

ConnectedNEO



Cleveland's Smart & Innovative Future

ConnectedNEO

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Executive Summary

The quality of information technology infrastructure in large U.S. cities is an increasingly crucial determinant of the economic vitality and quality of life for its residents. While Cleveland is today the worst digitally connected large US city, this need not be so going forward. The solution is at hand, both financially and technologically. All that is required is the will.

By combining an understanding of broadband technology (both fiber and wireless), innovative policy, enlightened leadership, and community voice, Cleveland can leapfrog the digital injustices of our past and create a sustainable, equitable solution for the future.

This paper calls for a transformational public investment in Cleveland's information technology infrastructure: **\$20 million of ARPA funds to install 630+ miles of new, future-proof fiber throughout each of Cleveland's 34 neighborhoods.** The new fiber network -- the most consequential public investment in neighborhood technology in the city's history -- will be a physical IT backbone upholding a new era of digital justice in Cleveland.

Residents will be able to connect to the new fiber asset wirelessly through neighborhood-based networks. Each network will have a point-of-presence (PoP) and enough street-level transmitters **that Cleveland's 82.5 square miles will be blanketed with high-speed, open-access wireless broadband internet that provides a minimum of 100 megabits per second (Mbps) download speeds and 25 Mbps upload per user; which is upgradeable in the future.**

This strategic investment in Cleveland's technology infrastructure can become a catalytic engine of progress in which all residents and neighborhoods can share equitably, securing a thriving community for the Cleveland of tomorrow.

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- Efficient deployment of (Smart) City Services
- Neighborhood-centric **ABCD**
- Increased civic engagement

The PROBLEM

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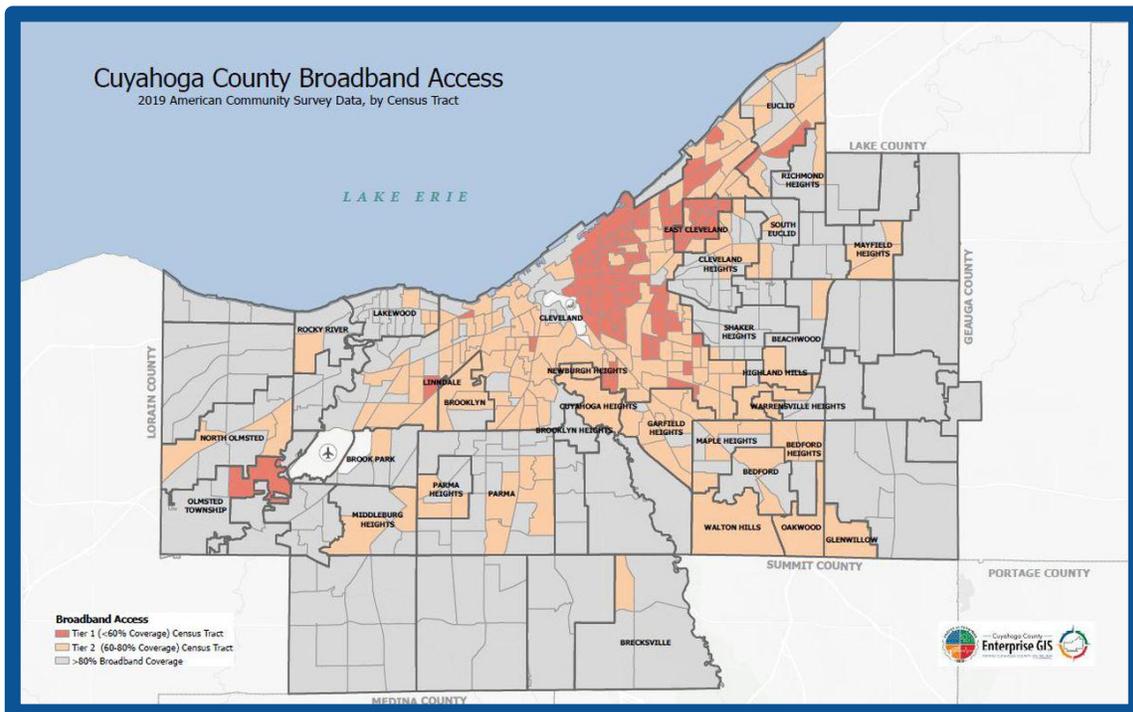
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The PROBLEM

Bridging The Digital Divide:

Major swaths of the city exist in an information desert, from both broadband limitations and cellular data unavailability. This inequity has come about due to a number of factors, and has consequences that permeate the entire community. Whether you are a student trying to do homework, a teacher trying to tutor online, a business trying to hire qualified employees from a pool of online applicants, or a senior citizen trying to visit a doctor virtually, the lack of an equitable, planful approach to information technology in Northeast Ohio neighborhoods affects everyone...though not equally.

This problem didn't start with the COVID pandemic; however, the depth of the systematic deprivation of much of inner-city Cleveland's access to information technology was glaringly revealed during its near-two-year tenure.



The PROBLEM

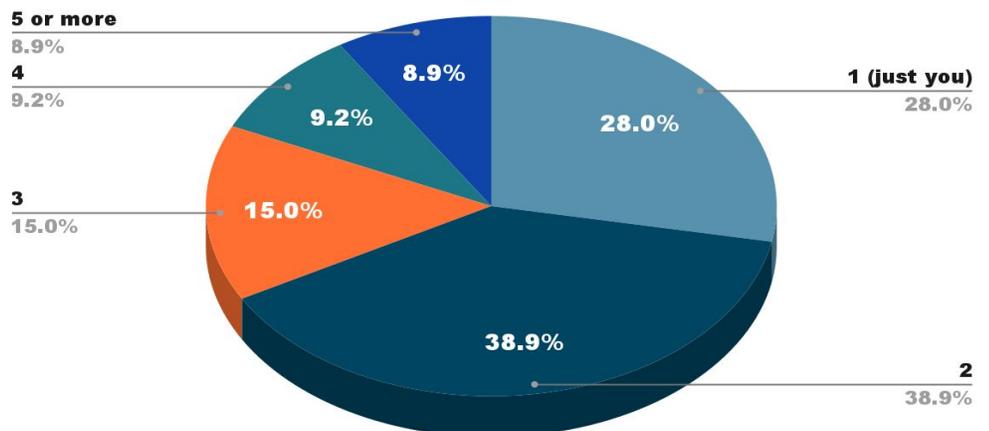
“The digital divide prevents Cleveland residents from accessing meaningful programs, jobs and opportunities -- and disproportionately affects our residents of color.” - Leon Wilson, Chief of Digital Innovation and Chief Information Officer • The Cleveland Foundation

- Cleveland is currently the least digitally connected large city (100,000 homes) in the country.
- 30% of households lack broadband of any type.
- 46% of households lack non-cellular broadband subscription.

Through thousands of conversations, and a concise [survey](#), **ConnectedNEO** asked Northeast Ohio residents about their internet usage. Two of the questions and the responses are below.

1) “How many people in your household use the internet, including you?”

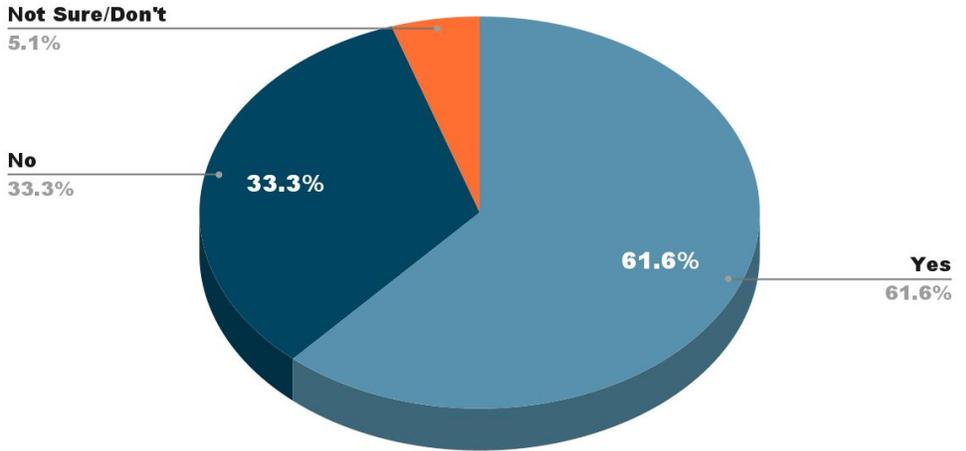
***72% of Cleveland households need enough bandwidth for more than one person to be online at a time.**



The PROBLEM

2) "In the last month, has a poor internet connection interrupted internet usage for you or anyone else in your household?"

For example, have you had trouble streaming videos or games, attending class or using video conference apps (applications)?"



Relevant Information:

- Students are seven percent more likely to earn a high school diploma and attend college, when connected to the internet at home, and are reported to earn over \$2 million more [over their lifetimes](#).
- An unemployed person with internet service at home will be employed seven weeks faster than one without internet service and can earn more than \$5,000 in additional income annually, according to analysis of 2015 data from the Bureau of Labor Statistics.
- According to Deloitte, every day that a person is not connected to the internet, America loses \$2.16 of potential economic activity, which means that the digital divide currently costs our country over \$130 million a day in economic activity. [Source](#)

The PROBLEM

Lack of Infrastructure and High Costs:

In the past, traditional telecommunications companies have dominated the space of providing broadband technology. Unfortunately, a lack of infrastructure and poor return on investment are often cited as reasons for failing to deliver affordable, high-speed broadband throughout Northeast Ohio. Currently these companies offer programs to provide limited access to lower quality bandwidth service with time-limited subsidies in order to counter public criticism and promote their brands. These programs yield mostly marketing benefits for the telecoms, with comparatively fewer benefits to the community.

As Cuyahoga County noted in its July 7, 2021 Request for Proposal (RFP), *Partnership for Deployment of Broadband Services in Cuyahoga County, Ohio...*

“The County recognizes that broadband is a critical infrastructure, all residents need to thrive. Providing equal and affordable access to broadband is essential to promoting equal opportunity in business, education, employment, healthcare, and all other aspects of day-to-day life.”

In fact, the County’s RFP constitutes an acknowledgement of the market failure by these telecom companies’ initiatives to accomplish the objectives it identified, as well as the need to chart another course.

Substantial efforts have been made in the local philanthropic community to address these issues over many years. Though funding has been extremely generous over time, the resulting number of residents that gained high-speed broadband access is in the hundreds, while the need is in the hundreds of thousands.

The PROBLEM

Currently there is a proliferation of ideas and approaches to providing the much needed broadband access to residents in Cleveland, each with its benefits and supporters. All of them are competing for financing and institutional support. Some tie the inherent wisdom of their approaches to related issues, like housing, while others take a more narrow approach.

The variables being weighed in comparing and contrasting these systems are many and complex: total system cost; durability of systems over time; deployment time; system design speed; ability to upgrade system speeds in the future; ability to create an integrated city- or county-wide system, and linkage to local skills/economic development-related issues, SMART-city readiness and others.

However, analysis shows a foundational approach and comprehensive plan are missing from all of these approaches. What are the long-term objectives for the community?

What does success look like? What is the foundation upon which alternatives can be developed, prototyped, and tested to evolve the best solutions for our community?



The PROBLEM

“I think the real problem [with getting broadband service to marginalized communities] is the business model. We need something else to make this happen. [There is] rapid progress in wireless technology, but business models are a block to internet equity.”

- Dr. Arogyaswami Paulraj, Professor Emeritus • Stanford University
Department of Electrical Engineering, during the December 9, 2020
“Connecting Cleveland: How Broadband Technologies Can Help
Build a 21st Century City” City Club of Cleveland forum

The SOLUTION

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The SOLUTION

The technology industry focuses on pushing boundaries to solve problems, often with great success. Its effectiveness is typically based in the analysis of zeros and ones, software and hardware. This is a critical attribute when working with computers, networks and data. However, the Digital Divide is as much of a technical problem as it is a socioeconomic one, requiring an understanding of the human experience and systemic constraints that perpetuate it. Combining technical knowledge with a social and systemic understanding is the analytical foundation required to deploy a durable, human-centered solution.

The proposed concept is to build a fiber backbone, via a “fiber highway,” into each of Cleveland’s 34 neighborhoods. From this fiber backbone, a matrix of neighborhood based, (cooperatively-owned) broadband networks will be established to serve as ‘the last mile,’ leveraging existing city and community assets (e.g. recreation centers, schools, libraries, police and fire stations, community development corporations) as hubs for the network (to create a point of presence (PoP)).

From each neighborhood-based PoP, a fully functional broadband network would be designed and deployed to be cooperatively and collectively owned by its residents. Each neighborhood would have critically necessary support to be trained in network operations, monitoring, and maintenance. This model puts ownership and control in the hands of residents, prioritizing individual community needs over corporate profits.

Lessening the city’s burden:

The fiber backbone and solution lessens the burden on Cleveland to maintain and operate broadband for its residents. Instead, the city would provide funding and resources to support building the infrastructure, to ultimately relinquish its responsibility to an organized and informed group of engaged residents. It’s *not* “municipal broadband” -- with all of its opposition -- because the city wouldn’t be responsible for the service. Instead, it’s a *cooperatively owned, operated, and maintained asset* to provide universal high-speed broadband access to the city’s residents.

The SOLUTION



Rendering of paths for hypothetical fiber highways (in green) and how they would bring broadband into each of the 34 Cleveland neighborhoods to create the independent networks. When appropriate, fiber highways follow along major thoroughfares in the region.

The SOLUTION

Building A Fiber Backbone:

Current research shows that no broadband medium is nearly as effective or future-proof as fiber. Its transmission capacity can be increased almost infinitely, allowing it to supply any level of bandwidth. It is immune to electrical interference and requires fewer powered nodes, making it the most consistent and reliable technology option.

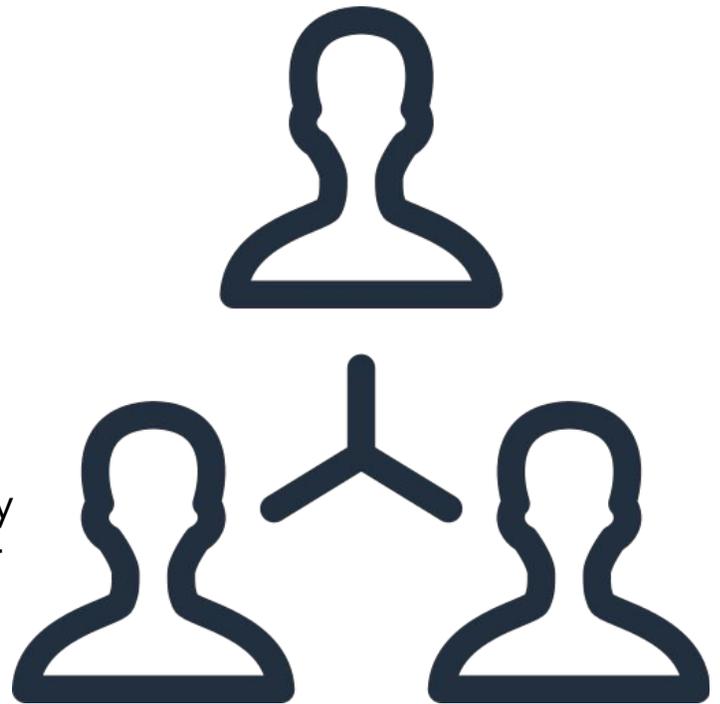
There are several traditional telecommunications and Internet Service Providers (ISPs) that provide either fiber or wireless internet access within Northeast Ohio. Some operate for profit, some are not-for-profit; however none of these entities have built, nor plan to provide, broadband access for all Clevelanders. The extremely limited fiber network that exists in Cleveland substantially constrains future broadband deployment options. A lack of broadband infrastructure (such as a fiber network) or unacceptable return on investment (ROI) are often cited as reasons for failing to provide broadband access to all residents. The concept of a city-wide cooperative fiber backbone remedies both of these concerns.

Beginning at an Internet Exchange Point (IXP) located downtown, the proposed “fiber highway” would bring fiber broadband infrastructure into each neighborhood. This would address the inequity created by traditional telecom companies’ lack of investment in Cleveland’s inner city (digital redlining). This “fiber highway” would be either aerial or terrestrial, or some combination thereof, based on several factors particular to each neighborhood, and run along common paths (usually major thoroughfares), branching off as needed to reach each neighborhood PoP.

The SOLUTION

Connecting The Last Mile:

Cleveland is a city of neighborhoods. These 34 neighborhoods have a long and rich history that creates a sense of “pride of place” for their residents. This makes developing networks based on these “boundaries” instinctively beneficial. Effective and efficient network-building would leverage community pride and foster community ownership as an asset and resource for their neighbors and themselves.



Each would be

designed and deployed using the most future-proof methods (wirelessly, wired, cellular, etc.) to ensure effective installation and sustainability. The system’s design will feature an “open” side for use *outside* - on the streets for the houseless and transient- and a “closed” residential side for in-home use with more security. This allows each neighborhood to be ‘blanketed’ with opportunities to access the internet in the way that best meets their needs.

Each network would be built based on the assets available for its own community. There are any number of technical solutions available to deploy, though wireless mesh has become one the most affordable, while also being one of the most reliable. Network technology will be based on the most efficient installation options for each neighborhood.

The SOLUTION

Managing Central Support:

There will be a need to provide both technical and customer service support for each neighborhood network as they are launched. Though each neighborhood's network will operate independently, having a centralized support network to provide monitoring and maintenance will be the most efficient use of resources. Based on need, the 34 neighborhoods can 'share' one

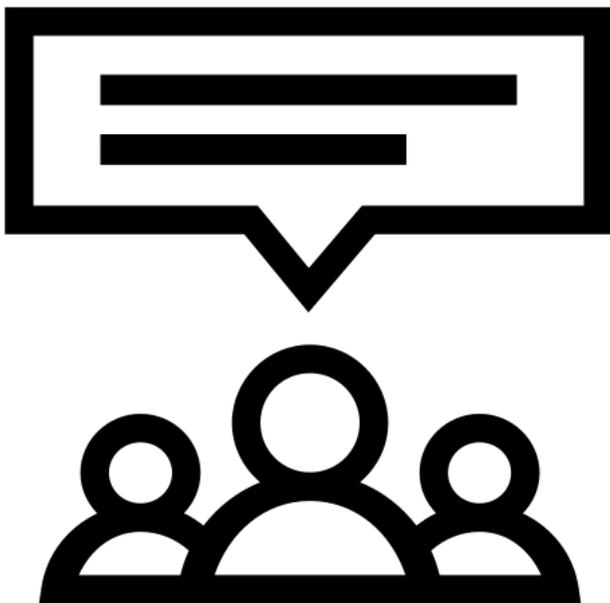
Central Support Team:

Customer Service - sales staff and first interaction with end user

Tier 1 Tech Support - initial support level responsible for basic customer issues

Tier 2 Tech Support - more in-depth technical support (than Tier 1)

Tier 3 Tech Support - highest level of support, responsible for handling the most difficult or advanced problems.



Digital Ambassadors:

Each network would have its own Digital Ambassadors to help with digital literacy, skills building, device availability, etc. These ambassadors also will assist other organizations working in the digital divide space to help connect them to neighborhoods and residents.

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HOW?

Funding:

Early in Fall 2021, Cleveland City Council proposed allocating \$20M of American Rescue Plan Act (ARPA) funds to address the digital divide.

Cost:

Industry standard costs have fiber deploying at \$6 per foot. The \$20M in funding that Cleveland City Council proposed to address the digital divide would purchase more than 630 miles of deployed fiber.

- Fiber deploys at \$5-6/foot.
- \$20M buys ~630-760 miles of fiber.
- Deploying into all 34 neighborhoods requires 18-22 miles for each.
- City of Cleveland is 82.48 square miles.

As Cleveland builds out the fiber assets into each of the 34 neighborhoods and develops the PoPs, the proverbial 'last mile' can be supported by traditional funders, CDCs, and other benefactor organizations to help build out the networks in the neighborhoods they serve.

Timeline:

Building out a network this way allows for phased deployment. Through standard deployment processes, the fiber network can be rolled out within a year, and each neighborhood network can be deployed within 90 days, even simultaneously.

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WHY?

These recommendations are driven and informed by the following elements of a thriving future community, which are seen as essential to all civic investment. As a community, together, this effort to bridge the digital divide must...

- Prepare for a future where all members of the community are offered an accessible, future-proof technology infrastructure.
- Ensure the benefits of this information infrastructure are equitably offered to all residents, businesses, institutions and governmental bodies, to secure mutual, interdependent thriving.
- Create a holistic, systematic approach to positive transformation of the social determinants of a thriving community -- in education, health, well-being, economy, opportunity and, most importantly, imagination.
- Prioritize investment in the social capital of Cleveland's residents by providing them with the tools to make informed choices; create spaces where they are welcomed and invited to fully participate in civic life; be healthy/successful/included/hopeful, and not only see, but also reach into the future to accomplish their aspirations.
- Attract people and businesses to 34 Cleveland neighborhoods,, which will fuel growth, prosperity and diversity.

WHY?

Efficient deployment of Smart City Services:

Traditionally, city services are deployed on set schedules and ways that don't always meet the needs and demand of residents. Via a fiber backbone, the city can tailor its services based on the hyperlocal needs of each community. Just as neighborhood networks would receive alerts/updates and services from the city, so too can city residents simultaneously connect and communicate in kind with municipal service providers. Some of the opportunities to make services more efficient include...

- Air quality reports
- Garbage/recycling pickup
- Road repair
- Safety alerts/updates
- School notices
- Weather warnings

Neighborhood-centric ABCD:

Asset-Based Community Development (ABCD) is a place-based framework that can help build strong, safe, and healthy neighborhoods. By bringing the community together and focusing on the gifts within, ABCD helps residents, associations, nonprofits, government, and the business community to act collectively as co-producers of their community's well-being. Deploying broadband infrastructure to neighborhoods provides an asset over which they have control and can use as a resource to reduce monthly expenses, improve quality of life, and strengthen their communities. Individual networks can make their own decisions about how to monetize (or protect) data and revenue generation, e.g. choosing to lease their own infrastructure space to other ISPs.

WHY?

Increased civic engagement:

Cleveland has struggled to get a majority of its residents engaged in civic processes. There are a number of reasons for this, but most agree that exhaustion/frustration from a lack of results is part of the issue. Seeing



action behind their voices being heard, receiving tangible benefit from involvement, and knowing their elected officials are truly serving them are the types of victories residents count to encourage their participation. The suggested process is as follows:

- Foster a clear sense of community ownership in residents by...
 - Carving out clear decisions that community residents will have power to determine
 - Inviting residents to take formal positions on Neighborhood Councils and as Digital Stewards
- Earn support of community members for ConnectedNEO's product

Appendices

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