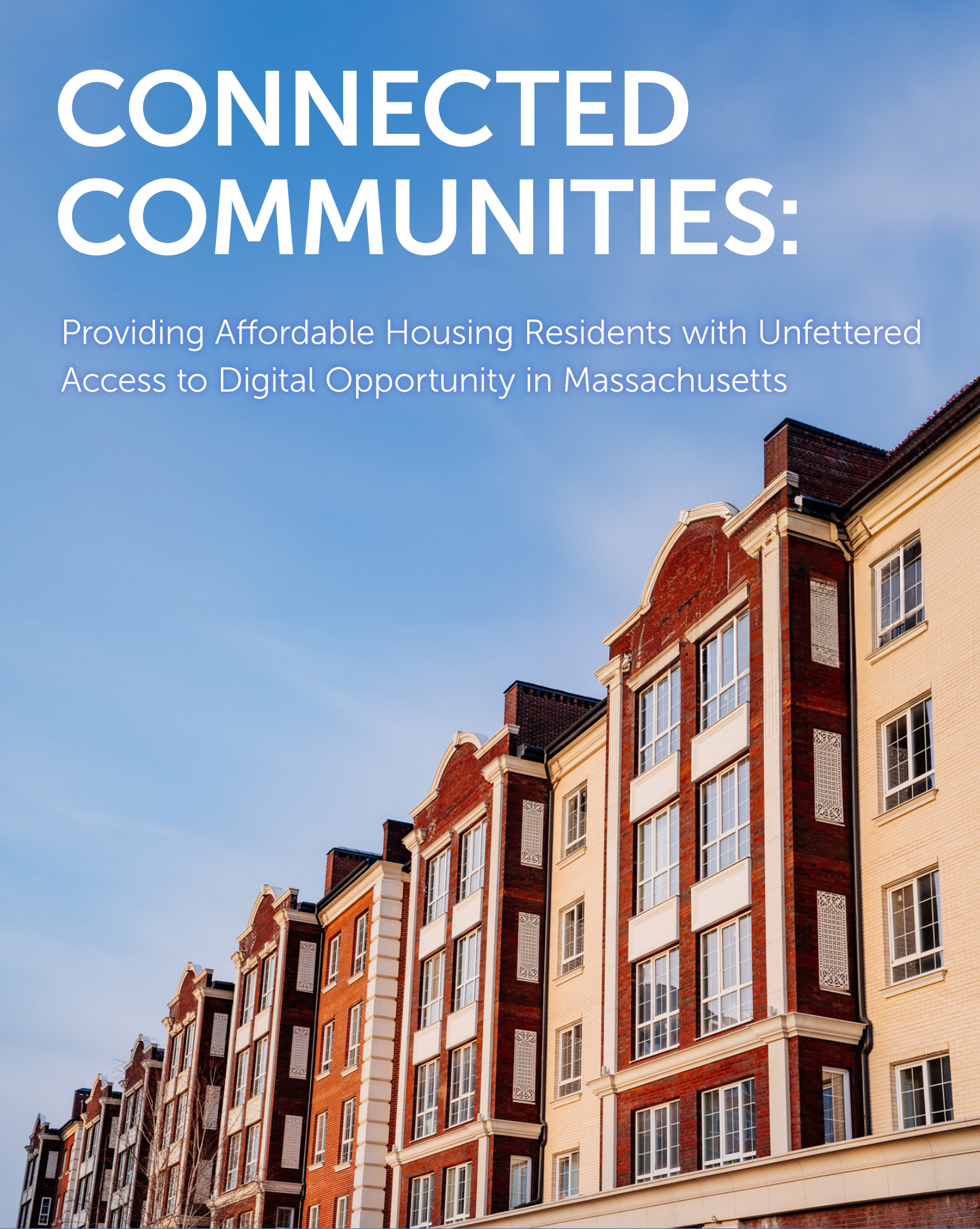
CONNECTED COMMUNITIES:

Providing Affordable Housing Residents with Unfettered Access to Digital Opportunity in Massachusetts



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I. A TURNING POINT

Drawing on federal funding from pandemic recovery packages and the Bipartisan Infrastructure Law, an unprecedented effort is underway to close the digital divide in the United States. Durable progress will depend heavily on the efforts of those who own and operate affordable housing developments. This sector's leadership will be particularly essential in Massachusetts, which has far more affordable housing than most states.[1]

The commonwealth's relatively large stock of affordable housing is one of its most valuable economic assets. Safe and stable housing has large benefits for individual well-being. For low-income children, living in high-quality affordable housing can increase life prospects, countering inequality and boosting economic mobility.[2]

Affordable housing residents have long recognized that access to the internet, computing devices, and the skills to utilize these technologies was a challenge for their residents, but few have had the resources to address this systemic issue. For affordable housing to continue to act as a springboard in our commonwealth, bridging the digital divide has become essential.[3]

Affordable housing providers got a heavy dose of this reality when COVID-19 hit. Without internet access at home, children could not attend school, their parents had difficulty receiving public benefits, and it was nearly impossible for residents to make appointments to receive the vaccine. In response, affordable housing providers aggressively sought out public and private resources. They partnered in new ways with school districts, libraries, community health centers, and nonprofits, bringing hotspots, laptops, and digital skills training to thousands of their residents.

These efforts provided a lifeline for those isolated from family and faith-based communities. Children and adults were able to maintain their connections to education. Those with disabilities found new opportunities to increase their earnings through remote work. And some even took advantage of the technology to bootstrap new online business enterprises.

Through the federal recovery and infrastructure bills, Massachusetts has at least $300 million to provide more residents with reliable access to the internet, capable computing devices, and digital skills training. These one-time funds will be a true turning point in our effort to permanently close the digital divide if we direct them to affordable housing developments and help their operators navigate an extremely complex bureaucratic gauntlet.

There are tight deadlines to expend the federal recovery and infrastructure dollars. Administrators will need to comply with myriad federal regulations. They must also adhere to Massachusetts state procurement laws, which are widely regarded as among the country's most onerous and inefficient when it comes to purchasing construction services. To add further complication, most affordable housing owners and operators lack experience installing digital technology, and many still have limited history working with organizations devoted to advancing digital equity.

Fortunately, early in the pandemic, the Massachusetts Broadband Institute (MBI) had the foresight to forge partnerships and test new models with affordable housing providers and digital equity nonprofits. Over the past two years, these pilots have surfaced both challenges and opportunities.

To unpack these lessons, MassINC and the Massachusetts Competitive Partnership gathered leaders involved in these efforts for informal discussions. This research brief presents clear takeaways from these conversations and distills near-term action items. We hope that this information will provide value to affordable housing leaders, as well as those working on state and local digital equity plans, officials in the Healey–Driscoll administration tasked with deploying the federal funds, and members of the legislature, who can ensure that Massachusetts is in the best position possible to make good on this unprecedented opportunity to permanently close the digital divide.

II. THE DIGITAL EQUITY OPPORTUNITIES AND CHALLENGES IN AFFORDABLE HOUSING

Leaders developing digital equity strategies for affordable housing must start with a thorough understanding of the potential benefits, as well as the unique set of challenges that they will need to overcome. Drawing on existing research and conversations with those pioneering digital equity efforts in affordable housing, we detail this landscape, starting with the impressive list of opportunities and then cataloging the eminently addressable challenges.

A. Opportunities

As detailed below, the benefits of increasing access to digital opportunity in affordable housing accrue at three levels. First, individual residents experience economic gains and improvements to their well-being. Second, the housing community as a whole benefits from stronger connectedness and social capital. And finally, building operators realize significant efficiencies and financial cost-savings.

Individual benefits. A large body of economic research captures the multiple ways that broadband improves our lives. The populations living in affordable housing should experience particularly large benefits from access to digital technology.[4] A disproportionate share of older adults lives in affordable housing developments. Access to the internet can keep them healthier by reducing social isolation. Internet access also increases their ability to receive medical care and wellness checks. Similarly, affordable housing developments house an outsized share of residents with disabilities. In addition to making health care more accessible, the growing number of jobs that can be conducted remotely provides new employment opportunities for those with mobility challenges or other barriers to working out of the home. Affordable housing also serves many residents with limited English. The pandemic experience shows how bridging the digital divide makes it easier for these residents to attend English classes and receive instruction tailored to their skill level.[5]

Access to digital technology also allows households to save money on everyday items. Rigorous estimates indicate the average US household reduces its expenses by approximately $1,800 annually through online purchases.[6] While the savings will be less in the aggregate for low-income residents, as a portion of their total spending, the savings from online shopping could be higher than average because low-cost brick and mortar retailers are often more difficult to reach for households living in affordable housing developments.

Community benefits. Studies have long shown that the internet can increase neighboring activity and the collective efficacy of communities.[7] This has only become more true with time, as internet access is increasingly essential for full participation in civic life, including political engagement.[8] Of course, there are tradeoffs, and the internet can sow distrust and division. But in mediated environments like housing developments, it is possible to establish positive practices. This is especially the case in older adult settings, where community members can share information and help protect one another from digital security concerns.[9]

By empowering residents and creating employment opportunities, neighborhood-level digital equity efforts can also produce strong community development outcomes. Commu-

DEFINING AFFORDABLE HOUSING FOR THE PURPOSE OF THIS DISCUSSION

Throughout this paper, we use the term "affordable housing" to refer to income-restricted rental housing financed with state and federal subsidies. While Massachusetts also has a considerable number of income-restricted housing units produced under Chapter 40B and local inclusionary zoning ordinances, these properties generally have a much lower concentration of affordable units, and they are generally located in neighborhoods where internet service providers have made greater investment.

nity development corporations (CDCs) and other community-based organizations are increasingly spearheading these comprehensive efforts, drawing heavily on the model established by the Detroit Community Technology Project (see box below). Even smaller scale efforts can have meaningful impact on affordable housing communities. For example, affordable housing developments with common spaces for people to access the internet provide opportunities for resident interaction. Children have room to do homework outside of cramped apartments, and older adults have another opportunity to mingle outside of their homes.

Operational benefits. From education and job training to health care and wellness classes, housing counseling, and eviction prevention, affordable housing properties are unique in the range of services that they offer to residents. These services can play an important role increasing labor force participation and economic mobility. Ensuring that each household has access to the internet can make resident services stronger and more efficient.[10]

Ubiquitous internet access in affordable housing developments will generate other large operational benefits. Building managers can collect rent payments and conduct hearings and resident briefings online. Broadband also opens up opportunities for the installation of smart devices that can increase energy efficiency, lower utility costs, and improve building safety and security.

COMMUNITY DEVELOPMENT THROUGH COMMUNITY WIRELESS IN DETROIT

The Detroit Community Technology Project grew out of a decade of coalition-building led by the local nonprofit Allied Media Projects. The original focus was on using technology for social change. However, it became clear that lack of internet access was a formidable barrier to technology adoption for many Detroiters, including 70 percent of public-school students, who did not have access to the internet at home. In 2012, Allied Media Projects partnered with the New America Foundation to train neighborhood residents to design and deploy community wireless networks. These "digital stewards" complete a 20-week training program, which teaches skills in community organizing and wireless engineering. With these trained residents in the lead, the project is now creating community wireless networks throughout Detroit's neighborhoods. These networks give residents free connections to reliable high-speed service.[11]

B. Challenges

Affordable housing leaders are knowledgeable about the challenges that they must tackle to realize these substantial benefits. They include the capital expense of installing and maintaining networking equipment in older buildings; limited knowledge of the internet and mistrust of providers among residents; lack of resources for ongoing operating costs; and above all, in the context of deploying federal resources cost-effectively, burdensome procurement laws that are ill-suited to purchasing, installing, and operating this technology.

Retrofitting older buildings.
Nearly three-quarters of all federal public housing buildings in Massachusetts are more than 50 years old.[12] And even most of our newer-generation affordable housing developments, financed with the Low-Income Housing Tax Credit (LIHTC), predate the internet age. The materials utilized in these older buildings can make them very difficult to wire, particularly if lead and asbestos are present. And often, affordable housing developments contain multiple structures, which adds significantly to installation expenses. While installing wireless networks is one way to overcome these challenges, building materials and the layouts of these complexes can also make it challenging to penetrate units with wireless signals. This is an especially common challenge in Gateway Cities, where the newer-generation affordable housing projects built with LIHTC are often located in 19th-century converted mill buildings with massive brick walls.

When affordable housing developments do have wiring for in-unit cable and internet access, residents are unlikely to have a choice of providers. In part, monopoly markets are common because these developments are located in poorer neighborhoods where private for-profit internet service

providers (ISPs) have limited incentive to invest. But there are other challenges to providing choice and competition in multifamily buildings, as well. In some instances, buildings, owners have entered into exclusive marketing or revenue sharing agreements with ISPs. While the FCC recently issued findings limiting this practice, many of these contracts remain in place and continue to present barriers to competition. In other cases, it is difficult to provide competitive choice because a building's wiring chase has limited space and it is difficult to accommodate cabling from another provider.

With affordable housing units in high demand, buildings, operated by private owners may have limited incentive to ensure that residents have access to the best possible service at competitive prices. Some are even reluctant to give ISPs access to their buildings to install equipment.

Limited knowledge of the internet and mistrust among residents. Building a market for internet service in affordable housing development is difficult because even heavily discounted service can be unaffordable for very low-income residents. And some residents may be unable to justify the expense because they lack knowledge about how they can use digital technologies to improve their lives. Language barriers are also common. In addition, residents may have had challenging experiences with ISPs in the past. They may be fearful that they will become indebted if they sign up for long-term plans and prices rise or their income is disrupted. Maintaining trust is also challenging when the parameters of federal subsidies to help low-income residents afford the internet shift over time. In some instances, residents may also distrust the building operator and fear that the technology will be used for surveillance in ways that cause harm to them or their neighbors.

Lack of sustainable resources. While federal funds provide an avenue to wire affordable housing developments, these sources will not cover long-term operating costs. Affordable housing operators must identify resources to purchase service from ISPs and refresh the hardware in their networks. Maintaining these systems will be especially challenging where the optimal solution is a public Wi-Fi network; wireless transmitters and access points have a relatively short lifespan.

The federal subsidies in the Bipartisan Infrastructure Law that go directly to low-income households offer one potential avenue for sustaining these networks. However, there is no certainty that resources for the Affordable Connectivity Program (ACP) will be available when the $14 billion that Congress appropriated runs out next year. Moreover, the ACP is difficult for housing operators to make use of as currently structured. While all residents of federally assisted affordable housing automatically qualify, they must still sign up with ISPs individually, and this process is extremely cumbersome.

The US Department of Housing and Urban Development (HUD) recently allowed housing authorities to tap into their operating funds to increase broadband access, but these budgets are already stretched extremely thin. Resident service fees provide another potential revenue source to increase access to the internet and digital skills training. However, federal public housing developments lack dedicated resources for resident services, with the exception of properties serving older adults, and existing affordable housing developments have not been planned and capitalized with schedules for these costs.

Procurement. In our conversations with leaders in this space, state procurement laws surfaced repeatedly as a formidable obstacle. Under current procedures, it is difficult to wire an affordable housing property that involves public ownership and/or public funding without undertaking as many as five separate procurements. First, the project must contract for design and engineering services. Then it must purchase the necessary equipment and contract with a construction firm to install the technology. Finally, it will need to purchase ongoing ongoing managed service provider (MSP) and ISP services. If the affordable housing provider hopes to stimulate community development benefits through these investments, it is exceedingly difficult under current state procurement laws. Negotiating workforce goals and other community benefits is difficult when selecting bidders. And encouraging supplier diversity is also exceedingly challenging, as MassINC documented in a 2022 report with Lawyers for Civil Rights.[13]

Public agencies are already struggling with staffing shortages as they work to deploy billions of dollars in new federal programs. If Massachusetts cannot find ways to make these paper processes more efficient, leaders believe it will severely inhibit their ability to achieve transformative results with this unprecedented federal investment.

III. CLOSING THE DIGITAL DIVIDE WITH INVESTMENTS IN AFFORDABLE HOUSING

While limited digital skills and lack of access to computing devices are major contributors to the digital divide, experience in places like public housing in New York City demonstrates that these barriers can be overcome (see p. 14) when affordable housing operators find ways to provide residents with reliable internet access. Pilot programs in Massachusetts give us a sense of the resources that will be required to furnish high-speed broadband in our affordable housing developments. In this section, we offer rough estimates of how much it will cost to bring high-speed internet to all affordable housing residents, how much progress we can make closing the digital divide by making this investment, and funding sources that we can draw from to cover these costs.

A. Cost Estimates

Massachusetts has 160,000 units of affordable housing.[14] Based on pilot projects, leaders believe wiring affordable housing developments will cost approximately $1,000 per unit. This suggests upfront costs for covering the state's entire portfolio will be $160 million.

If these investments were mostly Wi-Fi deployments, the capital cost to maintain these networks would fall in the $19 million per year range or $120 per unit (see box p. 10 for more on the differences between technologies). The ongoing capital cost for fiber networks would be far smaller, around $800,000 per year. A 50-50 mix between the two technologies would require $10 million per year or $63 per unit.[15]

About half of the capital investment would need to go to LIHTC developments, which are mostly held by private entities (CDCs and larger nonprofit affordable housing developers, as well as for-profit companies that develop and operate affordable housing). The other half of the investment would go to public housing authorities.

Deploying these resources will be challenging because there are numerous private owners and even more housing authorities, each of which is an independent entity. While federal public housing and LIHTC developments are relatively concentrated in Boston and the Gateway Cities, state public housing is far more dispersed.

Figure 1: Number of affordable housing developments and units by location and funding source.

Location	Federal		State		LIHTC		Total	
	Developments	Units	Developments	Units	Developments	Units	Developments	Units
Boston	58	9,103	21	2,118	323	29,372	402	40,593
Gateway Cities	86	17,523	291	12,088	344	27,511	721	57,122
Other	62	6,845	1,067	29,064	345	25,547	1,474	61,456
Total	**206**	**33,471**	**1,379**	**43,270**	**1,012**	**82,430**	**2,597**	**159,171**

Sources: HUD and Massachusetts Executive Office of Housing and Livable Communities

B. Impact Estimate

Our back-of-the-envelope math suggests Massachusetts could close as much as one-third of the gap in internet access with targeted investments that provide high-speed internet service to affordable housing developments across the state.

Coincidentally, Massachusetts has nearly the exact same number of households without any form of internet access as it does affordable housing units. Low-income residents occupy the overwhelming majority of these 160,000 homes (85 percent).[16] While it is difficult to say for certain how many of the households in Massachusetts without internet live in affordable housing developments, it is certainly a sizeable number.

One indication is the share of households without internet in neighborhoods with affordable housing developments. In Boston census tracts with one or more affordable housing developments, 14 percent of households have no internet service of any kind. Internet access is even more limited in Gateway City census tracts with affordable housing. In these neighborhoods, 20 percent of households are without any form of internet service **(Figure 2)**.

If we assume affordable housing residents have internet access at the same rate as those in their surrounding neighborhoods, Massachusetts could close approximately 15 percent of the internet access divide by providing free or low-cost service to residents of its affordable housing developments. However, this is a very conservative estimation method, as those in public housing are more likely than their neighbors to be very low-income and unable to afford internet service. (The median household income for residents of federal public housing developments in Massachusetts is just $16,000.[17])

Research nationally finds one-third of public housing residents have no internet access.[18] If the 77,000 households in Massachusetts living in state and federal public housing lack internet access at this rate (and we continue to assume LIHTC development residents are without internet at rates proportional to their census tracts), providing free or low-cost internet in affordable housing would close one-quarter of our internet access gap. For an upper bound estimate, we can extend this one-third without internet service assumption to the 82,000 households in LIHTC units. Under this scenario, Massachusetts could close as much as one-third of the internet access divide with targeted investments that provide free or low-cost internet service to affordable housing developments across the state **(Figure 3)**.

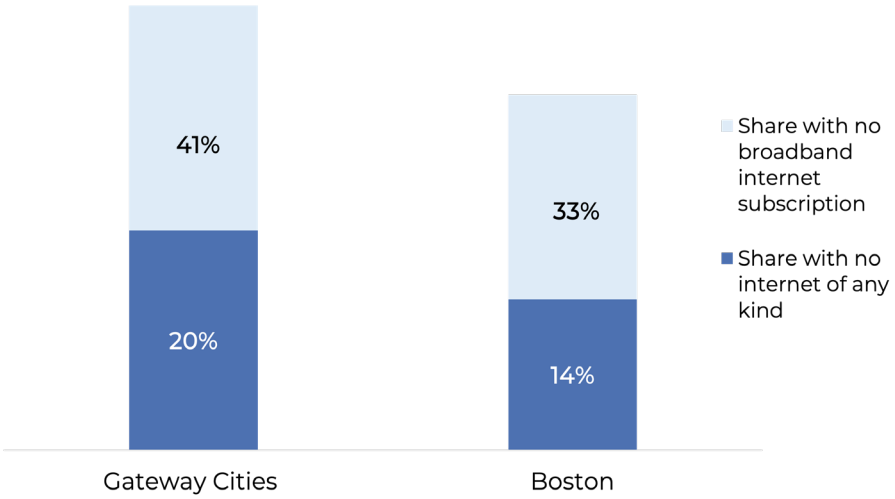
It is also important to note that Massachusetts has another 340,000 households that rely on some form of internet that is not a wired broadband subscription, such as a cell phone, a neighbor's Wi-Fi, or some other connection to the internet that typically provides slower speeds and less reliable service. Census tract data suggests these households are highly concentrated in affordable housing. Moreover, many Massachusetts residents in poorer neighborhoods pay for wired broadband but receive service at less than broadband speeds for various reasons. Factoring in the considerable number of additional households that would benefit from improved service significantly increases the return on investment in affordable housing networks.

MBI DIGITAL PARTNERSHIPS PROGRAM — WI-FI ACCESS INITIATIVE

Drawing on a portion of the $75 million in ARPA funds the state allotted to MBI for digital equity programs in 2022, the Wi-Fi Access Initiative provides grants to install free Wi-Fi in affordable housing developments. Resources flow to partner organizations, which procure services to design a network that will provide fast and reliable in-unit Wi-Fi internet to all residents of a property. The partner then works with the property owner to procure the necessary equipment and construction services to install the network. Partners can include regional planning agencies, community foundations, public and nonprofit service providers, and other community-based organizations with relevant technical expertise.

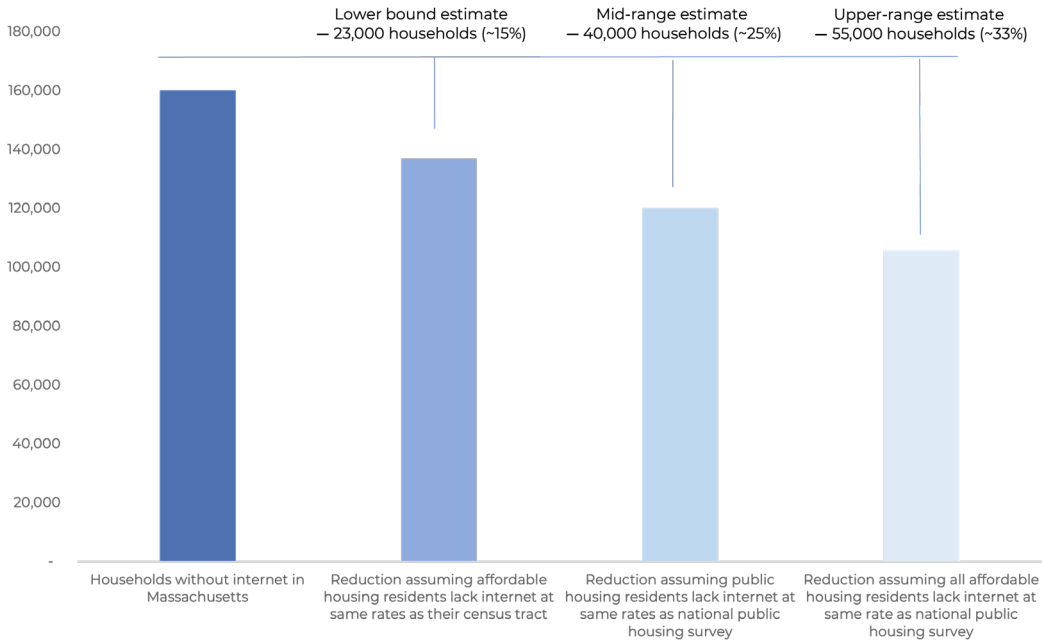
The Metropolitan Area Planning Council (MAPC) has served as a partner, regranting funds to install networks in public housing projects in Chelsea and Revere. The experience has provided deep learning. Most notable is the onerous and time consuming challenge of leading the various procurements for designing the network, building it out, and purchasing internet service from an ISP.

Figure 2: Share of households with limited or no internet access in census tracts with affordable housing developments



Source: Author's analysis of data from 2021 5-year ACS and HUD

Figure 3: Lower and upper bound estimates of reductions in households without Internet through affordable housing investments



Source: Author's estimates

C. Funding Sources

Massachusetts has various sources to draw on to generate the $160 million necessary to bring high-speed internet to all residents of affordable housing. They include:

CPF. ARPA included a $10 billion Capital Projects Fund (CPF) to help states increase access to high-speed broadband with a focus on low- and moderate-income communities. Massachusetts will receive $175 million from this fund. These resources can be used to install fiber or Wi-Fi networks in affordable housing developments in low- and moderate-income communities. New York state has directed 30 percent ($100 million) of its CPF dollars to broadband investments in affordable housing; Nevada has committed 40 percent ($55 million) for broadband in public housing. In sharp contrast, Massachusetts plans to allocate most of its CPF dollars to predominantly rural areas ($143 million) through its Gap Networks Grant Program. This investment should connect 16,000 households, covering the vast majority of those in Massachusetts without broadband access. The state will still have $32 million remaining from CPF that it can direct to affordable housing, and its CPF investment should allow it to expend a sizeable share of BEAD (see below) on affordable housing.

BEAD. The Bipartisan Infrastructure Law's Broadband Equity Access and Deployment (BEAD) Program is the largest federal investment ever to connect un- and underserved households to the internet in the United States. Massachusetts will receive $147 million from the program. Broadband investments in affordable housing are an eligible use for these funds, but states must first connect unserved households before they can improve access to buildings with existing internet service. However, Massachusetts will be able to make a credible case in its BEAD plan that it has already fully met this requirement through previous state investment in rural broadband and by committing its CPF funds to this task.

Building decarbonization. The Healey–Driscoll administration recently created the nation's first green bank dedicated to affordable housing with $50 million in state funds. Led by MassHousing, the bank will work to leverage these resources with funding available from the federal Inflation Reduction Act as well as private capital. When operators refinance older affordable housing developments to bring in new capital for improvements, the green bank will deploy its resources to help ensure that the renovations include installation of solar panels, heat pumps, high-efficiency appliances, and other energy efficiency upgrades. This work could include installation of broadband networks to support smart devices that reduce energy usage. These investments provide a promising avenue to address the digital divide long-term, because this financing can cover the costs of networking equipment and construction will be far more efficient by coordinating it with other building improvements. Moreover, some of the savings from reduced energy usage could help support the ongoing costs to deliver high-speed internet to the building.

CRA. The state can also likely tap private capital at reduced rates as it works to leverage federal funding for broadband infrastructure. Digital equity is a well-understood activity under the Community Reinvestment Act (CRA). The connection comes in part because of digital redlining and the recognition that low-income neighborhoods have not seen as much of this infrastructure investment as other areas. As more and more banking activity occurs online, there is also a rationale that financial institutions must support digital equity in low-income communities to ensure fair access to lending.[19]

Other federal recovery funds. While the sources above represent the prime opportunities, there are other buckets that could potentially contribute to the effort, namely remaining ARPA and Elementary and Secondary School Emergency Relief (ESSR) dollars. In 2021, the legislature provided MBI with $50 million from its state ARPA recovery allocation for digital equity initiatives. So far, MBI has expended $31 million, with approximately $5.1 million going to the Apartment Wi-Fi demonstration project. While there is still $19 million to spend down, this flexible funding stream is a vital source for providing digital skills training and other digital equity planning and outreach services. Massachusetts school districts received $2.6 billion from the ESSR. Increasing access to broadband for students is an allowable use of ESSR funds. A significant share of these dollars has not been expended, with only a year remaining before the September 2024 deadline. While it is late to direct ESSR funds to broadband access projects, it is possible that a handful of communities will use this resource to increase internet access in underserved neighborhoods with significant concentrations of affordable housing.

NORTH SHORE CDC BEAMS WIRELESS TO SALEM'S POINT NEIGHBORHOOD

Amid the height of the COVID-19 pandemic, North Shore Community Development Coalition spearheaded efforts to close the digital divide in Salem's Point neighborhood. Providing free Wi-Fi through a mesh network became the cornerstone of the strategy. The CDC planned to start small and add more coverage over time, leveraging the 31 buildings that it owned in the neighborhood to reach the approximately 3,000 residents living there. In less than six months, the CDC had a design. Construction took approximately one year, including significant pandemic-related supply chain delays. Since the network came online in May 2022, approximately 1,500 individual users have accessed the free service.

With support from the Essex County Community Foundation, the CDC is working to capitalize on this infrastructure with a range of digital equity activities. To increase awareness of the new opportunities and encourage residents to take advantage of them, the CDC hired five community ambassadors. More than 250 refurbished devices have been provided to residents in need of computers. Hundreds of residents have participated in digital skills courses provided primarily in Spanish, in partnership with Tech Goes Home (TGH). And small businesses in the neighborhood have received specialized digital skills training. To date, approximately $200,000 has been invested in this effort. The CDC anticipates absorbing ongoing operating costs of roughly $25,000 per year.

URBAN EDGE BRINGS DIGITAL OPPORTUNITY TO THE JACKSON CORRIDOR

Urban Edge is a community development corporation (CDC) in Boston with over 1,500 affordable housing units heavily concentrated in the area between Jackson Square in Jamaica Plain and Egleston Square in Roxbury. The CDC's industrious efforts demonstrate how a community-based organization can play a leading role in identifying the digital equity needs of local residents and working collaboratively to address them. At the height of the pandemic, Urban Edge partnered with MAPC to conduct a community needs assessment, surveying over 200 neighborhood residents and organizing focus groups with neighbors and local nonprofit partners.

Continuing the partnership with MAPC, the CDC then explored a variety of technological solutions to provide residents with reliable and affordable internet access. They settled on a plan to hardwire its affordable housing developments, bringing fiber directly into 800 units to give residents access to free or low-cost high-speed service.

Urban Edge is proactively working to ensure that residents can make the most of this new internet access when it becomes available. Through a partnership with TGH, Urban Edge staff are delivering digital skills training. They are also developing a model that pairs older adults with area youth to reinforce lessons learned through the TGH training and help them troubleshoot problems in their homes. In soliciting vendors to build the network, the CDC is looking for companies that can train and employ community members to install and service the network. And Urban Edge will soon have a Fellow from the American Connection Corps to help organize and lead these efforts.

NETWORK DESIGN OPTIONS

There are many technologies that affordable housing leaders can deploy to give residents access to reliable high-speed internet. Each has strengths and weaknesses, and engineering studies are generally required to determine which will best serve the goals of the community. Most developments will evaluate variations of these three basic approaches: fiber to the unit, building Wi-Fi, or mesh broadband.

Fiber to the unit. Running fiber through conduits to each housing unit within a building is generally seen as the best solution because it ensures that all residents will have high-speed access in their home without interference from other signals. However, this approach typically requires the most upfront expense because of the extensive wiring. It also requires many routers. They can be placed in the units, which gives residents the ability to self-service the devices. Alternatively, routers can be located in hallways. This lowers the upfront cost because routers in hallways can serve multiple units, but the building then assumes responsibility for maintaining these devices.

Building Wi-Fi. For most developments, installing a public Wi-Fi network will have lower upfront costs, but in the long term, the costs are likely significantly higher. The property will need a managed service provider to operate this network, especially given the unique security issues that Wi-Fi networks introduce. Wireless equipment that broadcasts 24/7 also has limited lifespan. According to the Benton Institute, 40 percent to 80 percent of the capital costs must be reinvested every five years to refresh this equipment, whereas a fiber network requires between 1 percent and 10 percent of the capital reinvestment every 10 years.[20]

Mesh broadband. A third solution is building a mesh broadband network that broadcasts signals from an affordable housing development into its buildings and throughout the surrounding neighborhood. While this requires an even more substantial investment in equipment that must be maintained and regularly refreshed, economies of scale are possible because the approach has the potential to reach a large number of underserved residents in low-income neighborhoods. There are also significant community development benefits if neighborhood residents take responsibility for building and maintaining their network.

ONE NEIGHBORHOOD BUILDERS, OLNEYVILLE

One Neighborhood Builders, a CDC with 42 affordable housing developments in the largely residential Olneyville section of Providence, has demonstrated the promise of a wireless mesh network as a community and economic development strategy. The CDC conceived of the project and brought it online in just eight months during the worst of the pandemic. Over the past two years, they expanded the network and updated equipment to optimize its reach. They now have 23 nodes providing 100 Mbps/symmetrical service across 7 million square feet in the neighborhood. Approximately 2,500 users access the free network each day. This effort has required considerable investment: $475,000 for construction and equipment, and $82,000 in annual operating expenses ($33/user/year).

One of the unique aspects of this project is the backhaul fiber optic connection available through OSHEAN, a nonprofit ISP that provides premium, affordable service to large institutions in Rhode Island, including hospitals, schools, state agencies, municipalities, and libraries. In 2008, OSHEAN installed 600 miles of fiber optic cable in the region with a $22 million federal grant and a $10 million match from the state of Rhode Island.[21]

IV. A WORK PLAN FOR STATE POLICYMAKERS AND AFFORDABLE HOUSING DEVELOPERS

Funding from the federal government's unprecedented investment in broadband infrastructure is already arriving in Massachusetts. This leaves very little time to act. Leaders must come together across sectors to develop clear strategies and an accompanying list of to-dos. To help initiate productive dialogue, we have drawn on our research and conversations with digital equity pioneers to flesh out action items for both state policymakers and affordable housing developers.

Action Items for State Policymakers

1. **Marshal federal resources for investment in affordable housing broadband infrastructure.** Massachusetts can narrow the digital divide considerably by helping residents of affordable housing connect to the internet, but as we have seen, this will require substantial investment. The state has already committed the majority of its CPF funds to rural areas. In an ideal world, it would reevaluate this decision with its federal partners. CPF is more flexible than BEAD funds and does not require the 25 percent match. CPF could go a long way toward meeting the need for capital investment in affordable housing properties. And the state would still have more than enough resources through BEAD to wire unserved households.

   If Treasury requires Massachusetts to adhere to its initial CPF plan, the state can make a compelling case to the National Telecommunications and Information Administration (NTIA) that its primary use for BEAD will be underserved residents. The CPF investment under the initial plan should be sufficient to wire more than 99 percent of locations in Massachusetts. There are very legitimate questions about the cost-benefit associated with efforts to reach into the 99th percentile. Connecting unserved households will require a subsidy of $9,000 per household, and this is with the unlikely assumption that all newly connected households will want to purchase service once they have the option. As Massachusetts reaches the extreme tail of unserved locations, the cost per new connection will rise exponentially. And these public investments will create large windfalls for private owners in remote areas (many of them second homes), who purchased properties at below market prices because they lacked broadband access.

   Massachusetts received less than 0.5 percent of Congress's total allocation to BEAD, in part because it aggressively utilized its own resources to wire rural areas over the past decade. At this point, the focus should be deploying Massachusetts's limited resources, both BEAD and CPF, in as equitable and as cost-effective a manner as possible.

2. **Gain economies of scale by aggregating developments for bulk purchasing of both design and construction services.** Massachusetts can expend its broadband resources most effectively by inviting affordable housing operators to join collaboratives that procure design or construction services for numerous developments jointly. With thousands of properties to wire, this approach should still give affordable housing operators flexibility to select the type of network that will best meet their community's needs.

   To ensure that they can make an informed decision about the technology they want to pursue through bulk procurement, MBI should pre-qualify consultants familiar with evaluating network solutions in affordable housing contexts. Individual affordable housing operators could then pay these consultants for their services.

3. **Gain economies of scale by aggregating developments for bulk purchasing of ISP and MSP services.** Affordable housing developments that want to provide free service to residents will need to purchase this service through contracts with ISPs. They will also need to contract with MSPs to manage their networks. Massachusetts can generate considerable savings for affordable housing operators by replicating the success that PowerOptions has had purchasing electricity on the wholesale market to lower costs for nonprofit entities (see box on p. 15).

CHELSEA HOUSING AUTHORITY PROVIDES FREE WI-FI DIRECTLY TO ITS RESIDENTS

With support from MBI and MAPC, the Chelsea Housing Authority will be the first in Massachusetts to pilot a free Wi-Fi network in its Prattville Apartments. The process began with a needs assessment to develop a better understanding of the two-building complex and its residents' aspirations. With a firm grasp of physical conditions and resident needs, MAPC issued procurements for both construction and ISP service. Designing the network and purchasing and installing the equipment cost approximately $1,200 per unit.

4. **Create a unified procurement framework for public investment in broadband networks.** Providing a clear and seamless design-build process for broadband is one of the most impactful steps the state can take to ensure that this quantity of one-time federal funding has maximal impact on the digital divide.

   While bulk-purchasing design and construction services sequentially will be an ideal solution for many properties, larger developments may find it more effective to pursue a single design-build contract. The ideal approach to facilitate these procurements would be to replicate the procedures established by Chapter 25A for clean energy services. Over the past decade, this model has established a strong performance record for public agencies working to advance complex clean energy projects. Especially promising is the ability to procure services through Chapter 25A that include a community benefit component. The Boston Housing Authority has demonstrated how this can work with project labor agreements that contain requirements for pre-apprenticeship job training in clean energy retrofits.

   Ideally, broadband projects in affordable housing will similarly create opportunities for residents to co-develop the technology solution and market and maintain their local networks. Pursuing this approach could be especially beneficial as a workforce development strategy. Affordable housing organizations can play a meaningful role recruiting and training the workers that will be required to install and maintain broadband networks and perform ongoing digital skills outreach and training for residents.

5. **Create a sustainable funding source for digital equity services.** MBI quickly expended more than half of the $75 million the legislature appropriated for the Digital Equity Fund. As digital equity efforts take root across the state, there will be far more demand for these resources in the future. Massachusetts must find a sustainable revenue stream to support these efforts long-term. Options include a line item in the state budget, collecting voluntary contributions from ISPs, including an end-user service fee to internet bills (following the Mass-Save model for residential energy efficiency upgrades), attaching a surcharge to digital device purchases or asking consumers to donate to a fund at the time of purchase, or a combination of these mechanisms. Affordable housing developers and others working to spend one-time federal funds have complex decisions to make with many variables to evaluate. Clarity on the scale and stability of state revenue for digital equity efforts going forward will be especially helpful as they make these difficult choices.

6. **Ensure that residents of affordable housing have unfettered access to the internet.** Pressure to screen content is a major challenge when affordable housing operators manage networks. Many believe they will face liability as well reputational risk if they do not take preventive steps to keep residents from engaging in illicit activity online. However, content moderation is notoriously difficult, and there are serious civil rights issues associated with limiting how low-income residents can access information. For this reason, public libraries in Massachusetts are unified in their belief that any type of filtering is unacceptable. The state can reduce the time and expense associated with content filtering and help shield operators from potential liability with a blanket prohibition on content filtering in broadband networks serving residents of affordable housing.

Key Tasks for Affordable Housing Developers

1. **Participate in digital equity planning and policy discussions.** More than 70 communities, including Boston and most Gateway Cities, are currently in the process of developing digital equity strategies. At the same time, the state is preparing a digital equity plan and a plan to deploy BEAD funds. Affordable housing leaders can learn more about digital equity resources in their region and inform future efforts to further digital equity in the community by engaging in these planning efforts.
2. **Establish relationships with community-based organizations providing digital equity services.** From statewide organizations like TGH and the Massachusetts Public Housing Tenants Union to local Boys & Girls Clubs, YMCAs, libraries, and adult education providers, an increasing number of groups are helping residents access and adopt digital technologies to improve their lives. Affordable housing operators can develop deep partnerships with these organizations to create more digital opportunity for their residents.
3. **Create well-equipped spaces for digital equity training and shared technology.** While operating fully equipped computer labs on site is difficult for most affordable housing developments, ensuring that community rooms have sufficient internet access so that community partners can provide digital equity training on site is more manageable. Maintaining printers and other basic devices in these community spaces can also provide opportunities for residents to interact and informally exchange knowledge about technology.
4. **Encourage residents to engage online.** As residents gain access to technology and internet service, affordable housing operators can help them build digital skills, starting with the basics such as paying rent and submitting work requests online. Community engagement teams can also work to ensure that digital opportunity is empowering by helping residents communicate with their neighbors through moderated community email lists or websites.
5. **Pursue the "dig once" approach when refinancing developments.** The ideal time to install fiber and networking equipment is when buildings are undergoing major renovations. This approach provides cost savings and minimizes disruption for residents. Affordable housing operators can also take advantage of existing capital programs to bake the costs for this networking equipment into the pro forma so that the financial plan for the development accurately accounts for the long-term capital and operating expenses of providing internet connectivity to residents.

LAWRENCE COMMUNITY WORKS BRINGS FREE WI-FI TO UNION CROSSING

Lawrence Community Works (LCW) is closing the digital divide in a particularly challenging setting: historic mill complexes. The CDC has spent more than two decades repurposing the city's mill buildings to provide both living and commercial spaces. These enormous structures with thick brick walls are especially difficult to hardwire or penetrate with wireless signals. The CDC has partnered with Education Superhighway to design a network with the power to broadcast Wi-Fi over a campus that includes one large mill and two adjacent buildings. The system should serve up to 500 daily users, including both residents and numerous small businesses occupying the commercial space. Design and construction is expected to cost $100,000. LCW plans to absorb ongoing operating costs of approximately $15,000 annually.

NEW YORK CITY HOUSING AUTHORITY GOES BIG

New York City Housing Authority (NYCHA) has demonstrated the power of connecting residents of affordable housing to the internet and digital technology. In 2016, NYCHA launched an effort to provide free high-speed Wi-Fi internet throughout Queensbridge Houses, the largest public housing development in the US, with over 7,000 residents. The de Blasio administration committed city capital funds to construct the project as well as resources for operating services and partnered with SpotOn Wireless to build and operate the network. The company committed to hiring 12 residents of the development to help with community outreach and engagement, which was especially helpful in building trust. Residents quickly adopted the service, with more than two-thirds signing up as soon as it became available.[22]

NYCHA has sought to build on this success. In 2021, five vendors signed agreements to offer high-speed internet access to 35,000 residents in 13 NYCHA developments (three developments at no cost, 10 for less than $20/month). The city drew this private investment by leasing its real estate assets. Providing the ISPs with the ability to install networking equipment in central locations gave them deeper reach and the ability to serve more customers in the surrounding neighborhoods. Four of the companies were minority-owned businesses relatively new to the market.

The Adams administration has taken another tack, committing resources to purchase service for NYCHA residents directly from ISPs. The aim is to expand free internet to 202 NYCHA complexes, reaching 300,000 residents by the end of the year.

BOSTON HOUSING AUTHORITY BUILDS ON BONET

The Boston Housing Authority (BHA) has long recognized the challenges its residents face in crossing the digital divide. Over the years, it has cobbled together funding and brought in partners to provide residents with access to computers and training. However, the resources have never been sufficient to span the agency's large portfolio and meet the needs of all residents. In recent years, BHA has worked to gain ground by partnering with the city of Boston. The city's most recent cable franchise agreement with Comcast included terms extending "BoNet" (the city-owned municipal fiber network) to 17 federal public housing properties, providing free public Wi-Fi in common spaces and community rooms. The BHA has been working to ensure that residents can get the most from this free internet access by partnering with several groups offering digital skills training and device access to residents. They include the Boston Public Library, TGH, and several elder services providers. The BHA is actively working to expand BoNet access to other properties. At the same time, the agency is seeking state and federal funding to make additional capital investments that will improve in-unit internet access in its many buildings.

BORROWING FROM THE ENERGY SECTOR'S COST-EFFECTIVE APPROACH TO PROCUREMENT

Recognizing the complexities of clean energy services, which require both the installation of technologies and financing tools for this new equipment based on cost savings, the Massachusetts legislature created a new procurement statute in the Green Communities Act of 2008.

Chapter 25A allows municipalities and state agencies to solicit bids for clean energy projects with a single contact for the full range of services required, including conceptualization, design, construction, post-construction monitoring and verification, and performance guarantees. They can procure these services using either a Request for Proposals (RFP) or a Request for Qualifications (RFQ). The RFP process allows municipalities to evaluate proposals based on both price and qualifications. RFQs provide even greater flexibility. The vendor is selected solely on qualifications, and then the agency negotiates a price based on the final scope of work developed with the vendor. Eligible projects for these procurement methods include energy conservation measures, including water and streetlights, and renewable energy generation, such as solar and wind.

PowerOptions is another relevant model from the energy sector with an even longer successful track record. Originally established by the state legislature under the Massachusetts Health and Educational Facilities Authority in 1998, PowerOptions is now an independent nonprofit energy buying consortium for both nonprofit and public sector purchasers. The consortium has grown to more than 450 members across New England. The collective purchasing power gives members lower costs and greater price predictability in the region's deregulated energy market.[23]

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ABOUT THE MASSACHUSETTS COMPETITIVE PARTNERSHIP

The Massachusetts Competitive Partnership is a nonprofit, nonpartisan, 501(c)(4) public policy group comprising chief executive officers from some of the commonwealth's largest businesses. MACP's goal is to promote job growth and competitiveness in the commonwealth by working in collaboration with public officials and business and civic leaders. MACP's mission is to make Massachusetts one of the leading states for business investment, inclusive job creation, and overall competitiveness.

ABOUT MASSINC

Founded in 1996, MassINC's mission is to provide the people of Massachusetts with the information they need to participate fully in our democracy. We are a nonpartisan 501(c)(3) and achieve impact through independent research, nonprofit journalism, and civic engagement

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