Achieving Digital Equity in Baltimore

by Mary Miller and Mac McComas, Johns Hopkins University's 21st Century Cities Initiative
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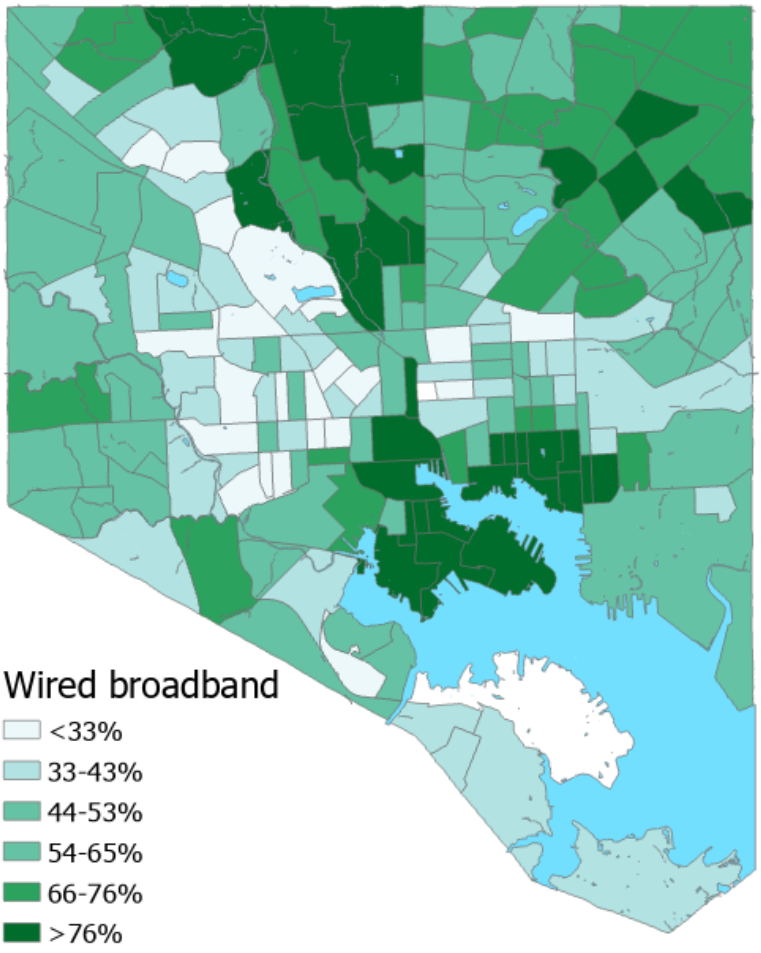
Introduction

The term "digital divide" was coined over two decades ago to describe the gulf between those with access to the digital world and economy and those without access. Today we recognize digital equity as a state of fair access and effective use of the technology necessary to participate in modern society where we increasingly experience education, work, human services, politics, and the economy over the internet. Yet a significant portion of society lacks the access and skills needed to participate, and Baltimore is no exception. The strong cities of the future need to be digitally equitable.

Figure I: Access to wired broadband by census tract, 2019



The 2019 American Community Survey found that 40% of Baltimore's 243,000 households had no wired internet service, and one-third had no access to a desktop or laptop. The map to the right shows the concentration of poor access in lower income areas. Furthermore, an August 2020 survey of small businesses by the Baltimore Development Corporation showed increasing reliance on digital technology but significant needs for technical support and faster reliable internet service. Over half of these small

See page 11 for acknowledgements and disclaimer.

businesses have Black owners, many of whom also lack financial resources for digital access. As another sign of digital service inequity, the Maryland Broadband Mapping Initiative showed that average internet speeds in the city of Baltimore are significantly slower than in surrounding counties.[1]

The 2020 global health pandemic further exposed digital inequity. When the country abruptly shifted to online learning, remote work and telemedicine, Baltimore's shortcomings were clear. At the same time, the urgency of the health crisis led to quick action, such as arming tens of thousands of Baltimore public school students with laptops and tablets to learn remotely. Wireless mesh networks sprung up to reach underserved areas. While crisis can promote action, it is not a substitute for a long-term plan.

Baltimore's digital landscape has been well documented over the past six years with foundational work to inventory the city's assets and identify the gaps. There is also strong and organized advocacy in the recently formed Baltimore Digital Equity Coalition with over 60 member organizations represented.

Anyone interested in understanding the challenges in Baltimore can arm themselves with the basic facts found in the Magellan study completed in 2015, the Smart Cities Task Force report from 2015, the Robert W. Deutsch Foundation 2017 report on digital inequity in Baltimore, the University of Maryland Smart Growth Center 2019 report on West Baltimore, and the Abell Foundation's 2020 report on the lack of digital access in Baltimore.[2] An updated study of the infrastructure needs commissioned by the city in 2018 may be released soon. Finally, the podcast series Charm City Dreamers recently interviewed many relevant experts and advocates for digital equity in Baltimore.

What is clear is that while more information is always useful, we already know enough to propose a plan with concrete steps

What is clear is that while more information is always useful, we already know enough to propose a plan with concrete steps. Too often, the solutions have been sought in silos – for schools, businesses, public housing, and residential areas – when what we need is a broad solution that will serve the whole city. It is also clear that this is not just about cost, but also about creating the right entity and resources to do this effectively.

Many do not appreciate the strength of the assets Baltimore already has in place to achieve digital equity and the opportunity for the city to capitalize on those assets. The costs of providing city-wide access appear lower than we expected; the bigger challenge is finding support for ongoing internet service costs and technical support for users. The other strong resource Baltimore has are local experts from the technology community who have much to offer this city in achieving digital equity.

We have looked at the experience of other cities across the country to help shape these recommendations, but we know the solution will be uniquely Baltimore's plan, based on the resources and people we have here to make this happen. Nevertheless, there are some common ingredients of success from other cities (Appendix I) that have informed these recommendations. In

[1] Maryland Broadband Cooperative 2010. The mapping project was from 2010, but disparities still exist. See Robinson and Kanneboyina 2020.
[2] Magellan Advisors 2015, City of Baltimore 2015, Robert W. Deutsch Foundation 2017, Lung-Amam et al 2019, and Horrigan 2020.

particular, Baltimore could learn from the experience of cities such as Austin, Cleveland, Detroit, Louisville, and Philadelphia.

Here is a roadmap that Baltimore could follow:

Oversight and Advocacy

- Create a permanent city Office of Broadband Authority to manage relationships with Internet Service Providers (ISPs), set digital goals, coordinate across public agencies and private parties, manage city-owned assets and internet access, and modernize policies and fees around assets and internet access.
- Establish a digital equity director position to advocate at the local, state, and federal level to increase funding for digital access and services and to support state legislation to extend broadband access in urban areas.
- Create an advisory board of public and private sector experts to help set the agenda.

Set Standards and Measure Progress

- Set standards for a minimal level of internet access, speed, and reliability for households and businesses in Baltimore. The Federal Communications Commission's (FCC) updated definition of broadband is often cited as insufficient for entities with multiple users simultaneously accessing the internet.
- Create a digital equity scorecard to regularly measure progress and our success in addressing this inequity.

Free Access for Community Anchors

- Provide free internet access to community anchors across the city – such as public schools and recreation centers – leading with areas with limited access today and following the model set by the Enoch Pratt Free Library 20 years ago when it connected every library branch with high quality internet service.
- Set a goal of providing free internet to city-operated public housing.

Digital Tech Support

- Build on emerging citywide tech support programs at these anchors through community engagement with trusted advisors and/or directly to individuals. This should include support for both digital skills and maintenance of devices and software.

More Competition

- Develop an open access network for Internet Service Provider (ISP) use, leasing city-owned fiber in existing conduits and providing an important source of revenue to support digital equity.
- Encourage private providers to build last mile service to homes and businesses by reducing barriers to entry.

Financial Support for Digital Equity

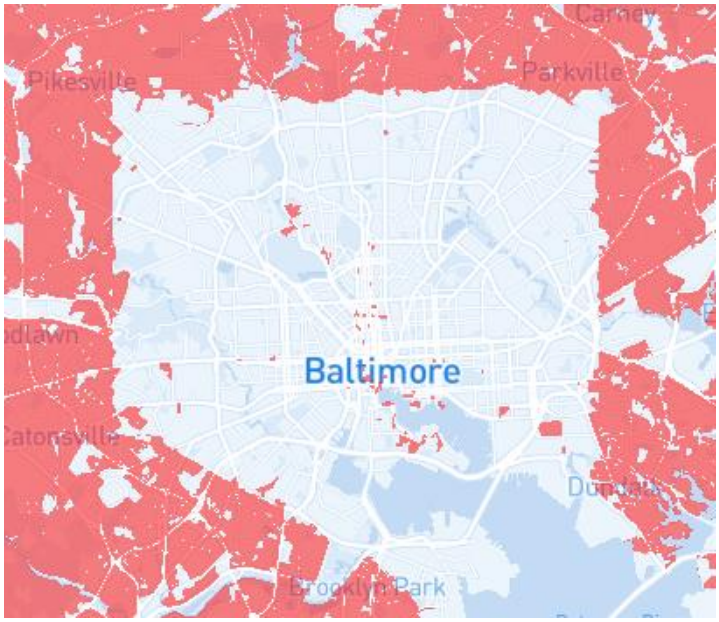
- Develop a sustainable subsidy for internet service costs that will attract internet providers to a viable customer base in the city.
- Establish an independent Digital Equity Fund outside of city government to allow philanthropic support and provide flexible funds for matching grants, led by Baltimore's private and non-profit sectors.
- Support community solutions to improve access to devices and digital literacy programs to build skills through the Digital Equity Fund.
- Put digital equity at the top of the list for intergovernmental assistance as part of a broader state and federal strategy.

Image: Computing Sciences outreach program for high school students by Berkeley Lab.

Baltimore's Current Infrastructure and Service

Baltimore is remarkably well positioned to improve digital access across the city because it already owns an approximately 300-mile fiber optic network that can deliver high speed and reliable service. This network is currently serving city agencies, but it has significant excess capacity in "dark fiber" or fiber optic cable that is not currently used but could be used to reach neighborhoods with low levels of internet access. The city could lease its unused fiber to private ISPs to enable more competition in service provision. Today, Comcast has an effective monopoly on internet service because of its historic provision of cable television service in the city and lease agreement to use city-owned conduit to provide broadband. As an example, while ISPs such as Verizon can provide service in the city, they can't compete effectively against Comcast's existing advantages (Figure II).

Figure II: Verizon Fiber Optic Service Availability



Source: BroadbandNow.com

The city's network can deliver internet access at higher speed, greater reliability, and at much lower cost than private providers attempting to create this infrastructure from scratch. Building off the existing fiber optic network with short local extensions – "last mile" cabling is a viable option to reach underserved areas. The Magellan study in 2015 estimated the cost of cable extension ranged from $180,000 to $270,000 a mile, with higher costs for denser, urbanized sections of the city. There is no good estimate of how many "last miles" exist in Baltimore, making it critical to establish attractive economics for providers willing to come into the city.

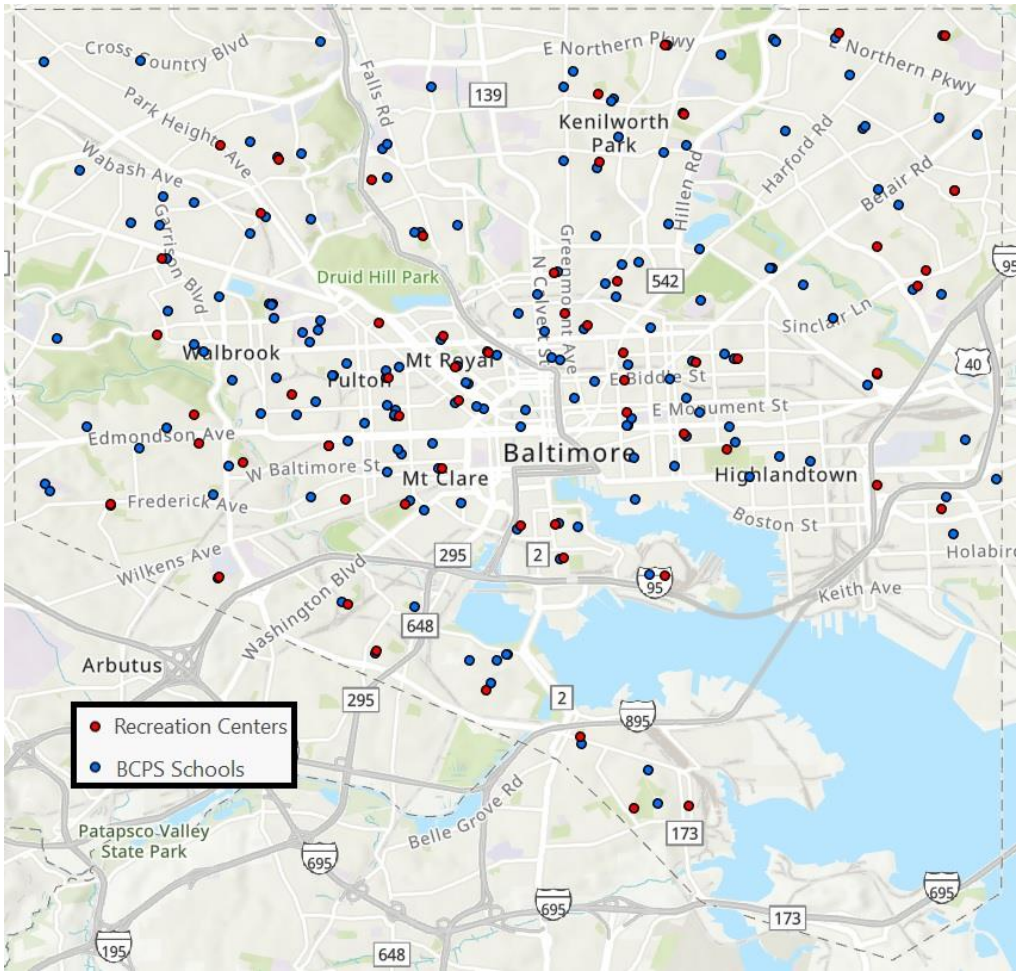
Advances in wireless internet technology, both mesh networks and 5G, offer new opportunities to leverage city infrastructure – including internet access and physical structures for mounting small cell deployment of wireless service. It also offers the opportunity for the city to structure appropriate fees to allow this service to be deployed in Baltimore and to use that revenue to support the broader goals of digital equity. The potential for revenue may be limited, however, by a recent court ruling upholding the Federal Communications Commission's rule that limits local governments' ability to generate significant funding streams from telecommunication companies' deployment of small cell antennas (see Appendix II for more information on this ruling.).

What would it cost to provide full access and high-quality service?

The precise cost of digital equity across the city is unknowable. However, we have endeavored to build some estimates using work that has already been done to quantify the needs and costs. Baltimore has the key advantage of significant infrastructure already in place. Often what we are attempting to measure is "last mile" connectivity where broadband service is provided by extending

the city's fiber to neighborhoods without good access today. As a baseline, we consider providing high-speed, high-quality broadband service to community anchor institutions such as public schools and recreation centers across the city's communities (see Figure III for locations of public schools and recreation centers).

Figure III: Baltimore City Public School Buildings and Recreation Centers



Source: Open Baltimore

Internet Access

In 2015, the Magellan study estimated a cost of $16 million to extend the city's broadband service to 206 city schools, an average cost of $78,000 per school. Today Baltimore City has 158 open city schools. Let's also consider the 42 recreation centers managed by the city. If we used the same average cost to connect these 200 community institutions with fast reliable internet service, this represents a one-time cost of approximately $16 million in 2015 dollars, or closer to $18 million in 2020 dollars. Of course, there is likely to be some overlap between these entities, and the city might not need to wire all of them.

Let's then consider access for public housing residents. The Housing Authority of Baltimore City operates approximately 7,000 public housing units, which have the advantage of being dense

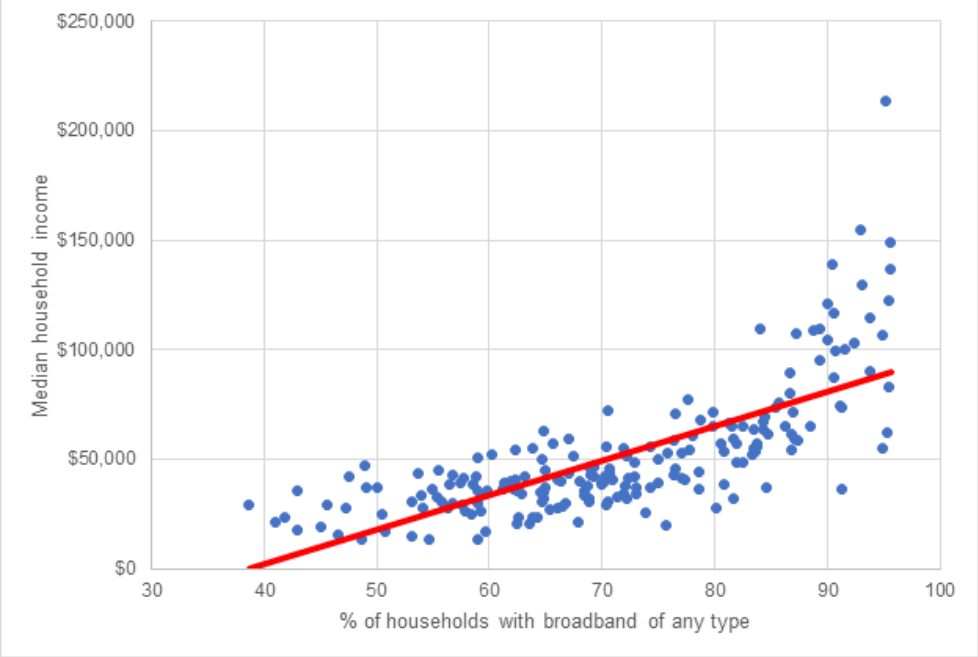
entities for establishing service. By one estimate, the cost of connecting these housing units would be roughly $500 per unit, or $3.5 million for 7,000 units.

This analysis does not consider the last mile cost of laying underground cable to reach every household and business in Baltimore, only the costs of reaching these community institutions across the city. However, if the city began there and offered common interconnection points to allow multiple service providers to reach their customers, these additional costs could be absorbed by the private sector. Advances in wireless technology also suggest there may be lower cost ways to connect homes and businesses at close range to these points.

Internet Service Costs

The second part of the cost analysis involves estimating the monthly cost of high quality and reliable internet service. Ability to pay in a city with nearly a quarter of its residents living below the poverty line has to be a consideration (Figure IV). The $10 per month Comcast Internet Essentials program is widely believed to be insufficient to provide enough stability, speed and reliability. Two non-profit providers of internet service charge $15 to $20 per month for service (PCs for People and Project Waves). Commercial rates in Baltimore start at $40 a month and go up from there.

Figure IV: Median household income and broadband access by census tract in Baltimore, 2018.



Source: American Community Survey

If we use a conservative figure of $40 as a starting point to provide monthly service to the estimated 96,000 existing households without internet today, the annual cost would be $46 million. If $20 per month is considered affordable for low income households, the required annual subsidy would be half of this or $23 million. However, some of these households may use the community anchors as their internet provider, and some may not want service at all. The challenge here will be to identify the sources of subsidy to make internet access affordable. Closing this gap is also critical to attracting more internet service providers to a viable customer base.

Compared to other cities, Baltimore has not taken enough advantage of intergovernmental support for internet access. The federal Lifeline subsidy program provides up to a $9.25 discount for phone or internet service. However, Comcast does not participate in the Lifeline subsidy program in Maryland. As such, there are no major broadband providers that offer the subsidy in the city of Baltimore, making it inaccessible to almost all city residents. If this support were available in Baltimore the annual service subsidy needed would be reduced significantly. As we write this, Verizon has announced a high-speed internet service for low-income residents in the Baltimore area for $19.99 per month, using the Lifeline program. While it is unlikely that city residents will benefit given the aforementioned absence of Verizon's fiber optic service in the city market, the offer validates a $20 per month affordability goal.

The FCC's schools and libraries universal service support program, known as E-Rate, provides funding to discount the cost of internet access at schools and libraries ranging from 20 to 90 percent of the costs of eligible services, depending on the level of poverty and whether the school is urban or rural. In 2019, Baltimore City Public Schools (BCPS) received $3.8 million in funding for an approximately 85% discount of the provided service.[3] If Baltimore City could provide this service using its fiber network instead of BCPS contracting it from a private provider, it could provide both net revenues for the city as well as cost savings for BCPS, a point made in the Magellan study.

Devices and Tech Support

Another cost to price out are devices, meaning laptops or tablets to use the internet. The 2019 American Community Survey identified almost 79,000 households in Baltimore without a desktop or laptop computer. The pandemic led to close to 50,000 devices being supplied to public school students who needed to learn from home. We don't know how many households - as opposed to students - gained access this year, but it was significant. Supplying refurbished or new devices to at least 25,000 additional households at an average cost of $150-$300 per tablet or laptop would cost $3.75 to $7.5 million.

Finally, the city needs to provide technical support and digital education. The advantage of using community resources like schools, library branches, and recreation centers is that they already have the physical location and some staffing that can support this need. There are a number of non-profits already doing this work in Baltimore, which offers yet another opportunity to coordinate locations and sources of assistance. The average cost of providing digital skills training at organizations such as Byte Back and Pass It On is $837 per trainee. If the city set a goal of training 1,000 residents a year, this would cost $837,000 per year. The Baltimore Digital Equity Coalition has been operating a tech hotline since fall 2020, helping Baltimore residents gain internet access, get devices, and troubleshoot tech issues. The Annie E. Casey Foundation has been funding the hotline in recent months. Identifying a sustainable source of funding for the hotline is another crucial need. This is where a Digital Equity Fund could provide support.

This exercise has identified approximately $21.5 million in hard costs to provide internet access to anchor institutions across the city and public housing and $3.75 to $7.5 million to provide devices for

[3] Baltimore City Public Schools 2019.

households to use the internet. The annual cost of providing internet service to households without service ranges from $23 million annually to $46 million depending on the degree of subsidy. While these are significant numbers, they likely overstate the cost by trying to price this to the maximum number of potential users at a significantly higher monthly cost.

We have notably not addressed the cost of providing internet access to small businesses, which is a need worthy of more detailed analysis. We know that there are approximately 52,000 small businesses in Baltimore, including 39,600 individuals who are self-employed, many of whom are likely captured in the household figures. Of the 12,500 small businesses in Baltimore with employees, we could use the same estimate of 40% of households without broadband to estimate that roughly 5,000 small businesses lack adequate connectivity and service levels. The establishment of strong internet service at community anchors could begin to close this gap in combination with more competition from private providers for internet service and more effective use of subsidies to support small business access needs and technical support.

The point of this very rough analysis is simply to say that achieving a much broader and higher quality level of service across the city's communities is not out of reach, likely costing in the tens of millions, not hundreds of millions of dollars, largely because of the infrastructure that is already in place today. For context, the city's capital budget for fiscal year 2020 was just over $620 million. In addition to committing its own resources and generating more fee revenue, the city can pursue funding from state, federal and private sources. To this aim, we created a non-exhaustive list of potential sources of funding in Appendix III.

What Will It Take in Baltimore?

Digital equity and inclusion are now front and center as an urgent need for Baltimore. The city needs a holistic plan to address digital equity that reaches households, the young and the elderly, and small businesses that can drive economic growth in the city.

We recommend a hybrid model of free municipal broadband service for community anchor institutions, through the expansion of existing city owned fiber, with priority given to underserved areas of the city, coupled with leasing city-owned dark fiber to private providers who can provide "last mile" connectivity to homes and businesses. This approach leverages the significant assets the city already owns, without putting the city in the position of directly managing internet service to individual users. At the same time, it opens up the city for more competition and potentially lower costs.

There are also revenue opportunities that the city is not recognizing today that could help pay for these investments. A review of other cities' work to achieve digital equity shows a greater use of federal programs for capital investment and service subsidies. There is additional revenue the city could realize through leasing its own dark fiber to more ISPs and charging for 5G cell deployment on city property. A city Office of Broadband Authority could help structure these relationships and fees. It would also be important for this office to work closely with the state government if it repositions its support for broadband access to include urban areas.

The city needs agreement on the roles for the public sector, private sector, and philanthropy to execute this plan in tandem. No single party can succeed alone, but there needs to be a formal

understanding of responsibilities. An advisory board of public and private experts could help an Office of Broadband Authority define these roles. Fortunately, there is plenty of talent in Baltimore to help with this exercise.

Community engagement to provide trusted voices to advocate for adoption and provide support services is key. The Baltimore Digital Equity Coalition is well positioned to support this, particularly if supported by a Digital Equity Fund.

Our analysis suggests the capital costs of providing infrastructure – while sizeable – are in the tens of millions of dollars, not hundreds.

Our analysis suggests the capital costs of providing infrastructure – while sizeable – are in the tens of millions of dollars, not hundreds. Likewise, the cost of providing devices is likely in the single digit millions. The bigger challenge is establishing an ongoing sustainable source of support for high-quality internet service to truly achieve digital equity for Baltimore.

Finally, the city needs a sense of urgency and accountability to succeed. The creation of a digital equity scorecard to regularly measure progress would keep residents and businesses informed about this critical need and our success in resolving this inequity.

The benefits of achieving digital equity will reach far beyond the COVD 19 pandemic. We can improve healthcare outcomes with telemedicine for our residents, realize better academic performance from our students to prepare them for the 21st century workforce, help businesses and residents engage in online commerce that saves time and money, and provide the digital skills for adults to find jobs and participate in the remote work force. In short, achieving digital equity in Baltimore would have profound economic and social benefits, as today's disconnected citizens are allowed to reach their full potential.

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Disclaimer

The authors of this report interviewed local and national experts to inform the recommendations included in this report, but the views included are solely the opinion of the authors. The recommendations outlined in the report are intended to generate conversation and action rather than serve as a definitive plan of action that any organization or individual should follow.

Glossary of Terms

5G: 5G is shorthand for fifth-generation broadband cellular networks. This technology uses high-frequency radio waves (higher than 4G networks) in small areas (or “cells”) to wirelessly transmit information over a network. While the geographic range of 5G is smaller than 4G, it can deliver much faster service of up to 10 gigabits per second or up to 100 times faster than 4G.

Conduit: Tubing that is used to protect internet service cables from the environment. It is usually run underground.

Dark fiber: This refers to fiber optic cable infrastructure that has unused capacity to provide internet service. This capacity can be leased by the owner to an ISP to deliver internet service. It is also commonly referred to as “unlit fiber”.

Fiber optic broadband: This is a broadband internet connection using fiber optic cables to transfer data. It is faster than data transferred via a telephone modem or dialup connection. It is usually laid through conduit.

Internet Service Provider (ISP): A company, such as Comcast or Verizon, or public organization that sells access to the internet to residential, business, and/or government customers.

Open access network: A network where the physical infrastructure used to deliver service operates separately from the delivery of the service. In this type of network, a city can own the physical infrastructure, such as the conduit and dark fiber, and a private provider can lease this physical infrastructure to deliver internet access to customers over the network.

Small cell antenna/5G tower: Low-power radio transmitters that deliver wireless service. They are “small” because their range is short (1,500 feet unobstructed but usually shorter in urban settings) compared to regular cell towers.

Wireless mesh network: A communications network made up of radio nodes that connect wireless devices to routers and service gateways. In this model, an end user on a cellular phone or laptop can access the internet through a router installed in their home that connects to a nearby wireless antennae, which is in turn connected to an internet service “gateway” that directly provides the internet. They require line-of-sight from a radio installed on a vertical asset (a tall building or pole) to a home or other end-user. The service life of the equipment in this system is shorter than a fiber or other hard-wired broadband network but less costly.

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Appendix I: What Have Other Cities Done?

While no city has closed the digital divide, other cities have made progress and can provide insight into strategies that could prove successful in Baltimore. With this in mind, we studied several peer cities with the goal of identifying promising strategies for closing the digital divide. In the following section, we explore some of these approaches.

Digital Equity Offices

Several cities have either established Digital Equity Offices or designated a full-time staff person in an existing city office to coordinate city efforts to address the digital divide. Digital Equity Offices can serve as liaisons to state and federal government offices and to the private and philanthropic sectors. They can work to fill service gaps in ISP networks; promote affordable devices, discounted service, and direct people to skills trainings; address community concerns and highlight solutions; and track and report on progress. The cities of Austin, Boston, Chattanooga, Detroit, Louisville, Portland, Salt Lake City, San Francisco, Seattle, and Washington, D.C., all have full-time staff dedicated to working on digital inclusion. However, it is still a relatively new position in cities. Boston was only the second municipality to hire full-time staff to address digital equity in 2015.

While it might not be surprising that cities like Boston, Portland, San Francisco, and Seattle have staff working on the issues, the recent experiences of Detroit and Louisville, Kentucky, are informative. In 2019, Louisville created the Office of Civic Innovation and Technology in part to address the issues of broadband service adoption and a lack of devices. However, with no dedicated staff or budget, they focused on promoting the adoption of existing discount service programs and developed partnerships with organizations to provide digital skills training and computer labs and offer discounted refurbished devices, making significant progress. Recognizing the importance of these efforts, the city hired a full-time program manager in 2019.

In early 2020, Detroit hired a Director of Digital Inclusion who helped start the city's Connect 313 initiative with funding from the Quicken and Rocket family of companies. The Director has ambitious goals of reducing the number of Detroit households with no internet access (25%) by five percentage points every year until the disconnected rate is 0% in 2024. The focus has been on connecting and convening disparate partners working on digital equity and building awareness of low-cost access internet and technology programs.

A spring 2016 survey of state level efforts to expand broadband adoption found that over half of all surveyed states had broadband offices but only 28% had a budget. At that time, Maryland did not have a broadband office and the report ranked the state 34th out of 48 surveyed states in its response to expanding broadband service and adoption. The state also ranked last among 48 states in its efforts to provide training and education programs to drive meaningful use. While the state now has an office, as of summer 2017, its focus is on providing broadband in rural communities.

Digital Equity Funds

A growing number of cities including Austin, Boston, Detroit, Philadelphia, San Jose, and Seattle have started digital equity/inclusion funds that provide a range of funding amounts to non-profits for innovative, community-led programs that aim to close the digital divide.

The City of Austin's Grant for Technology Opportunities Program (GTOP) is one of the oldest funds in the nation, operating since 2001. The GTOP provides matching funds ranging from $150 to $35,000 a year to local non-profits with programs aimed at closing the digital divide. The match can include in-kind volunteer hours and donated goods. In 2020, the GTOP awarded 15 organizations a total of $350,000 which will be used to increase access to devices, the internet, and digital skills training.

San Jose's Digital Inclusion Fund committed $24 million over the next 10 years to close the digital divide in the city. Through a collaboration between the city and California's Emerging Technology Fund, the Inclusion Fund aims to raise funds through public and private efforts including $14 million in funding from infrastructure fees from 5G small cell deployments, with the remainder coming from private and philanthropic dollars that are matched by the city. However, after the City of San Jose, along with dozens of other cities including Baltimore, lost their lawsuit when the Ninth U.S. Circuit Court of Appeals upheld the FCC's new rules limiting the fees that municipalities can collect from 5G small cell deployments to $500 for application and review and $270 per year per pole, the future of that funding stream may be uncertain. Nevertheless, redirecting fees from 5G deployment to a digital equity fund could be an equitable use of such fees because 5G towers will mostly be located in wealthier and denser areas that are more likely to have broadband access, possibly furthering the digital divide.

Philadelphia's Digital Literacy Alliance (DLA) was formed in 2017 through a partnership of 19 public and private organizations including $850,000 in seed funding from Comcast and Verizon. By 2019, the DLA awarded $534,000 in funds and in 2020 maintained $700,000 in funds. In response to the COVID pandemic, the DLA fast tracked $90,000 in funding to three organizations to fund digital navigators to help residents access digital resources in the community.

In June 2020, the City of Detroit announced the Connect 313 Fund in partnership with the Rocket family of companies that gave $1.4 million from the Rocket Mortgage Classic PGA Tour event. The fund focuses on building accurate data on neighborhood-level internet and device access, supporting tech hubs in community centers, training digital literacy ambassadors in communities, and coordinating fundraising and advocacy efforts. The United Way for Southeastern Michigan administers the fund with a board of directors made up of the City, community, non-profit, and philanthropic leaders.

Municipal- and Non-Profit-Owned Networks

More than 560 communities across the U.S. have some form of a municipal broadband network. While 19 states have either legal barriers or outright bans on publicly-owned telecommunication networks, Maryland is not one of them.

Municipal broadband networks can take the form of citywide cable networks, such as Rainier Connect in Tacoma, Washington, which provides internet, television, and phone service to residents using the Tacoma Public Utility owned cable network, formerly called Click! Network. In this model, the city went through a selection process to identify a business to operate the network over the public utility-owned infrastructure.

Some smaller cities directly provide service to residents through public utilities. Cedar Falls Utilities (CFU), a publicly-owned utility in Cedar Falls, Iowa, first offered broadband in 1996 and became the state's first gigabit city in 2013. In summer 2020, PCMAG named CFU as the Fastest ISP in America, as it was more than five times faster than its closest regional competitor. Chattanooga became the first gigabit city in the U.S. when its Electric Power Board (EPB) began providing service over the publicly-owned fiber network in 2010 and later became the first municipal network to offer 10-gigabit speeds in 2015. It should be noted that Cedar Falls (40,000 people) and Chattanooga (180,000 people) are two of the larger cities that provide fiber-to-the-home (FTTH) service directly. No city with over 200,000 people has a municipal-owned FTTH network.

Other cities with publicly-owned broadband infrastructure use their network as an institutional network. In this model, municipalities use broadband middle mile networks to connect community anchor institutions such as public libraries, schools, recreation centers, hospitals, and public housing units as well as city agencies. The city of Louisville, Kentucky, recently completed a 100-mile buildout of its existing 21-mile fiber network in August 2020 as the first phase of its Louisville Fiber Internet Technology (LFIT) project. The project connected Metropolitan Government facilities such as libraries and community centers and provides free Wi-Fi in a low-income community using a combination of HUD Choice Neighborhoods funding, state funding through the KentuckyWired program, and local funding. The project, which cost the city $5.4 million, is projected to save $78,000 a year from not having to purchase service for municipal facilities through a provider.

In addition to serving as an institutional network, Louisville is exploring options to lease dark fiber on the network to private ISPs to provide improved service in low-access neighborhoods, with the city projecting a conservative estimate of $5.8 million annually in revenue. Other county and municipal governments have built out similar institutional networks with significant annual savings due to avoided, hard-to-predict rate increases.

In Cleveland, the non-profit DigitalC (formerly OneCommunity and OneCleveland) collaborated with Case Western Reserve University beginning in the early 2000s to build out a similar institutional network connecting hundreds of health care facilities, libraries, universities, and other non-profits in Northeast Ohio across thousands of miles of fiber network with projected savings of 50 percent or more on institutional IT spending. Built using 2009 federal stimulus funding, the non-profit went on to start a for-profit, Everstream, to provide high-speed broadband to businesses and then refocused on its core mission to close the digital divide by providing devices and internet to 500 public housing households in 2018.

Measuring Improvement

While many cities have created digital equity, inclusion, or smart city plans, those plans often fall by the wayside and cities make little progress toward the goals they outlined. To be transparent, accountable, and committed to progress, cities need to both outline specific goals and metrics while regularly reporting progress to meet those goals.

The City of Austin adopted a Digital Inclusion Strategic Plan in 2014 and regularly provides updates to the plans and reports on progress. Since 2011, the city has worked with the University of Texas at Austin to develop, administer, and analyze a digital assessment survey every three years and report the findings to residents. The detailed survey reports digital inclusion across a variety of

demographics and neighborhoods in the city, measuring everything from telehealth access to students using the internet for homework to data on nonusers.

Appendix II: FCC 5G Regulation Lawsuit

City of Portland v. United States, 969 F. 3d 1020 (9th Cir. Aug. 12, 2020), petition for rehearing en banc denied (Oct. 23, 2020).

This case involves the fifth-generation technology for broadband cellular networks, which is colloquially known as “5G”.

Some observers expect that deployment of 5G will serve not only cell phone users but will also compete with cable internet providers such as Comcast in Baltimore City.

5G relies on high-frequency radio waves that have a shorter useful range than earlier cellular technologies. For this reason, deployment of 5G requires the installation of numerous small antennas on utility poles and other tall urban infrastructure.

The Federal Communications Commission (FCC) has statutory authority from Congress to regulate some communications technologies, including 5G.

In 2018, the FCC issued orders that restrict the authority of local governments, including Baltimore City, to regulate the installation of these 5G small antennas. The ostensible purpose of these orders was to speed 5G deployment. These orders limit fees that local governments may charge for permits to install 5G antennas; impose time limits on local government decisions on permits (60 days, down from a 90-day limit imposed in 2009); and limit restrictions on installation of 5G antennas on utility poles. The ruling upheld the FCC’s limit of $500 for each application fee for a 5G deployment of 5 small cell antennas at one site and $100 for each additional small cell antenna at the same site and $270 per year for ongoing fees per deployment.

Led by the City of Portland, dozens of local governments, including Baltimore City, challenged the legality of the FCC’s orders in federal court.

In August 2020, the U.S. Court of Appeals for the Ninth Circuit issued an opinion in which it essentially upheld the FCC’s orders. The only portion of the ruling in favor of cities was the judges overturning an FCC ruling that limited aesthetic requirements local governments could require for 5G installations.

Appendix III: Potential Broadband Funding Sources

Source of Funds	Purpose	Link / More Information
FCC Emergency Broadband Benefit Program	A forthcoming program. Congress created the Emergency Broadband Connectivity Fund with $3.2 billion to connect low-income households to broadband. This will be a temporary program lasting until funding runs out or until 6 months after the pandemic ends.	Link and more information
FCC E-Rate	The FCC provides a service subsidy for schools and libraries.	Link
FCC Lifeline	An FCC program that provides a service subsidy through ISPs for households. Comcast does not offer it in Baltimore.	Link
Municipal Bond Market	In 2020, Baltimore City voters approved $80 million in bonds per year to support capital improvements. Similar bonds could be issued to provide funding for broadband infrastructure buildout.	Link
T-Mobile Project 10 Million	T-Mobile is providing free internet access and mobile hotspots for students.	Link
Maryland Technology Infrastructure Program	State legislation is in committee to create a fund for infrastructure.	Link
EDA Public Works and Economic Adjustment Assistance Programs	Projects can include enhancing access to broadband to support job growth and business creation and expansion.	Link
DOE Title III Part A Programs - Competitive Grant	This DOE program has been used for grant funding for institutions of higher education for the purpose of broadband infrastructure, skills training, or hotspots.	Link
DOE's Office of Elementary & Secondary Education, Impact Aid Program, Section 7003b Basic Support Payment	This DOE program has been used to provide funding for digital literacy at public schools. The city received $253,615 in FY2017.	Link and more information

HUD's Public Housing Capital Fund	This HUD program has been used as a source of funding for Neighborhood Networks computer labs, which can include skills training.	Link
HUD Community Development Block Grants	This HUD program has been used to fund fiber optic and other broadband infrastructure buildout.	Link
DOT BUILD Discretionary Grants	These DOT grants have been used to upgrade city conduit networks.	Link
DOL's Employment and Training Administration, Workforce Development in Telecommunication Sector: Apprenticeship Investments in Support of Broadband and 5G	The DOL provides funding for public-private partnerships skills trainings, which could include digital skills training.	Link
New Markets Tax Credits	This federal tax credit has been used to fund broadband infrastructure buildout.	Link and example
Community Reinvestment Act eligible investment	Banks can meet CRA requirements by investing in broadband infrastructure, digital skills training, and other purposes.	Link
NSF's Platform for Advanced Wireless Research	The NSF provides funding for public-private partnerships for smart cities, research, and evaluation.	Link
NSF Smart & Connected Communities	The NSF provides funding for smart cities research and demonstration programs.	Link
NSF Spectrum and Wireless Innovation enabled by Future Technologies (SWIFT)	The NSF provides funding for research and demonstration of wireless broadband communication systems.	Link