ONE|NB CONNECTS

Closing the Digital Divide

ONE
NEIGHBORHOOD BUILDERS

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Free Community WiFi in Olneyville

A Case Study

"Free WiFi access is essential to bridging the digital divide"

JENNIFER HAWKINS

Executive Director, ONE Neighborhood Builders

ONE Neighborhood Builders

We Knew We Needed to Act

In early 2020, as people around the world began contracting the novel coronavirus, the World Health Organization declared a public health emergency. Local communities went on high alert. COVID-19 was labeled a pandemic. Rhode Island Governor Gina Raimondo declared a state of emergency. By March 13, local children were dismissed from school for a week.

Government and business leaders sent employees home. People tentatively began wearing masks in public. Grocery stores set early shopping hours only for the elderly. Customers stood six feet apart, outdoors, waiting their turn to stock up on food, uncertain when they might shop again.

At ONE Neighborhood Builders in Providence, I sent my staff home, thinking we would soon return to our headquarters. From our Olneyville neighborhood, our nonprofit builds affordable housing and breaks down barriers that prevent people from equitably accessing health care. At this community development corporation that I have led since 2017, our mission never wavered.

Many of us could work at home. Accessing our files was tricky, but we developed new systems to do so. Nevertheless, our hopes that the world would bounce back to normal dissipated.

Rhode Island soon decided its students would attend class remotely, from home, instead of returning to classrooms. Some parents took their children to parking lots outside fast-food restaurants, hoping they'd be able to access the internet and their virtual classrooms. Many Central Providence residents struggled to watch their children or go to work, unable to do both.

I began to have trouble sleeping. I knew the people we were helping did not have the luxury that many on my staff had to work from the safety of their homes. Many neighborhood residents lived in tight quarters, where quarantining was difficult, if not impossible.

President and Executive Director, ONE Neighborhood Builders

We knew we needed to act.

Our neighborhood faced the highest poverty rates in Providence. COVID cases were higher here than anywhere else in Rhode Island. Only 66.1% of households in our 02909 ZIP code had internet access, compared with the city-wide rate of 78.2%. Although people talked about telehealth, many local residents simply did not have the technology to see their doctors remotely.

I had no idea how to create free internet access for Olneyville, but I was determined to figure it out. This was our moment to make a real difference—and we did so within just eight months.

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Drone photo by Aviv "Stingray" Hod

Why Olneyville?

When our team set out to create the first free community WiFi network in Rhode Island, we started at home, in the Olneyville neighborhood that has been our headquarters since 1988. This historic neighborhood was a center of industry from the mid-1800s through the late 1940s, when mills alongside the Woonasquatucket River produced textiles, metal products, and other goods. In recent decades, the neighborhood's demographics have shifted dramatically. Now, more than 53% of Olneyville residents speak a language other than English at home, with Spanish being the most prevalent. The neighborhood retains a spirit of entrepreneurship and innovation and is home to a variety of arts organizations, restaurants, and vibrant green spaces.

When ONE Neighborhood Builders (ONE|NB) began considering how to bring free community WiFi to Olneyville, we knew we had the potential to help many schoolchildren—in a community that is younger, on average, than Rhode Island as a whole. As children across the country began needing the internet to attend school from home, we paid attention to data showing that only 66.1% of households in Olneyville had internet access, compared with a citywide access rate of 78.2%.

We knew we could help a community facing enormous need—at a time when the COVID-19 pandemic was disproportionately impacting communities like Olneyville, which has rich ethnic and racial diversity and a higher percentage of individuals living in poverty compared to the rest of Rhode Island. We never set out to replace the commercial services of traditional internet service providers (ISPs). Rather, we began exploring how to supplement what was available.

Source: U.S. Census Bureau, American Community Survey Data

We selected Olneyville for our pilot location because the neighborhood had:

The lowest proportion of in-home internet in Providence.

Among the highest rates of poverty in Providence.

The highest number of COVID-19 cases in the State and second-highest number per capita in the State, based on ZIP code data.

Olneyville Community Profile

Table 1: Population	Olneyville	Providence	Statewide
Population	6,247	180,609	1,057,231
# of Households	1,769	62,046	410,489
Pop. Density (per mi²)	10,737	9,813	1,081
% Under 18	26.1%	22.3%	19.6%
% Over 65	9.5%	10.7%	16.8%
Life expectancy in years	77.3	78.3	79.8

Table 2: Economic Indicators	Olneyville	Providence	Statewide
Median Family Income	$46,250	$53,659	$67,167
Individuals in Poverty	30.2%	25.5%	13.4%
Children in Poverty	35%	36%	14%
Some College or A.D.	21.0%	20.1%	17.0%

Table 3: Housing and Amenities	Olneyville	Providence	Statewide
Homeowning Population	13.74%	36.1%	64.5%
Vacant Housing Units	29.61%	16.28%	3.51%
Households with Internet	64.9%	81.9%	84%

Source: Official 2015-2019 Census estimates.
U.S. Bureau of Labor Statistics as of April 7, 2022
Neighborhood-specific data is based on approximate Census tracts.

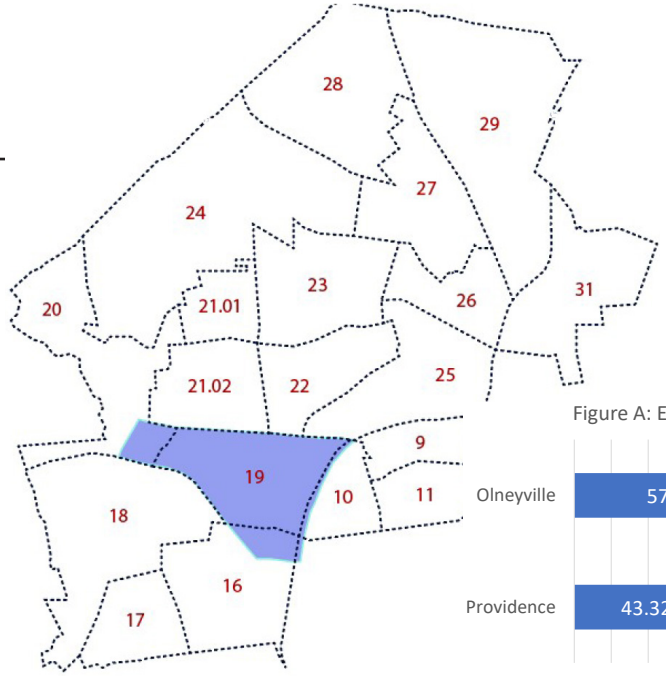


Figure A: Ethnicity by Location

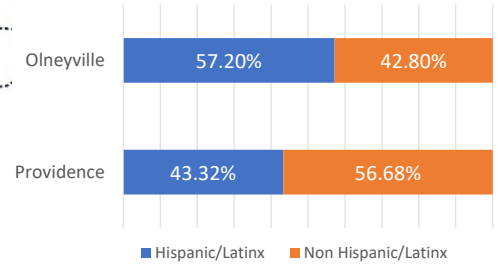
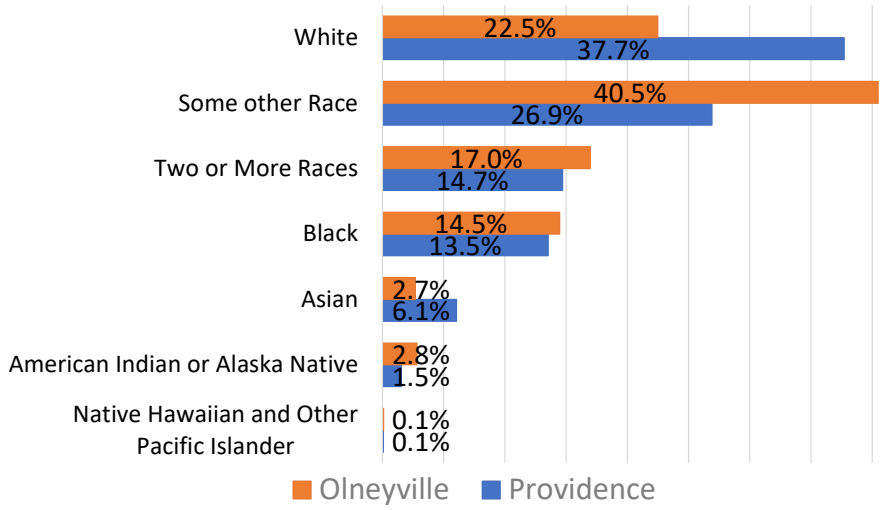


Figure B: Race by Location

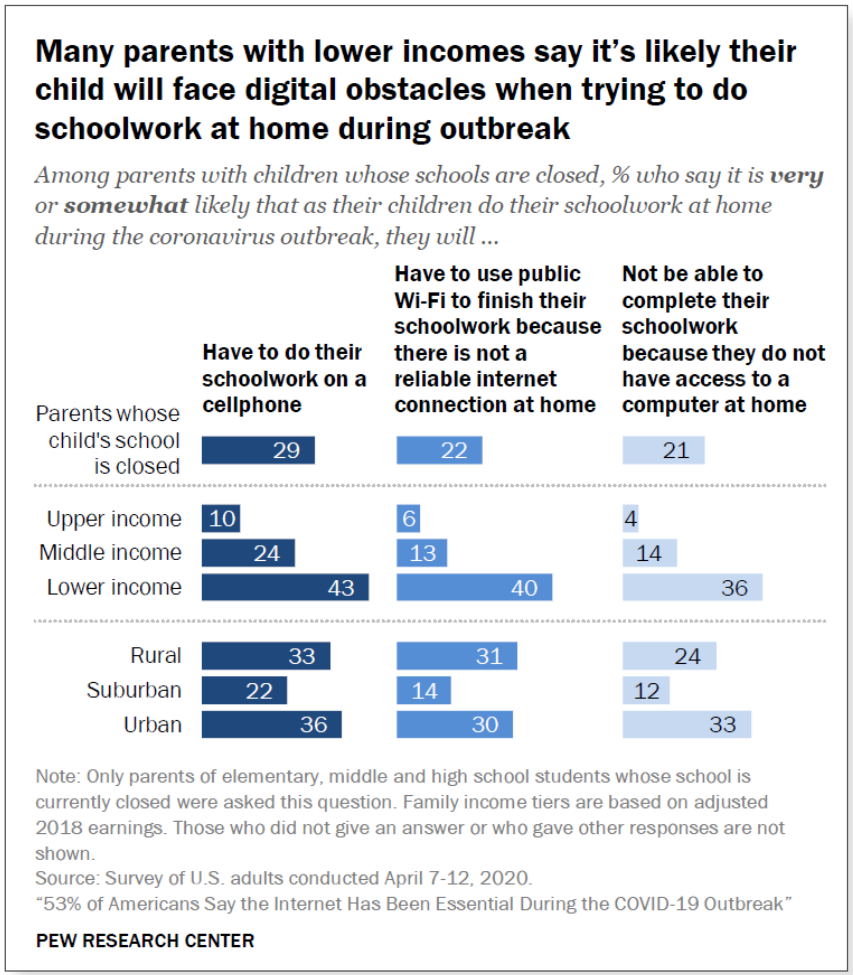


The Broader Picture

In Olneyville, where poverty and health disparities abound, ONE Neighborhood Builders committed to creating the first free community wireless network in Rhode Island to help families access the internet. We were keenly aware that the digital divide impacts communities across America—and the pandemic was only exacerbating the inequities for those who could and could not access the internet.

As the pandemic took hold, the lack of internet access for low-income families—once considered a "homework gap"—was quickly revealed as an education opportunity gap. Olneyville is only .44 square miles—but the population density here is 10 times what it is, on average, throughout Rhode Island. We saw great opportunity in this densely populated neighborhood. And importantly, we believed our own backyard was small enough where we could enact change and have a real impact.

Another factor also motivated us: If we could figure out how to bring free community internet access to Olneyville, we could share lessons with others around the country who are hoping to do the same for their own communities.



Who is Impacted Most by the Digital Divide?

> The digital divide is more than just the technology itself. It's about a pathway to some of the economic opportunities that are available. When 50 million school-aged kids were actually sent home, and 15 to 16 million of them did not have broadband access to learn, that was a problem.
>
> And, unfortunately, it did disproportionately affect Black and brown and Native students, who really needed access to learn. And I'm not just talking at K-12. I'm talking about college students as well, who left their campuses and went [to their] homes, where they were in that desert."
>
> —**Nicol Turner Lee**, Brookings Institution, in **PBS News Hour report, May 9, 2022**

Getting Started

Realizing the increased need for internet access due to the pandemic was here to stay, we quickly researched how to create a free community WiFi network.

ONE|NB Executive Director Jennifer Hawkins called the Rhode Island company that manages our information technology needs—Brave River Solutions in Warwick—to seek their advice.

At first, our team considered building a WiFi tower—to transfer data from a traditional internet service provider to other WiFi towers and to local residents and businesses. We researched efforts by other communities, from Pittsburgh to Detroit to New York, to close the digital divide. (See details in our Appendix on pages 38 and 39).

We soon learned there was no other program in Rhode Island offering free community WiFi. We also learned most community-based WiFi systems do not provide internet access inside people's homes. More typically, they provide access from communal and outdoor spaces.

> "Digital equity is a passion of mine, and I leaped head first into working with her [Jennifer Hawkins] to figure out possibilities."
>
> —Brave River's Chief Technology Officer, **Vin DiPhillipo**, who said he welcomed the call from ONE|NB

OSHEAN Closes Broadband Gap for Providence's Most Vulnerable

By Noah Garrett
[OSHEAN's 2022 The Quilt Circle newsletter]

The pandemic exposed just how broadband access really is in today's world. When lockdowns forced school districts to go remote and the term "distance learning" leapt from education jargon to commonplace and the enormity of the broadband access gap was laid bare for many in our state and across the country.

While the broadband gap exists in all communities, it's wider in Rhode Island's most urban areas, including the capital city. When the pandemic forced temporary closures of otherwise reliable, well-known free Wi-Fi access locations like libraries, coffee shops and community centers, ONE Neighborhood Builders stepped up to fill the need in the Olneyville neighborhood. ONE|NB, as they are known, is a Providence-based community development organization now providing free Internet to a portion of the Olneyville neighborhood situated in West-central Providence. Working with IT partners Ocean State Higher Education Economic Development and Administrative Network (OSHEAN), Brave River and Harbor Networks, ONE|NB built a mesh Wi-Fi network covering 5 million square feet in the community, serving roughly two-thirds of all local residents.

"The Internet is a public utility," said Jennifer Hawkins, executive director of ONE|NB. "No one questions whether you should have access to clean water and heat and so forth, right? For so long, we just considered the Internet to be a luxury, a convenience. But, it really has absolutely transcended that at this point in time."

It wasn't long ONE|NB got off and running in late 2020, on a mission to provide broadband for the Olneyville neighborhood, that the team at OSHEAN stepped up to help make free community Wi-Fi a reality. "Partnering with ONE|NB has been a natural fit for OSHEAN as we're able to lend not only our expertise interacting with service providers like Cox, regulatory compliance and engineering know-how, but also just executing on delivering reliable broadband access within Rhode Island," said David Marble, CEO at OSHEAN.

OSHEAN was in the thick of the project the whole way, working with Brave River and Harbor Networks to find Wi-Fi design solutions that blanketed as much of the community as possible. Together, the teams collaborated on mapping, engineering and network design, with ADT installing the hardware. They also developed a heat map to determine the optimal locations for Wi-Fi access point placement that would cover the greatest number of people with the fewest number of devices. Olneyville's high population density was an advantage, with about 6,900 people within just four-tenths of a mile. Ultimately, the team chose two underground fiber-optic cable routes connecting 12 access points, a solution that covered a little more than 66% of Olneyville's residents with a strong WiFi signal.

OSHEAN looks forward to repeating this success

in other neighborhoods - working either with municipalities or housing authorities to create more public Wi-Fi networks. "The Internet is not a luxury anymore, but a necessity to opportunity," added Marble. "We've got a long way to go in bridging access gaps, but we're prepared to work with state and local leaders to help make that goal a reality."

For two decades, OSHEAN, Inc., has played a significant role in connecting people, institutions, technologies, and solutions across the research and education community in southeast New England. By delivering a next-generation technology infrastructure and solutions to member institutions and the communities they serve, OSHEAN empowers healthcare organizations, colleges and universities, K-12 schools, libraries, government agencies, and other community organizations to build relationships, leverage shared expertise, foster innovation, and advance their missions.

Choosing the Right System

Our initial idea to install a WiFi tower was not feasible for a variety of reasons, including the aesthetics of installing a 50- to 80-foot tall tower in the neighborhood. Far more importantly, we learned that installing one requires compliance with the Federal Communications Commission's rules for environmental review. We were working fast to bring internet to families in need, so we steered clear of a method requiring a lengthy regulatory process. We researched other options, including a cooperative open-source mesh, a Citizens Broadband Radio Service (CBRS), and a mesh network.

Ultimately, we agreed a mesh network made the most sense in Olneyville. In such a system, a group of devices acts as a single WiFi network so there are multiple sources of connectivity (called points). In a traditional WiFi network, phones and computers are connected to a single router, and all communication passes through that router. The farther the device is from the router, the weaker the signal. With a mesh network, the multiple points mean that users are never far from a point.

Did you know?

By the fourth quarter of 2020, traffic on broadband networks had increased 54% over the prior year, according to an OpenVault Broadband Insights report.

Additionally, someone can connect to the internet and move throughout the coverage area without having to disconnect and reconnect to the network.

One factor that helped us choose this system is that we own or manage 42 residential properties that are densely located in about one-quarter of a square mile in Olneyville. We mapped the property locations and selected strategic properties based on the best "site line"—no tall buildings or hills to impede the signal. We then mounted the technology inside and on top of our buildings. The fact that we were able to install technology exclusively at properties we controlled reduced any complications that might have arisen if we needed access to buildings owned by others.

We decided to build our network in a highly residential area of Olneyville. Our network covers the front of the William D'Abate Elementary School, parts of the commercial corridor along Manton Avenue, and a large residential area down to Riverside Park.

Key Partnerships

Moving our bold initiative forward required several partners.

Our Team:

OSHEAN: A nonprofit broadband service provider in Rhode Island that provides technology-based solutions to community problems, OSHEAN delivers premium, affordable, broadband telecommunications to large institutions, including hospitals, schools, state agencies, municipalities, and libraries. OSHEAN's nonprofit mission as a Research and Education Network is to provide fiber access to community anchor institutions in Rhode Island, affordably, and with service levels that include features that would be costly to users. OSHEAN made it possible for us to access the fiber optic cables necessary for our system to work.

Harbor Networks: This Massachusetts company is a communications systems integrator that offers managed services and IT solutions. Harbor's engineering team helped guide the overall network design so the radios could communicate with each other.

CommScope: This North Carolina company provides wired and wireless networking equipment and software. We chose CommScope's Ruckus equipment to build our initial network because they owned unique software—Beamflex—that best met our needs.

Cambium Networks: This Illinois company is a leading global provider of wireless infrastructure for business and residential broadband and WiFi. The company serves network operators in education and health care and provides services on industrial campuses and for municipalities. We chose Cambium equipment for our expansion.

American Tele-Connect Services (ATS): This Rhode Island company offers customized communications solutions, including telephone systems, audio visual systems, fiber optic cabling, and security cameras and systems. ATS installed the hardware for ONE|NB Connects.

LinkyFi: This software platform by AVSystem provides its business customers with insight about their WiFi systems and marketing services intended to help organizations improve visitor experience and target their customers better. LinkyFi provides data, but not marketing services, for ONE|NB Connects. The Poland-based AVSystem has a regional office in Boston.

Brave River Solutions: Our information technology consultants here at ONE|NB, this Rhode Island company connected ONE|NB to Harbor Networks and Ruckus CommScope.

Building the Network of Fiber Optic Cables

In 2008, **OSHEAN** won a $22-million Federal grant and secured a $10-million match from the State of Rhode Island to build about 600 miles of fiber optic cable and infrastructure. OSHEAN placed that project out to bid. Several local fiber providers assisted OSHEAN in building their network, including Crown Castle, Cox Communications, and Fibertech. They laid the cable and infrastructure in and around Rhode Island and up to Boston, as well as to Albany, Worcester, Springfield, and New York City.

OSHEAN only provides its services to other nonprofits—not residential or commercial customers. OSHEAN is a membership-based network that allows even the smallest K-12 education system or nonprofit member in Rhode Island to access services at rates that are similar or better than those of larger members, such as Brown University and Lifespan. Nonprofits pay a tiered amount to OSHEAN to access that vast network of fiber optic cables. ONE Neighborhood Builders pays the lowest cost tier, the amount that K-12 schools and municipalities pay, says Mark Montalto, OSHEAN's vice president of business development.

Technical Approach

Before digging into the nitty-gritty of what came next, we are enormously proud to say that on the day before Thanksgiving of 2020, ONE Neighborhood Builders launched the first free community wireless network in Rhode Island.

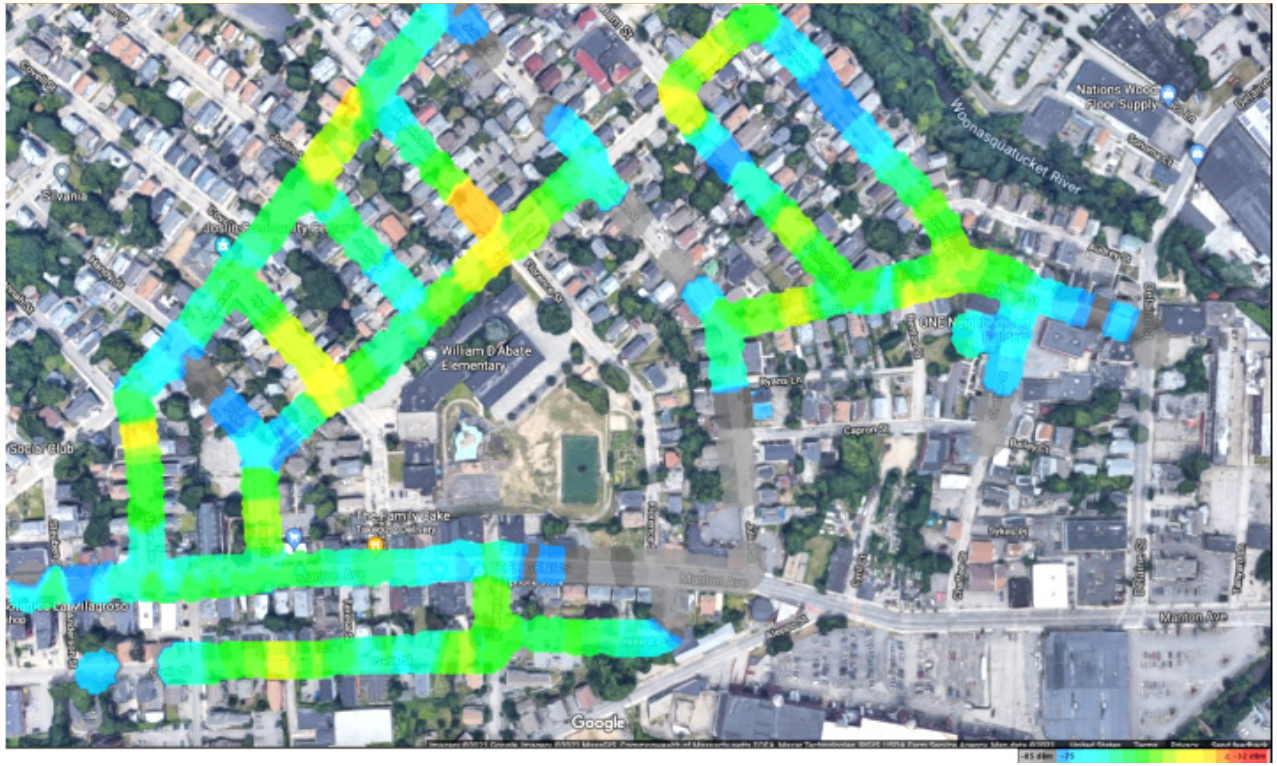
- We named our network "**ONE|NB Connects**."
- We held a small parade in the neighborhood.
- We attached oversized helium balloons that spelled out WiFi to our maintenance truck.
- We drove through Olneyville, honking the horn and celebrating the free community WiFi now available in our neighborhood.

ONE|NB staffers held a parade the day the network launched. The "caravan" traveled down local streets announcing the free neighborhood WiFi, complete with a banner, colorful helium-filled balloons that spelled out WiFi, and postcards that provided residents with instructions in English and Spanish on how to get connected.
Photo by ONE|NB Staff

Notably, our launch took place eight months after we asked the compelling question that began this entire initiative:

Couldn't we just build a system so that everyone in the neighborhood could access free WiFi?

Olneyville Installation Coverage



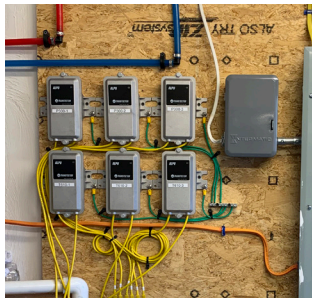
A "heat map" of our initial coverage in Olneyville shows higher download and upload speeds in blocks that are green and yellow and lower speeds blocks that are blue. Coverage extends into the houses and backyards.

To build ONE|NB Connects, we installed 2 hubs, 12 access points, and 24+ transmitters.

American Tele-Connect Services installed all the hardware, and ONE|NB has a five-year service agreement with Harbor Networks and OSHEAN to assist with maintenance and support. Our initial network covered about 5 million square feet of Olneyville.

We've learned that internet access and a network's viability hinges on the download and upload speeds. Initially, ONE|NB Connects provided users download and upload speeds of 20 megabits per second (mbps).

How the Installation Worked



The 2 lateral hub installations were located inside two separate Olneyville buildings, next to the electrical boxes. (Our headquarters, 66 Chaffee St., and 261 Manton Ave.)

These hubs act as "routers." The wires leading from the hubs serve two purposes:

- They connect to the underground fiber optic cables, so the system has access to those cables. Essentially, they allow the underground fiber to transmit broadband signal into the buildings.
- They connect to access points (which are radios) mounted atop those two buildings. Before the system sends signals to the access points, that broadband signal is filtered through our firewall for cybersecurity reasons.

The 12 access points were Ruckus CommScope radios that were mounted on buildings that we own and/or manage throughout the neighborhood. [Radio model: T610s]

- They transmit the network signal from one access point to another, and they must be within sight of each other.
- The transmission of the network signal from one access point to the next is what actually creates the "mesh" network.

The 24+ transmitters were also Ruckus CommScope radios that were mounted on buildings that we own and/or manage throughout the neighborhood. [Radio model: P300s.]

- They provide the WiFi signal to the devices and, more broadly, to the greater coverage area in the neighborhood.
- Those radios "repeat" the network connection, essentially refreshing it by pinging the next radio in line to continue the circuit.

We anticipated certain benefits that our mesh network would provide:

1. **Flexible coverage:** Additional points can be added for better coverage in hard-to-cover areas;
2. **The ability to "self-repair":** If one access point goes down, communication is rerouted through another point; and
3. **A direct path:** Since all access points are connected to each other, data can take several paths toward its destination. It will always choose the best route from Point A to Point B.

What is a Last-Mile Provider?

The nonprofit OSHEAN is what's known as the "middle-mile provider," an essential component for connecting the vast network of fiber optic cables to the people who use them to access the internet. The fiber optic cables can run underground or on utility poles, and they are routed to OSHEAN members, who help their individual users access the internet or internal resources, explains Mark Montalto, OSHEAN's vice president of business development.

The final step in providing internet access is what's known as the "last-mile provider." That's the term for the final entity that connects fiber optic cables to the cell phones, laptops, desktops, and other devices that people use to access the internet. In the case of ONE|NB Connects, our mesh network is the "last-mile provider" for our users. In other situations, the last-mile provider would be the traditional internet service provider that someone pays for the service, i.e., Cox Communications, Verizon, etc.

- Each home that connects to the internet does so through its last-mile provider, whether that is the ONE|NB Connects mesh network or a more traditional system. In either case, the last-mile provider connects users to those fiber optic cables.
- That access can be through coaxial (copper) cables, whose performance and speed is limited, or through FIOS (fiber optic cables), which is a lot faster and more resilient. "Legacy," or older, connections use copper cables. Fiber or WiFi provide superior access methodology for end-users.
- Especially in poorer neighborhoods, that technology hasn't been upgraded and is more likely to be copper cables rather than fiber optic cables.
- When ONE|NB Connects was installed, technicians spliced into OSHEAN's fiber optic cables on utility poles in Olneyville. They

then inserted another fiber optic cable into a junction box on the pole and ran that cable down the utility pole and into the building. Once inside, the cable was connected to the lateral hub, Montalto explains.

- The fiber in the building is routed into equipment mounted on the wall, and that's where the fiber cable ends.
- Then a port connected to that box on the wall is connected to the computer room in the building with the lateral hub.
- WiFi technologists then install a switch in the computer room and a WiFi controller.
- Those devices plug into OSHEAN's devices, and that last connection is what connects the mesh WiFi network to the underground fiber optic cables that access the internet.
- The radios installed on rooftops and buildings throughout Olneyville then provide wireless connections from devices into the wired system and, ultimately, those boxes mounted inside at the lateral hubs.

Fundraising and Publicity

Recognizing the need for financing to complete our vision, ONE Neighborhood Builders began aggressively seeking grant funding and philanthropic donations. At first, we set a budget for $100,000 to build the network.

Executive Director Jennifer Hawkins began calling past funders, community members, political leaders, and anyone else she thought might support this effort. Many individuals who were energized by the idea of helping during the pandemic began donating small amounts of money, which soon added up to about $4,000. An anonymous donor pledged $100,000 and asked if ONE|NB would match that amount. We worked concurrently to design the network and raise the necessary funds to build it.

Hoping to raise community awareness, ONE|NB reached out to a reporter from the **Boston Globe**, who wrote a story about the nascent initiative and our enthusiasm for getting this done. We called other reporters. **ConvergenceRI**—an online publication— wrote about the effort. Hawkins participated in a podcast with a reporter from **Community Networks**, a project of the Institute for Local Self-Reliance. The early donations and coverage created a bit of a buzz on social media. The more attention the project got, the more support it garnered. Donations kept rolling in.

However, it became apparent we needed more money than we initially thought. The deeper into creating the network we got, the more we realized we also needed money to support and maintain it, at least for the first few years. Budget projections rose to about $350,000. Around that time, the Rhode Island Department of Health announced a funding round to distribute CARES act funding to help communities with COVID-19 recovery efforts. ONE|NB developed a thoughtful application that explained how funding ONE|NB Connects would help residents hit hardest by the pandemic.

When the Health Department funded our application, that $150,000 award pushed ONE|NB over our fundraising goal and allowed us to put our plan into action. We placed an order with Ruckus for equipment to build the network, and we signed a contract with OSHEAN to operate as our intermediary to access the fiber optic cables.

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In low-income Olneyville, a free Wi-Fi program could be a game-changer for families

By Dan McGowan Globe Columnist, Updated September 24, 2020, 11:16 p.m.

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Public Services

One Neighborhood Builders launches community WiFi network in Olneyville

"The internet is a public utility – No one questions whether you should have access to clean water and heat and so forth, right? For so long we just considered the internet to be a luxury, a convenience. But it really has absolutely transcended that at this point in time." ONE Neighborhood Builders has achieved its fundraising goal of $200,000

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HarborOne Foundation Rhode Island Awards New Round of Non-Profit Grants

(Warwick, RI) – December 10, 2020 – ONE Neighborhood Builders was among 11 recipients of HarborOne Foundation Rhode Island grants focused on helping Rhode Island individuals and families - especially those impacted by the COVID crisis. This new round of giving brings the 2020 total of grants awarded by the Foundation in Rhode Island to $275,000.

The ONE Neighborhood Builders grant will be utilized to support efforts to deliver and maintain internet access to hundreds of residents in the Olneyville neighborhood of Providence where close to 40% have limited connectivity. With residents needing to work at home, and children schooling from home, lack of internet access was and economic and educational detriment that Neighborhood Builders has stepped in to fix.

"Internet Access isn't a luxury, it is the key to letting all of our residents have access to work, and crucially, to an education,

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ONE Neighborhood Builders Provides Free Broadband for Community

Providence, Feb. 3, 2021 -When the coronavirus pandemic hit, many economic and racial disparities were exposed as key drivers of the spread of disease. The disparities have always been there, but the lack of safe, affordable housing, access to healthy and nutritious foods, and the ability to work and learn from home became even more acutely

The neighborhood of Olneyville, located in Providence, Rhode Island

s for both students and remote workers.

Beneficiaries

One-third of a mile from ONE|NB offices, at the **William D'Abate Elementary School**, Principal Brent Kermen vividly remembers March 13, 2020, as Rhode Island schools and offices began shutting down due to COVID-19. Reflecting on that day two years later, he talks about it being one of those "life moments" where our reality shifted so suddenly that people realized in a moment that they didn't have a handle on what was happening all around them.

About 90% of the school's 400 students qualify for federal free and reduced-price lunches.

One reality that stood out for Kermen was that "probably 99%" of his staff at the school had no trouble accessing WiFi at home, but internet access was a serious issue for about 35% of his students and their families. Many had no internet access. For some, it was inconsistent at best or marked by minutes or moments when they could access it and then could not. As he described it, "They have it, have it, have it, and then don't have it right now because we need food, housing, our medicine."

He knows the order of importance for the bills his families can afford: "Food, housing, medicine … and then what's next? For a lot of them, it is a phone, communication." But it's pretty difficult to do homework and join classes via Zoom on a phone, especially if your Mom or Dad needs it to go to work.

William D'Abate Elementary School Principal Brent E. Kermen said because ONE|NB's interns visited the school to talk about the network, they became trusted, familiar faces.

The school district very quickly ensured that all children had at least a Chromebook. But families still struggled. The district provided hotspot devices, and school employees brought them to children's homes. They moved those devices around depending on which families needed them at any given point in time.

When ONE|NB Connects launched in the fall of 2020, Kermen helped ONE|NB conduct outreach to neighborhood families. Families who trusted their children's teachers told friends and families who didn't have children in the school that ONE|NB had this new internet service available, Kermen said. School families who weren't sure whether this free internet access was legitimate asked Kermen whether they should trust the network and use it, and he assured them that they could.

When ONE|NB's interns visited the school in the spring of 2021 to talk about the network, they became familiar faces to the parents and children, Kermen said, and they shared the same message he was telling families: "It's safe, reliable, trustworthy." And when they heard that in the school, Kermen said families knew it was true.

> “If I have a question, I just come across the street and ask them.”
>
> —**Harry Quiñones**, an Olneyville resident

Harry Quiñones, left, of Providence, works with Antonio A. Rodriguez, ONE|NB’s Assistant Director of Facilities Management, ensuring he’s fully connected to the free neighborhood WiFi.

Photo by Stephen Ide, ONE|NB

Another advantage of ONE Neighborhood Builders’ approach to providing neighborhood WiFi is that the organization is available to help. As with any new service, letting people know about it and helping them connect to it became part of the mission.

Shortly after launching the network, ONE|NB hired two interns to help inform residents about the service and help them connect to it.

Also, residents of our affordable housing developments who know ONE|NB staff because they help with maintenance issues at their homes felt comfortable dropping into our headquarters to ask for help.

When resident Harry Quiñones couldn’t figure out a connection issue on his own, he just walked across the street from his home and asked for Antonio A. Rodriguez, ONE|NB’s Assistant Director of Facilities Management. For people who are not internet-savvy, Quiñones said, having an organization to turn to in the community is vital.

“If I have a question,” Quiñones said, “I just come across the street and ask them.”

Continuous Improvement

As we designed and built this system, we knew maintaining it would require long-term commitment and constant iteration as technology evolved. When we first launched ONE|NB Connects, our goal was to cover 2,100 Olneyville households.

By mid-2021, less than a year after launching, we had learned that one of the anticipated benefits of our mesh network—its ability to "self-repair"—wasn't working as well as we had expected. That was because we didn't have direct line of sight from each radio to the next since trees and other houses get in the way. Those gaps in the system reduced the number of households covered by the mesh, and the fact that our radio technology would occasionally go down was impacting our users' connectivity experience.

Therefore, we began exploring ways to reach more residents and improve connectivity. We realized we needed to strengthen the functionality of existing equipment and install new equipment in a broader geographic area within Olneyville.

Boosting Coverage

By installing additional relay points and improving the quality of the pre-existing relay points, we successfully boosted neighborhood coverage to nearly 35% of the physical area of Olneyville, up from about 25%.

By June of 2022, ONE|NB Connects had an estimated 2,583 unique users of the free WiFi network—surpassing our original goal. On average, users are connecting to the network for 308 minutes per connection.

By December of 2021, just 13 months after launching the network, our data indicated we were reaching an estimated 1,729 users—a strong number, but shy of our goal.

ONE|NB is constantly working to ensure that our network meets high standards and offers high-quality internet access. After raising additional funds, we were ready for expansion. We decided to upgrade to equipment from a company called **Cambium**. Our hope was that new transmitters (Cambium Radios) would raise our network speed and help us plan for future expansions.

In May of 2022, our team went up in bucket trucks throughout Olneyville to install newer equipment that's expected to reduce "dead zones" in the neighborhood and double or triple internet speeds. Now, if one radio goes down, the system sends a signal to the next closest radio and the next closest. Rather than a point-to-point system that pings one radio after the next, this more reactive network has redundancies built in so other radios in the system can be pinged more effectively and efficiently. Communication is now rerouted more seamlessly from point to point.

May 2022 System Improvements:

- **Cambium Networks** installed additional equipment at 255 Manton Ave. and at ONE|NB's headquarters at 66 Chaffee St.
- We relocated seven of the original 12 nodes; and
- We installed 11 new devices at various locations.

In May of 2022, our team went up in bucket trucks throughout Olneyville to install newer equipment that's expected to reduce "dead zones" in the neighborhood and double or triple internet speeds.

Just How Fast is ONE|NB Connects?

Internet access and a network's viability hinges on the download and upload speeds—essentially, those speeds help ensure that people can stream videos without the system slowing down and that people can download files and access the internet quickly.

The Federal Communications Commission sets the speeds that define high-speed internet access. At the start of the pandemic, the FCC's definition of high-speed broadband was download speeds of 25 megabits per second (mbps) and upload speeds of 3 megabits per second.

Initially, ONE|NB Connects provided speeds of 20 mbps for both downloading and uploading to the internet. As with all technology, recommendations for best quality speeds have increased in recent years. Some traditional for-profit internet service providers have recommended during the pandemic that customers buy packages that offer download speeds of 100 mbps and upload speeds of 10 mbps if they're working and learning from home.

> "The service has been successful, and the expansion minimizes dead zones, improves security, and doubles or triples the speeds for users."
>
> —**Antonio A. Rodriguez**, ONE|NB Assistant Director of Facilities Management

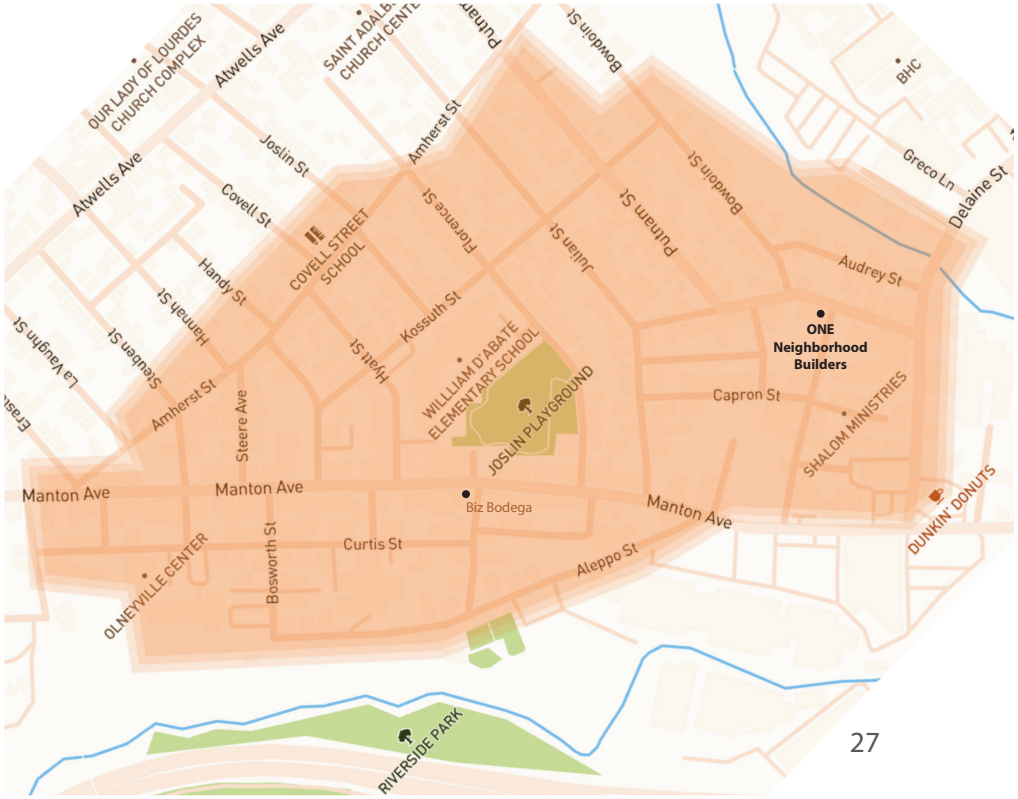
However, recommended speeds are evolving rapidly, and some federal entities are moving toward requiring that systems built with federal funding have symmetrical download and upload speeds of 100 mbps.

After upgrades in the spring of 2022, our network speed increased so that downloads and uploads are symmetrical at up to 100 mbps.

Coverage Expansion

A modified map our coverage in Olneyville shows in red where improvements and expansions were made, increasing speeds and extending the mesh into other areas of the neighborhood.

Final Coverage Area



To expand ONE|NB Connects, we relocated seven of the original 12 nodes and installed 11 new devices at various locations. Our expanded network now covers about 7 million square feet of Olneyville.

Initially, ONE|NB Connects provided speeds of 20 mbps for both downloading and uploading to the internet. After upgrades in the spring of 2022, we've increased our network speed so that downloads and uploads are symmetrical at up to 100 mbps.

Project Budget

One-time Expenses	Budget
Engineering	$46,324
Equipment	$237,786
Installation	$191,490
Total	**$475,600**

Annual Expenses	Budget
System maintenance, firewall, analytics	$32,000
Middle-mile fiber fee	$50,000
Total	**$82,000**

Funders

Our funders also included private philanthropists and people or organizations who asked to be anonymous.

BankNewport Foundation

BayCoast Bank Foundation

Blue Cross Blue Shield of Rhode Island Foundation

State of Rhode Island Community Development Block Grant funds

Citizens Bank Foundation

HarborOne Bancorp

integra Belong. Be Well.

LISC Rhode Island

NeighborWorks America

TUFTS Health Plan a Point32Health company

United Way of Rhode Island

Washington Trust Foundation

Rhode Island Department of Health - CARES Act

Overcoming Barriers

For our free community WiFi network to be successful, it required community and resident engagement. Outreach activities during COVID-19 proved challenging, especially in the beginning. Initially, people expressed hesitation and concern about fees, data, and cyber security issues.

Marketing the network as a safe, free, and reliable service was challenging.

Our early challenges

- Difficulty reaching people during the pandemic, when few events were planned to reach people face-to-face and when people were even reluctant to answer a knock at their door.
- Lack of central gathering spaces in the neighborhood, such as a community center, while people were hunkered down and interacting very little with each other.
- General distrust of the "free" program, with many in the community questioning whether they would be charged later or expressing doubts about its safety and legitimacy.
- Concern from many that the network was initially too slow or "dropped off" too frequently to make using it regularly a valid option. In the early days, pockets of disruption meant that one house on a block might have the signal while others did not.
- Initially, ONE|NB Connects' speeds were not consistently fast enough for streaming and video conferences.

The Trust Factor

School Principal Brent Kermen spoke to the trust factor and how the longstanding relationship between the William D'Abate Elementary School and ONE|NB helped families believe that the service was safe and reliable. With this in mind, ONE|NB hired two interns to conduct neighborhood outreach and encourage usage.

In one month alone (June 2021), we experienced a 74% jump in the number of users.

Our Outreach Strategies

We distributed a postcard with the free WiFi log-on information.

- In-person outreach and face-to-face engagement with residents at the local food pantry and with parents at the William D'Abate Elementary School.
- Engaging with local businesses and asking them to post flyers and leave postcards at their registers.
- Consistent literature drops in mailboxes as well as in bags given out at the local food pantry.
- Text blasts sent out from ONE|NB, the elementary school, as well as from Clínica Esperanza, another nonprofit in the neighborhood which provides medical care to the community.
- Engaging with other neighborhood institutions, including the United Way, the local library, and the local neighborhood association.
- Neighborhood canvassing and door knocking.
- Spanish radio paid advertisements and interviews.
- Large banners that we hung around the neighborhood.

Principles of Success

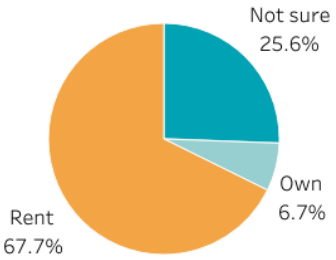
The geography of Olneyville—a tight-knit, densely populated community—helped ensure success. The fact that it's a relatively flat community meant that hills and valleys didn't prevent the radios in the mesh network from facing serious connection challenges. The wood-frame homes were easier for radio signals to transmit through. Think about when you've tried to access the internet from a large auditorium constructed with concrete foundations and steel structures. Those particular challenges that sometimes prevent wireless systems from working well did not exist here.

Partnerships, partnerships, partnerships. None of the success of ONE|NB Connects would have been possible without the relationships developed with all the partners who designed and installed the system and provided the equipment and vision that makes it work. One after another, ONE|NB connected with people who shared our vision that the digital divide must be tackled and that internet access has become a right that all people deserve.

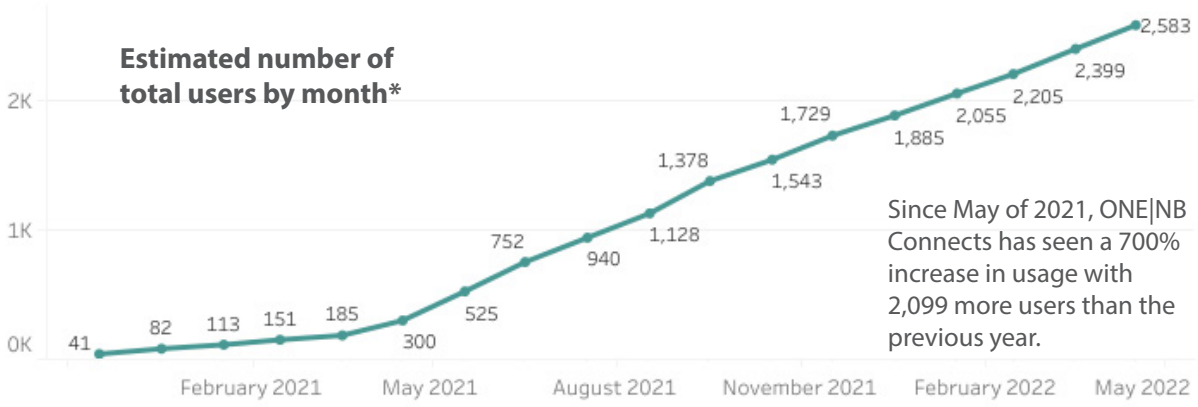
Having a "champion," one person who could oversee and advocate for this project from start to finish, was a vital factor that contributed to its successful implementation. To complete this project, ONE|NB Executive Director Jennifer Hawkins never accepted "No" for an answer. She spoke directly with banks, foundations, individual philanthropic donors, and media outlets. From the start, the Executive Director's role as the spokesperson for this initiative allowed other organizations to take the idea more seriously and encouraged their leaders to collaborate with ONE Neighborhood Builders. One final decision maker was also essential as ONE|NB strived to implement a bold initiative that had never been done before in Rhode Island.

Data Usage in the First Year

Do ONE|NB users rent or own their homes?



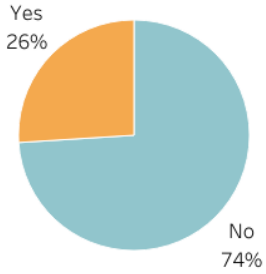
Estimated number of total users by month*



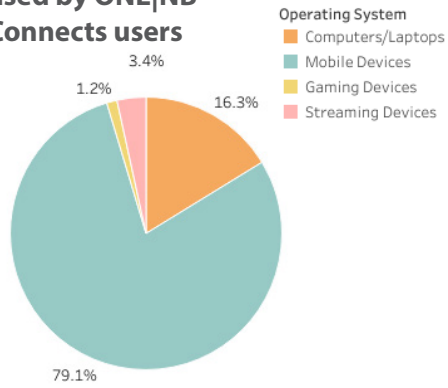
Since May of 2021, ONE|NB Connects has seen a 700% increase in usage with 2,099 more users than the previous year.

* based on the number of logged-in devices by month

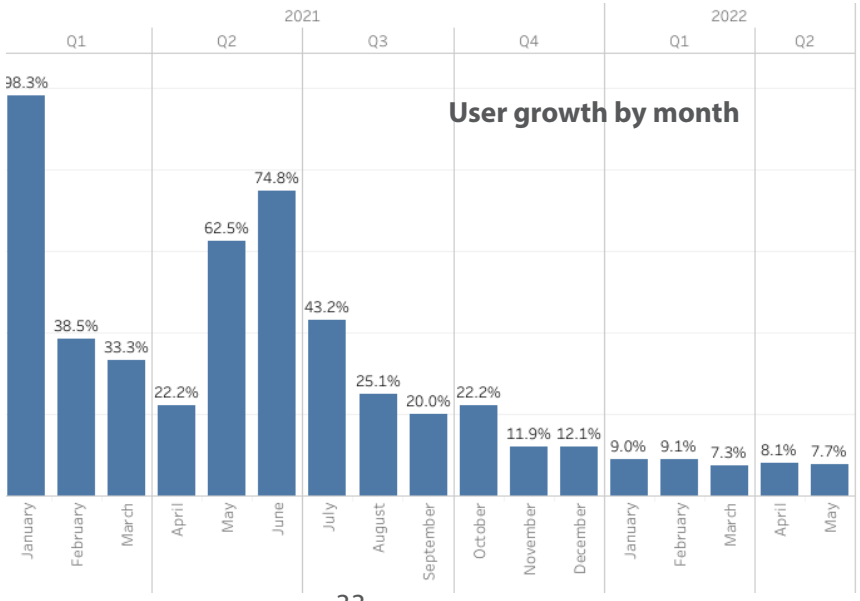
Do ONE|NB Connects users have in-home WiFi?



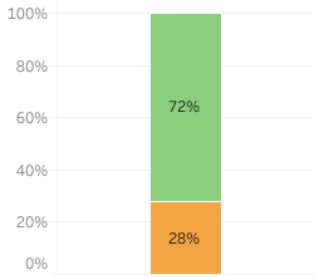
Top Types of Devices used by ONE|NB Connects users



User growth by month



Airtime Utilization



Airtime Utilization is a key metric to measure and assess the health of the wireless network. It's expressed as a percentage of how much of the available airtime is used. Our utilization averages about **28%**, meaning that we have **72%** of "free" airtime available. Thus, the data indicates that we could attract far more users and still not run out of available airtime.

Local/National Outreach

ONE Neighborhood Builders has fielded inquiries from other Rhode Island nonprofits and entities that want to build something similar to ONE|NB Connects. Plus, entities from elsewhere in the country have also turned to ONE|NB to learn more about how this network was established and continues to flourish.


Broadband Access in our Communities
Addressing the Digital Divide

Jennifer Hawkins
ONE Neighborhood Builders
Providence, RI

Mia Purcell
Community Concepts Finance Corporation
S. Paris, ME

Melissa Minnich
Fifth Avenue Committee
Brooklyn, NY

Jennifer Hawkins, ONE|NB's Executive Director, participated in a Massachusetts Health Equity Task Force dialogue on Telehealth, Digital Equity, and Health Equity Zones with CEOs from around the country and the Essex County Community Foundation. In addition, Hawkins has participated in a number of sessions, including a NeighborWorks America conversation with Boston-based Urban Edge.

Also, **Antonio A. Rodriguez**, ONE|NB's Assistant Director of Facilities Management, joined panelists from around the country for an online NeighborWorks America symposium on bridging the digital divide. NeighborWorks America shared a video they filmed that features Rodriguez and Harry Quiñones, the Olneyville resident who has used ONE|NB Connects since the beginning to help with his mother's medical issues and to access her doctors.

What's Next?

An architect's rendering shows The Avenue, now in predevelopment, which will include hard-wired broadband access.

ONE Neighborhood Builders brings its experience of having created and sustained a high-functioning and free community wireless mesh network to the next iteration beyond ONE|NB Connects. We are now actively raising funds for yet another expansion—to bring hard-wired broadband to **The Avenue**, one of our latest housing developments in the Federal Hill neighborhood of Providence. Hard-wired broadband is possible at The Avenue because this is a single-site development, featuring 39 apartments in one building.

Given our initial success, we firmly believe it's time to explore how and whether we can provide free or deeply subsidized internet access for the residents of all our future affordable housing developments. We are exploring a variety of technological options that differ based upon the type of building we are developing or renovating and the neighborhood and infrastructure that exist around each development.

Through it all, we keep in mind that providing internet access in large areas is not a new idea. We don't need to re-invent the wheel. Think about hotels, airports, and sporting complexes where people have access throughout the entire location. Nevertheless, how to pay for it so the most vulnerable members of our communities can always access the internet is a constant issue that we must explore. ONE Neighborhood Builders is proud to be at the forefront of exploring these ideas.

About ONE Neighborhood Builders

ONE Neighborhood Builders (ONE|NB) is a nonprofit community development leader in Rhode Island that is expanding its work to the broader Greater Providence area while maintaining its deep roots in its historic home of Olneyville.

ONE|NB's mission is to develop affordable housing and engage neighbors across Greater Providence to cultivate healthy, vibrant, and safe communities.

We accomplish our mission through:

Robust Housing Development and Quality Real Estate Management

ONE|NB will expand the availability of affordable, high-quality homes through the production, preservation, and acquisition of residential and mixed-used properties within our historic home of Olneyville and across Greater Providence.

Addressing Root Causes of Health Disparities

ONE|NB will engage residents and community-based organizations in our nine Central Providence neighborhoods to generate the social and economic conditions that prolong life expectancy and work to eradicate systemic barriers that lead to health disparities.

Embracing Innovation and Building the Community Development Field

ONE|NB will emerge as a thought leader in the field by distilling the lessons learned from developing and managing housing and convening residents and community organizations. We will participate in local and regional community development conversations, produce research and case studies, and amplify the impact of our community partners.

Founded in 1988 as the Olneyville Housing Corporation, the nonprofit changed its name to ONE Neighborhood Builders when it merged with Community Works Rhode Island in 2015. ONE|NB's annual operating budget is $5.6 million, of which about $3.6 million is raised annually from government agencies, private foundations, corporations, and individual donors. At full complement, ONE|NB has 28 full-time equivalent team members. The nonprofit is governed by an active, 11-member Board of Directors. ONE|NB is a charter member of NeighborWorks America, a nonpartisan, nonprofit organization in Washington, D.C., that supports more than 240 network organizations around the country that are creating opportunities for people to live in affordable homes, improve their lives, and strengthen their communities.

Since 1988, ONE|NB has developed 466 affordable apartments; 130 for-sale homes for low- to moderate-income homebuyers; and nearly 34,000 square feet of commercial and community space. These developments represent a total investment of more than $135 million and include the remediation of blighted and environmentally contaminated land and the preservation of historic buildings. ONE|NB takes on the most difficult projects, those that have the greatest impact on neighborhood revitalization, and has never had a development project fail.

ONE|NB is the convening entity of Central Providence Opportunities: A Health Equity Zone, which brings together residents, more than five dozen community-based organizations, health professionals, local businesses, elected officials, and others to address root causes of health disparities and to improve neighborhood conditions. As the convener, ONE|NB sets the strategic direction for this collective-impact initiative to increase economic mobility for residents in Central Providence. Through all of its collaborative and health equity work, ONE|NB has become adept at sharing its knowledge with a wide network of organizations, many of whom view us as the veteran collaborator and community leader.

Since 1988, ONE|NB has developed

- 466 affordable apartments
- 130 for-sale homes for low- to moderate-income homebuyers
- Nearly 34,000 square feet of commercial and community space.

Our work remains grounded in our enduring, core values and our central commitment to equity. We value diversity; promoting neighborhoods of choice that residents from different ethnicities, socioeconomic backgrounds, and cultures choose to call home; enlisting the expertise of neighborhood residents and stakeholders, inquiring about their revitalization strategies and endeavoring to implement their priorities; and seeking to regenerate neighborhoods without displacing residents and businesses, thereby deepening community wealth.

APPENDIX:

Our research led us to a variety of options for providing free internet access in other communities. Some examples:

Meta Mesh

This Pennsylvania nonprofit works to install new internet infrastructure and connect homes to free WiFi that aims to be as fast and as reliable as the services offered by any for-profit internet provider. **Meta Mesh** created "Every1online," its core in-home WiFi project, to provide free internet access to communities in need in the Greater Pittsburgh area. The program relies on a sponsorship model. Local stakeholders—school districts, service agencies, local governments, and businesses—can cover the internet service costs on behalf of community members.

Partners in this effort include:

- Carnegie Mellon University
- University of Pittsburgh
- The Keystone Initiative for Network Based Education and Research (KINBER)

School districts and community groups, including:

- New Kensington-Arnold School District
- Cornell (Coraopolis-Neville Island) School District
- Homewood Children's Village

Detroit Community Technology Project

In the Michigan city known in 2015 for being one of the country's least connected cities, the Equitable Internet Initiative was already working to support and develop efforts for historically marginalized residents to build and maintain neighborhood-governed internet infrastructure that fosters accessibility, consent, safety, and resilience. **The Detroit Community Technology Project,** three local community organizations, and Community Tech New York have partnered to:

- Increase internet access in underserved neighborhoods;
- Increase internet adoption through digital literacy programming;
- Train and develop residents as Digital Stewards; and
- Strengthen neighborhoods through community organizing, participation, collaboration, and resiliency.

Community Tech New York (CTNY)

This nonprofit as been working since 2011 to create community-owned internet infrastructure. Consultants and educators support groups that are building their own networks to meet community needs and follow shared principles. **CTNY** believes no one should be shut out of accessing basic necessities, such as education and health care, because they don't have access to a home broadband connection.

ONE|NB Connects WiFi: A Lifeline in the City

By Stephen Ide and Kate Bramson
ONE Neighborhood Builders

The onset of the COVID-19 pandemic in 2020 meant a loss of access and an isolation people had never experienced before.

Schools shut down, forcing students to suddenly learn online. Public places shuttered, and many employees began working from home. Hospitals were overwhelmed. Telehealth visits with doctors became the norm. When they could, people ordered groceries online to be delivered.

For residents in Olneyville, an economically distressed neighborhood on the west side of Providence, the effects of the pandemic and need for internet access became urgent.

> "There was a clear need in the neighborhood and a clear need for there to be more equitable access to broadband wireless."
>
> —**Antonio A. Rodriguez**, ONE|NB's Assistant Director of Asset Management

ONE Neighborhood Builders (ONE|NB) recognized that online access was essential, yet unattainable for many Olneyville residents. By the fall of 2020, ONE|NB had launched a free mesh WiFi network that covered roughly half the neighborhood and potentially up to two-thirds of its 7,000 residents.

Called ONE|NB Connects, the network provided a crucial lifeline.

Before ONE|NB Connects, the cost of getting online for essential services was out of reach for many residents.

"We had to get cable with the WiFi," said Olneyville resident Harry Quiñones, who needed to help his mother, who had had two heart seizures. "You couldn't just get WiFi. … the bills were outrageous, $342. Some families can't afford that."

Quiñones felt the sting of COVID-19 acutely. His brother died of the disease, he said, and he needed to take care of his mother, who also lives in the neighborhood.

The free WiFi has "been able to help me with my mother's health," he said. "I'm able to talk with doctors and keep up with her progress."

His mother's doctors were able to reach out to him directly online, so he could understand the side effects of his mother's medications. Access to the internet has also allowed Quiñones to order food for his mother, and it has permitted her to speak face-to-face with family members who live out of state.

"And that helped with a little bit of depression because during

COVID, a lot of older people stayed locked up," he said. "They didn't have access to anything, but at least now, if they feel lonely, they can call their relatives."

Building this network all began in early 2020, when ONE Neighborhood Builders Executive Director Jennifer Hawkins was compelled to find a way to offer free internet access to Olneyville residents. She called potential funders, connected with data and technology experts, reached out to the media to drum up support, learned fast about what it takes to build a WiFi network, and found an ally on her staff.

Antonio A. Rodriguez, ONE|NB's Assistant Director of Asset Management, had joined ONE|NB after working for nearly seven years at another Rhode Island-based community development corporation in Woonsocket. While there, Rodriguez had worked to bring community WiFi to that community, but the plan didn't take off, mainly due to the expense it would have required, he said.

Harry Quiñones of Providence used the free WiFi to help his mother, who has health issues. *Photo by Stephen Ide, ONE|NB*

By May or June of 2020, Hawkins drew Rodriguez into the ONE Neighborhood Builders project, telling him: "We have partners. We don't have a plan yet. We have a lot of ideas. We don't know what would work."

Hooked by the urgency to figure this out, Rodriguez started working closely with the partners whom Hawkins had convened.

"There was a clear need in the neighborhood," he said, "and a clear need for there to be more equitable access to broadband wireless."

Like in Woonsocket, the idea centered on the belief that offering equitable access to the internet was the right thing to do. A key difference existed, though. Amid the pandemic, potential funders more readily recognized the need for equitable internet access.

Reflecting on ONE|NB Connects after it was up and running, Rodriguez remarked:

"I got to make my dream come true in Providence."

Acknowledgements

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