Broadband Technology 101:
A Guide for HUD-Assisted Communities

ConnectHomeUSA ▶▶ **Deep Dive Guide**

Broadband Technology 101: A Guide for HUD-Assisted Communities

Connecting HUD-assisted homes to affordable, reliable internet is an important part of achieving digital equity across the country. To support that goal, this guide first provides an overview of technology solutions and addresses the question "How does the internet work?" Continue reading for considerations Public Housing Authorities (PHAs) can use to assess solutions when designing connectivity projects as well as highlights from community examples.

This guide accompanies the Broadband 101: Connectivity Solutions webinar held on September 27, 2022, featuring the Institute for Local Self Reliance. The webinar can be viewed here: https://www.hudexchange.info/trainings/courses/2022-connecthomeusa-broadband-101-connectivity-solutions/4770/.

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What is Broadband?

Broadband is an umbrella term used to describe any high-speed internet connection meeting the download and upload speeds set by the **Federal Communications Commission** (FCC).

The FCC definition of broadband has evolved over time and is currently classified at 25 **Megabits Per Second (Mbps)** download speeds and 3 Mbps upload speed. However, higher speeds are preferable for increased internet usage for remote work, telehealth, and online learning programs.

Internet connection refers to the connection between a device and the internet via broadband technology. The type of broadband connection will determine the speed, cost, and reliability of internet service.

Check out the BroadbandUSA Glossary for more key terms.

> **What speeds are right for your community?**
>
> The FCC's Broadband Speed Guide and Household Broadband Guide are a useful starting point to help determine the speeds HUD-assisted households need to adequately meet their online activities.

Short-Term Internet Solutions

If your residents are not served by high-speed broadband, there are other short-term solutions that can help. To fill the gap, many ConnectHomeUSA communities have provided the interim connectivity solutions outlined below, which serve to bring reliable and affordable internet service to residents. ConnectHomeUSA communities are encouraged to work with their State Broadband Offices to ensure that federal funding for broadband infrastructure under the BEAD program[1] reaches their areas, enabling them to pursue longer-term solutions to connect residents to affordable at-home internet.

Interim connectivity solutions may include:

1. Hot-spot device lending programs

2. Extending internet service from PHA offices to community rooms

3. Extending municipal internet coverage to public housing areas

To learn more about these connectivity solutions, check out the CHUSA Connectivity Case Studies.

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[1] The Broadband Equity, Access, and Deployment (BEAD), a $42.45 billion grant program provides states with funding to bring needed broadband infrastructure to unserved, underserved, and Community Anchor Institutions. To read a summary of how this program works, please check the CHUSA Guide to New Broadband Funding for HUD-Assisted Communities.

How Does Broadband Work?

Broadband may seem like an abstract concept, but it can be broken down into several components that make it possible to connect household devices to the internet.

1. **The Backbone.** This term is used to refer to the fiber optic pipes, buried under the ocean floor, or deep underground, that cross state and international boundaries. These are the main routes through which internet traffic travels.

2. **USA's Backbone/Long-haul Networks**. Within the United States, there is another network of fiber optic cables and satellites connecting data centers in cities and regions.

3. **Middle-Mile (or backhaul) Networks**. This is the portion of the broadband network that connects the backbone to the last-mile. Data centers are connected to multiple networks which extend service to various neighborhoods.

4. **Last-Mile Internet Connection**. The portion of the broadband network that connects a local Internet Service Provider (ISP) to a customer, through a fiber, DSL, or cable line to the home.

5. **Connecting Devices.** A modem is a device that connects your home to your ISP. Once an in-home network is established, devices can connect wirelessly through a **router**.
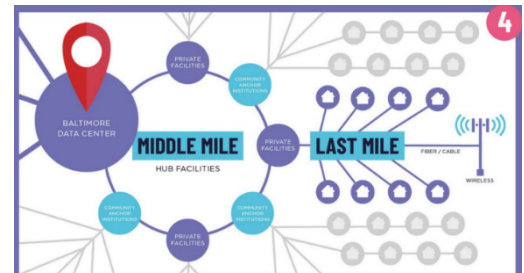
www.rwdfoundation.org/dell

📶 Last-Mile Challenges

Connecting the last-mile of internet is a common challenge for HUD-assisted communities. Barriers to connectivity include the materials of older buildings and sites in historically underserved areas. As a starting point for your connectivity options, look up and verify your network service options on the FCC Broadband Map.

Connecting Buildings to Broadband Networks

Depending on your location, a building may not have a "Last Mile" connection, meaning there is not a network currently available to connect a building or development. There are a few options for bringing internet service to a building. Each has its benefits and challenges.

Fiber Optic

Bringing a fiber optic line to PHA developments, if one doesn't exist, can be costly. There are a few options for how to do this:

1. **Partner with a city institutional network** or other local public agencies to use their existing fiber optic network. Learn more about how one CHUSA community, Durham Housing Authority, partnered with the city to connect residents to the city's fiber broadband network: DHA: Free Internet Solution Made Possible with Municipal and Private Partnerships - HUD Exchange

2. **Build your own fiber optic network** to connect your residences. This is an expensive option, but it can be necessary in internet dead zones where there aren't any internet service providers. See how the Choctaw Nation of Oklahoma is successfully building fiber lines for their residents: CNHA: Fiber Networks and Reliable Internet Service Provided to Remote Sites for the First Time - HUD Exchange

3. **Lease a line from a private provider.** This option may allow a PHA to pay a private provider for access to their networks.

Point-to-Point Radio (Fixed Wireless)

An alternative to fiber optic networks, Point-to-Point Fixed Wireless brings broadband to a building without physically connecting the building to a fiber optic network.

Fixed Wireless solutions connect a building to a signal tower that is connected to a fiber network. This is done by installing a transmitter device on the building that sends radio waves to another device installed on a network tower. This connects the building to the broadband network without requiring the expansion of new fiber optic networks.

Learn more about how the Jersey City Housing Authority provided this type of service by reading this CHUSA case study: JCHA: Affordable In-Home Wi-Fi Delivered through Technical Solutions to Building Materials and Inclusive Service Contracts - HUD Exchange

Connecting Households to the Internet

Once a building is connected to broadband, either through fiber optic or a fixed wireless connection, the next step is to connect the building units. There are several options for this, and PHAs should consider a variety of factors to determine which solution will meet their residents' needs.

Factors to consider for determining connectivity solutions:

1. Overall project costs and feasibility related to building size, age, materials.

2. Number of units and total population (which impact the amount of bandwidth required.)

3. Population type – internet usage is likely different in a senior development than at family properties (less or more bandwidth may be needed.)

> **Project-Specific Approach**
>
> The number of connectivity options may seem overwhelming but remember that one size doesn't fit all! Tailor your solution by considering who will use the connection and common uses.

Wired Technology

Wired solutions involve individually connecting each unit to a broadband network. This means running a connecting wire from the broadband source to individual units. Most buildings establish a **Telecommunications Closet (TC),** which is the central junction point for all wiring

equipment and wiring for devices connected in the local area network. It is often accessed by service personnel to service or install cabling networks within buildings.

Wired technologies may require more resources for up-front costs, but they are generally considered more "future proof" - meaning they can be upgraded to meet future needs.

1. **Fiber-to-the-unit** involves bringing a fiber line directly to the unit.
2. **Ethernet** is a different wired technology that is brought via cable line directly to the unit.

Wireless Technology

Wireless technology may be less costly to install but generally has longer-term maintenance costs associated with it, as well as limitations on the number of people it can serve. It can be a less effective solution for older buildings, and there may be 'dead zones' if certain building materials like concrete are present.

- **Wi-Fi** can be set up to bring an internet connection into the home using a router that gets its signal from the broadband source in the building. This can be set up to service one unit, several units on a hallway, or an entire building in a hotel-style connection.

Funding Considerations

Funding is a common barrier to connectivity projects, and available funds can determine the types of solutions a PHA might pursue. The following are some considerations to take into account when contemplating which connectivity option to pursue:

1. **Set project goals**. One approach is to determine what a successful connectivity project will accomplish and then work backwards to determine costs and funding sources. For example, if the goal is to connect residents to reliable at-home internet, and a building is experiencing dead-zones, you may need to pursue a wired technology solution.

2. **Look at short- and long-term costs.** To advocate for a solution that will be more costly in the short-term to a board or potential partners, explain how higher up-front costs may save costs in the long term.

3. **Analyze resident needs through surveys, and let their voices tell the full story.** If a service provider technically provides service but residents report that its unreliable, let that inform a different solution. See the Jersey City Housing Authority Case Study for more information.

4. **Reach out to potential partners.** There may be more funding sources available for connectivity projects than might be readily apparent. Reach out to your city's economic development department (or equivalent) to inquire about streams of funding that might support broadband projects. Contact like-minded nonprofit organizations and/or colleges/universities to see if a joint project might be possible. See the Durham Housing Authority Case Study for examples of this partnership arrangement with a city and university. Banks may also be interested in supporting your efforts. They are eligible to receive Community Reinvestment Act credit for investing in broadband-related projects.

Positive CRA reviews facilitate bank expansion plans – so it's in their interest to consider your broadband-related proposals. **See this guide issued by the Federal Reserve of Dallas for more information.**

ConnectHomeUSA Case Studies

ConnectHomeUSA communities have successfully completed connectivity projects in their communities using a variety of approaches. Check out the case studies to help with ideas on partnerships, securing funding, and determining technology solutions.

1. Jersey City Housing Authority: Affordable In-Home Wi-Fi Delivered through Technical Solutions to Building Materials and Inclusive Service Contracts

2. Durham Housing Authority: Free Internet Solution Made Possible with Municipal and Private Partnerships

3. Choctaw Nation Housing Authority: Fiber Networks and Reliable Internet Service Provided to Remote Sites for the First Time

4. Akron Metropolitan Housing Authority: Braided and Property-Specific Funding Strategy Connects Residents

See all CHUSA Connectivity Case Studies here

Resources

Additional information on connectivity technologies can be found here.

1. Exploring Digital Equity Fact Sheets – Institute for Local Self-Reliance (ilsr.org) offer bite-sized overviews of challenges and solutions to digital equity.

2. More information from Institute for Local Self-Reliance Community Net's project can be found here: | Welcome to Community Networks (communitynets.org)

3. This broadband glossary from Broadband USA.

4. Closing the Digital Divide: A Framework for Meeting CRA (Community Reinvestment Act) Obligations, Federal Reserve Bank of Dallas

5. This guide accompanies the Broadband 101: Connectivity Solutions webinar held on September 27, 2022.