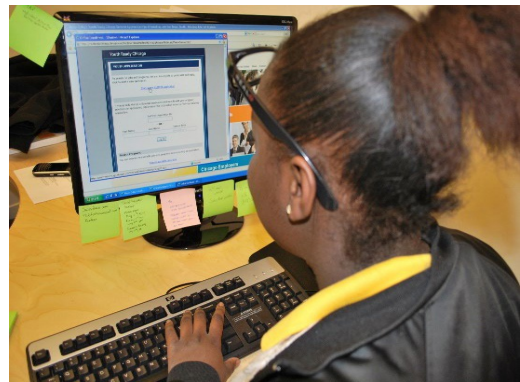


# Bridging the Digital Divide in Affordable Housing Communities

*A Practitioner's Resource for Multifamily Operators*



*Stewards of Affordable Housing for the Future (SAHF) is a national collaborative of nonprofits with a shared vision of a world where every person has a healthy home in a flourishing community. Our mission driven alliance combines the sophistication and expertise of thirteen of the largest and highest-performing nonprofit affordable housing providers to accelerate policy changes, innovation and on-the-ground solutions for affordable, quality, environmentally sustainable homes within healthy, equitable communities.*

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**Photo Credits:** The Community Builders, National Housing Trust, Retirement Housing Foundation (in order on the front page)

# Introduction

The steady shift of essential services such as education, employment, health care and banking to online platforms has made the ability to use reliable, affordable internet with a fully capable device a necessity for even the most basic participation in our communities. The COVID-19 pandemic accelerated the shift to online services, making digital access an *essential lifeline* to sustain health and economic well-being. Access to a high-speed internet connection and a fully capable device allowed many people to transition to remote work, education, socialization and healthcare. But for millions of people of limited economic means -- a disproportionate number of whom are people of color -- little or no connectivity has deepened health and economic inequities. This includes many residents of affordable housing, who are nearly twice as likely to lack high-speed internet connections as the general population, placing them at significant risk of falling further behind during the greatest public health crisis in a century.

The impact of the digital divide among affordable housing residents during COVID-19 is profound. Seniors, who are more likely to face barriers to digital access, experience the mental and physical impact of social isolation. As telemedicine has become a prevalent model for people to manage their health needs, seniors who lack digital access and literacy are left behind. Children and working-age adults who depend on public spaces (libraries, community centers, schools) to access internet for education, employment and financial services, are left unconnected. Without reliable and affordable internet access in their own homes, residents lose their agency and security by needing to rely on other sources for connectivity. The pandemic has brought such swift changes to how we engage in society that even when COVID-19 subsides, reliable connectivity will remain crucial for years to come.

The digital divide disproportionately affects communities of color. Black and Hispanic households lack in-home internet access at higher rates than white households earning comparable incomes and 82% of white households report owning a desktop or laptop computer, compared with just 58% of blacks and 57% of Hispanics. The dearth of internet connectivity and fully capable device adoption among communities of color limits their ability to participate in activities critical to their health, economic well-being and education. ***We must seek solutions that are both practical and equitable, ensuring that digital inclusion efforts address the needs of communities and people underserved by current policies and systems.***

Stewards of Affordable Housing for the Future (SAHF) and its members recognize the critical link between digital inclusion and the health and economic well-being of affordable housing residents. While SAHF and its members have sought scalable solutions to address the digital divide in multifamily affordable rental housing, the rapid and innovative responses to the acute need brought about by the pandemic offered an opportunity to better understand the complexity of the issue and

highlight both near and long-term solutions. This *Practitioner's Resource* draws upon the experience of SAHF members and other practitioners to provide an outline of the challenges and barriers facing affordable housing residents and owners, and identify policy and practice-based solutions. This resource also includes several case studies that highlight innovative models and partnerships aimed at closing the digital divide within multifamily and senior affordable housing communities. Because fully scaled, long-term solutions to the digital divide will require policy and systems change, this document highlights some key policy ideas that are included in SAHF's [2021 Policy Agenda](#).

# Defining Broadband & Connectivity

The digital divide is not just a phenomenon between those who have internet access and those who do not, *but also separates those who have high-speed internet and those who have slower speeds.*

Broadband services are delivered through several different transmission technologies, each offering various bandwidth capabilities and related costs (Appendix A). Importantly, the Federal Communications Commission (FCC) defines broadband using speed at which data is transmitted. The current FCC definition, which was set in 2015, considers broadband as download speeds of at least 25 Megabits per second (Mbps) and upload speeds of at least 3 Mbps (25/3). Though the FCC standard for broadband might be enough for one person's regular internet needs, including basic functions like sending emails, browsing the internet, and checking social media, broadband speeds can slow based on several factors. These include the number of people accessing the network, the types of devices used to access the internet, and the kinds of online activities (Figure 1).

| Household<br>Broadband Guide | Basic Use<br>Checking email ,<br>browsing the web,<br>basic video,<br>internet radio | Moderate/High Use<br>Basic use + streaming<br>HD video, multiparty<br>video conferencing,<br>telecommuting |
|------------------------------|--|--|
|                              | 3-8 Mbps   | 12-25 Mbps   |
| 1 user on 1 device           |  |  |
| 2 users or devices at a time | 3-8 Mbps   | 12-25+ Mbps  |
| 3 users or devices at a time | 12-25 Mbps   | 25+ Mbps   |
| 4 users or devices at a time | 12-25 Mbps   | 25+ Mbps   |

Figure 1: Recommended broadband speeds based on number of devices and use. Adapted from FCC's Household Broadband Guide (FCC, 2020)

As more individuals in a household utilize the internet at once (especially during COVID-19) and the types of online activities require greater bandwidth, the online experience of users becomes more challenging.

The current FCC definition has been scrutinized for being misrepresentative of industry capabilities and consumer demands. Since some broadband networks offer speeds far greater than 25/3 mbps and with the anticipation of 5G technology in the coming years, this standard is increasingly out of date. Proponents of raising the FCC standard cite 100/100 Mbps as the minimum threshold of speed that should be guaranteed by ISPs.

Research on internet connectivity has shed light on the accessibility of broadband internet, specifically fixed, in-home broadband internet, among American households. While roughly 90 percent of American households are connected to the internet in some form (including mobile internet), 27 percent of people remain without fixed, in-home internet access. Unfortunately, the connectivity that the vast majority of Americans enjoy remains out of reach for residents of affordable housing. Though data on connectivity in privately-subsidized housing is limited, data collected from HUD in public housing shows that one-third of households lack internet access and another third are “underconnected,” without high-speed access and/or depend on cellular data plans. Given the similar tenant populations, we can assume that the disparities are also prevalent in other affordable housing communities.

Affordable housing providers have recognized the importance and value of providing internet access to support resident stability and wellness. For over twenty years, owners have frequently included onsite computer labs that provide access to anywhere between 1-20 computers with hardwired internet access. Although computer labs provide residents with access to both internet and computing devices, this model limits how many can access the internet at one time. In addition, computer labs often have limited hours that do not meet the needs of all residents and lack the same level of privacy as a personal device/network. As technologies advance, and in an effort to provide internet access for more residents at once, providers have moved away from traditional computer labs toward models that make internet accessible in community spaces through Wi-Fi technology. These models require residents to use their own internet-capable devices (or an owner-provided device). As internet access is now considered a standard for homeowners and market-rate renters nationwide, affordable housing providers acknowledge the necessity for their residents and strive to provide in-unit high-speed internet as an amenity.

# Barriers to Digital Equity

Residents of affordable housing properties face three types of barriers that prevent them from equitable internet connectivity: **availability, access, and adoption.**

## Availability

The availability of high-speed internet is highly dependent on the physical infrastructure of properties and existing broadband infrastructure at the property and in the community. Since many affordable housing properties were built before the introduction of broadband internet, the physical design/structure often creates wiring challenges for many owners who are exploring models for providing in-unit internet access to their residents.

### *Broadband Infrastructure*

The current broadband infrastructure landscape reveals significant gaps that contribute to the digital divide. ISPs, particularly large providers, are often unwilling to build the infrastructure and provide service in areas where there are limited returns in profit. This has led to fewer available ISPs in most rural areas and in lower income neighborhoods in urban areas. When ISPs fail to invest in infrastructure, residents in these neighborhoods are unable to access higher speed connections.

ISP monopolies can further contribute to limited broadband infrastructure investments in underserved communities. Telecommunications companies are more likely to invest in faster quality technology in regions where competition is high; this often includes higher-income, urban markets leaving communities in areas with low competition underserved. Service providers can charge high rates to construct cabling and wiring especially in rural areas given the lack of alternatives. Furthermore, when ISPs build and own the infrastructure to service an area, they are able to limit other ISPs from using that transmission equipment, leaving housing providers and residents with only one or two options for service providers.

Limited ISP options leads to fewer opportunities to build partnerships with competitive alternatives that provide innovative technological solutions to infrastructure challenges and lower costs for residents of affordable housing. As cities across the country begin to introduce 5G technology to select areas, the availability of affordable fixed-broadband and fully capable devices remain out of reach for many low-income communities of color, which threatens to deepen inequities in areas critical to health and well-being.

### *Building Infrastructure*

Older buildings often lack the wiring for wireless internet connection and thick walls can block the transmission of Wi-Fi and satellite signals. These necessary infrastructure investments can present

prohibitive costs for property owners that can vary by property (estimates from \$10,000-\$100,000). Moreover, multi-building properties such as garden style or buildings with multiple long wings can present infrastructure challenges as their sprawling layout can increase costs and preclude some solutions available in denser buildings.

HUD's 2016 Narrowing the Digital Divide Rule mandates broadband wiring infrastructure in all new construction and significant rehabilitation projects with HUD funding. The HUD rule specifies that new infrastructure is required to provide broadband speeds, as defined by the FCC at the time that pre-construction estimates are calculated to each unit. While this standard is helpful in ensuring that HUD-assisted buildings will have connections in the future, only a small portion of the portfolio is rehabilitated each year so additional strategies and funding sources are needed to provide necessary infrastructure improvements. Moreover, the HUD rule does not affect projects not regulated by HUD, including those funded through the Low-Income Housing Tax Credit (Housing Credit) and/or the US Department of Agriculture, leaving a significant portion of affordable housing stock without regulations on broadband access.

While many state housing finance agencies (HFAs) have begun requiring broadband infrastructure for properties that receive Housing Credit allocations, most of the states that mention internet simply refer to the HUD rule. Only ten states go beyond the HUD rule by mandating or incentivizing higher speeds, paying for tenants' coverage, or providing device-lending programs. Instead, the HUD rule and most HFA requirements address only availability, leaving significant access challenges at detailed below.

## Access

The costs associated with broadband subscriptions, which are out of reach for millions of Americans of limited economic means and communities of color, present the greatest challenge in expanding digital accessibility and adoption rates in multifamily affordable rental housing. HUD's ConnectHome report on digital access found that 80% of residents in public housing cited the cost of broadband subscription as the reason why they remain unconnected to the internet at home. The cost of internet services is **not** considered a utility when calculating costs in affordable housing programs. While some housing providers seek to provide access for residents, the cost of ongoing service alongside any infrastructure investment is a significant expense that cannot be sustained by many affordable rental housing communities. *Reducing broadband subscription costs for both affordable housing residents and owners could help increase broadband adoption.*



## **ConnectHome: A Step Toward to Expanding Access in Affordable Housing Communities**

A federally funded initiative launched in 2015 through HUD, ConnectHome facilitates collaboration between public housing authorities and private sector organizations to expand access to high-speed internet in low-income communities. ConnectHome grew out of the Obama administration's ConnectED program, which focused on connecting K-12 students in classrooms, to ensure students living in public housing have internet access after school. Under its holistic model of digital inclusion, ConnectHome's broad partnership of ISPs, philanthropy, private sector organizations, and nonprofit groups work with public housing authorities to provide low-income households with affordable high-speed broadband access, fully capable devices, and digital literacy trainings. Since 2015, thirty-seven percent of HUD-assisted households with children have gained internet access.

In 2017, ConnectHomeUSA was established under the leadership of its nonprofit partner EveryoneOn. The program recognized the need for internet in a variety of households beyond families with children and expanded participation to senior, veteran and disabled households. Thus far, 56 communities are participating and have helped connect over 52,000 households with broadband access, with the goal of connecting 100 communities to broadband internet by 2021.

Though the ConnectHomeUSA program is an innovative private-public partnership model for expanding broadband access, the model has not broadly scaled into the millions of privately owned affordable rental housing units, in part because it is more burdensome to establish eligibility for residents and because the scale of a single owner's portfolio in a given market tends to be smaller than a public housing authority's. With the support of federal and local governments, PHAs also have substantial networks to attract buy-in from external stakeholders whereas privately owned providers may have a more difficult time attracting support and building partnerships for digital access and inclusion efforts. Similar support targeting privately owned affordable rental housing could help expand partnerships and access.

*Existing tools to address access have limitations that prevent thousands of low income households from achieving connectivity.* Lifeline is a federal program that subsidizes the cost of phone (wireline or wireless) and internet services as well as bundled voice and data service packages for low-income individuals. Individuals who qualify for the program receive a service discount subtracted from the total bill amount (\$9.25 per month, or \$34.25 per month for residents of tribal lands). Though Lifeline is an essential federal program that allows millions of low-income households to access the internet, several limitations contribute to its significant underutilization.

### *Eligibility*

In order to receive benefits, a household's income must be below 135 percent of the federal poverty line (FPL) or someone in the household must participate in a public benefits program such as food



assistance (SNAP) or federal public housing assistance. Presumptive eligibility based on FPL does not apply to other housing subsidy programs though, leaving many households in affordable housing communities out of Lifeline's reach. Moreover, households are only able to use Lifeline for one service -- telephone, standalone home internet, or bundled phone and internet -- and only one person per household is allowed to enroll in Lifeline services. Lastly, a cumbersome enrollment process discourages participants to apply for the program. A more efficient way to establish eligibility is to improve data matching for a wide range of housing programs that serve or target otherwise eligible households (such as project based Section 8 and Section 202) and provide blanket enrollment at the time individuals enroll in federally qualifying programs.

### *Cost & Speed*

At \$9.25/month, the lifeline subsidy only covers a small percent of average monthly cost of broadband subscription, approximately 13 percent of the average advertised monthly price. For very low-income households, the monthly cost for subscription plans with the Lifeline subsidy would still exceed \$10/month which experts consider an appropriate benchmark. To address costs for consumers, many ISPs market their low-cost internet subscription programs to Lifeline participants; examples include Xfinity's Internet Essentials or Access from AT&T. However, ISPs enforce burdensome requirements that limit access to these low-cost programs such as paperless billing, holding no previous debt with the ISP, and making payments with a bank account; these requirements cut off access for many residents of affordable housing. Further, while ISPs often advertise their speeds under these programs as 25/3 Mbps, research indicates that ISPs often service *up to these speeds* – meaning the speeds experienced by users are oftentimes below the FCC standard – which is already insufficient to meet current demand. Because of the difference in advertised and experienced speeds, these “low-cost” plans offer poor value to low-income households. *Thus, even if households are able to access the internet through low-cost programs, the slower speeds severely limit functionality and present another hurdle to bridging the digital divide.*

### *Fully Capable Devices (tablets and computers)*

In addition to the cost of internet access, the costs of fully capable devices such as desktop computers and laptops are another roadblock to full connectivity for affordable housing residents, especially for Black and Hispanic households **(see Figure 2)**. Low-income households without fixed broadband access are more likely to depend on smartphones to access the internet; in public housing, three

quarters of connected households rely on smartphones for internet access. While smartphones are flexible and cost-effective connectivity solutions for many residents, they are not nearly as efficient in performing essential tasks such as school assignments and searching for employment. Further, smart phone service plans often have strict limits on data usage that constrain what a resident can accomplish or requires them to access free Wi-Fi networks, which make home-based schooling, work and healthcare less accessible. *Since ninety percent of Lifeline’s users apply their subsidy to mobile service plans; other solutions are required to encourage fixed broadband adoption to enable more functionality and reliable connectivity.*

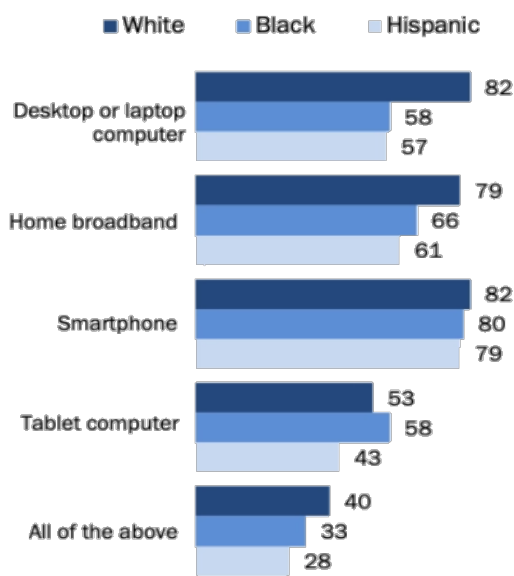


Figure 2 (% of US Adults who own devices): Adoption rates of fully capable devices among Blacks and Hispanics are lower than Whites. Pew Research Center, 2019

## Adoption

If residents have affordable internet access and a fully capable device, yet lack the necessary technical skills, the digital divide will persist. The FCC estimates that over 60 million Americans lack the basic digital literacy skills necessary to take advantage of online resources and services. Evidence illustrates a positive correlation between digital literacy programming and educational outcomes, providing an impetus for housing providers to pair digital literacy interventions with their broader infrastructure and connectivity investments. These interventions are needed more than ever as the COVID-19 pandemic exacerbates the “homework gap” for students in low-income households, who are forced to rely on smartphones and public Wi-Fi to complete assignments.

The Pew Research Center has found that roughly 52 percent of adults were “relatively hesitant” to adopt digital tools for their personal learning. Factors that contribute to a reluctance to adopt digital tools include unfamiliarity with computing devices, concerns over privacy and security, and weak digital skills. In HUD’s ConnectHome report, focus groups with residents show adults are generally less comfortable using laptops or desktop computers, especially for more complex tasks such as checking medical records and paying bills. While children were found to be more comfortable accessing the internet using a variety of devices, parents were concerned about the content their children were accessing and unaware of how to regulate or monitor internet use within their households. Current efforts to facilitate adoption of internet capable devices include resident engagement through mobile and web-based apps, partnerships with libraries and nonprofits that offer digital trainings and deploying smart speakers in senior housing communities **(see case study #4).**

The use of digital navigators is crucial to ensuring successful internet and device adoption efforts in affordable housing communities. Digital navigators can be volunteers or cross-trained staff who work at community-based organizations and help residents access online health care services, education, employment, and government benefits. For affordable housing providers, using trained digital navigators from outside organizations relieves the burden of property staff. Instead of utilizing their own time and resources to develop digital literacy programming, providers can depend on the expertise of digital navigators to support residents. Importantly, during the COVID-19 pandemic, the digital navigator model is well suited to a remote environment. Rural Local Initiatives Support Corporation (LISC) worked with the National Digital Inclusion Alliance (NDIA) to deploy digital navigators at nine sites across Appalachia. By collaborating with affordable housing organizations, human services agencies and other community groups, the digital navigator model will become a critical part of their existing services and Rural LISC is able to target digital inclusion efforts in some of the highest-need communities in the country.

## Solutions

Mission-driven and resident centered affordable housing providers have been seeking creative solutions for digital access and inclusion for some time. Long-term solutions to the core components of digital access -- availability, accessibility and adaptability -- require policy changes and larger time and financial investments, but also offer sustainable connectivity for affordable housing residents. A holistic approach to digital inclusion includes innovative technological solutions that address infrastructure challenges, strategies to cover monthly subscription costs and partnerships with ISPs to broaden access for residents.

The onset of the COVID-19 pandemic has illustrated why stakeholders must pursue both near and long-term action to bridge the digital divide in affordable housing communities. In the past nine months, housing providers have designed and adopted quick solutions to create the access that their residents needed to connect with loved ones, engage in distance learning, and access health care services, among other critical activities. While these programs are sufficient for the short-term, limitations such as user autonomy, higher cost for providers, difficulty in scaling across properties and shorter timeframes for utilization mean that affordable housing communities must continue to pursue sustainable solutions.

### Short-term

#### *Device & Mobile Hotspot Lending Programs*

Several SAHF members including Mercy Housing, Preservation of Affordable Housing, and Volunteers of America have developed lending programs to help residents gain internet access with a mobile

hotspot and fully capable device (**see case study #1**). Through these lending models, affordable housing providers or an affiliated partner (school district, library, foundation) retain ownership of the devices, while residents are provided with an in-unit solution that offers relative user autonomy. Residents are spared the high costs of an internet subscription and fully capable device, which are significant barriers to digital access. However, while lending programs offer connectivity solutions and avoid challenges around property infrastructure, members report several drawbacks: reliance on their own staff for troubleshooting IT and hardware issues, mounting monthly costs and a limited number of devices to deploy. Importantly, mobile hotspots are not a substitute for in-home fixed broadband, as some hotspots can only support a minimal number of devices, are subject to data caps, and are unable to support tasks that require more bandwidth.

### *Community Hotspot Vehicles/Installations*

Another short-term solution is deploying community hotspots, which provide internet access on a property-wide level. For instance, a hotspot vehicle equipped with wireless Wi-Fi technology allows individuals within a certain radius to access the internet. SAHF member National Housing Trust developed a partnership with a school district to establish mobile hotspot vehicles and ensure digital access for students living in their properties (**see case study #1**). Community hotspot solutions are cost-effective and provide greater speeds to a larger number of residents compared to mobile hotspots. Yet they are still subject to user bandwidth limits and require residents to use their own devices.

## **Long-Term**

### *Working with Small ISPs to procure affordable and innovative transmission technology solutions*

Forming strategic partnerships with small ISPs presents affordable housing providers with a long-term solution to existing infrastructure and cost barriers. With innovative wiring techniques and wireless technologies, smaller ISPs often provide higher quality and more affordable internet service than their larger counterparts. However, these smaller actors face barriers to entry given that some of the large ISPs have a monopoly in certain markets and continue to own the wiring in affordable housing buildings.

Starry, an ISP providing service to households in Boston, Denver, Los Angeles, New York, and Washington, DC, helps affordable housing property owners through their Starry Connect Initiative, which brings broadband services to public and affordable housing communities across the country for an all-inclusive fee of \$15 per month/household. Starry works directly with affordable housing owners to install and wire their equipment in properties at no cost, offers a minimum of 30 Mbps symmetrical (upload and download) speed to residents, and does not enforce eligibility requirements and credit checks for residents. Moreover, program eligibility is tied to the apartment unit, ensuring sustainable

connectivity for new residents, which makes Starry an ideal ISP partner for affordable housing providers (**see case study #2**).

### *Mesh Networks – a low-cost wireless solution*

A mesh network offers affordable housing providers with a cost-effective infrastructure model that avoids the need for costly building retrofits by uses pieces of interconnected hardware, or nodes, to share and transmit signals across a specific area. A mesh network allows for the connection of each building floor, with a cable running from the main internet connection outside the building to access points on each floor. A network of wireless access points (WAPs) are established in hallways, allowing for Wi-Fi signals that are strong enough to penetrate individual unit walls so residents can access the internet in their homes. Since the mesh network requires less cabling and drywall patchwork, it serves as a feasible and inexpensive alternative to retrofitting existing buildings. Mercy Housing successfully implemented a mesh network model at a 106-unit property in Denver, CO (**see case study #3**).

Though the upfront investment for a mesh network is higher than a short-term solution and requires technological expertise, it reduces the ongoing costs to a reasonable amount such that property budgets may be able to cover them.

### *Cable Solutions*

Housing providers continue to seek solutions that provide cabled/hardwired solutions to individual units, and often partner with brokers or consultants to negotiate with ISPs for the best rates and services for the property as a whole. Some providers report that by agreeing to directly pay for service in all units, the costs are lower than if individual residents subscribed. The challenge for providers is how to cover those costs, particularly for properties that already have a financing structure in place that did not assume the costs of internet paid by the owner. Properties with replacement reserves or other reserves regulated by HUD or an HFA can seek approval to use reserves for infrastructure costs, but funding for ongoing service can be more challenging. For properties that are new construction or undergoing refinancing, there is an opportunity to build in these costs, but given the restricted rents in affordable housing properties, there may be limited ability to cover this increased cost.

# Operational Considerations

Effective solutions to the digital divide in affordable rental housing require a sustained commitment by housing providers and willingness to explore a range of options for confronting the broad challenges of availability, access and adoption. The following are some key considerations for housing operators seeking to address the digital divide drawn from the experience SAHF members and other affordable housing providers.

## Availability

*Staffing:* identifying and addressing the availability of broadband infrastructure and connectivity for residents implicates most functions within an affordable housing provider's operation, but may lack a natural or established champion. In the past, a single department or individual may have been charged with addressing this during or after the development stage, but successful initiatives have demonstrated that Development, Property Management, Information Technology, Asset Management and Resident Services functions may all need to be consulted to identify what service is available and its feasibility. Organizations should identify a champion(s) who could best identify digital inclusion and vet potential solutions for both properties in the development pipeline and those already under asset management. Then, the selected staff have a choice of coordinating internally and perhaps establishing a "digital task force" to collaborate across functions. Organizations could also look to an external expert who consults with the designated champion to coordinate the organization's efforts.

*Available Services:* Once a champion or process owner has been identified, they must identify the services available in the area; this includes not only the dominant ISPs, but also whether smaller providers may be available. SAHF members have noted that smaller ISPs may be better positioned to provide creative solutions, but that additional diligence is needed to evaluate the risk that a smaller actor will withdraw from a market.

*Building Infrastructure:* For buildings that already have cabling or other infrastructure, operators should determine whether there are existing agreements with ISPs in place that may preclude the use of wiring with another provider, limit the amount of owner-paid access that can be provided or otherwise constrain creative solutions. Developers may also wish to consider internal guidance or policies on such agreements for staff to consider before entering contracts on new or recapitalized developments in order to provide flexibility for solutions in the future.

*Neighborhood Infrastructure:* Operators seeking to improve infrastructure should consider whether there are opportunities to partner with other neighborhood institutions such as schools, to address

infrastructure barriers. Affordable housing providers may also wish to consider whether they can provide services beyond the property boundaries as part of larger community efforts.

*Future Infrastructure:* Place based developers should also consider monitoring and engaging on the decisions about future infrastructure, including 5G deployment, to help guard against further divides and challenges to access.

## Access

The cost of ongoing service continues to be the key challenge for most affordable housing residents and providers.

*Resident Paid Options:* When exploring options that drive down resident costs, owners should be aware of whether they are working with a Lifeline Program that provides only a modest discount on costs and may be unavailable to residents who already have a Lifeline Benefit, or encounter other requirements. Owners should also be mindful that costs quoted by some providers are predicated on an estimated percentage of residents subscribing to services. Owners that can increase subscription rates may be able to drive down costs, but if there are barriers to subscriptions, costs could increase.

*Recently passed Emergency Broadband relief funds may provide some tenants with an interim source of funds for connectivity, but owners and resident services staff may wish to work with residents to identify longer term solutions as those funds are exhausted.*

*Owner Paid Options:* Many owners have found that owner paid service is the most cost effective way to ensure 100% connectivity.

- New construction or refinanced properties may be able to build the expense into the underwriting of the transaction either as an ongoing expense or through the establishment of a reserve upfront.
- Regulated affordable housing properties may have limitations on the ability to pay for this connectivity as operating expenses. Operators should consult their regulatory document and auditors or other advisors before proceeding.

*Technical considerations for operator provided solutions:* When an owner chooses to furnish the connection, there are a host of technical considerations in addition to the infrastructure/hardware that must be considered.

- Speed: Operators must consider what speed of service they aim to provide and whether they will implement guidelines or limitations on the number of device a household may connect or the types of uses (entertainment streaming vs. educational). This is a particular challenge on Wi-Fi networks.



- Privacy and Security: Operators should consider what network security they will provide and whether there are types of content or use that should be prohibited.
- Service Disruption: If the service is provided by the operator, the operator should determine who tenants will contact in the event of service interruptions. Without a designated and responsive system, residents may look to management and residents services to provide this support.
- Maintenance: Operators should also consider costs of upgrades to hardware (e.g. routers or WAP) and increased costs of connection when budgeting for operator paid connections
- Devices: If an operator seeks to support adoption by lending or providing devices, they must determine whether their own IT department or an external provider troubleshoot devices and provide technical instruction.

### Adoption

Adoption considerations are dependent on the type of program in operation at a property. Operators seeking to increase connectivity should seek the voice of the residents in identifying potential solutions and in developing plans for roll out and adoption. Such plans should consider both who will help residents connect to the internet service and who can help them utilize the devices to fully benefit from the connection.

*Resident Services Coordinators and Digital Navigators:* In many communities through the pandemic, the resident service coordinator has served as a defacto digital navigator, helping residents apply for and connect to low cost service. RSCs played this role well because of a trusted relationship with residents, but their capacity and technical expertise may mean that additional resources are required in many communities. Institutions like libraries and schools may offer resources and be potential partners. However, the National Digital Inclusion Alliance's digital navigator model provides affordable housing communities with external expertise to support residents in digital literacy and effective device adoption while allowing housing providers to focus their resources on other aspects of digital inclusion. Moreover, digital navigators elevate the voice and agency of residents when they gain the ability to access programming and services from within their own homes.

### Provider Benefits & Considerations

While most digital inclusion strategies appropriately focus on connecting residents to online resources, a robust digital inclusion approach may allow housing providers to implement changes in their daily operations that help reduce costs and provides greater efficiencies. Housing providers should consider how building wide connectivity might allow them to improve building operations and whether there are potential savings or other efficiencies that can help support the cost of connections.

- Rent Collections: With full connectivity, operators may be better able to use online platforms for rent payments and tenant certifications. This also provides residents with privacy and choice in where and when to undertake these transactions.
- Maintenance: Online systems for submitting and completing work orders can support resident satisfaction, more timely address of maintenance issues and more efficient completion of orders if staff can complete paperwork on site.
- Energy and Water Efficiency: With building wide Wi-Fi, operators can explore sensors and systems that monitor use to support efficient, comfort and health within their buildings.
- Resident Voice and Engagement: Some owners have reported that residents are more engaged in programming at connected properties and residents have access to fully capable devices. Properties with access and high adoption may also be able to explore online delivery of resident services to better tailor resources to what residents choose.

## Policy Recommendations

Permanent solutions to the digital divide require policy changes. Affordable housing programs include the cost of utilities when determining a person's total housing cost, but the definition of utility excludes internet. Our society has long passed the moment when internet access is a luxury. Access to the most basic services requires internet access. When access to healthcare, education, employment and civic engagement is provided online, we cannot profess to provide quality homes if they do not include access to the internet. Policy changes that define internet as a utility in affordable housing and make appropriate funding available are critical, as are changes to permit other programs such as SNAP and Medicaid to pay for connectivity for those who are not in regulated or subsidized affordable housing. These programs rely on online portals for delivery of services and should facilitate connections for participants. The newly enacted Emergency Broadband Benefit will offer lessons that can help inform long-term systems solutions.

In the interim, HUD and state HFAs should consider policy clarifications needed to facilitate creative solutions for owner-provided internet on a property wide basis. Finally, HUD should explore demonstration programs that track operational and resident services cost savings in properties where there is building wide access. Demonstration of cost savings could help identify a broader pool of partners who benefit from connectivity for affordable housing residents and may be willing to contribute to the ongoing costs.

# Conclusion

The digital divide affects millions of low-income households' health and economic well-being. For affordable housing residents and communities of color, little or no connectivity deepens broader inequities in health, education, employment and civic engagement, particularly since the onset of the COVID-19 pandemic, which forced a massive shift in how individuals access essential activities. This crisis has also offered lesson that can be built on to create systemic solutions, particularly in privately owned multifamily affordable housing. Connecting all affordable housing residents with reliable internet access and a fully capable device that serves their needs is urgent and long overdue. A timely response will require both sustainable, systemic solutions and creative interim steps to address availability, access and adoption and close the digital divide.

Identifying and implementing effective and sustainable solutions will require robust collaboration and coordination with residents and community, internally, across departments and functions of an organization, and externally with variety of partners, vendors and community stakeholders. Closing the gaps created by decades of inequitable policies is within reach, but requires both immediate and strategic long-term changes. This document is meant to serve as an evolving resource for affordable housing practitioners and stakeholders on their journey to understand the digital inclusion landscape, collaborate on best practices and ultimately implement sustainable solutions.

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## Appendix A – Types of Broadband Connections

| Connection Type               | Description   | Speed   |
|-------------------------------|---|---|
| Digital Subscriber Line (DSL) | Wireline transmission that carries data over telephone lines.   | On average, provides lower speeds than other technologies (high end of 45 mbps); dependent on distance between residence and telephone company facility.  |
| Cable Modem                   | Wireline transmission that utilizes coaxial cables used by cable companies to broadcast TV programming.   | Average; depends on type of modem used, cable network, and traffic load.  |
| Fiber                         | Converts electrical signals into light; transmits data through thin, transparent glass fibers.  | Comparably faster than DSL or modem connections; depends on how close fibers are to device and bandwidth being used.  |
| Wireless                      | Uses radio link between a device and the service provider's facility. Can provide service in remote areas lacking infrastructure required for DSL, modem, or fiber. Wireless Local Area Networks (WLANs) can extend the reach of wireless in a home or business, and Wi-Fi networks can offer private, in-home broadband access | Speeds are comparable to DSL or modem connections.  |
| Satellite                     | Wireless broadband that transmits signals over a satellite connection.  | Speeds are typically slower than DSL or modem connections, and service is often more expensive. Speed and connection reliability can also depend on several factors, including a device's line of sight to the satellite and the weather. |
| TV White Space (TVWS)         | Harnesses the unused channels between TV broadcasts to conduct internet signals. Can cover a greater distance than wireless hotspots, and is less expensive than rewiring homes   | Comparable to DSL or modem connections  |

# #1: Bridging the Device Access Gap - Device Lending Programs & Community Hotspots

## Key Definitions

### Mobile Hotspot

A small portable device that provides wireless internet signal for devices to access. Often comes with data caps and can typically support up to 2 users.

### Community Hotspot Vehicle

A mobile piece of equipment with wireless WiFi technology that allows individuals within a certain radius (~500 feet) to tap into the network and access the internet.

## Average Cost

- **Laptop or Chromebook:**  
\$240 – \$270 +
- **iPad tablet:**  
\$650
- **Mobile hotspot:**  
\$20 – \$30
- **Mobile hotspot service subscription:**  
\$15 – \$35 / month
- **Internet-enabled tablet:**  
\$19.74 / month

## Challenge

Across the US, [7.3 million school-aged children](#) live in households without fixed broadband access. The cost of internet access (even with existing reduced rate programs) continues to be a significant barrier for many households. Moreover, the cost of fully capable devices remain unaffordable for many low-income households. The lack of access to high-speed internet and fully capable devices is contributing to existing inequities at a time when millions of households are engaged in distance learning, working from home, and accessing health and support services remotely.

## Solution: Device Lending Programs

To help meet the increased need for affordable internet access and fully capable devices, many affordable housing owners developed device lending programs, whereby **residents sign out computer devices and/or hotspots for a fixed period of time** before returning the device. Through these lending models, affordable housing organizations or an affiliated partner (often a local school district, local library, or corporate sponsor) retain ownership of the devices, while residents are provided with an in-unit solution that offers relative user autonomy.

## Solution: Community Hotspots

Affordable housing communities have also partnered with local school districts to host large-scale mobile hotspots. Hotspot vehicles are **equipped with wireless WiFi technology that allows individuals within a certain radius to tap into the network and access the internet**. At a time when COVID-19 has accelerated the immediate need for internet connectivity, especially for students, community hotspot vehicles are an immediate solution that can support a greater number of users than individual hotspots. Community hotspot solutions are cost-effective and provide greater speeds to a larger number of residents compared to mobile hotspots. Yet they are still subject to user bandwidth limits, require residents to use their own devices and may exclude residents who live in units outside of the hotspot's range.

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## Case Study – Mercy Housing’s Device Lending Program

Mercy Housing recently launched a device-lending program to over 100 family and senior properties that allows residents, K-12 students in particular, to access Chromebooks, laptops, tablets, phones, iPads, and hotspots. Funded primarily through philanthropic donors and key partners (AARP Foundation, T-Mobile and Staples), Mercy retains ownership of these devices and is responsible for their maintenance and regular cleaning. When checking out a device, residents sign a device loan agreement and are expected to return the device on time (for the duration of program as determined by Mercy) and in good working condition.

Mercy is currently piloting a mobile application, developed in-house, to track devices as they are lent out to residents. When residents use Chromebooks, Mercy is able to manage their devices remotely through the Google Educational Mobile Device Management (MDM) software. For a one-time \$30 download fee per device, Mercy’s IT department uses MDM to preload software and apps for residents. The MDM software also allows IT staff to reset the device each time a user logs out.

| Device Lending Model – Opportunities/Challenges   |   |
|---|---|
| Opportunities   | Challenges  |
| Cost effective solution in the short-term by addressing immediate internet access for the highest-need households | Not a scalable solution – monthly hotspot subscription costs quickly become prohibitive for owners/affiliated partners  |
| When partnered with institutions, (libraries, school districts) this model fits well into existing structures     | On-site lending programs add increased responsibility to property staff, particularly resident service coordinators, who need to be available for residents for purposes of technical assistance, program management needs and device quality assurance |
| Not site specific, and thus, does not require infrastructure  | Sites need to have a plan to update and replace technology or troubleshoot technical errors as they arise   |
| Maximizes resident autonomy over access   | Not enough devices for all residents who need them – limited in scope   |

## Case Study – Partnerships with Stakeholders to Provide Community Hotspots

For National Housing Trust (NHT), a partnership with the Fredericksburg City Public Schools led to the establishment of two mobile hotspot trailers. At NHT’s Hazel Hill apartments, property staff were approached directly by Fredericksburg City school officials about finding a way to support the digital needs of students who lived on the property.

These community hotspots were built by the district’s IT team and are powered by solar energy. The hotspot offers speeds of 40 Mbps for up to 50-75 students at a time and individuals can tap



into the network from up to a distance of 450 feet. The trailers are strategically placed on the property where all residents are within the maximum distance of both trailers.

| Community – Opportunities/Challenges   |  |
|--|--|
| Opportunities  | Challenges   |
| For older properties with more challenging infrastructure to wire for internet access, community hotspots are a cost-effective short-term solution | Requires residents to use/acquire their own devices to access the internet                 |
| Provides internet access to a wide radius – allowing multiple residents to connect at once   | There is often a maximum number of users who can connect at a time before speeds slow down |
|  | Limited radius of access – residents may only be able to connect to the internet outdoors  |



Figure 1: NHT community hotspot vehicle at Hazel Hill Apartments

# #2: Small ISPs Providing Affordable and Innovative Transmission Technology Solutions

## Key Definitions

### **Internet Service Provider (ISP)**

An organization that provides services for accessing, using, and participating in the internet.

### Featured ISP Providers and Partners

#### **Starry**

An ISP based in Boston that brings ultra-low-cost broadband access to public and private affordable housing communities through its *StarryConnect* initiative

#### **Monkeybrains**

An ISP based in San Francisco that provides high-capacity network solutions to affordable housing communities through partnerships with city government and nonprofit housing developers

#### **California Advanced Services Fund (CASF)**

Established under the Public Utilities Commission, CASF provides grants for broadband infrastructure and adoption projects to bridge the digital divide

## **Challenge**

Since a large portion of affordable housing stock was built prior to the advent of the internet, many providers experience infrastructure challenges in wiring their buildings for broadband. Moreover, there is limited competition among internet service providers (ISP) in some markets and in buildings that do have wiring, the infrastructure may be owned by the ISP, further constraining options.

## **Solution**

Forming strategic partnerships with small ISPs presents affordable housing providers with a long-term solution to existing infrastructure and cost barriers. With innovative wiring techniques and wireless technologies, smaller ISPs often provide higher quality and more affordable internet service than their larger counterparts.

## **Case Study – Starry Partners with Affordable Housing Owners**

Starry, an ISP providing service to households in Boston, Denver, Los Angeles, New York, and Washington, DC (expanding to new cities in 2021) works with affordable housing owners through their Starry Connect initiative, which brings “ultra-low-cost” broadband services to public and affordable housing communities across the country. Starry works directly with affordable housing owners to install and wire their equipment in properties at zero cost and offers **a minimum of 30 Mbps symmetrical speed to residents.**

While Starry typically works with the existing broadband infrastructure of the building, they have the capability to introduce wiring into buildings that may not have it. Starry’s transmission model relies on hub-and-spoke technology, in which antennas installed on top of buildings or towers beam high capacity, high-speed internet to receivers located on rooftops of apartment buildings. From there, the internet signal is connected using existing available building wiring to reach individual apartment units. Residents are then connected to the internet via a WiFi router located on the property. This technology approach allows Starry to avoid many of the challenges that smaller ISPs face in gaining access to rights of way infrastructure to lay fiber or cable to the premise, a realm typically dominated by larger ISPs. Instead, their wireless “last-mile” solution simply requires wiring for the building, a cost that Starry is open to covering for affordable housing owners.

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## DELIVERING HIGH-CAPACITY INTERNET WIRELESSLY

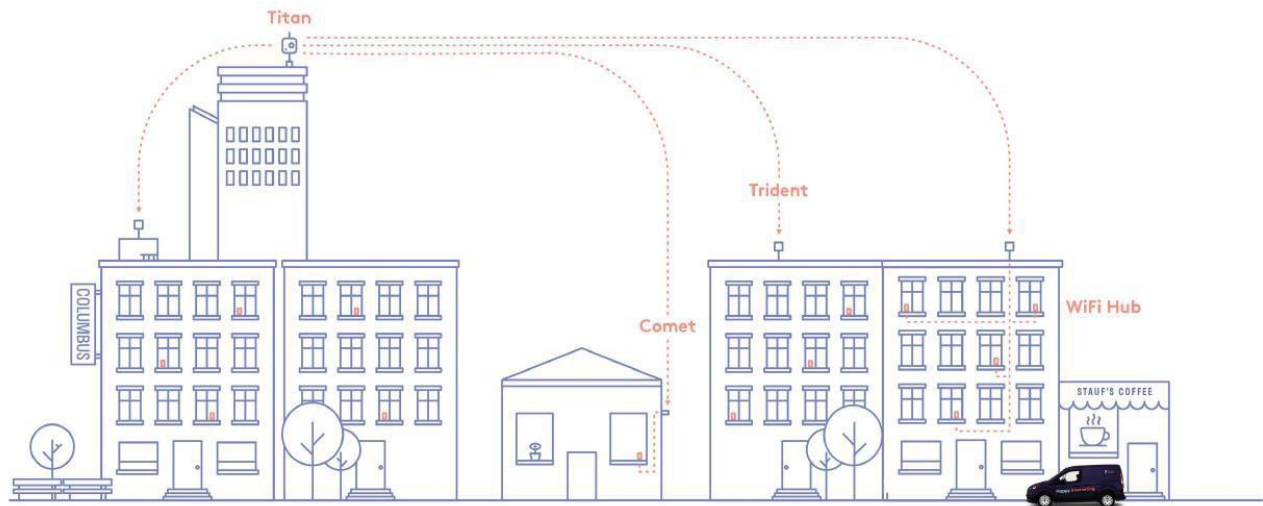


Figure 2 - Starry Technology (Graphic provided by Starry)

One of the benefits of Starry Connect is the program's commitment to exclude the credit checks, complex eligibility requirements, long-term agreements, or data caps that many other affordable broadband programs might require. Starry has already worked with public housing authorities, such as the Los Angeles, Boston and Denver Housing Authorities to bring their broadband services to residents in affordable housing for **\$15/month**. Depending on the property size and the number of households served, Starry is open to working with owners to negotiate lower rates. In addition to the affordable service Starry Connect has provided, Starry offers a host of additional programming components including marketing events and digital literacy training workshops.

Starry is unique among ISPs in its approach to digital inclusion; the Starry Connect model not only provides affordable internet access, but also addresses many of the infrastructure challenges housing providers face in ensuring connectivity for their residents.

## Case Study – Monkeybrains Securing Municipal Support & Public Investments

Monkeybrains, an ISP based in San Francisco, partnered with three nonprofit housing developers to install low cost, in-unit, wireless service, along with campus-wide Wi-Fi at 15 affordable housing properties, **with minimum 100 Mbps of symmetrical speed and in most places 1 Gbps symmetrical speed**. By collaborating with developers and the City of San Francisco during building renovation, Monkeybrains simplified the network installation process to provide high-speed internet direct to every unit over city-owned fiber at no cost to residents. Representatives from Monkeybrains stated that developers were able to significantly cut the cost of installing fiber optic and fixed wireless technology by accounting for all telecom needs during major renovations and rebuilds.

In partnership with the City of San Francisco, Monkeybrains also launched the Fiber to Housing Program, a public-private partnership that provides low-income households with free internet using existing city fiber infrastructure. The program ensures affordable housing communities are connected to public city fiber, and

through an innovative wiring standard, ensures every resident can receive speeds of 1 Gbps symmetrical. In some older buildings in which project redevelopers choose to keep landline service available, the Fiber to Housing Partnership is able to provide both landline service and 100 Mbps symmetrical speeds by using a wall jack supporting both telecom standards over one wire.

To fund their projects, Monkeybrains was awarded \$512,000 through the California Advanced Services Fund (CASF), a broadband infrastructure and adoption fund established by the California Public Utilities Commission. Since the completion of these projects, the California legislature eliminated eligibility for these types of infrastructure investments. [However, recent legislation would provide new funding and bonding capacity for local governments to invest in broadband infrastructure in underserved communities.](#)

The success of this program offers a potential model that could be replicated and scaled in communities across the country. Although California is a notable exception in its robust broadband policy and infrastructure, Monkeybrains' efforts illustrate that with local government support and public investments coupled with innovative wiring infrastructure, affordable housing residents can experience rapid high speeds that are normally available to only higher income households.

| Small ISPs – Opportunities/Challenges                              |  |
|--|--|
| Opportunities  | Challenges   |
| Space for public-private partnerships that can lower costs         | Market and regulatory barriers that prevent smaller ISPs from operating in certain markets |
| Can be adapted for properties of any size, shape, or configuration | Smaller ISPs can be limited to certain geographies and have limited regional scope         |

# #3: Overlapping Networks - A Low-Cost Wireless Solution

## Key Definitions

### **Overlapping Networks**

A system of wirelessly connected nodes that share and transmit signal across a specified area.

### **Wireless Access Points (WAPs)**

A hardware device that allows other Wi-Fi enabled devices to connect to a wired network.

### **Point of Entry (POE)**

A system that provides data connection and electric power to devices like WAPs.

## Average Cost

- Firewall: \$800 / each
- Professional-grade WAP: \$ 800 / each
- Stadium-grade WAP: \$2,000 / each
- Modem: \$250 / month (lease from Comcast)
- Refurbished switches: \$350 / each
- Hundreds of feet of cable: \$7,000
- Labor: \$10,000-\$25,000

## **Challenge**

Housing providers have struggled to find ways to pay for in-unit internet access for residents on an ongoing basis without incurring exorbitant infrastructure upgrade expenses.

## **Solution**

An overlapping wireless network requires less cabling and drywall patchwork and provides a more cost-effective alternative to wiring existing buildings for in-unit internet service. This technology allows property owners to establish an internet connection on each building floor and reduces ongoing costs to a reasonable amount so that property budgets are able to cover the cost. Since there are different ways mesh networks can be installed, this case study explains specifically how Mercy Housing implemented a mesh network at one of their properties in Denver.

In their model, cables run to each individual access point. They have a modem on the first floor and a single cable running to the second floor, a second cable running to the third floor and a cable running to the fourth floor. On each floor, there is a Power Over Ethernet (POE) switch that they then run cables to each access point. The access points get power from the switch at the end of the hallway. This removes the need to have power drops in the ceiling where each access point is, which may be necessary in other buildings. The cabling connects to several professional grade (made by Cisco Miraki) wireless access points (WAPs) to create a strong enough network to penetrate resident walls, so that residents can pick up the signal in their individual units. Different building materials, like brick or cinderblock, and varying property layouts may require higher grade access points to provide residents with a strong enough signal.

Mercy Housing is piloting an overlapping wireless network model at Decatur Place in Denver, CO. To support this 106-unit property, they are using eight professional grade WAPs per floor to

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ensure a strong signal can penetrate through the drywall of the hallways so the signal can carry into the resident units. Mercy's model deploys a bandwidth of **500/20 Mbps** which provides roughly 5 Mbps to each device if all units were using the service. The WAPs are cloud based which allows Mercy to manage the devices remotely and ensure residents are experiencing similar speeds. In order to achieve a higher bandwidth equipment may need to be upgraded and a visit by the vendor may be needed. Mercy Housing's overlapping wireless network is available to residents for free through the Chromebooks that are supplied through their device lending program. Mercy is considering making this wireless signal available for residents to access via their own devices in a future phase. The cost for the infrastructure depends on the size and building style; for Mercy to implement their mesh network model in a 106-unit building cost \$40,000-\$60,000 thousand, after accounting for labor costs.

| Mesh Network – Opportunities/Challenges                                  |   |
|--|---|
| Opportunities  | Challenges  |
| Requires less wiring than a traditional cable/fiber transmission network | Requires greater technical expertise and maintenance                            |
| More cost-effective than other wiring methods for long-term use          | Larger upfront investment   |
| The ability to provide in-unit internet access to residents              | Longer deployment period than short-term solutions like device lending programs |



# #4: Deploying Smart Speakers to Increase Accessibility and Adoption for Senior Residents

## Key Definitions

### **Smart Speaker**

An AI cloud-based, voice-command device that offers interactive functions and hands-free activation with the use of “hot words.”

### **Hot Words**

One-word commands or phrases that activate certain features of the smart speaker.

## Key Stakeholders

### **Volunteers of America (VOA)**

As one of the largest nonprofit affordable housing providers, VOA develops and manages low and moderate-income level housing for the homeless, families with children, seniors, veterans and people with disabilities across 40 states and Puerto Rico.

### **AARP Foundation**

AARP's charitable affiliate that serves people 50 and older by creating and advancing effective solutions that help vulnerable older adults build economic opportunity and social connectedness

### **Heaven's View Property**

A 41-unit, mid-rise community located in Delta-Montrose, Colorado and owned by VOA.

## **Challenge**

Among population groups, seniors face particular barriers to digital inclusion and access efforts. Nearly half of senior citizens lack a home broadband connection and low-income seniors are among the most underconnected populations in the US, highlighting the tremendous need for internet access in affordable senior housing properties. The COVID-19 pandemic has highlighted the importance of making internet access and a paired smart speaker a solution for the senior population to access telehealth services and combat social isolation.

## **Solution**

Many affordable housing organizations have utilized smart speakers as a tool for increasing digital connectivity. Smart speakers, also known as “virtual assistants,” respond to voice commands and offer various features for users including playing music, sending an email, setting a timer or a reminder, playing games, and turning on the lights. Through partnerships with philanthropic partners and non-profit organizations, some SAHF members including The NHP Foundation, National Church Residences, and Volunteers of America (VOA) have found smart speakers to be an innovative and effective way to get seniors connected.

### **Volunteers of America community Wi-Fi networks in Colorado properties**

| Property                        | Heaven's View     | Centennial Towers |
|---------------------------------|-------------------|-------------------|
| Building Size                   | 41 units, midrise | 40 units, midrise |
| Housing Type                    | Senior            | Senior            |
| Cost of Wi-Fi infrastructure    | \$3,000           | \$4,000           |
| Internet Service Provider       | Elevate Fiber     | Elevate Fiber     |
| Connection Type                 | Fiber Optic       | Fiber Optic       |
| Speed (Mbps)                    | 250/250 Mbps      | 300/300 Mbps      |
| Ongoing cost of Wi-Fi per month | \$330             | \$330             |

VOA properties in Delta-Montrose, Colorado have applied a two- pronged approach to connectivity, through their building-wide WiFi network and the application of the AARP Foundation's Connected Communities Amazon Alexa pilot, thus covering both the infrastructure and in-unit access costs. VOA

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Heaven's View and Centennial Towers provide internet access through community WiFi network and promote internet adoption efforts through the [Connect2Affect pilot program – a partnership with the AARP Foundation](#). Through the pilot program, interested senior households were provided with an Amazon Alexa Echo Dot to increase resident engagement and alleviate social isolation.

VOA's commitment to awareness and outreach was a critical part of the program's success. Prior to the launch of the Alexa pilot in January 2020, Heaven's View staff distributed flyers throughout the building to raise interest. Some residents expressed initial privacy and security concerns. To address these concerns, resident service coordinators (RSCs) were trained on how to use the Alexa operating system and helped senior residents apply the technology to their everyday lives. To familiarize the residents with this new technology, property staff created a color-coded chart to clarify different functions of the device. Participating residents were required to sign a contract in which they agreed to take responsibility for the device, to return it if they moved from the property, and to contribute to any future surveys or data collection on their device use. After securing enough funding to provide devices to every resident, the program became available to all interested residents.

Since the program's introduction at Heaven's View, approximately 85% of residents are connected through Amazon Alexa. The function of this type of connectivity relies heavily on RSCs to encourage implementation and train residents on use of the Alexa device. At Heaven's View, building trust and strong relationships with residents has been instrumental for successful deployment of this program, particularly for residents who are more hesitant to adopt new technology. Through the main Wi-Fi network, RSCs are able to send both property-wide and direct messages to residents through their Alexa device. The widespread use of Amazon Alexas within a property can make it easier for RSCs to connect with residents, especially since COVID-19 has limited in-person interactions.

| Smart Speaker Model – Opportunities/Challenges   |   |
|--|---|
| Opportunities  | Challenges  |
| Solves accessibility challenges by providing complementary devices on a broad scale                    | Can be difficult to use for residents with hearing loss or are tentative about the internet for fears of security risks |
| Accommodates residents with varying levels of digital literacy by allowing basic to advanced functions | Even with multiple staff members involved with the pilot, programming responsibilities fall heavily on RSCs             |
| Offers wide scale of functionality – from playing music to setting timers to sending emails            | Requires existing internet access (through in-unit subscription, community Wi-Fi, or mobile hotspots)                   |
| Allows property staff to provide immediate and direct messages to residents                            | Wi-Fi network speeds must be significant to support internet use – sometimes program can lag                            |