broadband_report_3-12.pdf?OpenElement).
- 26 PMO was established within the newly created Office of the State Chief Information Officer/NYS Office for Technology.
- 27 Governor David Paterson, "Fact Sheet: 2007-2008 Universal Broadband Grants," press release, March 19, 2008, available at https://web.archive.org/web/20080420091253/http://www.ny.gov/governor/press/press_0319082.html.
- 28 NYS Broadband Program Office, 2011-12 Annual Report, pg. 33, para. 3, available at https://broadbandmap.ny.gov/sites/default/files/documents/2011-12-Broadband-Annual-Report_7.11.12.pdf.
- 29 The Council was staffed with representatives from the seven State agencies that intersect with broadband from a policy and planning perspective: NYS Office of Information Technology Services; Public Service Commission; Department of Economic Development; Department of Transportation; New York State Foundation for Science, Technology, and Innovation; Division of the Budget; and the Office of Cyber Security and Critical Infrastructure Coordination. See 9 CRR-NY 7.22, Executive Order No. 22: Establishing a Broadband Development and Deployment Council, available at <https://www.law.cornell.edu/regulations/new-york/NYCRR-Tit-9-Sec-7-22>.
- 30 Specifically, the study found broadband was available to 92 percent of households in the State, but only 67 percent of households had access to broadband services. Broadband access rates were only 37 percent for the poorest households (with incomes less than \$20,000) compared to 91 percent for the wealthiest households. See Center for Technology in Government, "Broadband Internet Service Adoption and Use in New York State Households," May 10, 2011, pg.1, available at https://www.ctg.albany.edu/media/pubs/pdfs/broadband_survey.pdf.
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- 36 See, for example, Wade B. Levan, "DOT Fiber Tax Discourages Connectivity Investment," The Post-Journal, October 3, 2020, available at <https://www.post-journal.com/opinion/local-commentaries/2020/10/dot-fiber-tax-discourages-connectivity-investment>; and "Editorial—Lawmaker disconnect: Albany's fiber optic fee will hurt families in the north country," NNY360, July 11, 2020, available at https://www.nny360.com/opinion/editorials/editorial-lawmaker-disconnect-albany-s-fiber-optic-fee-will-hurt-families-in-the-north-country/article_e8d3dd91-f0ef-5538-b80c-d54b8d4548d8.html.
- 37 Assemblyman Mark Walczyk, et. al., letter to Governor Andrew Cuomo, June 25, 2020, available at https://assembly.state.ny.us/write/upload/member_files/116/pdfs/20200701_0093171.pdf.
- 38 Paul Ong, "COVID-19 and the Digital Divide in Virtual Learning," UCLA Center for Neighborhood Knowledge, December 9, 2020, pg. 7, available at https://knowledge.luskin.ucla.edu/wp-content/uploads/2020/12/Digital-Divide-Phase2_brief_release_v01.pdf.
- 39 The Consolidated Appropriation also included \$250 million to enhance telehealth services.
- 40 Household eligibility is based on meeting one of the following criteria for a member of the household: income at or below the federal poverty line; participation in assistance programs such as Medicaid, Supplemental Nutrition Assistance, or free- or reduced-price lunch; receipt of a federal Pell Grant during the current year; or substantial income loss due to job loss or furlough for households with income below \$99,000 for single filers and \$198,000 for joint filers. Eligibility is also authorized based on criteria established by providers for low-income households or in relation to COVID-19. See FCC, "Emergency Broadband Benefit," 2021, available at <https://fcc.gov/broadbandbenefit>.

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- 41 FCC, “Emergency Broadband Benefit Program Enrollments and Claims Tracker,” accessed September 7, 2021, available at <https://www.usac.org/about/emergency-broadband-benefit-program/emergency-broadband-benefit-program-enrollments-and-claims-tracker>.
- 42 More specifically, the three grant programs are: (1) \$288 million for the Broadband Infrastructure Program to fund deployment projects, enhance speeds, and improve cost-effectiveness, particularly in rural areas and others lacking broadband. The program was launched in May 2021 and applications will be accepted until August 17, 2021, with awards announced in late-November 2021. (2) \$980 million for the Tribal Broadband Connectivity Program to provide funding for broadband deployment projects on tribal lands and improve telehealth systems, distance learning, and broadband affordability options. The program was announced in June 2021 and applications will be accepted until September 1, 2021, with award announcements scheduled for late-November 2021. (3) \$268 million for the Connecting Minority Communities Pilot Program to provide grants to Historically Black Colleges and Universities, Tribal Colleges and Universities, and Minority-Serving Institutions to purchase broadband services and equipment or to train information technology personnel. Final rulemaking concluded on June 15, 2021. For more information, see National Telecommunications and Information Administration, Broadband Infrastructure Grant Program, Notice of Funding Opportunity, available at https://broadbandusa.ntia.doc.gov/sites/default/files/2021-05/NTIA%20Broadband%20Infrastructure%20Grant%20Program%20NOFO.Final_.pdf; Tribal Broadband Connectivity Program, Notice of Funding Opportunity, available at https://broadbandusa.ntia.doc.gov/sites/default/files/2021-06/NTIA.Tribal%20Broadband%20Connectivity%20Program.Final_.OMB%20Cleared.pdf; and Federal Register, Vol. 86, No. 113, 47 CFR Part 302, June 15, 2021, available at https://broadbandusa.ntia.doc.gov/sites/default/files/2021-06/fr_connecting_minority_communities_pilot_program.pdf.
- 43 Federal Register, Vol. 86, No. 93, 31 CFR Part 35, May 17, 2021, available at <https://www.govinfo.gov/content/pkg/FR-2021-05-17/pdf/2021-10283.pdf>.
- 44 Detailed summary provided to Marianne Levine and Burgess Everett, “Bipartisan infrastructure deal sails through first Senate vote,” Politico, July 28, 2021, <https://www.politico.com/news/2021/07/28/bipartisan-infrastructure-deal-501278> and <https://static.politico.com/7e/74/659737a14980a049b2b233aa43c9/bif-summary.pdf>.
- 45 Reimagine NY Commission, “Action Plan for a Reimagined New York,” March 31, 2021, available online at https://www.governor.ny.gov/sites/default/files/atoms/files/CRNY_Report.pdf.
- 46 Digital Promise, ConnectED NY program overview, available at <https://connectedny.digitalpromise.org>.
- 47 Household eligibility is based on meeting one of the following criteria for a member of the household: eligible or receiving free or reduced-price lunch, supplemental nutrition assistance program benefits, Medicaid benefits, the senior citizen or disability rent increase exemptions, or an affordability benefit from a utility. The law also requires service providers to report to the Public Service Commission annually on their offers and uptake.
- 48 Rebecca Armstrong, “States That Pay the Most and Least for Internet in 2020,” HighSpeedInternet.com, November 10, 2020, available at <https://www.highspeedinternet.com/resources/state-cost-of-internet>.
- 49 U.S. Census Bureau, American Community Survey 1-year Estimates, 2019, 2019 table S2801, available at <https://data.census.gov/cedsci/table?q=S2801&tid=ACSST1Y2019.S2801>.
- 50 See Verizon, “Customers in Boise, Panama City and New York City get Verizon 5G Ultra Wideband service,” press release, September 26, 2019, available at <https://www.verizon.com/about/news/boise-panama-city-new-york-city-verizon-5g>; AT&T, “AT&T Introduces 5G in New York City,” press release, August 6, 2019, available at https://about.att.com/story/2019/5g_in_nyc.html; and Sprint, “Sprint Lights Up True Mobile 5G in Los Angeles, New York City, Phoenix and Washington, D.C.,” press release, August 27, 2019, available at <https://www.t-mobile.com/news/legacy-sprint/sprint-lights-up-true-mobile-5g-in-los-angeles-new-york-city-phoenix-and-washington-dc>.
- 51 In a reverse auction, the sellers compete to obtain business from the buyer and prices will typically decrease as the sellers underbid each other.
- 52 Phase One of the 5G for Rural American Fund will allocate \$8 billion (\$680 million specifically for Tribal lands) to support areas lacking 4G or 5G mobile broadband. Phase Two will provide \$1 billion to target the deployment of 5G networks that facilitate precision agriculture. See FCC, Establishing a 5G Fund for Rural America, pg. 5, para 9 and 10, available at <https://docs.fcc.gov/public/attachments/FCC-20-150A1.pdf>.
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