A Digital Inclusion Blueprint For Public Housing

Monkeybrains and the city of San Francisco partnered to deliver gigabit service to public-housing residents.

By Hannah Rank and Christopher Mitchell / *Institute for Local Self-Reliance*

Urban areas today have nearly universal, albeit pricey, broadband internet access from cable companies and other service providers, with the number of providers varying from neighborhood to neighborhood. Fewer options are available to those who have less capacity to pay for service. Many low-income households simply cannot pay for decent internet access.

In two affordable housing complexes in San Francisco near the heart of the tech industry, Hunters Point East and West (HPEW) and Robert B. Pitts Apartments, few residents could afford high-quality internet service until Monkeybrains, an internet service provider (ISP) that has operated in San Francisco for 20 years, partnered with the city to provide 100 Mbps connectivity in HPEW and 1 Gbps connectivity in Robert B. Pitts.

Despite nationwide efforts to close the digital divide, at least one-fifth of Americans who do not use the internet cite the prohibitive costs associated with access. The program to connect HPEW and Robert B. Pitts to high-speed internet shows how innovative thinking, organization and commitment from various stakeholders can make high-quality internet access a reality for low-income households. As San Francisco continues on its path to shrink the digital divide, other municipalities could use this model and follow suit.

BIDDING ON HPEW

The nonprofit San Francisco Housing Development Corporation (SFHDC) took over Hunters Point East and West in 2014, making the complex eligible for Rental Assistance Demonstration, a HUD program that helps transfer low-income housing from public to private ownership. SFHDC was formed in the late 1980s by residents frustrated with the displacement of people of color in their community. Along with The John Stewart Company, a housing developer, SFHDC started renovating the complexes in 2016 and then began temporarily relocating residents and soliciting bids to update the buildings' internet connectivity.

Monkeybrains wasn't aware of the upgrades sought at HPEW until Preston Rhea, its director of field operations, caught wind of the bid request through his work on the Community Tech Network (CTN) board of directors. CTN, a nonprofit digital literacy trainng organization, was working with SFHDC to develop training for residents of its housing complexes, including HPEW.

Comcast had already bid on the HPEW project, proposing a single Wi-Fi access point for each building for approximately $200 per month. For the 27 buildings, HPEW would rack up an estimated yearly bill of nearly $65,000. Monkeybrains staff knew they could offer a better solution at a much lower price point that would provide far better access for everyone in HPEW for years to come.

Monkeybrains offered free installation of wireless access points as well as wired access to each individual unit. SFHDC would pay $10 per month per unit to Monkeybrains for the

first two years, but there would be no cost to residents. With 213 units at $10 per month, the total cost to SFHDC runs just under $26,000 per year – half what Comcast bid for an inferior option. After that, Monkeybrains can donate the bandwidth, extend the agreement with SFHDC or offer a low-priced service directly to residents. Monkeybrains takes help-desk calls from HPEW residents just as it does for other customers.

While renovating and securing the internet upgrades after winning the bid, Monkeybrains realized it could tap into funding from the California Advanced Services Fund (CASF). It secured nearly $80,000 in CASF funding for the HPEW installation, which allowed it to install common-area Wi-Fi in addition to the in-unit connections. (Because of changes in state law, CASF now significantly restricts funding eligibility for projects like this one.)

INTERNAL WIRING AT HPEW

Ongoing renovations at HPEW simplified the network installation process. Monkeybrains said the project upgrade from hallway Wi-Fi to in-unit Ethernet access was "as simple as a change order." The contractors were to pull new Cat 5e wiring to each unit for telephones and install a type of jack that supports only landlines. Depending on how these wires are installed in the unit, they can support either DSL connections or, with the new jack Monkeybrains requested, Ethernet connections at 100 Mbps and regular telephone connectivity simultaneously.

"This simple change order added almost no cost but would have been a giant hassle and expense if done later," Rhea explained. "We were able to install a simple Ethernet switch in each building. Now we have a local area network … in each building."

Although the current wiring supports 100 Mbps symmetrical, Monkeybrains could have asked the contractors to pull two cables instead of one if it had had advance knowledge of the renovation. The ISP says if a resident wants to upgrade and does not need to use the landline for telephone service, it will send a technician at no

Monkeybrains technicians discuss internet delivery with Leo Sosa of <dev/Mission.>

charge to reprogram the jack to support 1 Gbps. To date, no one has requested this change.

Though communication between the ISP and SFHDC allowed for a streamlined installation process, costs could have been even lower had the parties been in contact sooner. Running fiber between the 27 campus-style buildings and entry into each building would have been less expensive during the major construction phase, when other utilities were being upgraded. Likewise, running wires to each unit would have been less expensive when crews were doing similar work, rather than after the fact.

The city since has streamlined efforts to ensure that wiring changes occur simultaneously with housing renovations. DT has plans to connect more than 20 additional public housing complexes in fiscal year 2019–2020.

DOING IT RIGHT

Mason Carroll and Rhea, lead engineers for Monkeybrains, underscore the importance of not simply installing buildingwide Wi-Fi access. They wanted to offer the same high-quality service to affordable-housing units that all their customers expect.

According to Rhea and Carroll, using a single Wi-Fi access point per building "only invests money to further cement the digital divide by establishing different classes of communications infrastructure for different classes of residents."

Wi-Fi in the hallways is a nice amenity, say Rhea and Carroll, but it is not a sufficient, long-term solution for connecting the households in these buildings. Because a dozen or so families in each building share internet access, heavy use in a few households can cause severe slowdowns for others. In addition, shared Wi-Fi can be less secure than a private connection, and quality of service can vary tremendously depending on a unit's location relative to the Wi-Fi access point. As more residents depend on telemedicine in coming years and are generally more connected, hallway Wi-Fi may not adequately meet standard needs.

Though buildingwide Wi-Fi may seem like an easier lift, Monkeybrains says that with the right planning, in-unit connectivity can be as simple and does more to bridge the digital divide. Getting the wiring right from the start may be the difference between a sustainable, low-cost, high-quality

The city of San Francisco is bringing city-owned fiber to affordable-housing complexes so residents can access high-speed internet. The inside wiring is provided by private ISPs.

internet solution and significantly less robust shared Wi-Fi.

With proper design, a building can accommodate multiple ISPs in the future, each serving a different niche. Switching providers could be as easy as moving an Ethernet cable in the server closet from one switch to another. These buildings are expected to last for decades, so any assumptions about their residents' being less technically sophisticated because of poverty will not stand the test of time.

WIRELESS BACKHAUL

At first, Monkeybrains used its hybrid wireless and fiber network to backhaul access from HPEW to the rest of the internet. Specifically, it used fixed wireless on HPEW rooftops to connect HPEW to its local network. Two types of radio dishes were used for the HPEW uplink: The airFiber24 has a link distance range of around 8 miles, and the Siklu EH 1200 can link with dishes about a mile away.

In general, Monkeybrains uses a combination of fiber optic and fixed wireless technology because of the cost and permitting issues associated with installing fiber to every location. In a 2017 interview on ILSR's Community Broadband Bits podcast, Carroll noted that part of the benefit of wireless in a fast-moving city is its ease of installation. "In a matter of 48 hours, if necessary, we can come out, install a licensed radio link in a point-to-point topology, and deliver full gigabit speed really, really quickly," Carroll said. Some customers asked for a fiber connection but changed their minds after experiencing the wireless service.

Monkeybrains sometimes decides to take fiber to a building if it uses a lot of capacity or is geographically well-suited to feed nearby radios. Building fiber is expensive – rarely more so than in a crowded city such as San Francisco – and the uncertainty of permitting time is a challenge.

Wireless capacity can be diminished by interference from other radios, heavy precipitation or the construction of an inconveniently tall building between two radios. To avoid the latter, Monkeybrains continually tracks large new buildings in the vicinity of its network.

CITY FIBER

Drawing on the momentum from the success of the HPEW project, the city began a pilot program to improve digital access in affordable housing complexes elsewhere in the city, starting with the Robert B. Pitts housing complex, which has 203 units in 34 buildings.

The public safety team in the San Francisco Department of Technology (DT) recognized the benefits of connecting these facilities directly with the city's fiber for backhaul. The Office of Housing and Community Development approached DT and Monkeybrains about working on Robert B. Pitts and Hunters Point West (one of the buildings in the HPEW complex); the city planned to build out the fiber to the buildings and needed an ISP partner. Hunters Point East eventually received fiber as well.

The city contributed significant resources to replace the faceplates at HPEW so each unit could have at least 100 Mbps. DT rewired Robert B. Pitts to allow gigabit internet connections. Monkeybrains donated all the hardware, switches and core equipment required to light the fiber as well as the labor to bring the households online. Monkeybrains estimates that its costs of setting up Robert B. Pitts, which it donated, were approximately $20,000, split approximately evenly between hardware and labor.

One challenge of keeping operating costs low for low-income households is keeping track of devices, such as the home routers used to create local Wi-Fi networks. Monkeybrains did not want to have to track these devices as families moved in and out, so DT and the Office of Digital Equity set up a program to give routers to residents. Google donated 100 Wi-Fi routers, and Monkeybrains donated 132 routers. Making router management easy can

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KEY TAKEAWAYS

To get a program like this one going in your city,

- Find a local champion who either understands this technology or is excited to dive into it.
- Find good partners with the right incentives. Some ISPs will be enthusiastic about projects like these, and others (from small to large) may pass. Understand what motivates your potential partner.
- Research funding options. Plenty of states have created programs to subsidize internet access, but few of these programs are available for urban residents. Consider reaching out to foundations to explain that smart, one-time expenditures can create ongoing, self-sustaining, high-quality internet access.

ILSR and the National Digital Inclusion Alliance can offer help for those who need additional information.

meaningfully lower the operating expenses of providing internet access in a multitenant building.

DIGITAL LITERACY

A fast, affordable connection is a key part of bridging the digital divide for low-income populations. However, once people are connected to high-speed internet access, they need literacy to maximize benefits and safety.

CTN has been involved in digital literacy since 2001, working with libraries, senior centers and affordable housing to provide services to individuals who previously lacked adequate internet access. For three years, with support from CASF, CTN has worked in affordable-housing developments to promote access to the digital world through training programs that focus on basic digital literacy. Email and internet safety, job search and social media connectedness are the main priorities. Those who complete the three-part, eight-hour training get a free device to join the internet.

With support from the San Francisco Department of Aging and Adult Services, CTN also offers one-on-one responsive tutoring to walk-in clients at computer labs in the partners' spaces. CTN operates in more than 20 affordable-housing complexes in the Bay Area, in both senior and multifamily residential developments.

In the first six months that CTN offered services at Hunters Point West and Bayview, 17 students graduated from its training program. CTN still operates at those housing sites, and an organization called <dev/Mission> offers IT training and coding classes to young adults. CTN and housing managers promote adoption of technology and digital literacy after the barriers to access have been eliminated. CTN also helps lighten the customer support load for Monkeybrains, keeping operating costs low enough to offer fast access at low prices.

Customer service is Monkeybrains' single costliest ongoing expense. When a building is properly wired, costs to the ISP range from $60–$100 per unit in one-time expenses. The bandwidth cost per unit per month is less than $1, and other expenses are similarly low,

except providing help-desk support. And even there, if a local digital literacy effort can be a first line of help, Monkeybrains believes its model is sustainable at a cost of $10 per month per unit – for a gigabit.

PULLING IT ALL TOGETHER

Once a community decides universal broadband access is a priority and understands the basic economics of deploying broadband in different scenarios, the opportunities for closing the digital divide broaden immensely. Even in a large city, where bureaucratic silos and industry bottom lines can cloud community outreach, the case of San Francisco and Monkeybrains shows that a few committed stakeholders can make a difference for digital inclusion.

In American urban centers today, very few households lack access to other basic infrastructure, such as roads, running water and electricity. The case should be no different for broadband internet access.

Monkeybrains saw the decision to bring gigabit capability to each unit in the housing complexes as a way to demonstrate its belief that broadband is an essential utility.

"This is the infrastructural part of 'bridging the digital divide' at the level of access – fiber, a solid radio backup and top-grade carrier infrastructure right to the unit, just as would be expected in a well-resourced luxury condo building," Rhea explained.

What makes this project stand out is not only the manageable upfront and operating costs but also the fact that a few simple yet key decisions during the renovation process made the project sustainable for years to come.

Monkeybrains is helping San Francisco harness its dark fiber assets to provide internet connectivity to low-income housing. The city has

expertise in building fiber assets. Monkeybrains can provide access on that fiber and support individual users. The Department of Technology Office of Digital Equity, through CTN and others, offers training and home routers to drive adoption. This combination offers a model for true digital equity. ❖

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Installing a wireless antenna on an HPEW rooftop