BALTIMORE CITY'S

DIGITAL INCLUSION STRATEGY

2024-2029

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WELCOME MESSAGES

MESSAGE FROM THE MAYOR

I am delighted to share with you our city's comprehensive digital inclusion strategy, which aims to bridge the digital divide and ensure equal access to digital resources for all Baltimore residents. In this modern era, technology plays a pivotal role in shaping our lives, communities, and future. It is our responsibility to ensure that no resident is left behind due to a lack of access or opportunities in the digital realm.

Digital equity is not just a matter of fairness but also a catalyst for economic growth and community development. Our digital inclusion strategy encompasses a range of initiatives designed to eliminate the barriers faced by certain neighborhoods and individuals in accessing and benefiting from digital technology. To ensure we approach closing the digital divide with an equity lens, I asked Chief Information and Digital Officer Todd Carter, and his team in the Office of Broadband and Digital Equity, to develop Baltimore's Digital Inclusion Strategy.

This plan will serve as a comprehensive, forward-thinking roadmap to help expand Baltimore's digital infrastructure and empower every resident—regardless of their background or circumstance—to harness the power of technology for their benefit, and the betterment of our city.

Now, let's get to work and make Baltimore a city where digital equity is a reality for all.

Sincerely,

Brandon M. Scott
Mayor, City of Baltimore

MESSAGE FROM THE CIO

I am proud to present Baltimore City's Digital Inclusion Strategy, which demonstrates the city's dedication to eliminating barriers to digital access and adoption. This strategic plan strongly supports Mayor Scott's Action Plan for Baltimore, specifically the Equitable Neighborhood Development pillar.

In today's increasingly technology-dependent world, we understand the importance of ensuring every Baltimore resident has equal access to digital resources and opportunities. The City's Digital Inclusion Strategy recognizes digital equity is not just a goal, but a necessity for a thriving, prosperous, and fair city.

This plan builds upon the solid groundwork established by the Office of Broadband and Digital Equity (BDE), a division of the Baltimore City Office of Information and Technology. Over the past two years, BDE has collaborated with federal and state partners, City agencies, and a diverse range of community partners to gather input from residents, local nonprofits, neighborhood associations, and marginalized populations. This inclusive approach ensures that the community's voice is heard and that resources and investments are prioritized accordingly.

I want to express my gratitude to everyone who took the time to provide their input into the strategy. I also want to recognize our dedicated staff who take their work seriously and strive each day to narrow the digital divide.

Sincerely,

Todd A. Carter
Chief Information Officer
City of Baltimore

EXECUTIVE SUMMARY

Baltimore City has an unprecedented opportunity to narrow the digital divide. The digital revolution changed the way we live and work. But not all of Baltimore's residents share in the opportunities this digital age offers.

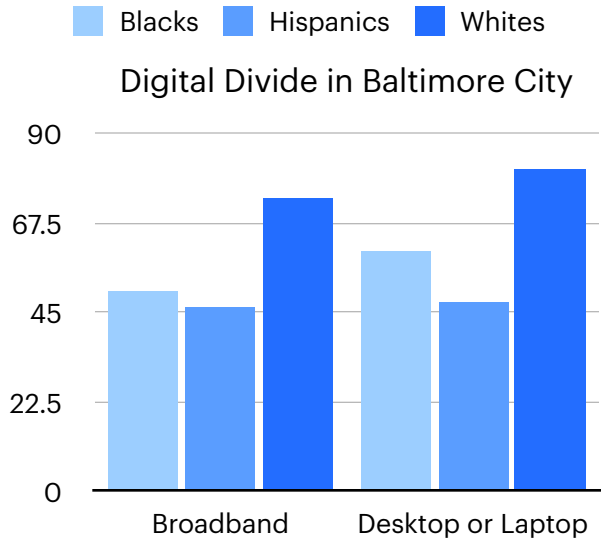
In a world where we rely on technology, we recognize the urgency of ensuring all Baltimore residents can access digital resources. Our Digital Inclusion Strategy rests on a belief that digital equity can support a thriving, prosperous, and equitable city.

The activities described below represent more than improving access to technology. Our efforts will foster economic opportunity, reduce disparities, and offer all Baltimore residents resources to succeed in life.

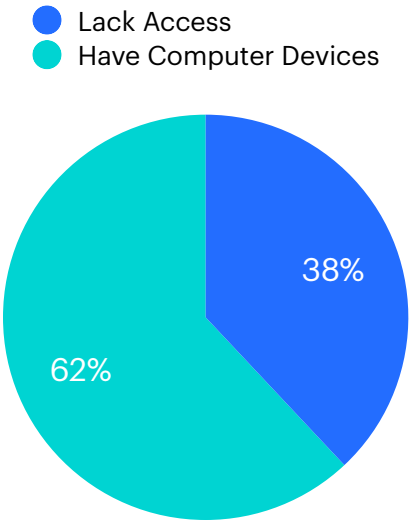
CURRENT STATE

According to the Abell Foundation:[1]

- 73.3% of white households in Baltimore City have wired broadband, compared with 50.2% of black and 46.4% of Hispanic households.
- 80.7% of white households have desktop or laptop computers, compared with 60% of black and 47.5% of Hispanic households.



[1] Source: "Baltimore's Digital Divide: Gaps in Internet Connectivity and the Impact on Low-Income City Residents," Abell Foundation, https://abell.org/wp-content/uploads/2022/02/2020_Abell_digital20divide_full20report_FINAL_web20dr.pdf.



Low-Income Households in Baltimore City

Maryland's Statewide Broadband Access and Equity phone survey highlighted the lack of access to computer devices. See Appendix C. The survey reported that 38% of low-income Baltimore households either lacked a computer device or only had access via a smartphone.[2]

To address digital equity, Baltimore's policies, programs, funding, and advocacy must **acknowledge the impacts of 300 years of structural and institutional racism**.

ACTIONABLE GOALS TO ADVANCE DIGITAL EQUITY

We established four overarching goals to advance the principles of digital equity and inclusion. Mapping, data, and analysis described in this plan guide these goals. In addition, we relied on the critical input of residents' voices and experiences.

1. **Reliable, High-Speed Internet**. Baltimore City residents will have access to affordable, reliable, high-speed broadband based on investments in future-proof fiber optic networks, starting with the most underserved communities.

2. **Technology and Devices.** Baltimore City residents will be able to get a modern computing device.

3. **Digital Skills Training**. Baltimore City residents will have access to digital skills training, helping them use computing devices and safely navigate the internet.

4. **Technical Support**. Baltimore City residents will receive technical support, in multiple languages, to master internet access and devices.

[2] Maryland statewide Broadband Access and Equity scientific phone survey, 2023.

STRATEGIES TO ACHIEVE OUR GOALS

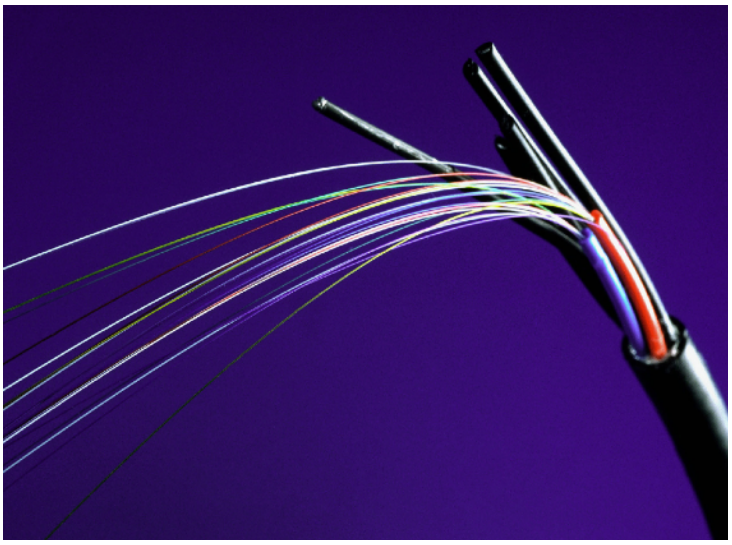
Action strategies outlined below can accomplish each of the above goals. For many of these strategies, we will assemble stakeholders—including residents, philanthropic organizations, service providers, and nonprofit organizations. We have and will continue to coordinate their resources to support these strategies.

STRATEGY 1: CONVENE STAKEHOLDERS TO SERVE THE MOST MARGINALIZED COMMUNITIES

We must ensure that the work to increase digital equity and inclusion benefits residents in marginalized communities: people living with disabilities, the non-native English speaker, low-income families, the unhoused. We will **convene stakeholders** to understand the needs of those communities and match organizations with core competencies to meet those needs. Where necessary, we may apply for and coordinate grant funding and program development along with local nonprofit partners. We will **partner with community-based organizations**, the philanthropic community, service providers, nonprofit organizations, and community anchor institutions.

STRATEGY 2: FOCUS ON FIBER

We recognize community-wide fiber optics as the preferred infrastructure to create reliability, longevity, and capacity with scalability to meet community needs. We will **invest in new fiber infrastructure** to expand our backbone fiber infrastructure, fiber connections, and enable best-in-class, fully fiber optic connectivity. Our investment will provide **meaningful broadband access** to all residents, incentivize private investment, and facilitate competition in underserved communities. Other network technologies, such as copper DSL, lack the capabilities and resilience of fiber. Coaxial cable and fixed wireless service may act as temporary solutions to connectivity gaps, but neither offer the same reliability, longevity, nor scalability of fiber-optic networks.



STRATEGY 3: EXPAND INFRASTRUCTURE THROUGH PUBLIC-PRIVATE PARTNERSHIPS

We will incentivize investment through public-private collaboration. This strategy will reduce the cost and risk to the City while expanding private sector opportunity. We will use our funds, efforts, and assets to **build and operate a world-class communication infrastructure in Baltimore**, through partnerships, leased access for providers to new facilities, and deployment projects to eight public housing properties within Baltimore.

STRATEGY 4: BUILD CONFIDENCE AND SKILLS

We will expand existing skills training and ongoing support programs, including efforts funded through the Digital Equity Fund (funding provided through the American Rescue Plan Act) and the Health Resources & Services Administration. We will:

- apply for new federal funding and identify additional sources of potential funding;
- coordinate with local institutions to develop culturally competent and multi-language digital skills videos and training materials;
- employ a **"train the trainer" model** to scale delivery;
- strengthen partnerships with academic institutions, health care, and community centers;
- work with other City agencies to ensure Baltimore City employees have access to digital training to support and advance in the workplace, and life in general; and
- establish a **network of tech hubs** in neighborhoods where residents can access technology, get support, participate in training classes, and develop confidence.

STRATEGY 5: INCREASE PARTICIPATION IN SUBSIDIZED SERVICES

Baltimore has already successfully leveraged federal programs like the Federal Communication Commission's Affordable Connectivity Program (ACP) to support broadband adoption in lower-income communities. We will:

- expand efforts to **support broadband adoption**;[3]
- employ new resources to further community outreach;
- help low-income residents understand and access these programs and work with State and Federal agencies to reduce barriers for enrollment; and
- identify ways to **sustain future initiatives**, especially in the face of uncertainty regarding federal funding to drive increased adoption of broadband and needed devices.

STRATEGY 6: FUND OPPORTUNITIES TO ENSURE LONG-TERM SUSTAINABILITY

We continue to look for funding opportunities that support ongoing as well as new initiatives. The Digital Equity Competitive Grant Program created by the Bipartisan Infrastructure Law and the Economic Adjustment Assistance program represent promising federal grant opportunities for Baltimore. This long-term program will require resources and cooperation from community leaders to apply for, receive, and administer funding.

- In June 2023, the National Telecommunications and Information Agency announced **Maryland's Broadband Equity, Access, Deployment (BEAD)** program allocation of $268 million for broadband infrastructure deployment projects to support unserved and underserved households. We will study the BEAD program and eligibility rules to determine how this program can benefit covered populations and community anchor institutions in Baltimore. Given the legislative directive to support unserved and underserved locations with priority, it's uncertain how much of the BEAD funding will be available for projects in Baltimore City.
- The **Digital Equity Act** allocated $2.75 billion nationwide for planning grants for states, territories, and Tribal governments to develop state digital equity plans. The State of Maryland has published its plan, anticipating grant funding availability in 2025. We will coordinate with local digital equity stakeholders to connect these resources to digital equity and adoption initiatives that achieve quantifiable success.

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[3] https://technology.baltimorecity.gov/affordable-connectivity-program/

- The **American Rescue Plan Act (ARPA)** supplied COVID relief funding for Baltimore City, including for broadband access and adoption. We will continue to develop programs that support community organizations' efforts to advance digital access and equity. We will monitor any future ARPA grant programs the State of Maryland may release.
- The **Public Works and Economic Adjustment Assistance Program** administered by the U.S. Department of Commerce allocates $161 million to address needs in economically distressed areas. Grants made under this program prioritize projects that develop needed infrastructure in a way that advances equity goals. We will explore how this source of funding will support our current broadband goals and strategies.

We will explore additional funding opportunities through public-private, philanthropic, and nonprofit partnerships

PLANNING PROCESS

In 2020, Mayor Scott created the Office of Broadband and Digital Equity (BDE) to coordinate Baltimore's response to the digital divide. In Baltimore, an estimated **120,000 households face barriers to accessing affordable, reliable, high-speed internet, computer devices, digital skills training, and ongoing support**. As we work to improve the digital ecosystem, we have engaged residents and other stakeholders to ensure residents' voices and experiences guide our equity planning.

Baltimore City's Digital Inclusion Strategy incorporates resident and stakeholder input from dozens of canvassing conversations, focus groups, interviews, surveys, and town hall meetings. These feedback opportunities happened in-person and virtually. This strategy reflects **how residents envision true digital equity throughout Baltimore**. Multiple City agencies convened these conversations from August 2022 through September 2023. We appreciate the thousands of hours of input from residents and other stakeholders to shape the final document.

CONTEXT

"Digital equity" requires that all individuals and communities have the information technology needed for full participation and enjoyment in their communities, democracy, and economy. Digital inclusion requires intentional strategies and investments to reduce and eliminate historical, institutional, and structural barriers to technology access and use. **If digital equity is the goal, we will get there through digital inclusion**.

We use four goals to focus the activities and investments in the digital ecosystem. These pillars represent the community consensus on ensuring that each Baltimore City resident has the resources to bridge the digital divide.

DIGITAL DIVIDE

The digital divide is the gap between those who have affordable access, skills, and support to effectively engage online and those who do not. As technology constantly evolves, the digital divide prevents equal participation and opportunity in all parts of life, disproportionately affecting people of color, Indigenous peoples, households with low incomes, people with disabilities, people in rural areas,

Source: https://www.digitalinclusion.org/definitions

Reliable High-Speed Internet: Baltimore City residents must have access to **affordable**, reliable, high-speed broadband based on investments in future-proof fiber optic networks, starting with the most underserved communities.

Technology and Devices. Baltimore City residents will be able to get a modern computing device.

Digital Skills Training. Baltimore City residents will have access to digital skills training, helping them use computing devices and **safely** navigate the internet.

Technical Support. Baltimore City residents will receive technical support, in multiple languages, to master internet access and devices.

In May 2023, we released Digital Equity Framework 2.0.[4] Framework 2.0 expanded our primary goal from equity through infrastructure to focus on equity through broadband affordability, digital skills training, devices, and technical support.

[4] Baltimore City's Digital Equity Framework 2.0: https://technology.baltimorecity.gov/sites/default/files/CoB_Digital Equity Framework_2.0.pdf

COMMUNITY INPUT PROCESS

Under the Mayor's leadership, City agencies partnered with community leaders to share information about Baltimore's digital ecosystem. More than 2,000 residents and stakeholders shared the challenges that they faced along the continuum of the digital divide. To ensure that the community feedback included the most vulnerable members of Baltimore's communities, we sought and received input with specific representation from the following groups:

- Persons who are 60 years of age or older;
- Formerly incarcerated individuals;
- Persons with disabilities;
- Members of racial or ethnic minority groups;
- People who are unstably housed;
- Individuals with a language barrier, including those who are English learners or have low literacy; and
- Individuals living in households with incomes not exceeding 150% of the poverty level.

Participating agencies included:

- Baltimore City Health Department
- Baltimore City Office of Information and Technology
- Department of Planning
- Enoch Pratt Free Libraries
- Housing Authority of Baltimore City
- Mayor's Office of Children and Family Success
- Mayor's Office of Immigrant Affairs
- Mayor's Office of Performance and Innovation

We used both qualitative and quantitative methods to solicit robust feedback. The Office of Performance and Innovation (OPI) set the guiding principles for both types of analysis. Those principles are: 1) talk to **people** whose feedback is **normally not included in planning** conversations, and 2) get **in-depth insight** into the digital divide **through trusted messengers**.

Our community engagement process allowed residents to:

- collectively identify the barriers they face to digital equity
- prioritize meaningful and effective solutions for their communities

Our approach invited residents and stakeholders to **bring their lived experience and local knowledge** to the topic of digital equity. Grounded in design justice principles, our input sessions addressed the impact of language and literacy needs, accessibility challenges, and guaranteed participation across diverse racial and generational backgrounds. The resulting feedback proved dynamic and enlightening.

COMMUNITY VOICES

"After my stroke, my entire life revolves around technology. Without access to the internet, my nurse won't know if I am having problems when my monitors go off."

—Resident in West Baltimore

FEEDBACK

Resident and stakeholder feedback provided insights we have used—and will continue to use—to deploy infrastructure, solicit resources, and develop programs to close the digital divide.

BROADBAND

Cost: Residents consistently identified cost as the **number one barrier** to accessing high-quality broadband. Residents also **fear unanticipated increases** to their bills.

Access and Reliability: Residents experience variations in signal strength and broadband availability (especially Wi-Fi) throughout Baltimore.

TECHNOLOGY AND DEVICES

Cost: Residents consistently identified cost as the primary barrier to obtaining high-quality devices.

Knowledge: Residents and stakeholders identified the need for more resources to help community members **understand device function and features**.

Useful Life: Residents and stakeholders expressed concerns the devices they get (especially donated/free devices) do not function for a reasonable period.

DIGITAL EDUCATION AND SKILLS

Information: Residents indicated they are rarely aware of digital literacy and training resources available in the City.

Dignity: Residents identified **feeling inferior or unintelligent** as a barrier to developing digital skills.

Consistency: Many residents indicated when they locate appropriate programs, those programs do not last long enough for the community to receive a meaningful or transformative benefit.

Residents getting technical assistance.

ONGOING SUPPORT

Safety: Residents are very **concerned about their information and economic safety** while navigating the digital ecosystem.

Changes: Residents worry they will not be able to keep up with upgrades and advancements.

Trust: Residents want to work with service providers committed to empowering them.

Dignity: Residents identified being treated as inferior or unintelligent as a barrier to engaging ongoing support.

EQUITY CONSIDERATIONS

Crosscutting values help to provide a cohesive framework for addressing local digital equity challenges. Based on the community engagement findings, the following values have emerged as essential to future efforts:

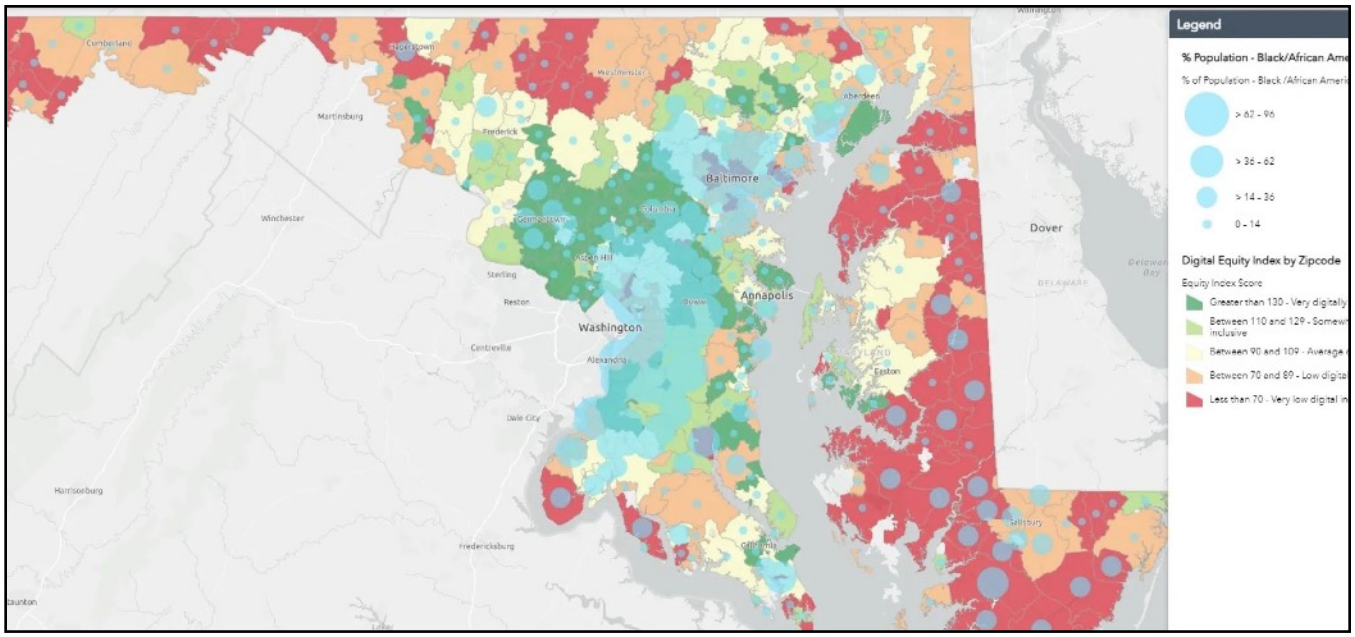
- **Affordable and Accessible**: Focus on affordability and accessibility in all digital equity solutions. Promote universal design and accessibility to accommodate diverse user groups.
- **Collaborative**: Foster collaboration among various stakeholders, including government agencies, nonprofit organizations, educational institutions, and community groups. Catalyze partnerships that can address the digital divide, share resources, and provide holistic support.

COMMUNITY VOICES

"Technology changes so often and as soon as I learn how to stop one type of scam and identity theft, a whole new scam pops up."

—Attendee at Digital Equity Town Hall

- **Community Inclusive**: Invite local communities to participate in the consultative processes and the implementation of digital inclusion efforts. Ensure communities understand how their knowledge provides increased understanding of local needs and issues. Be transparent about how input gets considered and used to inform decisions.
- **Person-Centered Data**: Collect the stories and examples from residents who experience digital divide challenges in a systematic way. Establish a centralized community data system to identify and address evolving needs.



Baltimore Neighborhood Indicator Alliance map of digital equity index by neighborhood[5]

- **Equitable**: Ensure all initiatives address the needs of disinvested communities, including those with limited resources, disabilities, and language barriers.
- **Justice**: Ground efforts to enhance the digital ecosystem in concepts of equity and justice.
- **Inaccessible Hardware and Software**: Address the need for appropriate devices and software for individuals with disabilities.
- **Internet Service Provider (ISP) choice**: Improve selections and address cost issues by expanding beyond a single broadband ISP in Baltimore.
- **Limited Community Access Locations**: Internet access points must meet the needs of shift workers, English language learners, and support people with physical disabilities, particularly the blind and visually impaired.
- **Poor ISP Customer Support**: Improve customer support and satisfaction from internet service providers when customers seek help.

COMMUNITY VOICES

"That's an issue on the block. Being able to afford 'more internet' is an issue."
—Resident in Druid Heights community

[5] Source: https://communitydevelopmentmd.org/digital-inclusion. See also: https://bniajfi.org/digitalaccess/

- **Privacy and Security Fears**: Educate community members on concerns about online privacy and security that act as barriers to digital engagement.
- **Service Interruptions**: Reduce frequent interruptions and slow connections that impede quality online experiences. When interruptions happen, make sure residents understand why and what they can do to prevent it in the future.
- **Trusted Trainers and Training Programs**: Increase the number of trainers with lived experience, particularly for residents who face challenges due to age, mobility, criminal justice, housing and/or immigration status.
    - Identify trainers proficient in addressing unique needs related to language, literacy levels, and physical abilities.
    - Using best practices, tailor training programs to meet adult education and development needs.
    - Prioritize investment in community-based organizations with demonstrated experience working with disinvested communities.

SOLUTIONS

Residents generated approaches they believe will move us toward closing the digital divide faster.

EMPLOY A HYPER-LOCAL FOCUS

- Different neighborhoods have unique digital access challenges, and a hyper-local approach enables tailored solutions that address specific needs.
- Inform decisions by collecting localized data and ensuring funding and activities align with the most critical challenges in each community.

FOCUS ON TRUST BUILDING

- Foster active participation and collaboration from community in digital inclusion efforts.
- Address skepticism and fear, especially in communities where concerns about online privacy and security create barriers to digital engagement, or where confidence in City government has eroded.
- Help residents advocate for digital equity, driving lasting change and influencing policymakers, and demonstrating respect for residents' wisdom.

COMMUNITY VOICES

"I want to use the system [Wi-Fi] and exit. I don't want to feel like I'm leaving any information when I exit."

—Resident in Brooklyn Homes

SEEK OPPORTUNITIES TO STRENGTHEN COMMUNITIES

- Use specialized training programs to address the unique needs of individuals, such as language, literacy, physical ability, and economic circumstance.
- Invest in local organizations that have trusted track records of meeting the diverse needs of community members.
- Select methods that foster agency, collaboration, and interdependence.

ALIGNING STRATEGIES AND ACTIONS TO GOALS

A variety of strategies will support the four goals of Digital Inclusion Strategy.

	Goals			
Strategies	**Reliable, High-Speed Internet**	**Technology and Devices**	**Digital Skills Training**	**Technical Support**
1. Convene stakeholders to serve the most marginalized communities.	☑	☑	☑	☑
2. Focus on fiber.	☑	☑		
3. Expand infrastructure through public-private partnerships.	☑	☑		
4. Build confidence and skills.		☑	☑	☑
5. Increase participation in subsidized services.	☑	☑		
6. Fund opportunities to ensure long-term sustainability.	☑	☑	☑	☑

KEY PERFORMANCE INDICATORS

We will use multiple Key Performance Indicators (KPIs) to track and monitor progress toward achieving the four goals:

- Number of households that receive a device or have a device repaired
- Number of digital skills or education opportunities funded via the Digital Equity Fund
- Number of City employees served through Digital Skills training courses
- Number of residents provided information regarding digital inclusion resources
- Number of recreation centers connected to BDE Network
- Number of Public WiFI access points (APs)
- Neighborhoods with at least 1 Public WiFi APs
- Percent of eligible households enrolled in ACP

STRATEGY 1: CONVENE STAKEHOLDERS TO SERVE THE MOST MARGINALIZED COMMUNITIES

In support of several goals, we must assemble diverse stakeholders to achieve outcomes.

TABLE 1: ACTIVITIES THAT SUPPORT CONVENING STAKEHOLDERS

Activity	Description	Timeline
Enable partnerships	Identify partners who provide or support digital inclusion work through their projects, programs, or initiatives. Serve as a **matchmaker** between partners with complementary services and/or missions.	Immediate
Expand library- and nonprofit-based training	Provide funding for libraries and nonprofits to offer digital skills training, based on standardized and tested curricula that reflect cultural appropriateness	2024 to 2029, based on funding availability
Provide information and guidance	Distribute relevant materials to share expertise and guidance so that communities can identify partners and best practices	Ongoing

STRATEGY 2. FOCUS ON FIBER

Ensuring universal fiber distribution throughout Baltimore will begin to equalize access and opportunities across neighborhoods.

TABLE 2: ACTIVITIES THAT SUPPORT BUILDING FIBER

Activity	Description	Timeline
Promote competition to improve affordability	Since Comcast primarily serves Baltimore for high-speed service, the ubiquity of fiber would give residents and businesses **options for other services**, may encourage upgrades to Comcast's cable service, and will provide residents more price options for service	2024 and thereafter, based on funding availability
Expand use of City-owned conduit to incentivize and support private investment	To expand opportunities for fiber deployments, we will be an active partner and work to facilitate and accelerate construction to as large a service footprint as possible	2024, and thereafter
Expand Baltimore's middle mile infrastructure	We will invest in expanding our backbone fiber infrastructure and enable best-in-class, fully fiber optic connectivity to eight Housing Authority of Baltimore (HABC) properties	Immediate, through 2029, based on funding availability

STRATEGY 3. EXPAND INFRASTRUCTURE THROUGH PUBLIC-PRIVATE PARTNERSHIPS

Pursuing public-private collaboration to invest in Baltimore's most underserved communities will provide private sector opportunities.

TABLE 3: ACTIVITIES THAT SUPPORT BUILDING INFRASTRUCTURE

Activity	Description	Timeline
Develop Internet Service Provider Request for Proposal, in partnership with HABC	To develop the planned fiber to the premises network design to eight priority HABC properties, we will identify partners through a Request for Proposal (RFP). This RFP and the resulting partnership will support **access to affordable broadband services** to almost 4,100 housing units serving low-income and underrepresented communities in Baltimore	Immediate and ongoing

STRATEGY 4. BUILD CONFIDENCE AND SKILLS

Before city residents can benefit from increased access to broadband services, they need high-quality devices, related skills, and support to use the new technologies.

TABLE 4: ACTIVITIES THAT BUILD CONFIDENCE AND SKILLS

Activity	Description	Timeline
Support creating a digital equity resource clearinghouse	Identify, support, and promote existing resources that provide technical support to residents online and through call centers	2024 to 2029, based on funding availability
Distribute more Digital Equity Fund grants	We will offer additional opportunities for nonprofits and service providers to apply for grant funding through the Digital Equity Fund	2024-2026, based on available funding
Expand partnerships with training entities	Using available grant monies, expand training programs through partnerships, including academic institutions and local colleges/universities	Ongoing through 2029, based on funding availability
Expand library-based and nonprofit-based training efforts	Provide funding for libraries and nonprofits to offer training at the local level regarding **online safety** and privacy, based on standardized and tested curricula that reflect cultural appropriateness	Ongoing through 2029, based on funding availability
Fund community-based tech support	Provide funding to offer tech support for tech hub and other community digital site users	2024 to 2029, based on funding availability

STRATEGY 5. INCREASE PARTICIPATION IN SUBSIDIZED SERVICES

In tandem with building digital skills, City residents need to be able to afford broadband access services and computer equipment.

TABLE 5A: ACTIVITIES THAT SUPPORT PARTICIPATION

Activity	Description	Timeline
Develop educational materials	Provide content and support for educational campaigns among organizations that focus on the Affordable Connectivity Program (ACP) and the Maryland Emergency Broadband Benefit Program (MEBB) (or future programs) as well as for localities, community anchor institutions, and nonprofits that have not previously worked to extend enrollment	Immediate and ongoing
Encourage Internet Service Provider (ISP) partnerships for ACP enrollment drives	Encourage ISPs to partner with local nonprofits to develop ACP and MEBB enrollment drives and initiatives	Immediate and ongoing
Fund community and/or library-based ACP and MEBB enrollment drives	Provide funding for community-based organizations and/or libraries to offer ACP enrollment drives for eligible households	2024 to 2029, based on funding availability
Pursue alternative low-cost and subsidized service programs to fill gaps if ACP is eliminated	Promote continuation of MEBB Program, including by advocating with state lawmakers; promote enrollment in any low-cost programs offered by local ISPs	Starting when ACP funds are exhausted
Fund a third party, or develop in-house capability and capacity, to operate a small call center	Provide outreach and education on programs, plus intake of questions and referrals to help struggling households with step-by-step instructions to sign up for programs	Support with federal digital equity funding no sooner than 2025

TABLE 5B: ACTIVITIES IN SUPPORT OF DEVICE PROVISION PROGRAMS

Activity	Description	Timeline
Secure and give out 50,000 devices to income-eligible households	Partner with the Office of Statewide Broadband, Enoch Pratt Free Library, and other organizations to provide free HP Chromebooks to low-income households	Ongoing through 2024
Provide information	Help nonprofits to develop and expand existing programs that provide free devices to lower-income households	2024 and thereafter
Support ACP enrollment and use of ACP device subsidy	Work with partners to help eligible households purchase computing devices using the $100 subsidy available under the Affordable Connectivity Program	Ongoing
Increase device distribution programs through partners and with state and federal funding	Develop internal capacity, or fund 3rd party efforts, to create device distribution programs for qualified households; pair these programs with digital skills training and technical support discussed in Strategy 5	Consider current partnerships; additional funding may begin in 2025

Residents at a digital equity resource fair

STRATEGY 6. FUND OPPORTUNITIES TO ENSURE LONG-TERM SUSTAINABILITY

Long-term federal programs like the Digital Equity Competitive Grant Program promise significant opportunities to fund digital equity initiatives: applying for and administering grants once obtained will require resources and cooperation from agencies and Baltimore community leaders. However, grants are limited in scope and length of time. We will partner with philanthropic organizations and private industry to explore additional funding opportunities. Additionally, Strategy 2 and 3 discuss sustainable infrastructure investment strategies, leveraging City-owned assets to promote public-private partnership.

TABLE 6: ACTIVITIES THAT SUPPORT GRANT OPPORTUNITIES

Activity	Description	Timeline
Support and closely monitor the development of the BEAD program rules and framework to determine if we can participate	For example, we will review the material for the State's BEAD challenge process to identify locations in Baltimore City that are not properly classified as underserved or unserved (such as apartment communities or community anchor institutions).	Immediate and ongoing
Pursue funding opportunities through Digital Equity Act	We will expand our partnership with the State of Maryland to access grant funding from these programs to support existing and proven digital equity and inclusion initiatives that achieve measurable success	2024 and thereafter
Partner with HABC to identify funding opportunities through State of Maryland's Capital Projects Fund (CPF) program	A wide range of technical, planning, workforce development, entrepreneurship, and public works and infrastructure projects that create or retain jobs are eligible for funding under the CPF program. Included in this are building, designing, and engineering broadband infrastructure and facilities to advance economic development strategies	Immediate and ongoing

APPENDIX A

DIGITAL INCLUSION STRATEGY—A TECHNICAL DISCUSSION

DIGITAL INCLUSION STRATEGY—A TECHNICAL DISCUSSION

The following discussion provides a more-in-depth look at the City of Baltimore's strategy going forward.

STRATEGY 1: CONVENE STAKEHOLDERS TO SERVE THE MOST MARGINALIZED COMMUNITIES

Baltimore City has the power, resources, and position to increase digital equity and inclusion in all corners of the City, but we must bring all stakeholders together to achieve our collective goals. We will continue to use our resources in the most effective and efficient way to convene stakeholders on a regular basis.

Our stakeholders will include private foundations and the larger philanthropic community, service providers, nonprofit organizations of all types, community anchor institutions, and others. We will reach out to organizations as critical partners in this effort.

Through this convening process, we have been able to work directly with groups of nonprofits to take a more direct role in supporting their work to advance digital equity goals. These efforts include participating in grant applications for digital equity funding, guiding program development, and partnering on data collection efforts. Potential outputs for future gatherings include:

- Supporting the role of private foundations and other organizations as a "matchmaker" and matching the needs/gaps with core competencies to create partnerships;
- Aggregating information to identify needs and gaps and support efforts by nonprofits to tailor solutions to meet those needs through new programs, applications for funding, and outreach and education;
- Coordinating organizations that plan to apply for state and federal grant funding to ensure distributing funds in the most effective and efficient way to benefit residents of the City and possibly serving as a direct applicant for funding to coordinate efforts among organizations and support organizations with limited scale and resources;

- Supporting applications for grant funding, including letters of support or matching funds;
- Allocating City funds to existing projects or managing additional city grant programs; and
- Partnering with organizations committed to digital equity to establish resources such as tech hubs through recreation centers and senior centers to provide residents with access to computing devices, digital skills training, free wi-fi, information and resources to close the digital divide.

In addition, we will take other steps to ensure digital equity, including:

- Securing funding and establishing a program through the City's Office of Broadband and Digital Equity to provide devices to 50,000 households by September 2024;
- Identifying, supporting, and promoting existing resources that provide technical support to residents through online and call center mediums;
- Deploying a Community Tech Support team to partner locations for hardware and software assistance; and
- Promoting the Affordable Connectivity Program with a goal of enrolling 75% of eligible households in the program, and promoting other affordability programs.

STRATEGY 2: FOCUS ON FIBER

Baltimore City will focus its efforts on projects with technologies that provide access to high-speed, affordable broadband based on the City's fiber deployment. Fiber expansion represents a prudent investment with tremendous public benefit in the short, medium, and long terms. Community-wide fiber brings reliability, longevity, and capacity with unlimited scalability to meet community needs.

Expanding fiber access throughout the city is necessary to support the demands by every Baltimore resident, as the Federal Communication Commission (FCC) definition of "broadband" at 25/3[6] no longer supports work and learning from home and staying connected to friends and family. Residents who can only rely on outdated network technologies, such as copper DSL, lack the tools and capabilities to fully participate

[6] https://broadbandnow.com/report/fcc-broadband-definition

online. While coaxial cable and fixed wireless service may act as temporary solutions to connectivity gaps, neither media can compare to the resiliency, reliability, or capacity of fiber-optic networks.

EQUITY THROUGH FIBER ACCESS

Currently, only six percent of Baltimore City households have access to fiber-based internet (see Appendix C). These residents either live on the edge of the city limits, where Baltimore County's fiber presence has bled into the city, or in specific areas with industries or businesses that demand robust internet connections, such as neighborhoods surrounding Johns Hopkins University. This leaves most city residents, and almost all low-income city residents, without access to fiber-based internet.

Ensuring universal fiber distribution throughout the city with widespread fiber to the premises deployments, combined with strategies to ensure affordable access and digital skills training for the services offered over this fiber network, will begin to equalize access and opportunities across neighborhoods. Affordable and reliable access to high-quality broadband advances broader community goals to upskill and reskill online, work remotely, and support entrepreneurial pursuits. It also eliminates barriers to residential use, allowing for home-based business, telemedicine, and distance learning.

Fiber's gigabit-and-beyond speed allows businesses of all sizes to compete and grow at a global level through strategies like cloud computing, e-commerce, business-to-business relationships, and operational efficiency. Markets, investors, and consumers favor this infrastructure—and this infrastructure increasingly differentiates those communities that have it. For more information on the capabilities and benefits of fiber, see Appendix B.

PROMOTE COMPETITION TO IMPROVE AFFORDABILITY

Currently, roughly one-fifth of all residents have only one internet service option available to them. Therefore, they lack the benefits of a competitive marketplace. This lack of competition can impact pricing and customer service, and disincentivizes ISPs to prioritize upgrading network infrastructure to fiber. Since Comcast primarily serves the City for high-speed service, the ubiquity of fiber would give residents and businesses options for other services, may encourage upgrades to Comcast's cable service, and will provide Baltimore City residents with more price options for service. See Appendix C for an expanded marketplace analysis.

EXPAND USE OF CITY-OWNED CONDUIT TO INCENTIVIZE AND SUPPORT PRIVATE INVESTMENT

To expand opportunities for fiber deployments, the City will take all reasonable steps to facilitate and speed construction to as large a service footprint as possible by making available:

1. City fiber for backbone connectivity
2. Discounted or free access to City conduit
3. Space in Baltimore City hub sites for provider equipment
4. Facilitation of expedited permitting

This business model will require the City to lease available access to its fiber and conduit assets, including those that serve City facilities and public housing.

DEVELOP CITY-OWNED INFRASTRUCTURE IN LOW-INCOME AREAS

A City-owned middle-mile network will bring equitable high-speed broadband services to Baltimore communities. Working with the Housing Authority of Baltimore City (HABC), the City will focus its efforts in areas with public housing to facilitate a public-private partnership business model. The City's plans for the network design and infrastructure deployment are discussed in this strategy. The plans to leverage this infrastructure to build stronger public-private partnerships to bring benefits to City residents, including those in low-income housing, is discussed more fully in Strategy 3.

The City will invest in expanding its backbone fiber infrastructure and enable best-in-class, fully fiber optic connectivity to the eight HABC properties listed in Table 1, by December 2026. This network will also allow the City to deploy an open-access Wi-Fi network in low-income communities in public spaces and along pedestrian pathways. The City's planned deployment will extend connectivity from the City's major internet points-of-presence, at which dozens of major providers are collocated, to within feet of each of the approximately 4,100 residential units in the listed HABC properties.

TABLE 1: PRIORITY HABC SITES

HABC Property	Number of Housing Units
Brooklyn Homes	482
Cherry Hill Homes	1,281
Douglass Homes	387
Gilmor Homes	415
Latrobe Homes	669
McCulloh Homes	576
Mount Winans Homes	52
Westport Homes	201
Total Units	4,061

To facilitate leasing capacity on this network for private entities to serve these public housing units, the City will extend fiber throughout each of the HABC properties to exterior demarcations (underground handholes or similar enclosures) adjacent to each residential structure.

The City's plans include augmenting the existing backbone with approximately nine miles of additional backbone routes, constructing three hub shelters on the backbone to house network electronics, and installing eight miles of laterals from the City backbone to each of the HABC properties.

The City will design the fiber infrastructure for this initial effort to coincide with a conceptual plan for citywide fiber-to-the-premises (FTTP) infrastructure, ensuring compatibility with standards-based FTTP technologies widely adopted by commercial network operators. This, in turn, will create efficiencies for future expansion by the City and/or its partner(s).

STRATEGY 3: EXPAND INFRASTRUCTURE THROUGH PUBLIC-PRIVATE PARTNERSHIPS

America's cities lack business cases for private broadband investment in many parts of their communities. Private investment patterns in urban and suburban areas focus on high-volume customers such as large businesses and institutions and on wealthier residential areas that deliver significant broadband revenues. City leaders further understand that, in their efforts to attract private capital, they are effectively competing with their neighbors, both locally and regionally, and with other communities throughout the country.

We will focus our efforts on the most underserved communities by incentivizing investment through a strategy of public-private partnership. That approach will reduce the cost and risk to the City while enabling private sector opportunities. To do this, we will use our funds, efforts, and assets to make targeted investments in the City's infrastructure. In turn, this will help attract private capital to build and operate world-class communications infrastructure in Baltimore.

PUBLIC-PRIVATE COLLABORATION CREATES OPPORTUNITY

Even as fiber-based broadband has become a critical infrastructure element for cities, fiber deployment has not emerged—or has stalled in most American cities. In many cities, including Baltimore, incumbent providers such as Verizon have built some limited fiber in business areas and a few higher-income residential neighborhoods. Residents in Baltimore and its peer cities are likely not to see community-wide fiber anytime soon if the responsibility is placed exclusively on the private sector.

Existing cable networks reach most—though not all—residences; however, cable's hybrid fiber/coaxial infrastructure does not allow for symmetrical speeds offered by fiber and does not enable next-generation wireless. The combination of geographically-limited fiber and capacity-limited cable broadband means that many American cities may have difficulty competing in the long-term. As a result, cities will experience stark differences in broadband options across different parts of their communities.

Public-private collaboration can help expand opportunities for broadband more widely. This model leads to all residents having access to future-proof broadband. This collaboration can also incentivize private investment through public investment.

Collaboration supports the business case in areas that otherwise offer insufficient return to attract private capital.

A BALTIMORE PUBLIC-PRIVATE PARTNERSHIP STRATEGY

As discussed in Strategy 2, Baltimore City is planning a project to support the deployment of middle mile and distribution fiber network facilities to eight public housing properties within the City. This project will include the installation of wiring within buildings to serve each unit of the property. While the City will pay for and own the facilities, including from the demarcation point into the building to serve each unit, it will lease capacity on these facilities to allow service providers to provide discounted services to low-income residents.

The business model need not involve any operational or customer service role for the City or HABC. Around the country, fiber providers are taking renewed interest in serving cities. Based on a market sounding commissioned by the City, a well-structured Request for Proposal (RFP) offering use of City assets, and with the City agreeing to pay the monthly cost of service to tenants for an initial period, is likely to provide enough incentive to attract proposals and sustain the private business model and, potentially, to stimulate additional private investment.

This new infrastructure is focused on the areas of the City with HABC properties we identified, but will complement and provide other opportunities for partnerships as the City leases access to additional facilities and develops fiber deployments and open-access public Wi-Fi deployment in other neighborhoods and serving City-operated recreation centers.[7] As a result of this single project, the City can continue to actively outreach and encourage opportunities for additional public-private partnerships that bring significant benefits to the most people, while supporting effective use of public funding.

IDENTIFICATION OF PRIVATE PARTNERS

We will identify partners through an RFP to develop this planned fiber to the premises (FTTP) network design. This RFP and the resulting partnership will support access to

[7] "American Rescue Plan Act Funding Announcement: Mayor Scott Announces $35 Million Investment to Kickstart Efforts to Close the Digital Divide," City of Baltimore, https://arp.baltimorecity.gov/sites/default/files/arp_baltimorecity_gov/attachments/Funding%20Announcement_Broadband%20and%20Public%20WIFI.pdf

affordable broadband services to almost 4,100 housing units serving low-income and underrepresented communities in the City. This partnership entails the City owning the infrastructure, while the partner will bring its substantial expertise and knowledge to operate the network and provide affordable services to each resident that requests it within the building.

The RFP will direct investment into low-income neighborhoods that have been historically passed over for private investment in infrastructure. It will also solicit affordable options for broadband access to the residents of these housing developments and explicitly support broader private investment into the City and offer commercial services to residential, business, and institutional customers.

This initial effort will include extensions to handholes adjacent to certain HABC properties, putting the City in a position to execute on the RFP strategy.

- The first goal is to identify an entity to construct fiber—specifically, the building access and in-building elements of a fiber network—into eight priority HABC sites from nearby City handholes (that is, connecting to the City's middle-mile fiber network), and then lease and operate that fiber. The City will offer an indefeasible right of use on this fiber that may be decades long, securing the business opportunity.
- The second goal is to seek pricing for five years of broadband service to 100% of HABC households choosing such service. The RFP will state that the City (not HABC) will commit to pre-paying for these five years of services for all residents who choose to take service.
- The third goal is to use both mechanisms—the access to fiber, plus a five-year City commitment to pay for service—as an inducement for the entity to invest private capital in broadband infrastructure and service to other parts of the City.

We anticipate partnering with HABC (as the eligible entity) to apply to the state of Maryland to fund as much of this work as possible. The City will seek ARPA Capital Projects Fund monies for construction. Anything not funded by the State, the City will fund. See Strategy 6 for a discussion of funding opportunities.

We will welcome the responses of incumbent internet service providers (ISPs), competitive providers, nonprofit institutions, cooperatives, and entities that are not traditional ISPs, which are interested in offering service. We will encourage collaboration among proposers as necessary to meet the RFP's goals.

STRATEGY 4: BUILD CONFIDENCE AND SKILLS

Before Baltimore City residents can fully benefit from increased access to broadband services, they must also have the related skills and opportunities to use the new technologies to meet their needs. To bring these benefits to all neighborhoods, we will substantially expand the number of skills programs and technical support services in the City. The programs will ensure all residents feel confident and secure using digital tools and online services.

According to a 2018 report by the U.S. Department of Education, digital literacy among U.S. adults generally increases with educational attainment. About two-fifths (41%) of U.S. adults without a high school diploma are not digitally literate compared with 17% of adults who have a high school diploma but no college degree, and only 5% of adults who have a college degree are not digitally literate. According to the U.S. Census Bureau, approximately 13.7% of Baltimore residents do not have high school diplomas. This suggests up to 80,000 Baltimore City residents may lack digital literacy.

According to the State of Maryland Department of Labor's Adult Education Digital Literacy Framework 2.0, City residents need digital skills to successfully navigate the digital ecosystem, operate all types of devices, and bridge the digital divide. These skills would allow residents to learn basic technical skills, protect online privacy and guard against fraud, access, share, and validate informational resources using online platforms, collaborate with others, problem solve, access public resources, and develop content.[8]

EXISTING DIGITAL SKILLS TRAINING PROGRAMS

The Baltimore Digital Equity Fund (DEF), administered through the Baltimore Civic Fund, was established in 2022 with ARPA funding to support community-led efforts to close the digital divide in the City. The DEF offers three types of grants: education and outreach, planning, and implementation for neighborhood-level digital equity and inclusion

[8] Source: "Adult Education Digital Literacy Framework," State of Maryland Department of Labor, https://www.dllr.state.md.us/adultliteracy/digitalliteracyframework.pdf.

activities.[9] In September of 2023, the City announced that it was awarding more than $900,000 in grants to help advance digital skills by supporting 22 Baltimore-based organizations as they create digital inclusion plans and develop related programs. For example, Byte Back—an organization that provides historically excluded communities with digital literacy and tech certification training—received funding in 2023 to continue its work.[10]

Additionally, we have launched programs including ones funded by the federal Health Resources & Services Administration for skills training in libraries. For example, the Enoch Pratt Free Library received funding to deliver training to older adults at senior centers.

We view these and similar programs as candidates for funding and partnerships to expand their services and accommodate the critical need for digital literacy and skills training.

NEW PROGRAMS

We anticipate many opportunities to develop new programs and partnerships. We also recognize the need to reach new communities and expand opportunities for digital skills training, including training on protecting privacy while online and guarding against fraud and other threats. Partnerships with academic institutions at all levels—including universities, community colleges and local schools—will support expanding digital skills and literacy training to reach a broad cross-section of Baltimore City residents, including residents of all ages, backgrounds, and levels of income.

We will institute programs at senior centers and recreation centers to provide programs tailored for those communities. We will consider engaging partners to develop digital skills training materials to post for on-demand access by community organizations and members. This resource would allow a broader audience to be served. This model also provides a "train - the - trainer" opportunity to grow the number of organizations that can support digital skill trainings.

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[9] https://technology.baltimorecity.gov/digital-equity-fund

[10] Mayor Scott Invests Nearly $1 Million to Close Digital Divide With Grant Awards to Baltimore-Based Organizations (Sept 8, 2023) https://mayor.baltimorecity.gov/news/press-releases/2023-09-08-mayor-scott-invests-nearly-1-million-close-digital-divide-grant

Additionally, we are building a network of tech hubs located in community spaces across the City such as senior centers, libraries, and recreation centers. These tech hubs will provide access to digital skills trainings, privacy and online security trainings, as well as technical support resources.

These free public internet sites will provide access to computer labs and free internet access. We will organize the tech hubs in places where people have been underrepresented, creating a public "commons" where residents can go to get support from others, participate in training classes, and have companionship, all the while developing digital confidence and building skills.

These tech hubs can also include in-person technical support with one-on-one assistance. We may also fund other types of tech support opportunities through local nonprofits and other social services providers that can be delivered over the phone or online. This approach can also encompass supplemental resources, such as video tutorials or printed materials, designed to help all Baltimore City residents.

Multiple studies have indicated that lack of technical support available to users is one reason for lower digital equity outcomes in some communities. These outcomes are exacerbated when combined with other limiting circumstances (for example, low educational attainment, poverty, non-native English speaker). One of the ways we will address this issue is to provide on-demand support to encourage increased internet access and adoption.

STRATEGY 5: INCREASE PARTICIPATION IN SUBSIDIZED SERVICES

Just as having strong digital skills support will help Baltimore City residents reap the benefits of increased broadband access, it is also critical that all City residents can afford to subscribe to broadband access services without having to make significant sacrifices in their household budget. Affordability includes whether the services being offered provide the speeds, reliability, and data capacity to meet each household's individual needs at a price point that the household can afford.

There are subsidy and discount programs that support the affordability of high-speed broadband services. However, these programs frequently place unnecessary burdens on families as part of the enrollment process, including strict eligibility requirements that

exclude many communities in need, onerous eligibility documentation requirements, continuous renewal obligations, and poor customer service. While the level of benefits and customer service may vary among these programs, the struggle for a family to enroll is similar for private programs, such as Comcast's Internet Essentials, as well as federal initiatives like the FCC's Lifeline and Affordable Connectivity programs.

Baltimore has a very low level of broadband adoption, especially for a major city. Low numbers have many contributing factors, but affordability is one key consideration. See Appendix C for more discussion.

To support affordability of expanded broadband access, a key solution is to ensure all eligible households are aware of and enrolled in applicable low-cost broadband plans or broadband subsidies.

As of August 1, 2023, estimates based on FCC reported enrollment suggests that 71,471 Baltimore City households were receiving the ACP subsidy—which is about 56% of the estimated 127,971 eligible households in the City.[11] This enrollment rate is substantially larger than the statewide average of 33% and the national average of 40.4%. While this enrollment rate is comparatively encouraging, it still leaves roughly 57,000 eligible households that are not receiving subsidized internet service (if they receive internet service at all). This represents an opportunity for the City to utilize its resources to help more eligible households receive subsidized service.

We have already successfully leveraged federal programs to support broadband adoption by lower-income members of the community,[12] and we now plan to expand these efforts for further community outreach and support to help low-income residents understand and access these programs, as well as to help with overcoming the effort necessary to demonstrate eligibility.

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[11] ACP enrollment numbers were sourced from the Universal Server Administration Co (USAC) and updated as of August 2023 by the State of Maryland's ACP enrollment partner, EducationSuperHighway; https://www.educationsuperhighway.org/no-home-left-offline/acp-data/#dashboard

[12] "BMore Connected" program to provide outreach and education on federal subsidy program funded by federal American Rescue Plan Act programs, the FCC, and the Abell Foundation, Mayor Scott, BCIT, to Bring Affordable Home Internet to Baltimore Households (May 2023) https://mayor.baltimorecity.gov/news/press-releases/2023-05-18-mayor-scott-bcit-bring-affordable-home-internet-baltimore-households.

EXISTING AFFORDABILITY PROGRAMS

Low-income Baltimore residents have a $30 monthly subsidy available through the federal Affordable Connectivity Program (ACP). The State used $45 million in federal funding to create the Maryland Emergency Broadband Benefit (MEBB) Program that provides a $15 State subsidy in addition to the ACP subsidy.

Although funding is limited, we will work with the State and other entities to extend these programs as resources allow. We will work with partners to create successor programs and encourage philanthropic and nonprofit efforts to develop additional subsidy funding.

Even if these federal and state subsidy programs expire, eligible residents have low-cost options from service providers, such as a service offered by Comcast for $10 per month called Internet Essentials or a faster, higher bandwidth service for $30 per month called Internet Essentials Plus.[13] Other large providers have their own income-eligible low cost programs and future federal funding will require the offering of a discount programs as a condition to receive grants, thereby serving as a catalyst for expanded affordability programs.

These programs work better if we mitigate or remove enrollment barriers. To advance affordability goals, we will develop programs, including education and outreach programs, to ensure the highest possible enrollment levels in these or future programs with a goal of having 75% of eligible households in Baltimore enrolled in the ACP.

In July of 2023, Governor Wes Moore announced a new program, “Maryland ActNow,” in partnership with EducationSuperHighway to increase awareness of ACP and the State’s MEBB program.[14] The City of Baltimore is an active partner with EducationSuperHighway and the State of Maryland to support ACP outreach and enrollment efforts. The City will identify opportunities for the sustainability of future initiatives to help drive increased adoption of broadband and needed devices.

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[13] https://www.xfinity.com/support/articles/comcast-broadband-opportunity-program

[14] “Governor Moore Launches Maryland ActNow Campaign to Close the Digital Divide in Maryland,” Office of Governor Wes Moore, News Release, July 18, 2023, https://governor.maryland.gov/news/press/pages/governor-moore-launches-maryland-actnow-campaign-to-close-the-digital-divide-in-maryland.aspx.

STRATEGIES FOR PROGRAM DEVELOPMENT

We have many initiatives to consider and have already worked to expand affordability for high-speed broadband services by creating opportunities for outreach and education about broadband affordability programs.

These strategies also include possible public or private funding, or a partnership of the two, to help fund discounts for services to the most disinvested communities of the City, especially if the federal ACP is discontinued.

We will expand our education and outreach program to residents through trusted local nonprofits to explain eligibility and program benefits in providers' low-cost programs (Comcast's Internet Essentials program, for example) as well as the FCC's Lifeline and Affordable Connectivity Program. This expansion will leverage existing efforts to maximize the impact of long-standing programs that are available to many residents.

Finally, we need to further investigate setting resources to develop, support or expand existing small call centers to help residents understand and navigate these programs. The call centers should conduct outreach and take incoming calls and referrals to help households qualify for these programs. As a synergistic benefit, a well-trained call center staff may also assist residents in obtaining other resources, such as rental assistance or food assistance, thereby increasing the effectiveness of the investment in the call center.

We may consider using such call centers to help small ISPs get qualified by the FCC to participate in Lifeline and ACP and help determine if customers are eligible.[15]

Experience indicates a relatively modest call center staffed by three people could have a potentially large impact—assisting thousands of families per year increase access to affordable broadband services.

[15] This approach would take some of the burden off smaller ISPs. For big ISPs, this is a relatively easy chore; they have access to the federal Lifeline verifier, as well as their own low-income programs.

OUTREACH INITIATIVE TO HELP FAMILIES MIGRATE FROM ACP TO OTHER LOW-INCOME PROGRAMS

Considering the risk of ACP expiring, we will provide outreach and education to support provider low-income and low-cost services, facilitate sign up, and support participation in new digital equity programs. This outreach and education program will have a goal of expanding enrollment in providers' low-cost programs (such as Comcast's Internet Essentials program). We will continue to promote the Affordable Connectivity Program–or its successor–to ensure 75% of eligible households are enrolled in the program.

Such a strategy would develop and provide educational materials, encourage partnerships with service providers to educate and support customer enrollment, and work with community organizations to support enrollment drives to fill the gap left by the loss of ACP.

The strategies are summarized below:

BACKGROUND, METRICS AND DATA FOR DEVICE-RELATED STRATEGY

Affordability of broadband service is only part of the puzzle to bring high-speed broadband to disinvested communities. The benefits of the internet cannot be attained without affordable, modern computing devices to reach it. Provisions should also be made to update and maintain the device. The City will benefit from significant expansion of existing efforts to get high-quality devices to disinvested communities through the City.

According to the Abell Foundation, more than 70,000 Baltimore City residents have inadequate access to quality computing devices such as a desktop or laptop computer. As seen in the table below, low-income households are more likely to have a smartphone instead of a more powerful laptop or desktop computer. Meaning they're at a disadvantage in terms of their ability to use internet access for telehealth, remote learning, or telework.

TABLE 2: ACCESS TO COMPUTING DEVICES BY INCOME LEVEL

	All	Under $25,000	$25,000-$49,999	$50,000-$74,999	$85,000-$149,000	$150,000 and greater
Desktop or laptop computer	68.3%	42.8%	62.2%	75.8%	88.6%	92.8%
Tablet computer	53.3%	30.7%	43.7%	60.1%	71.3%	83.9%
Smartphone	81.9%	68.3%	80.2%	83.8%	91.8%	96.6%
Number of households	237,144	65,994	54,271	37,965	52,817	26,097

Source: *Baltimore's Digital Divide: Gaps in Internet Connectivity and the Impact on Low-Income City Residents*, Abell Foundation

DEVICE PROGRAMS

The Maryland Department of Housing and Community Development's Office of Statewide Broadband has announced another round of its Connected Devices Program (MD-CDP) with $30 million in federal funding to provide approximately 145,000 devices to low-income families in fiscal year 2023, distributed through county and municipal governments.[16] Through this program, Baltimore City received funding to distribute over 30,000 of those devices to eligible City residents through the Enoch Pratt Free Library.[17]

MD-CDP is important but unlikely to fully close the device gap in Baltimore. To help close this gap, we will continue to partner with the Office of Statewide Broadband, nonprofits, and philanthropies to find funding opportunities and leverage existing programs.

As discussed below, there will be future federal funding through the Office of Statewide Broadband and the federal Digital Equity Act that could be used to support and develop these and other efforts. It's crucial for the success of any device distribution program, or outreach and education effort, that it's paired with information about digital skills and technical support programs discussed above. While affordability is a significant aspect of whether a household has sufficient device capability, it is just as important recipients of these devices receive training to use, maintain, and upgrade the device.

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[16] https://dhcd.maryland.gov/Broadband/Documents/CDP-Presentation.pdf

[17] https://mayor.baltimorecity.gov/news/press-releases/2023-10-03-mayor-scott-bcit-and-pratt-library-distribute-free-chromebooks-low

STRATEGY 6: PURSUE ADDITIONAL FUNDING OPPORTUNITIES TO SUPPORT LONG-TERM SUSTAINABILITY

Baltimore City has committed to an ambitious set of goals and strategies to advance digital equity and inclusion for all residents. As part of this work, we must manage a wide variety of funding resources in partnership with federal and state entities, private philanthropic organizations, and City funds. The most promising federal grant opportunities for Baltimore are the Digital Equity Competitive Grant Program created by the Bipartisan Infrastructure Law (BIL) and the Economic Adjustment Assistance program funding created by the American Rescue Plan Act (ARPA). These are long-term programs with significant opportunities for the City, but also will require resources and cooperation from other agencies and Baltimore community leaders to apply for, receive, and administer.

This overview of federal grant opportunities is not exhaustive, as the funding landscape continues to evolve. This represents the type of resources and opportunities we will continue to pursue as part of this Plan.

Maryland's Broadband Equity, Access, Deployment (BEAD) program may be a future source of infrastructure or digital equity funds for Baltimore.

In June 2023, the National Telecommunications and Information Agency (NTIA) announced the BEAD program's allocation of $268 million. The Office of Statewide Broadband will administer this infrastructure deployment program over the course of the next five years.

Under the Maryland Five-Year-Action Plan for using this funding, the State has set the following primary objectives for broadband deployment:

1. Serving 100% of unserved locations (that is, below 25/3 Mbps) within five years – including public and nonprofit owned multiple dwelling unit (MDU) locations that are determined to be unserved through the State's challenge process to ensure the availability of reliable and affordable high-speed broadband access in low-income and affordable public housing
2. Serving 100% of underserved locations (that is, between 25/3 and 100/20) within five years

3. Assuming adequate funding, delivering gigabit connections to community anchor institutions that do not have that level of service within five years

Should BEAD funds remain after the first three objectives are fulfilled, Maryland will then focus on:

4. Supporting digital equity and inclusion programs to help drive higher adoption among BEAD-defined covered populations

The BEAD program may also allow states to "pursue eligible access-, adoption-, and equity-related uses, as well as any other uses approved by the Assistant Secretary that support the Program's goals."[18]

It is uncertain how much of the BEAD funding will be available for projects in Baltimore City or granted to the City to administer subgrants. Because the legislative priorities for BEAD mandates that funding must be used for unserved and underserved broadband locations, with a priority for deployment to unserved locations, it is possible that BEAD funds will be exhausted before they can be used for other types of projects.

We will engage in and closely monitor the development of the BEAD program rules and framework to determine if we can participate. For example, we will review the material for the State's BEAD challenge process to identify locations in Baltimore City that are not properly classified as underserved or unserved (such as apartment communities or community anchor institutions). These challenges will help ensure that every location in the City is properly funded for improved broadband access. We will also review the State's plans to determine if community anchor institutions or public housing units in the City will have access to any of the BEAD funding.

THE STATE'S FORTHCOMING STATE DIGITAL EQUITY PLAN AND FUNDING PROGRAM HOLDS THE BEST POTENTIAL FOR DIRECT FEDERAL FUNDING FOR BALTIMORE CITY

The Digital Equity Act allocated $2.75 billion nationwide for programs to support digital equity and inclusion and provide the opportunity for everyone to have full access to the digital economy. In 2022, the NTIA allocated $60 million nationwide for planning grants for states, territories, and Tribal governments to develop State Digital Equity Plans.

[18] NTIA BEAD Frequently Asked Questions, Version 3.0, https://broadbandusa.ntia.doc.gov/sites/default/files/2023-07/BEAD_Frequently_Asked_Questions_Version_3.0.pdf (accessed September 1, 2023).

Maryland received almost $1 million of these preliminary funds and has its plan under development.

Baltimore is home to a significant number of residents that are explicitly designated as "covered populations" by Congress to be the focus of the benefits under the Digital Equity Act. These covered populations include low-income individuals, older adults, racial and ethnic minorities, people with disabilities, veterans, and formerly incarcerated people. We will target our efforts described above to specifically address the needs of these communities.

Under the Digital Equity Act and NTIA's implementation, there will be at least two grant opportunities for digital equity programs in the City. For the Digital Equity Capacity Building Program, the State will apply for funding from NTIA and develop its own subgrant program for local projects throughout Maryland. NTIA will also release a Digital Equity Competitive Grant Program that represents an opportunity for funding additional projects. These programs are expected to be operational toward the end of 2024 and through 2025.

The City will expand its partnership with the State of Maryland to access grant funding from these programs to support existing and proven digital equity and inclusion initiatives that achieve measurable success. Funding will support programs that address affordability of broadband and devices, provide education and tools to increase privacy and cyber security, develop digital literacy and technical skills for personal and professional growth, and provide technical support and training to repair and update devices.

BALTIMORE IS ALREADY AN ACTIVE PARTICIPANT IN PROGRAMS FUNDED BY THE AMERICAN RESCUE PLAN ACT (ARPA)

The ARPA State and Local Fiscal Recovery funds went to both the State of Maryland and directly to cities and counties. We used some of our share of these funds to support outreach and education for ACP as well as grants for digital equity capacity building to local organizations.

There are many different types of projects that are eligible for this funding. This structure gives us the most flexibility to use these funds to expand and develop new broadband infrastructure and digital equity programs. We will monitor state and local opportunities

for future ARPA grant programs, including those that the State of Maryland's Office of Statewide Broadband may release. These opportunities could support the strategies above, including the construction of wired high-speed broadband infrastructure for the City's public low-income housing communities, as well as device distribution programs and subsidies for low-income households for services.

We would consider taking advantage of this opportunity through a direct application for funding or, as part of our convening activities, work with local organizations and service providers to encourage them to apply for projects that will benefit Baltimore City residents.

GRANTS FOR FIBER INFRASTRUCTURE MAY ALSO BECOME AVAILABLE VIA THE STATE OF MARYLAND'S CAPITAL PROJECTS FUND (CPF) PROGRAM

Maryland's Office of Statewide Broadband has held multiple rounds of its "Connect Maryland: Maryland Network Infrastructure Grant Program" with the source of CPF funding also provided under the ARPA statute. This program is exclusively used for infrastructure projects and would build on the funding the City of Baltimore has already received from both the state and federal governments to support broadband infrastructure. As with the Fiscal Recovery Funds, we would likely look for a partner to support our efforts under this program or conduct outreach and education to encourage other eligible applicants to apply for funding for projects within the City.

A wide range of technical, planning, workforce development, entrepreneurship, and public works infrastructure projects that create or retain jobs are eligible for funding under this program. Included in this are building, designing, and engineering broadband infrastructure and facilities to advance economic development strategies. In prior rounds, there were limits to the total amount of funding and the applicant was expected to provide matching funding of 10% to 30% of the total project cost.

We will monitor the development of future rounds of this funding as possible support for our planned investment in fiber infrastructure and public-private partnerships to support Strategies 2 and 3.

THE PUBLIC WORKS AND ECONOMIC ADJUSTMENT ASSISTANCE PROGRAM HAS OPPORTUNITIES FOR DISTRESSED COMMUNITIES

The Economic Development Administration (EDA) of the U.S. Department of Commerce administers funding opportunities for a wide variety of projects with an allocation of $161 million nationwide. The program is designed to address needs in economically distressed areas, and projects must meet specific criteria to show the project area is economically distressed. While this federal agency does not receive many broadband applications, communities that can show broadband is needed as an element of their economic development plan may satisfy funding criteria.

Grants made under this program will help communities plan, build, innovate, and put people back to work through infrastructure construction or non-construction projects designed to meet local needs. EDA encourages applicants to present "new ideas and creative approaches to advance economic prosperity in distressed communities" and will consider projects that incorporate priorities related to equity, entrepreneurship, and workforce development. Building, designing, or engineering infrastructure and facilities to advance economic development strategies, or planning efforts to implement such solutions, are all considered eligible costs. Several of the strategies and projects discussed above could be eligible for funding under the program.

There are no application deadlines for this program and the City is an eligible entity to apply for this funding. Importantly, higher education and nonprofit organizations are also eligible entities, suggesting that we may pursue a joint application with interested community organizations. Grant awards vary with a minimum of $100,000, and a maximum of $30 million. Applicants will be required to provide matching funds of no less than 20%, with most grants requiring 50% or more of the total project costs.

For funding under this program, we must describe the steps we will "take to ensure that the economic benefits of the project will be shared by all communities in the project region, including any underserved communities." We will apply the "distress criteria" (high unemployment rates or low per capita income relative to the national average) to identify areas and neighborhoods of Baltimore that can take advantage of this opportunity. We will be mindful that projects with significant showing of "distress" through extremely high unemployment or low per-capita income will generally have the lowest match requirements, and thus more flexibility in how we design proposed projects.

BALTIMORE CITY WILL WORK WITH THE MARYLAND OFFICE OF STATEWIDE BROADBAND TO CONSIDER OTHER FUNDING OPPORTUNITIES

We recognize that the funding landscape is evolving as policy makers prioritize digital equity and inclusion goals. Digital equity and inclusion is one method to accomplish larger economic and social development objectives relating to education, healthcare, and social services. We will continue to work closely with the Maryland Office of Statewide Broadband to identify applicable state-funding and local programs that can provide support for the Strategies discussed above.

To ensure sustainability of the City's digital inclusion programs and investments, we will partner with philanthropic organizations and private industry to identify alternative sources of funding. Additionally, Strategy 2 and 3 identify opportunities to leverage City-owned assets through public-private partnerships, leading to lower cost, risk, and potential self-sustainability for infrastructure investments.

CONCLUSION

All the strategies described in this technical discussion depend on having partners committed to closing the digital divide. These strategies emerged from thoughtful research and discussion. They reflect the hopes and concerns of the residents standing to benefit from our actions. We all look forward to continuing and increasing our efforts to close the digital divide in Baltimore.

APPENDIX B

FIBER AS A TECHNOLOGY SOLUTION TO SUPPORT DIGITAL EQUITY

With the long pandemic as a catalyst, we spend much of our lives working, learning, and socializing remotely. Most policymakers recognize that the FCC's 2015 definition of broadband (25/3 Mbps service) no longer reflects the average US household's broadband demands[19]. As the internet continues to play an increasing role in our lives, Americans have continually consumed more and more data. The average household downloaded 462 GB of data per month in first quarter 2021, an amount that had steadily increased by 25% to 40% annually for the several years before the pandemic[20]. Videoconferencing applications have also tested the limits of networks' upload capacities. The internet monitoring company OpenVault found that average monthly upload usage increased 63% between the end of 2019 and the end of 2020, from 19 to 31 GB per month[21]. A growing number of upstream super-users have nearly reached the limits of certain networks; OpenVault noted that there have been "an increasing number of incidents in which upstream traffic exceeded 80% of node capacity," requiring that network operators pinpoint bottlenecks and take action to improve upstream connectivity.

People's choice of service packages reflects this increased demand for bandwidth. Nearly 10% of broadband subscribers have 1 Gbps service, an amount that grew 300% throughout 2020[22]. As of Q1 2021, 80.4% of broadband-subscribing households had adopted services providing downloads of at least 100 Mbps[23]. This level of high-speed broadband adoption where available suggests that a significant majority of the 27.5 million unconnected people across the nation are missing out on the opportunities that many of us now take for granted[24].

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[19] FCC, "2015 Broadband Progress Report and Notice of Inquiry on Immediate Action To Accelerate Deployment," GN Docket No. 14-126, January 29, 2015, Para. 26.

[20] OpenVault, "Broadband Insights Report (OVBI)," Q1 2021, 13; see also OpenVault, various "Broadband Industry Report[s]," Q1 2018-Q1 2021, available at https://openvault.com/resources/blog/

[21] Treasury, State and Local Fiscal Recovery Funds Interim rules, 73, citing OVBI Special Report: 202 Upstream Growth Nearly 4X of Pre-Pandemic Years, https://openvault.com/ovbi-special-report-2020-upstream-growth-rate-nearly-4x-of-pre-pandemic-years/

[22] OpenVault, "Broadband Insights Report (OVBI)," Q1 2021, 7. Another 4% have services between 500 and 900 Mbps. Ibid.

[23] OpenVault, "Broadband Insights Report (OVBI)," Q1 2021, 7.

[24] FCC, Communications Marketplace Report, 2020, p. 87.

Increasing minimum download speeds: Fiber enables faster download speeds. Policymakers have taken notice of the significant increase of actual broadband use by increasing the speed standards employed to set broadband deployment goals, define un- and underserved areas, and establish minimum buildout requirements. The Treasury Department, overseeing ARPA's broadband funding, and the FCC have both identified that a family of five who telecommute and use remote education need access to download capacity of at least 100 Mbps to work simultaneously[25].

Federal policy now acknowledges this 100 Mbps download standard occasioned by the ever-growing demand for bandwidth. For example, the U.S. Department of Commerce's Broadband Equity, Access, and Deployment (BEAD) Program classifies any service at 100/20 Mbps or slower as "underserved" and prioritizes fiber deployment of 100/100[26]. Other federal programs place strong incentives to meet this minimum standard. For example, the Rural Digital Opportunity Fund (RDOF) prioritized service offerings speeds of at least 1 Gbps, which resulted in a number of cable and primarily DSL providers proposing fiber deployments in order to receive deployment rewards[27].

INCREASING MINIMUM UPLOAD SPEEDS

Fiber enables upload speeds symmetrical with download. Upload speed requirements that are a mere tenth of download speeds are gradually being replaced by standards that recognize the growing necessity of teleconferencing applications. As the Department of the Treasury explained in a recent regulatory ruling, "The 100 Mbps symmetrical standard accounts for increased pandemic internet usage and provides adequate upload speeds for individuals and businesses to accommodate interactive applications such as virtual learning and videoconferencing, while also helping ensure that funding is responsibly used to provide a true and lasting benefit for years to come[28]."

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[25] Department of the Treasury, "Coronavirus State and Local Fiscal Recovery Funds," Interim Final Rule, 31 CFR Part 35, p. 72; Federal Communications Commission, Broadband Speed Guide, https://www.fcc.gov/consumers/guides/broadband-speed-guide.

[26] Infrastructure Investment and Jobs Act, Division F, Title I, Section 60102 (Broadband Grants), https://www.congress.gov/bill/117th-congress/house-bill/3684/text; National Telecommunications Information Agency, Notice of Funding Opportunity for the Broadband Equity, Access, and Deployment Program (May 2022),

[27] See, Federal Communications Commission, Auction 904 (Rural Digital Opportunities Fund) summary website for releases of authorized projects, https://www.fcc.gov/auction/904.

[28] Department of the Treasury, Federal Register Final Rule, 87 F.R. No. 18, p. 4420 (January 27, 2022); see also, "Coronavirus State and Local Fiscal Recovery Funds," Final Rule, 31 CFR Part 35, Subpart A, §§35.1-35.12.

To meet the growing demand for upload capacity, some states have required symmetrical download and upload speeds. The State of Maryland aims to have high-speed broadband, at speeds that exceed current definitions of broadband, available to all residents by 2026[29].

Scalability. Fiber—which is reliable and affordably scalable, with a high maximum bandwidth limit—represents a key component of our overall strategy. A strand of standard single-mode fiber-optic cable has a theoretical physical capacity of more than 10,000 GHz, far in excess of the entire wireless spectrum combined. Generally, only the equipment used to activate the fiber needs to be upgraded to provide more information bandwidth and take advantage of fiber's long-term potential. For this reason, most of the world's broadband backbone is fiber, powered by light relay devices that continually push performance boundaries and fuel electronic innovations that make ever-improving middle- and last-mile relays more affordable.

Table 1 identifies the bandwidth limits of several information transmission technologies. Relative to cables with metallic components, fiber offers better environmental and weather resistance, lower maintenance costs, and a longer lifespan.

TABLE 1: PHYSICS IMPOSES BANDWIDTH LIMIT AND MAXIMUM RANGE ON EACH BROADBAND TECHNOLOGY

Technology	Bandwidth limit	Max range	Lifetime	Maintenance costs
Fiber	2,800 GHz	Hundreds of km	Fiber: 30+ years Equipment: 10 years	Low
Entire wireless/ satellite spectrum	100 GHz	200 feet to line of sight	7 yrs.	High & frequent
Coaxial cable (Comcast network)	2 GHz	Few hundred feet	20 years	Low
Copper cable (AT&T network)	0.6 GHz	100 feet	20 years	High

[29] Senate Bill 66, Chapter 74, Digital Connectivity Act of 2021," Maryland General Assembly, https://mgaleg.maryland.gov/2021RS/chapters_noln/Ch_74_sb0066E.pdf, at Preamble.

Fiber's most direct technological competitor, the coaxial cable, illustrates many of the reasons why fiber is the only real option for future-proof networks. Comcast and its counterparts have done an impressive job of improving coaxial cable's performance characteristics, enabling the current DOCSIS 3.1 transmission standard used in most areas to achieve download speeds of 1 Gbps or more. However, the combination of coaxial cable's substantially higher resistance across distances and other technical limits have required that cable networks employ heavy use of fiber. Coaxial cables send signals via electrical impulses, so coaxial networks must repeatedly boost the signal every few hundred feet to overcome resistance losses. In contrast, fiber optic cable can carry the equivalent capacity over several miles without amplification. As a result, nearly all networks using coaxial cables are hybrid fiber-coaxial systems. Comcast and the other cable companies have been deploying fiber deeper and deeper into most neighborhoods to achieve better performance, leaving only tens of feet of cable between subscribers and their core fiber-based networks.

As upload speeds have become more important, coaxial-based services have gradually been outclassed. DOCSIS 3.1-based services generally offer upload speeds of between one eighth to one tenth the download speeds provided to fiber subscribers. Fiber can easily offer symmetrical services, with download speeds matching upload speeds. As a result, lower-tier fiber plans have offered substantially better opportunities for upload-heavy applications like videoconferencing, video uploads, and file transfers than cable services with equal or even greater download speeds.

Marketing claims surrounding 5G wireless technologies have suggested that they compare with wireline broadband service, but they also depend upon an underlying fiber network for "backhaul," the process of sending and receiving signals to the entirety of the internet beyond the local area. As each cellular broadcast node handles more information to and from mobile devices over the airwaves, it must increase its use of fiber accordingly.

This fiber requirement is also increased by other properties of 5G wireless networks. Due to the performance characteristics of the sections of the spectrum allocated to them, 5G services offer two different sets of performance characteristics. The millimeter wave band of spectrum has been lauded for its ability to produce speeds of 1 Gbps or more in certain circumstances. However, this section of the spectrum cannot be transmitted longer than

about a mile in optimal conditions and a variety of surfaces, including some glass windows, can completely block transmission. 5G transmission towers must be deployed significantly more densely than 4G cell towers to improve signal reliability and require even more fiber, deployed more closely to end users, to connect those towers to the internet. As a result, these high-speed wireless services are likely to only be cost-feasible in dense areas that justify the deployment expenses, such as stadiums, airports, and busy city centers. In contrast, the other portions of the 5G spectrum offer incrementally better performance characteristics, relative to 4G LTE services, but these improvements are not capable of satisfying most users' current wireline broadband demands, let alone keeping up with the rapid annual increase in broadband demand.

APPENDIX C

BALTIMORE CITY BROADBAND PROFILE

CITY OF BALTIMORE BROADBAND PROFILE

We conducted an analysis to inform Baltimore City's digital inclusion strategy. This included studying broadband availability and adoption and the current state of digital equity in the City.

Broadband availability refers to data that describe the current state of broadband infrastructure and service in Baltimore, including areas that may be eligible for state and federal grant funding.

Broadband adoption and digital equity refer to data regarding the current state of broadband adoption and opportunity in Baltimore, including on the issues of affordability, device access, and digital skills.

1.1 BROADBAND SERVICE AVAILABILITY

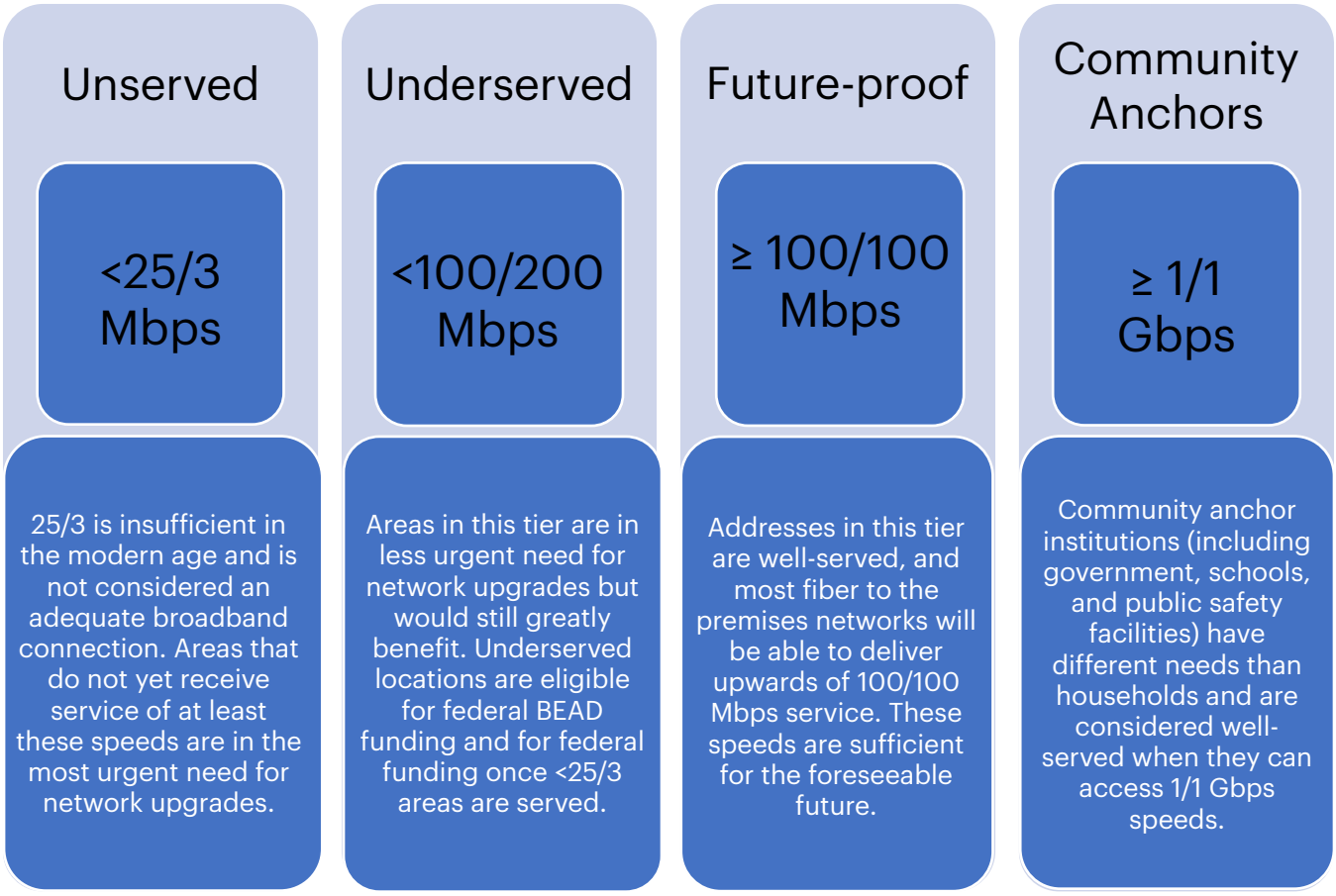
We used a variety of data sources and methods to identify broadband service availability:

- The FCC's National Broadband map helped identify unserved and underserved areas.
- We benchmarked service availability in the City against state and national averages.
- We performed geospatial analyses to understand:
  - Coverage areas,
  - Download and upload speeds,
  - Service delivery technology,
  - Levels of market competition, and
  - Household income levels.
- We investigated each internet service provider (ISP)'s offerings to evaluate pricing across geographies with different household income levels.

1.1.1 BROADBAND SPEEDS

With Congress' passage of the Infrastructure Investment and Jobs Act (IIJA), the FCC now considers 100 Mbps download, 20 Mbps upload (100/20) as the threshold for broadband, and therefore only areas with at least these speed levels available are considered "served." Areas that can only obtain service between 25/3 and 100/20 are considered "underserved."[30] New infrastructure initiated through federal funding requires a minimum of 100/100 speeds. Policymakers use the following definitions for benchmarking broadband speeds. Download and upload speeds are measured in megabits per second (Mbps) or gigabits per second (Gbps).

FIGURE 1: BROADBAND SPEED DEFINITIONS

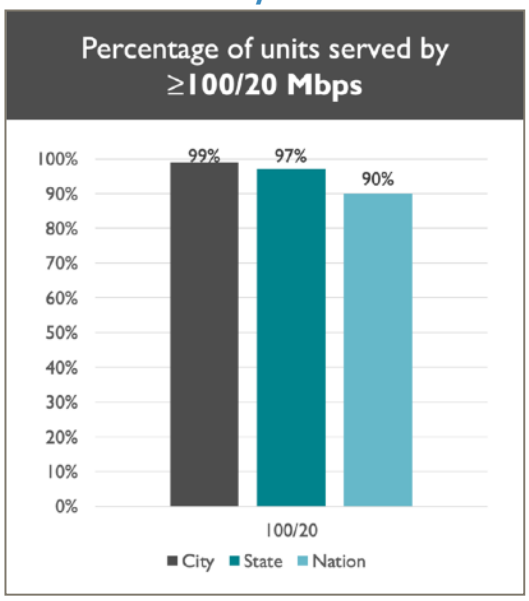


[30] "NTIA's Role in Implementing the Broadband Provisions of the 2021 Infrastructure Investment and Jobs Act," NTIA, https://broadbandusa.ntia.doc.gov/news/latest-news/ntias-role-implementing-broadband-provisions-2021-infrastructure-investment-and

1.1.2 SERVED AND UNDERSERVED AREAS IN BALTIMORE

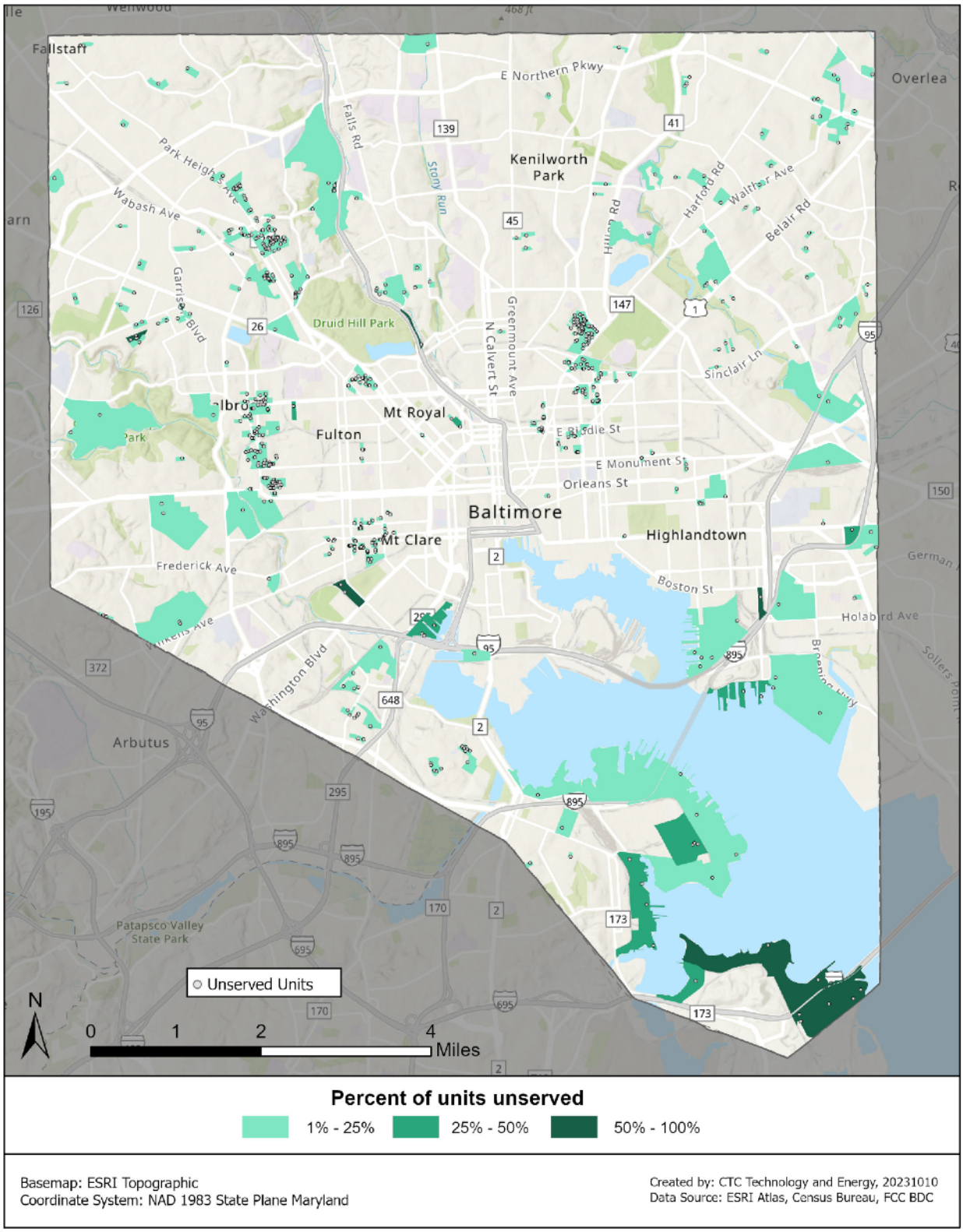
The City has a higher percentage of served households as compared to the state of Maryland and the U.S. average. Service availability is measured at the unit level (housing units) and address level (physical location or building). An apartment building may count as one address but contain many units. Figure 2 shows that 99 percent of units in Baltimore are served at 100/20 Mbps or higher as compared to 97 percent in Maryland and 90 percent in the U.S.

FIGURE 2: PERCENTAGE OF UNITS SERVED IN BALTIMORE, MARYLAND AND THE U.S. AT 100/20 OR HIGHER



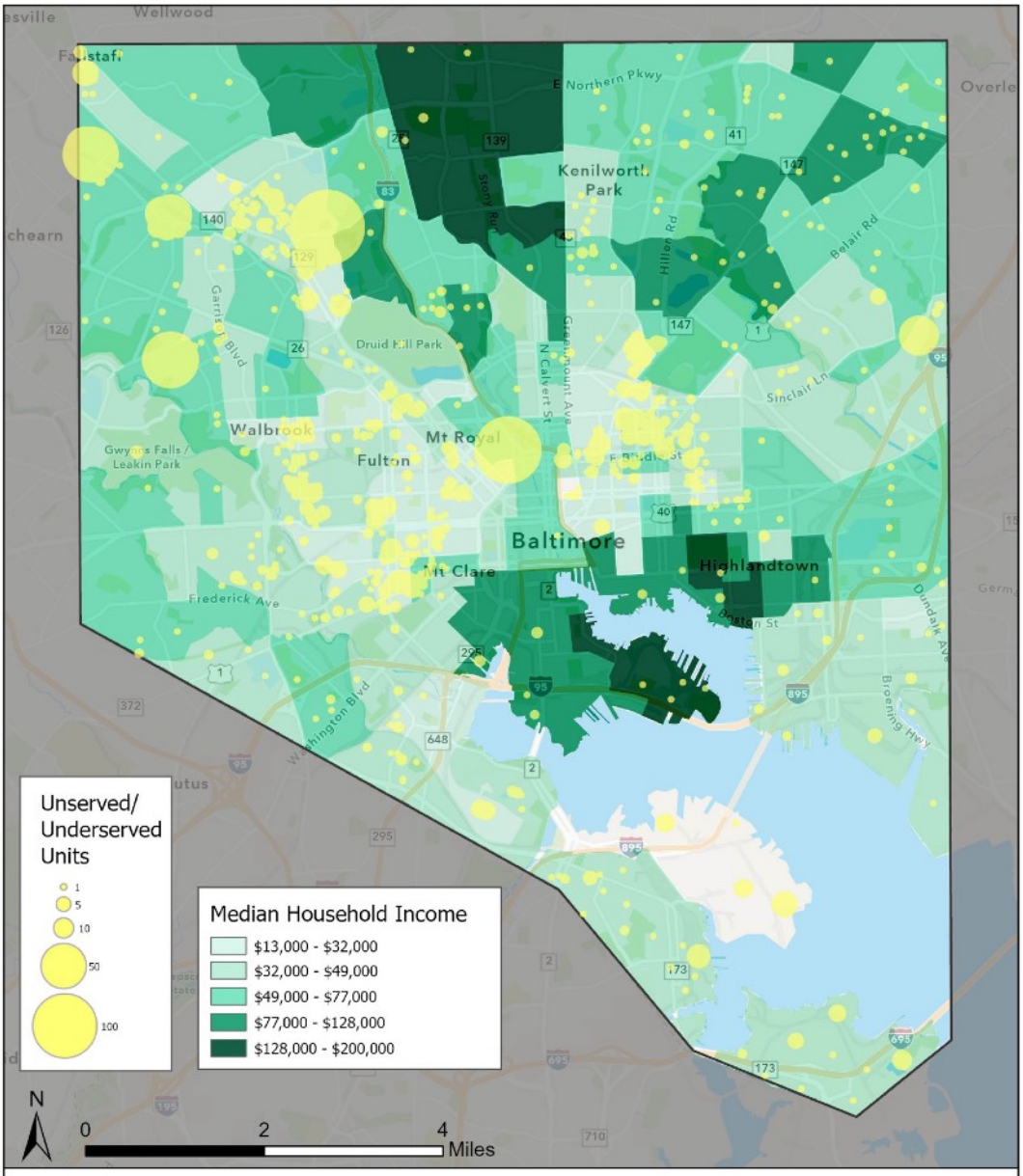
Less than 1 percent of residents are unserved in Baltimore. Those residents live northwest of Druid Hill Park in Park Heights; east of Gwynns Falls Park in Walbrook, Northwest Community Action, Winchester, and Mosher; north of Carroll Park in Mt. Clare; and west of Clifton Park in Midway and Coldstream (see Figure 3).

FIGURE 3: PERCENTAGE OF UNITS UNSERVED



A few scattered locations remain unserved and underserved downtown and in Baltimore's outer ring. More concentrated clusters of unserved and underserved appear in the lowest income areas. Figure 4 shows these locations by median income distribution.

FIGURE 4: UNSERVED AND UNDERSERVED AREAS BY MEDIAN HOUSEHOLD INCOME



Underserved and unserved units overlaid with median household income

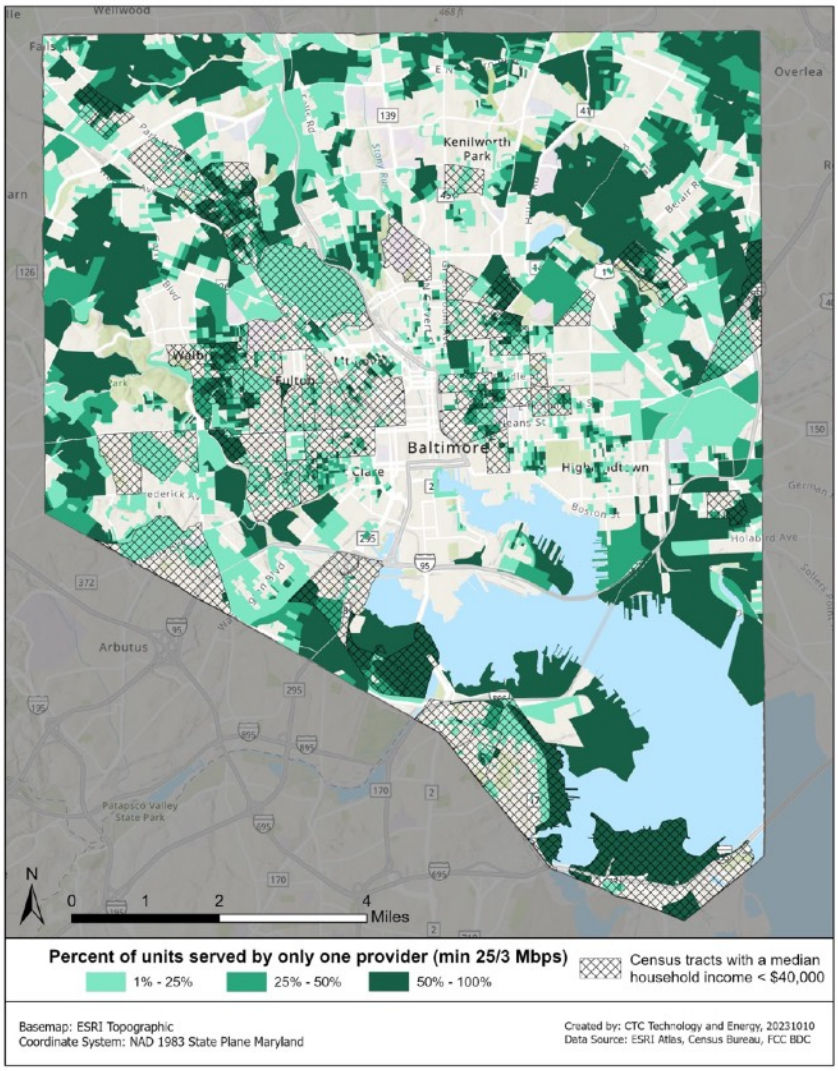
Basemap: ESRI Community Map
Coordinate System: NAD 1983 State Plane Maryland

Created by: CTC Technology and Energy, 20231020
Data Source: ESRI Atlas, Census Bureau, FCC BDC Oct 10 2023
Income reported by census tract: Units reported by census block

1.1.3 SERVICE PROVIDER COMPETITION

Twenty percent of Baltimore City locations have access to only one broadband provider that offers speeds greater than or equal to 25/3 Mbps. While this portion covers many of the lower income areas of the City, there is a lack of competition in many other areas (see Figure 5). 80 percent of served Baltimore addresses have access to more than one broadband provider offering at least 25/3 Mbps. 80 percent is a relatively high percentage, but it still leaves many areas without a choice in selecting an ISP. Expansion of mobile carriers and other ISPs with fixed wireless services—such as LTE and 5G home internet service—often provide competitive options at lower speed tiers.

FIGURE 5: PERCENTAGE OF UNITS WITH ONLY ONE PROVIDER AT 25/3 OR HIGHER



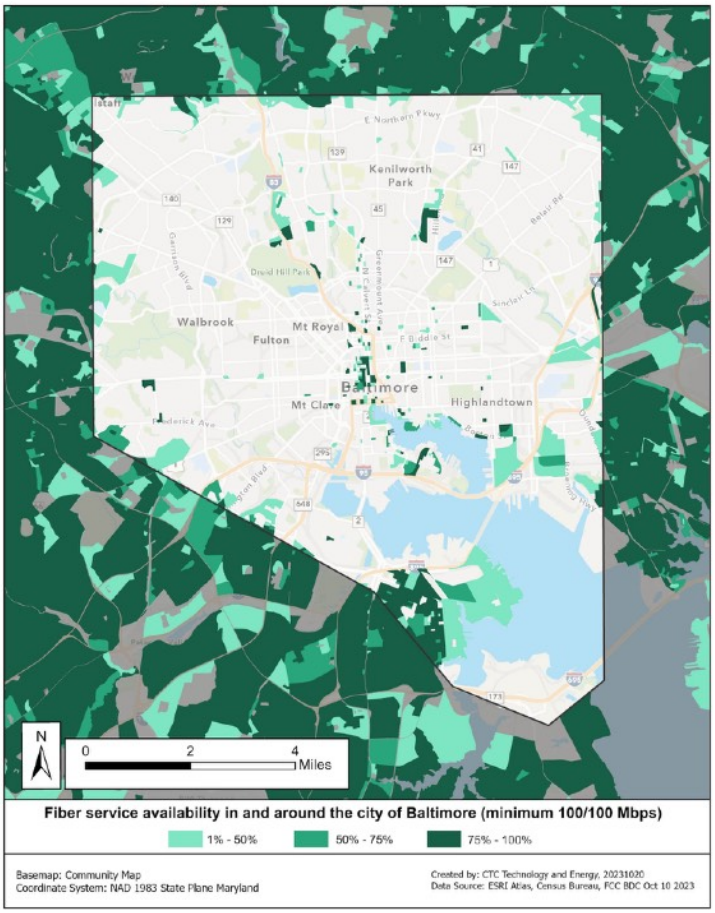
1.1.4 BROADBAND SERVICE BY TECHNOLOGY

Future-proof broadband infrastructure refers to fiber optic cable, which carries data in the form of pulses of light, enables symmetrical speeds (that is, the same download and upload speeds), lasts for decades, and is scalable through electronics upgrades to achieve speeds far higher than other technologies.

1.1.4.1 FIBER AVAILABILITY

While Baltimore is surrounded with fiber in the suburbs, there are relatively few areas covered by fiber within City boundaries (see Figure 6). Fiber is generally concentrated in the area around downtown. The other areas with fiber are around major arteries feeding downtown areas, especially in higher income areas, and in neighborhoods with businesses that require robust internet connections, such as the area around Johns Hopkins University.

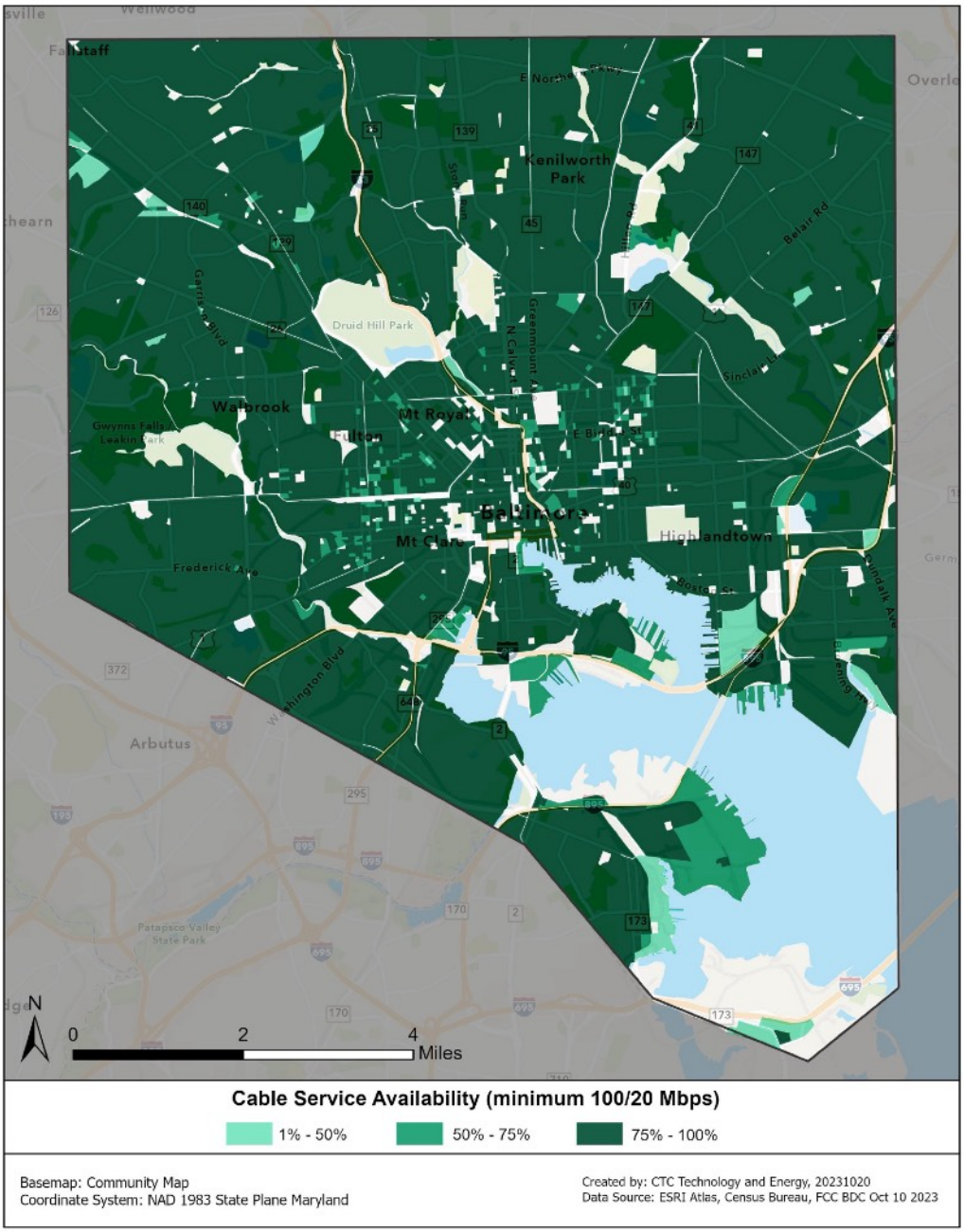
FIGURE 6: AREAS WITH FIBER COVERAGE



1.1.4.2 CABLE AVAILABILITY

The City is almost entirely covered by Comcast cable service as a result of franchise agreement obligations. Comcast can deliver up to 1.2 Gbps download speeds and up to 35 Mbps upload speeds. Increased upload speeds will require a significant upgrade to the cable network. See Figure 7.

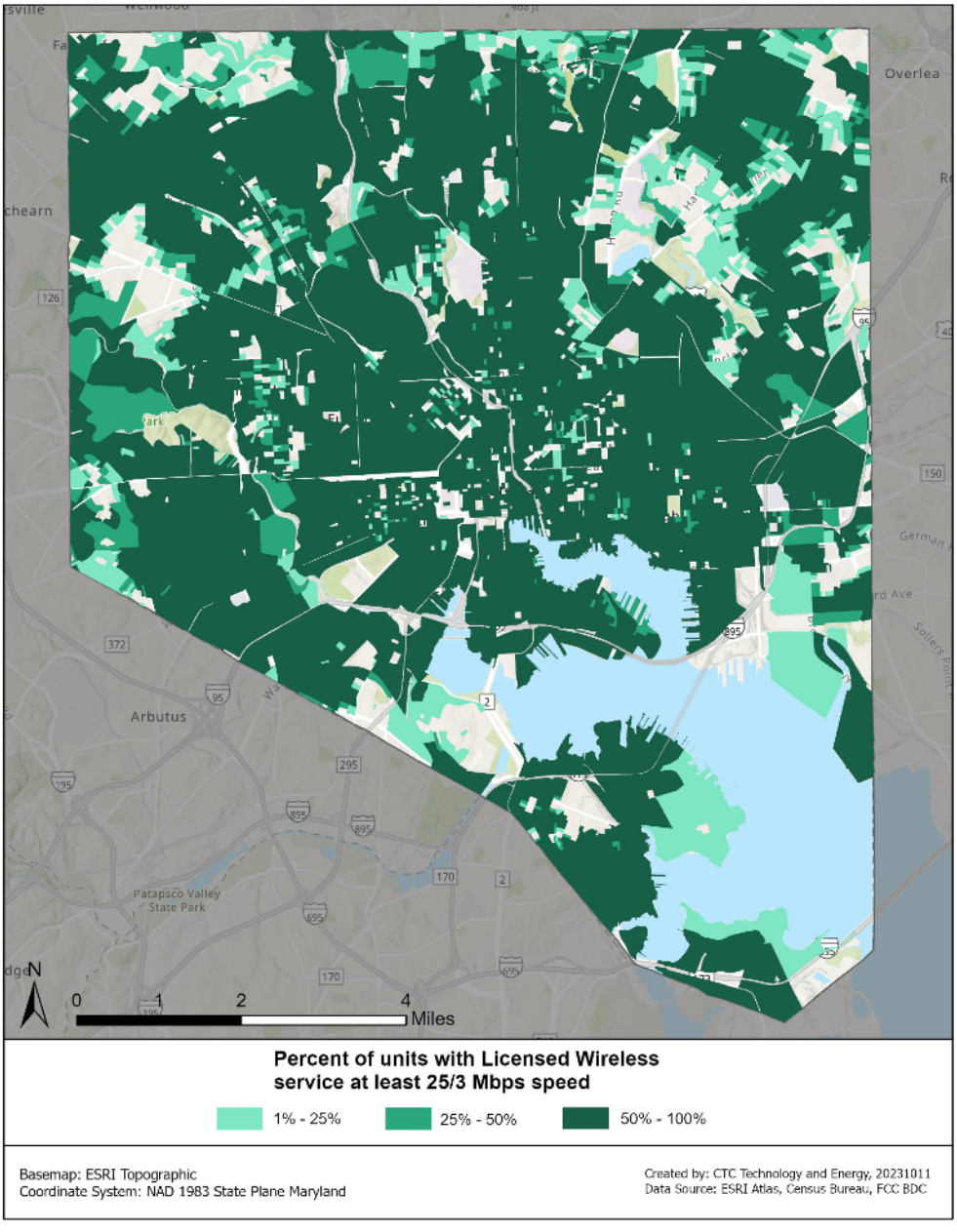
FIGURE 7: AREAS WITH CABLE COVERAGE



1.1.4.3 FIXED WIRELESS AVAILABILITY

Licensed fixed wireless is also available in the City. But although providers report that 79 percent of units are within reach of such services, coverage quality varies and existing capacity limits the actual availability of such services. Figure 8 shows the percentage of units covered by fixed wireless at speeds of at least 25/3.

FIGURE 8: PERCENTAGE OF HOUSEHOLDS WITH ACCESS TO FIXED WIRELESS SERVICE AT 25/3 OR HIGHER



The two main cellular fixed wireless providers (T-Mobile and Verizon) struggle to provide coverage at 100/20 or above, as shown in Figure 9 and Figure 10.

FIGURE 9: T-MOBILE HOME FIXED WIRELESS COVERAGE

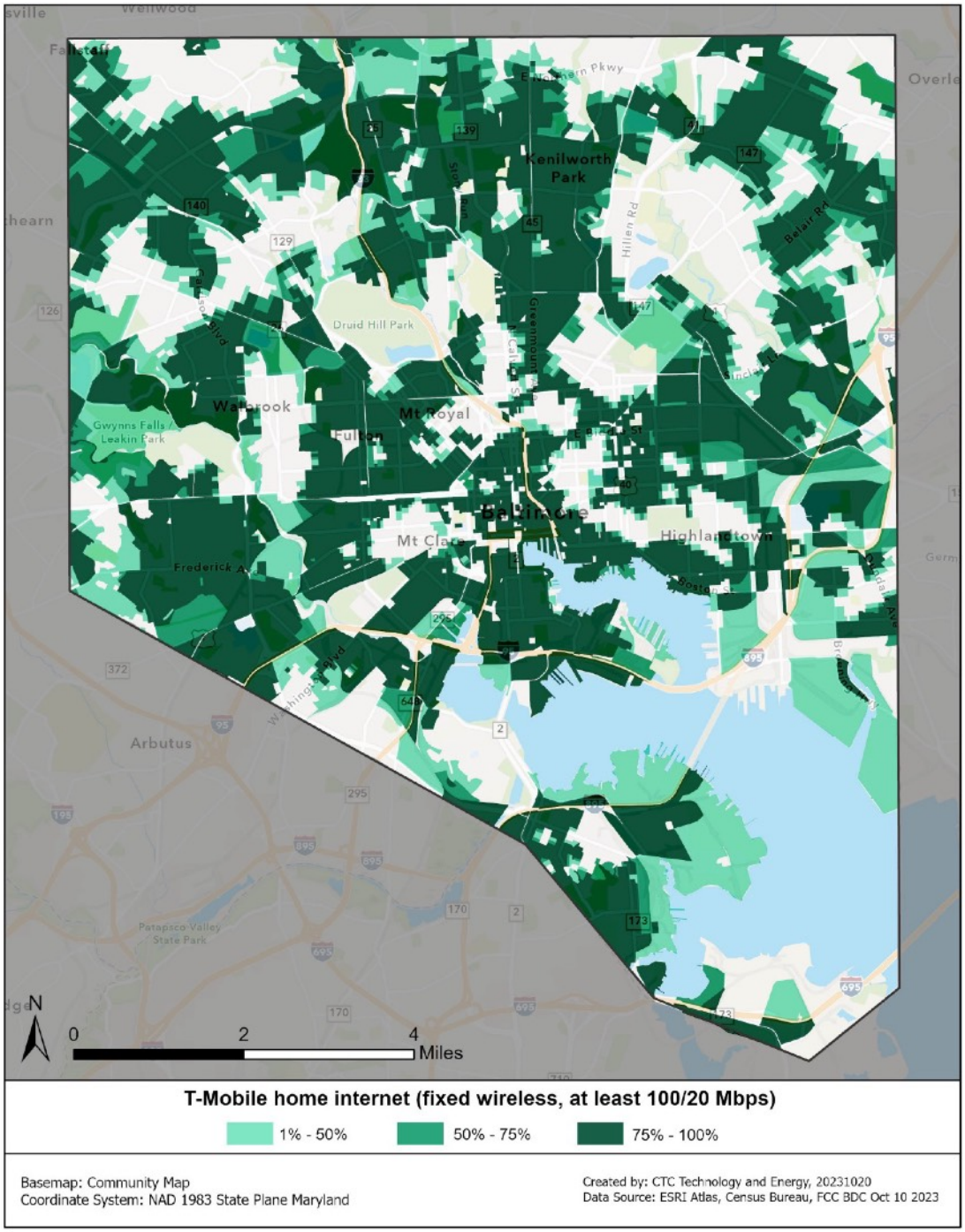
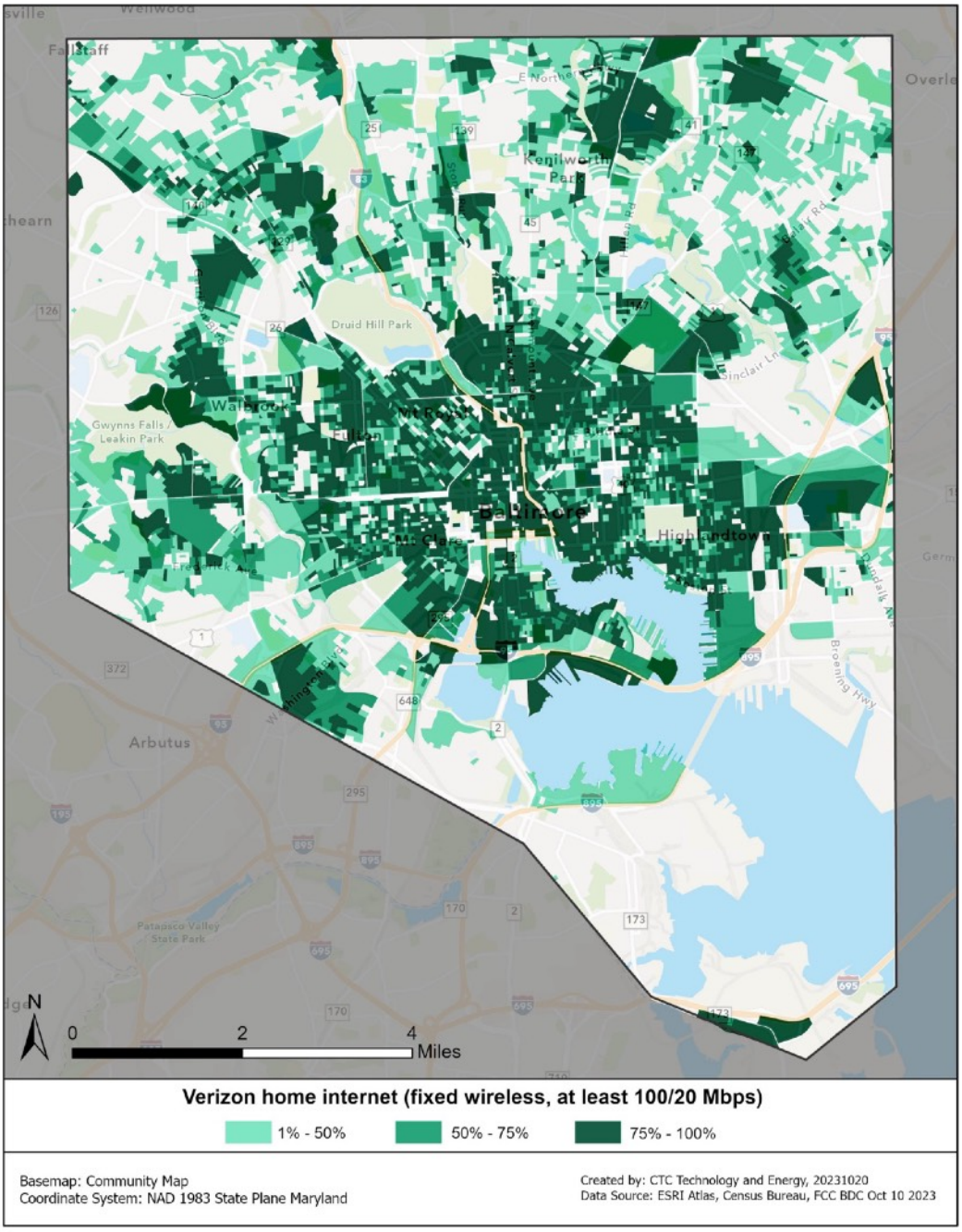


FIGURE 10: VERIZON HOME FIXED WIRELESS COVERAGE



1.2 BROADBAND ADOPTION AND DIGITAL EQUITY

This section presents an overview of the current state of broadband adoption and use (as distinguished from availability) in Baltimore, based on U.S. Census Bureau data and a scientific survey on broadband access and use. Digital equity is widely defined by five elements based on guidance from the NTIA. They include:

- **Broadband access**: Affordable, accessible, and reliable high-speed home internet service is available to all households.
- **Accessible and inclusive content**: Public online content is inclusive and accessible to all.
- **Devices and tech support**: All residents have access to a computer or tablet and technical support.
- **Privacy and security**: Data privacy and protection and online security are achieved.
- **Digital skills**: Training and skill-building is available to support meaningful use of the internet.

1.2.1 DATA SOURCES

We analyzed who is and is not using broadband in Baltimore—and why. We investigated barriers to determine the types of programs that should be prioritized. We then compared findings across demographic groups and geographic regions for contextual information. We employed the following methodology:

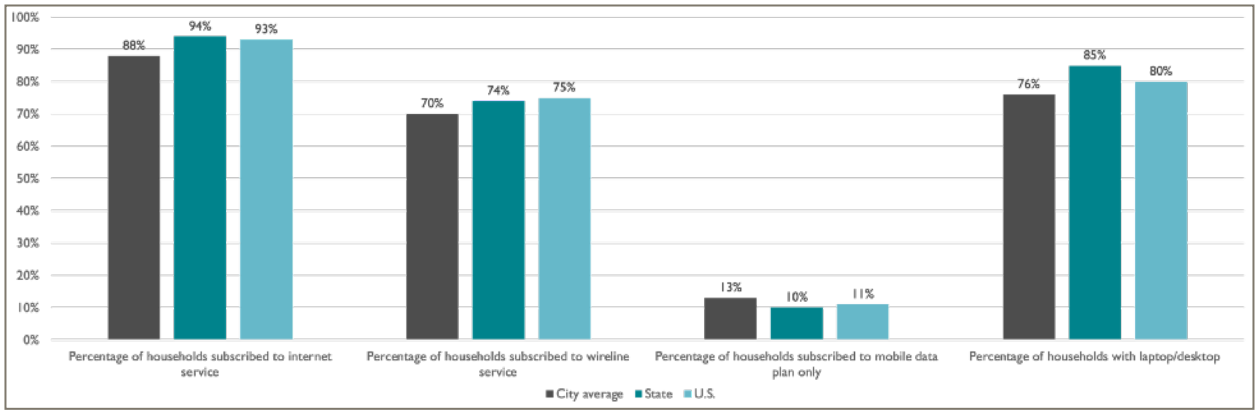
- Gathered data from the American Community Survey (ACS) and Maryland's own scientific phone survey
- Analyzed that data to understand the prevalence of prohibitively high-cost service, inaccessibility of online content for people with disabilities, lack of computing devices such as laptops, concerns about privacy and security, and confidence in digital skills
- Conducted additional analysis to understand bottlenecks for existing digital equity programs
- Compared barriers within demographic groups including seniors, racial and ethnic minorities, low-income households, and households with disabled individuals
- Where relevant, compared findings to state and national averages

1.2.2 INTERNET SUBSCRIPTIONS AND DEVICE OWNERSHIP

Baltimore lags both the state and national averages for internet adoption. Some 88 percent of City households report subscription to internet service of any kind, including mobile data plans and satellite services, compared to 94 percent for Maryland households and 93 percent for U.S. households. Some 70 percent of households in the City report subscription to wireline internet service, which is more reliable than mobile or satellite plans, and 13 percent report subscribing only to a mobile data plan.

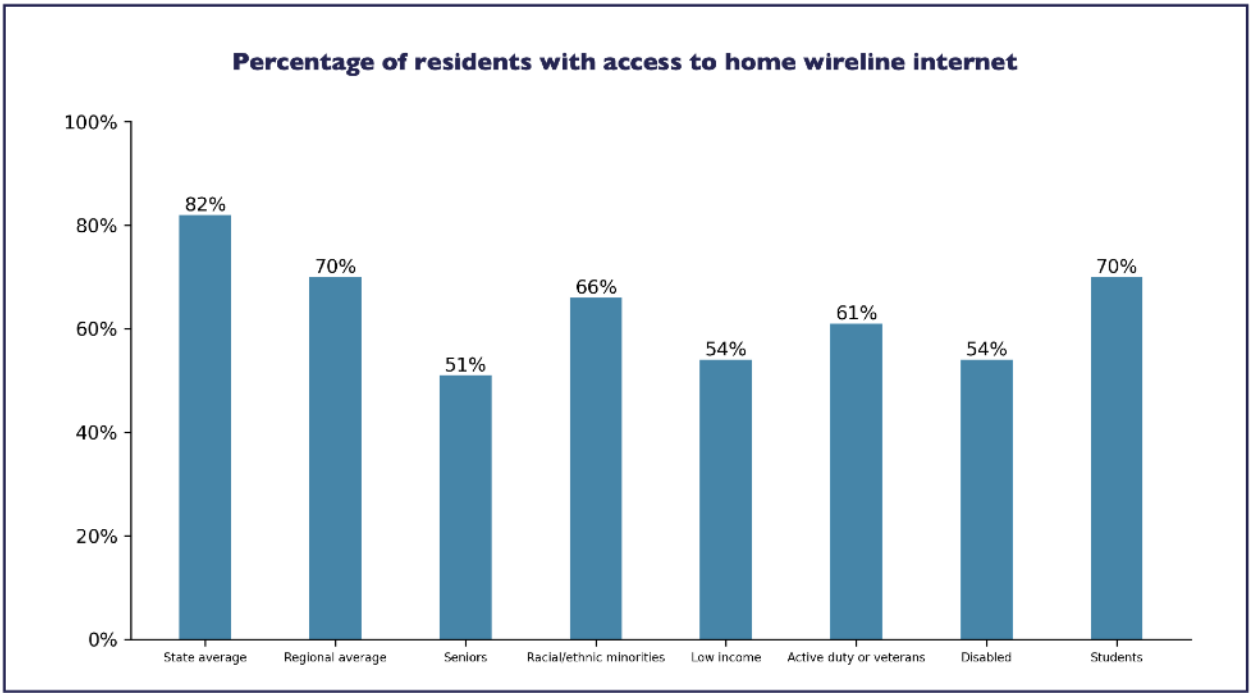
Regarding device ownership, 76 percent of households in Baltimore report owning a laptop or desktop as compared with 85 percent of Maryland households and 80 percent of U.S. households.

FIGURE 11: INTERNET ADOPTION IN BALTIMORE, MARYLAND, AND THE U.S.



Low-income households and those with seniors or disabled individuals show lower percentages of wireline internet subscription as compared to the average in Baltimore. Some 54 percent of individuals living in households under 200 percent of the federal poverty line report having a wireline internet subscription, and 51 percent of households with seniors and 54 percent of households with individuals with disabilities report wireline subscription.

FIGURE 12: SUBSCRIPTION TO WIRELINE INTERNET BY DEMOGRAPHIC GROUP



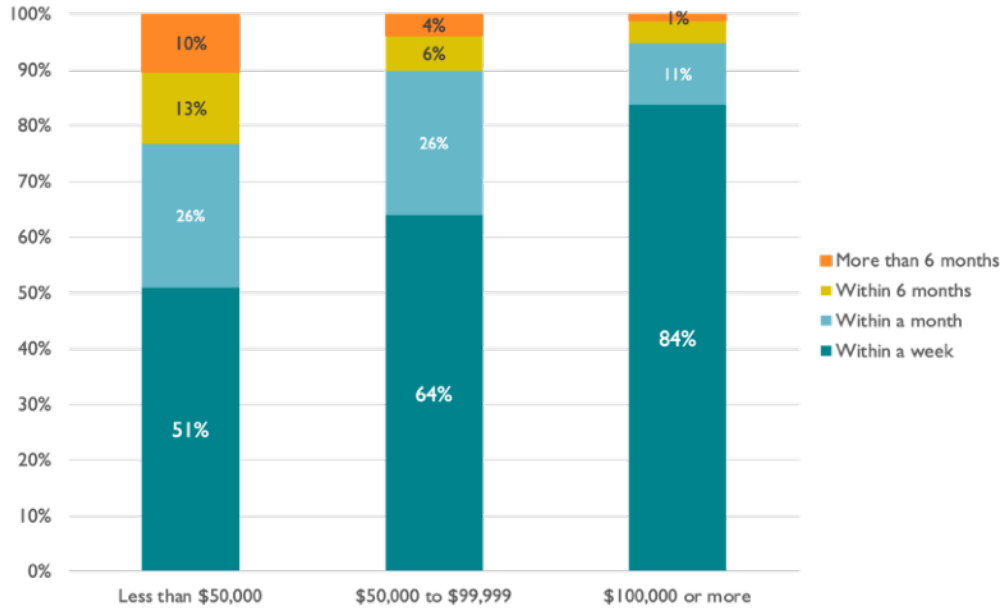
Low-income households demonstrate lower levels of device ownership than the overall City average. Some 26 percent of households in Baltimore that are under 200 percent of the poverty line have only smartphones and 12 percent of these low-income households have no internet-enabled device at all.

TABLE 1: DEVICE OWNERSHIP BY INCOME GROUP

	City	State	U.S.
Households using a desktop or a laptop	76%	85%	80%
Households with smartphones only	17%	10%	14%
Households with no internet device	6%	3%	5%
Low-income households using desktop or a laptop	62%	72%	66%
Low-income households with smartphones only	26%	19%	23%
Low-income households with no internet device	12%	10%	11%

Lower income households also report that they are less likely to replace a broken computing device. For households earning $100,000 or more in Baltimore, 84 percent report that they can replace a broken device within one week, as compared to only 51 percent of households with less than $50,000 in income.

FIGURE 13: TIMELINE FOR REPLACING A COMPUTING DEVICE BY INCOME



1.2.3 ENROLLMENT IN THE AFFORDABLE CONNECTIVITY PROGRAM

The federal Affordable Connectivity Program (ACP) subsidizes up to $30 per month for broadband for low-income households and can include a contribution toward buying a laptop or tablet. Baltimore outpaces the state and nation in enrollment rate of eligible households, but still has an opportunity for many more to benefit. Households are eligible if they earn up to approximately 200 percent of the federal poverty level or participate in one of many federal or state support programs (e.g., school lunch). As shown in Table 2, 56 percent of eligible households in Baltimore are enrolled in ACP as of August 2023.

TABLE 2: ENROLLMENT RATES IN ACP

	City	State	U.S.
Total enrollment (households)	71,741	253,606	20,572,930
Estimated eligible households	127,971	779,981	55,226,900
Portion of eligible households enrolled	**56%**	**33%**	**37%**

Source: *EducationSuperHighway*[31]

1.2.4 DIGITAL SKILLS

Even if a household has a working computer device and internet service, users must have the necessary digital skills to realize meaningful opportunity online. Low-income households are consistently less confident in their ability to complete online activities.

- Households earning less than $50,000 report a relative lack of confidence in undertaking critical, valuable online activities, such as job searches, education, and health care.
- For all online tasks, fewer households earning less than $50,000 report confidence in their abilities compared to high-income households.
- Households earning less than $50,000 are roughly 23 percentage points less likely than households earning $100,000 or more to feel confident finding a job over the internet.
- Low-income residents also report a lack of confidence in using the internet safely and securely.

[31] ACP enrollment numbers were sourced from the Universal Server Administration Co (USAC) and updated as of August 2023 by the State of Maryland's ACP enrollment partner, EducationSuperHighway; https://www.educationsuperhighway.org/no-home-left-offline/acp-data/#dashboard

FIGURE 14: CONFIDENCE IN INTERNET SKILLS BY INCOME

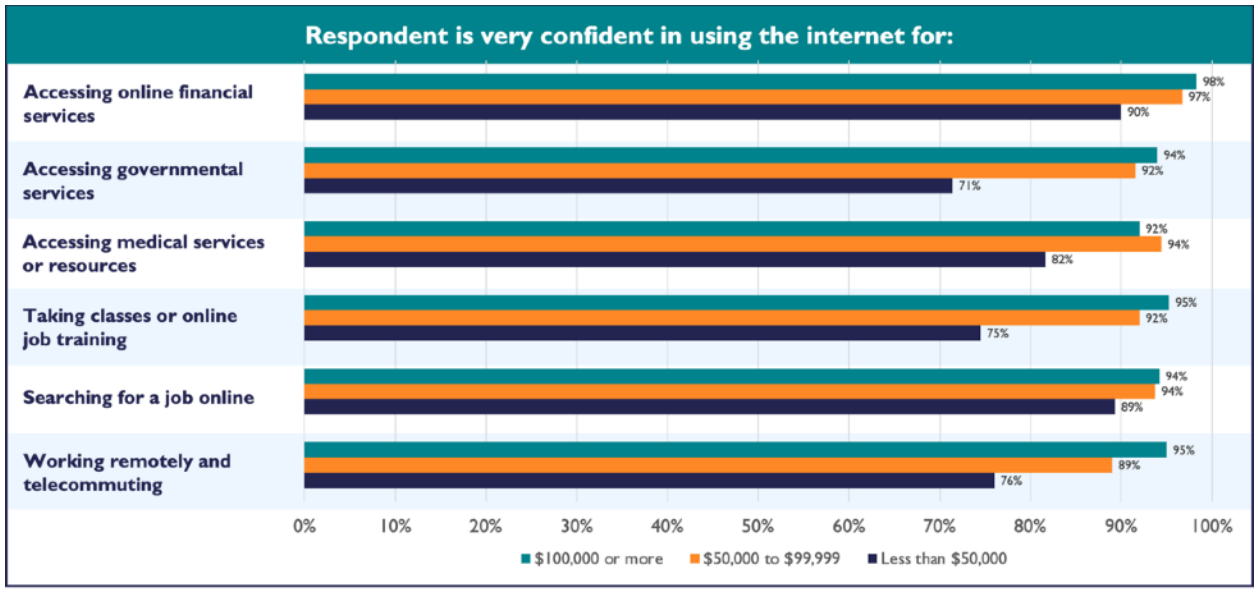


FIGURE 15: CONFIDENCE IN AVOIDING ONLINE FRAUD OR SCAMS BY INCOME

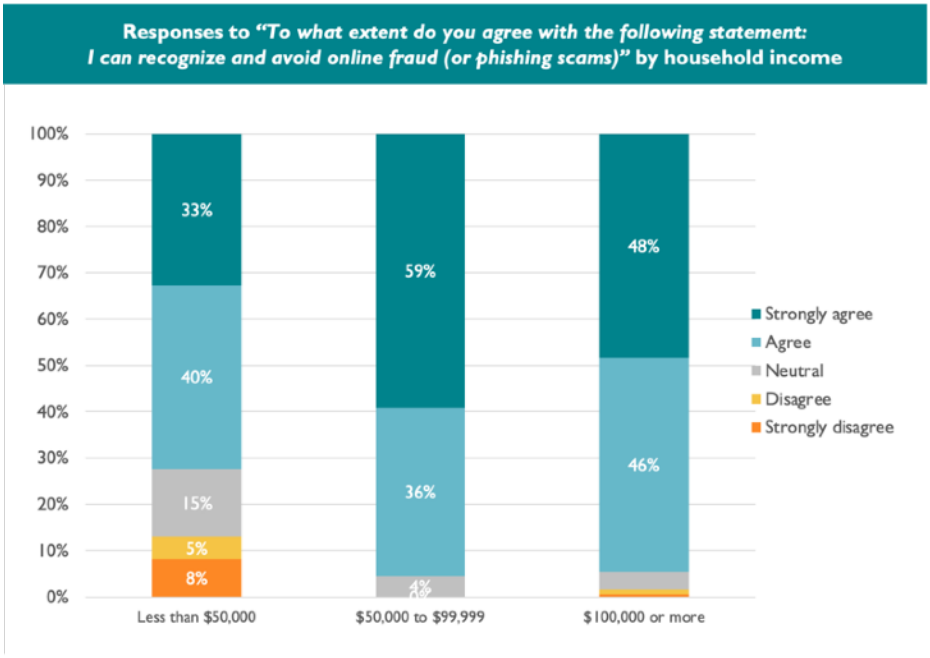


Image Credits

Page 4: Image of fiber optic cable by Canva

Page 17: Image of fiber technician by https://www.canva.com/p/paa-toos-images/

All other images by Shelby Swann at https://www.shelbyswannphotograpy.com/

We invite all stakeholders to engage with us about their ideas and feedback on closing the digital divide in the City of Baltimore.

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Broadband and Digital Equity