Lessons Learned in Broadband Deployment for Virginia Affordable Housing Developers

RURAL LISC

ctc technology & energy
engineering & business consulting

LISC VIRGINIA

SOUTHSIDE Community Development & Housing Corporation

VT COLLEGE OF ENGINEERING MYERS-LAWSON SCHOOL OF CONSTRUCTION VIRGINIA TECH
VIRGINIA CENTER FOR HOUSING RESEARCH

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Rural places fall behind the rest of Virginia in terms of high-speed internet access, creating a digital divide that has negative impacts on financial wellbeing, education, and health in rural areas. Nonprofit housing developers working in rural localities are uniquely situated to help bridge this digital divide, but many nonprofits do not have the expertise or room in their budgets to implement broadband internet access in their projects. With historic funding[1] now available to fund broadband[2] expansion and adoption, Rural LISC worked with People Incorporated of Virginia (People Inc.) and Southside Community Development & Housing Corporation (SCDHC) in 2022 and early 2023 to support a broadband planning grant for three rural affordable housing projects in different phases of development: a complete rehab, a retrofit, and a new-build project in the design phase.[3]

This document summarizes possible scenarios and provides recommendations that will be relevant to many nonprofit developers as they pursue solutions for their portfolio properties, including: major

1 On June 26, 2023, the Commonwealth of Virginia was awarded $1,481,489,572.87 from the Broadband Equity, Access, and Deployment (BEAD) program (part of the Infrastructure Investment and Jobs Act of 2021) to administer broadband infrastructure grant programs within its borders.
2 High-speed internet access enabled by high-capacity transmission technologies for data, voice and video communications.
3 The retrofit and rehab examples involved existing properties in Abingdon and Damascus managed by People Inc. and a greenfield community project in Emporia currently being planned SCDHC.

approaches to in building wiring, how to engage potential funding partners and internet service providers, different methods to bring connectivity to a project, minimum design standards, types of ownership models, and typical costs for telecommunications engineering .

Acknowledgments

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1 Connectivity in older buildings

In the 1990s and early 2000s, most multiple dwelling units (MDU) and older buildings were wired to enable telephone communications, not broadband. Copper wiring was typically installed by the phone company, which would usually extend a cable from a utility pole to an upper floor of the building, and then connect to a panel in a communications room or basement. From the panel, wiring was distributed to units and outlets. In reuse and rehab scenarios, this antiquated wiring continues to make it difficult to upgrade MDUs to modern communications standards.

When Digital Subscriber Lines (DSL)[4] were developed to carry broadband signals over telephone cable without interfering with simultaneous phone calls, no additional wiring was typically necessary. While DSL technology has improved, standard DSL service typically delivers speeds below the minimum contemporary federal broadband standard of 25 Mbps downstream, 3 Mbps upstream (25/3), and well below the standard to be considered fully served (100/20).[5] Telecommunications companies are reluctant to further invest in this legacy infrastructure, which means much of this infrastructure is now outdated.

"In the 1990s and early 2000s, most multiple dwelling units (MDU) and older buildings were wired to enable telephone communications, not broadband. To bring these buildings up to standard for today's—and future connectivity—needs, housing developers and their partners must consider multiple connection points: at the site, at the building and in the individual unit."

4 DSL was the original technology that popularized the term "broadband" as DSL quickly spread to American households in the early 2000s. The ability to carry digital traffic over many channels (bands), allowed telephone lines to carry much faster traffic than dial-up.

5 Under current federal definitions, unserved areas are defined as those lacking access to fixed broadband at 25 Mbps download and 3 Mbps upload (25/3). Underserved areas are defined as those lacking access to fixed broadband at 100/20 Mbps.

Similarly, a cable company may have also provided connectivity at some point to deliver television signals over coaxial cable. Cable companies were able to upgrade their networks to allow bidirectional traffic over these cables, delivering internet in addition to television. But not all premises were fully cabled, and the cable company would often cut cables when customers cancelled service, leaving messy, partially connected cabling. Cable companies that have gone out of business may still have infrastructure installed into a building that may not have been upgraded or removed.

To bring these buildings up to standard for today's—and future connectivity—needs, housing developers and their partners must consider multiple connection points:

- **At the site:** Ensure there is high-speed broadband connectivity supplied by at least one internet service provider (ISP)[6] to the property. This is easier than ever to determine with the release of the Federal Communications Commission's (FCC's) updated address-level national broadband map[7]. Note that the ISP may not be currently delivering service to the specific location and the property must fall into its coverage area.

- **At the building:** Provide for or facilitate a drop connection from the street curb to the building.

- **At the individual unit:** Provide for or facilitate in-building wiring from the main connection point to all customers in the building.

6 ISPs provide access to the internet for residential and business end users through fiber, cable, DSL or wireless solutions. Cable providers, telephone companies and mobile carriers can all be ISPs.

7 https://broadbandmap.fcc.gov/home

2 Three case studies

Three sites were selected by Rural LISC and the project team to pilot connectivity options.

- **The Abingdon site:** This location houses 44 units in two three-story buildings and has an onsite community center. The facility appears to currently be served by a DOCSIS service provider and does not have adequate attic space or a basement for effective rewiring. As a result, this location would require an external raceway or a renovation to upgrade to a fiber optic service. The coax cable appears to be in working order and could potentially be used for upgraded technology in the near term.

- **The Damascus site:** This location has 22 units in two single-story buildings with a connected common area that can be utilized by the tenants. Point Broadband offers fiber to this location at speeds of 100/20 or greater. DSL service is available in areas around this location, but not directly to the property. This location has a basement area that can be used to provide a raceway for wiring to the units above. There are existing coax cables installed in these units but visible damage to some was identified during a walkthrough. A cable audit and testing should be conducted to determine if it can be utilized for enhanced services.

- **The Emporia site:** This is a new construction that is in the design phase. The preliminary plans call for 52 single-family housing units and an onsite community building. Underground infrastructure is slated to be installed throughout the complex during construction so that each of these homes can take advantage of the most up-to-date broadband technology provided in this area.

3

Open access versus ISP-driven connectivity

When feasible, open access connectivity to a building is generally preferred by developers over ISP-driven connectivity. Open access for both drops and in-building wiring allows building owners and tenants to choose any ISP willing to deliver service and avoid long-term contracts with a low-performance provider. Unless a building is significantly recessed from the street, ISPs are generally willing to extend a cable to the building, often aerially, to a communications room and a central communications switch panel. This can become messy, however, and in some cases ISPs connect wires individually to a unit from an exterior wall, creating an eyesore and potential hazards.

When feasible, a conduit made available to an ISP to pull fiber through simplifies connectivity and allows ISPs to extend fiber into the building, greatly increasing speeds and reliability and enforcing uniform aesthetic and engineering best practices. A properly designed internal wiring system with fiber optic cable to all units allows ISPs to connect at the main switch panel without having to add or cut wiring with each subscriber addition or cancellation, and ensures the infrastructure is future-proof and ISP-agnostic. It also ensures that tenants can receive connectivity from an ISP without affecting other customers with rewiring and/or disruptive new construction.

In such situations, ISPs will need to install drop cabling to the building, then rewire or reuse existing cabling. Depending on the ISP, connectivity can receive anywhere from a moderate boost to “fiber-like” speeds.

Open access allows building owners and tenants to choose any ISP willing to deliver service and avoid long-term contracts with a low-performance provider. ISP-driven connectivity can make sense, however, where developers lack sufficient funding or need temporary solutions. Some rural areas may only be served by a single ISP, and open access is not possible until there are competitors.

4 Temporary versus permanent installations

As indicated above, temporary installations may be needed when more substantive rewiring is cost prohibitive for either the ISP partner or building owner. If an ISP is considering retrofitting by installing cables through exterior walls, along hallways and between floors, the building owner should ensure agreement on design to avoid unattractive or hazardous installation as well as agreement to decommission the wiring if a new fiber-to-the-unit network is installed at a later stage. For more information on ISP partnership negotiations, please refer to the full report called *Broadband Implementation Guidebook for Affordable Housing in Virginia*.[8]

8 Please contact Christa Vinson at cvinson@lisc.org for a copy of this report.

5 Four approaches to in-building wiring

This section outlines four different approaches to connectivity and considerations for each approach, as well as the recommendations developed through the three case studies.

When making alterations to existing structures—as in the case of the Abingdon and Damascus properties—decisions regarding open access and whether the solution is permanent or interim drive engineering and operational considerations. Funding prospects such as the Low-Income Housing Tax Credit (LIHTC) Program and the Virginia Department of Housing and Community Development (DHCD, Virginia Housing) Affordable and Special Needs Housing (ASNH) Program, can provide financial support for both new developments and renovations. (Please refer to the *Broadband Implementation Guidebook for Affordable Housing in Virginia* for a full discussion of funding options.) An understanding of local building codes and the building owner's long-term goals provide additional information that may be necessary to engage a construction partner and pursue funding opportunities.

The Damascus site is considered a retrofit as it requires that new wiring and devices be installed around existing infrastructure, while the Abingdon site is referred to as a rehab, which involves more substantial rebuilding, including new wiring inside walls. The Emporia site is a greenfield. Further discussion on each option follows:

Reuse

- Use of existing wiring requires an audit, testing and certification to determine which cables can support upgrades to bandwidth and what needs repair or replacement.

- If wiring is in working condition, it can be reused to provide up to gigabit speeds depending on the condition of the wiring using recent innovations that compensate for some of the limitations of old wiring.

- If both coax and telephone cabling are present, it is preferable to use coax, which can deliver higher speeds with these newer technologies.

- While it is possible to convert the existing wiring to an open access infrastructure that is usable by any ISP, it may require management of the operations of the connectivity from a communications closet to the unit. That option will only be a good fit for a building owner who already has a technology communications company serving them that is capable of monitoring and managing the network.

Retrofits

- Prior to deciding on a retrofit, it is important to consider timing for the next rehab. If it is imminent, a more temporary solution may be in order, such as reuse of existing wiring.

- Cabling on the exterior of the building should be properly installed and securely fastened to prevent damage, promote safety and ensure it does not create an eyesore.

- Options to install wiring on the interior of a building should be explored to improve the aesthetics of the project. For example, basement or attic space can be used to run conduit and wiring to deploy service to the units.

- Retrofits often employ “direction boring” to install infrastructure. While this method is effective in navigating existing utilities, such as under roadways and driveways, it has the potential to be more costly.

- Solutions should be considered that can accommodate both immediate and future needs. For example, cabling could be installed in a basement or attic and wiring pulled into units to deliver service to residents in the near term. This wiring could easily be pulled back into the basement or attic space during a future renovation and then re-pulled into the units, as opposed to waiting for the renovation to install upgraded infrastructure.

Rehabs

- Wiring should be installed by a professional installation company—such as an ISP or certified electrician experienced with network cabling—that will perform the work using industry standard practices and materials to achieve optimal performance, safety, and aesthetics.

- When possible, the project construction should be done in phases to minimize the impact on residents.

- Basement and attic spaces can be used to run conduit and wiring unobtrusively and with minimal obstruction. Replace all outdated telephone/cable wiring with Cat5e/6 and RG-6 Quad Shield Coaxial Cable.

- When possible, install a media panel in a central location for all the communication wiring and provider equipment to be installed. Places like mud or utility rooms or media closets are best. Power and grounding should be installed within these panels.

Greenfield developments

- The overall cost of fiber infrastructure is lower for an installation in a newly developed property than incorporating fiber into an existing site.

- Less costly techniques such as trenching or “dig once” methods can be utilized more safely during a new construction build out, keeping overall cost down.

- In the absence of an existing communications closet, a space or small room should be identified that is preferably centrally located and repurposed to house the equipment that enables connectivity to all units. Placement of equipment can be more flexible in this scenario.

- Depending on the design, a media panel in each unit would provide a point of connection from the ISP's equipment to the service outlets in the unit.

- Basement and attic spaces provide a secure, accessible, and aesthetically pleasing method of wiring the units above or below. Conduit and wire runs would effectively be out of sight from the exterior of the building.

- Future upgrades by the ISP can be done with little to no construction and usually result in minimal interruption within a subscriber's unit. (This fact would also be true in the case of both the Damascus and Abington sites, post-rehab/remodel, once the service is upgraded to a fiber optic solution.)

Engaging potential partners

Identifying local and regional ISPs and potential construction partners will take place during the planning phase. Once an engineering assessment has been completed, the developer will engage a local ISP and/or construction company to complete the build. A developer should consider the following in this phase:

- **Partner selection:** Identify which partner is best suited for rehabs and retrofits, if applicable.
- **Demarcation decisions:** Determine whether the ISP will provide service to the location only or service into the building, and where their infrastructure/wiring stops and the building owners begins.
- **Ownership:** Explore ownership models to determine whether the developer or management company is interested in acting as a provider or whether it would prefer to outsource service and maintenance, and whether it wants to own and/or ensure open access to any new infrastructure.
- **Term sheet negotiations**: Complexity of agreements depends on the developer's requirements and needs. If they want to ensure open access, own infrastructure, and/or control aesthetics, there may also be opportunities for more ambitious partnerships. Owners and developers could explore working with partners who would be willing to consider additional conditions, such as future upgrades and installing public Wi-Fi at key community areas.

Partner selection will depend on what approach is required and whether a whole-building open access infrastructure is considered.

Broadband to the street/neighborhood

If no ISPs are providing broadband speeds or if incumbents provide substandard services, an ISP may have an interest in partnering. For unserved locations, there may be broadband grant funding for ISPs to expand to such locations. In served urban areas, there may be ISPs interested in expanding with fiber optic technology to compete against incumbents. For those ISPs, having an "anchor building" in an affordable housing MDU can be an attractive way to target a particular street or neighborhood with good prospects for a high take-rate. If a project is grant-funded, current broadband grants generally require building all the way into the building, but in-building wiring may be fundable as well. Developers should consider the following:

- Identify whether broadband needs to be extended to the block by consulting the FCC National Broadband Map.[9]

- Map fiber providers for the general area and determine which are closest to the street or neighborhood. These providers could be good potential partners.

- Explore if the local incumbent provider offers fiber optic service in the area. They may already be planning to upgrade service in the area and could include the building in question.

- Partner agreements are relatively simple if the focus is on ensuring fiber is brought near the building and the ISP(s) will take care of their own drops and in-building connectivity.

- If a developer wants an open access infrastructure, the more funding and cost-sharing they can bring to the table, the more leverage they will have—and the more important it will be to understand the different aspects of connectivity and ensure they have a good partner.

9 https://broadbandmap.fcc.gov/home. Most states, including Virginia, have developed their own broadband maps through their State Broadband Office and the Office may be able to assist with more sophisticated geospatial analysis.

- If funding permits, install a conduit from the street to the building that will be open access and will become the building owner's property, but to which the partner will have free perpetual right of access.
- If retrofitting, ensure that the developer and their architect/building engineer agree to the design.
- If feasible, discuss options for installing fiber to the unit and making the fiber open access to any ISP.
- Discuss the process of migrating from retrofitted structures to permanent open access fiber to the unit if/when a rehab is due.

Connectivity to the building

If one or more ISPs have service on the block in the form of fiber or cable, connectivity needs to be extended to the building via a drop cable (or extension from a nearby building). This can be achieved aerially from a nearby utility pole or underground from a curbside handhole/vault that provides access to fiber or cable infrastructure. If the cable goes underground, it typically enters the building through a conduit into the communications room, or some other wall entry and then is internally wired to where the building communications panel is located. If wired aerially from a utility pole, cable will often attach to a roof or exterior wall structure and then enter from the roof or intermediate floor and then be wired internally to the communications room. ISPs can of course install their services directly to a unit from the outside, but this will create an unmanageable and problematic mess of wires and make it difficult to isolate where a problem occurs and remediation. Developers should consider the following:

- If a developer wants to control and own the infrastructure, installing a conduit is the best option.

- The selected partner can serve as the regular contractor/architect; they already have the knowledge necessary to build conduits and work with subcontractors.

- If a developer is interesting in cost sharing and is willing to cede some control, it could also partner with an ISP to provide the open access conduit and offer to cover some part of the funding in exchange for ensuring the conduit is open to other providers. Lease fees can be determined jointly and potentially even include revenue sharing arrangements.

- It is important ensure the partner or contractor/architect understand that the building needs a multi-duct conduit, however, which will allow multiple ISPs to pull their fiber. Developers should make sure their subcontractor has experience with fiber and/or is a certified electrician with experience with exterior conduits and wiring.

- If the developer wants ISPs to take care of their own drops, it is important that it communicates clearly how the ISP should connect to avoid crisscrossing, sagging wires connecting to different exterior wall areas and building entries. If standards for building entry have not already been established, the developer may want to adopt them with the architect/engineer.

In-building infrastructure

The in-building infrastructure is where a good partner is especially important. The more of the infrastructure a developer owns and controls, the more options it will have to enforce safety and aesthetic standards and competition between ISPs.

- For a developer who is designing to own, the best partner is the existing builder and architect. As mentioned above, they already know how to build and wire internally.

- The developer should make sure the partner understands the goal—fiber to the unit, for example—and retains a subcontractor experienced in wiring with fiber.

- If ISPs are installing infrastructure or reusing wiring, it is important to agree on building entry and where their equipment will terminate and ensure that it is clearly labelled and employs proper cable management.
- If an ISP is installing the retrofit, the developer should make sure to approve any design and ask for example photos of what it would look like.
- Establish clarity on who owns and can use the infrastructure installed.
- If active equipment is required, designs should ensure that it will be elevated away from any potential flooding and have access to power.

7

Funding

The cost of open access infrastructure is relatively high when installed in an existing building, although it typically has only minor associated maintenance costs. Retrofitting is a workaround intended to reduce capital expenditures but may require slightly more maintenance as the infrastructure is more exposed. Because of the lower overall cost of retrofitting, a developer may want to pursue a partner-specific arrangement that falls short of open access in the interest of giving tenants a cost-effective option for high-quality broadband. The cost to the developer in this case could be low, cost-shared, or even borne by the partner.

The incremental costs of installing new infrastructure are relatively low in new builds as well as in major rehabilitations, where walls are opened and electric wiring is brought up to code. Due to the relatively high cost and initial investment in the overall project, a developer may choose to pursue funding for capital expenditures. This funding is particularly well-suited for a partnership model where private entities provide internet connectivity and the developer builds future-proof infrastructure with low maintenance costs. The Low-Income Housing Tax Credit (LIHTC) program is a good potential source for this kind of funding but may favor rehabilitation over retrofitting as a long-term investment option. Retrofitting may work better for developer- or ISP-financed infrastructure that can serve as internal wiring and be opened to other providers.

State Qualified Allocation Plans (QAP) governs how the State's federal LIHTCs will be allocated, and developers will be experienced with identifing mandatory requirements for properties as well as scoring opportunities to make its application more competitive. In this case, particular attention should be paid to incentives related to access or adoption of broadband or technology.[10]

The QAP covers a wide variety of incentives, but developers are primarily interested in those that defray the cost of infrastructure installation rather than ongoing service or maintenance costs. In the case of SDCHC, the developer was unsure about the requirement in the QAP that states it

10 More detailed information on LIHTC is provided in Virginia Housing's Federal Housing Credit Manual.

will favor applications that provide “free individual high-speed internet access to each unit.” It is understandable that SDCHC was unsure about committing to this ongoing expense over the life of the project, but remains interested in investigating options that could reduce debt in the project, which could potentially lead to being able to offer this service.

The Virginia LIHTC program[11] has evolved to require high-speed, reliable connectivity in new construction projects and encourage retrofits and rehabs of existing low-income housing structures. Eligibility criteria for the 2023 cycle that directly address broadband include:

- Community rooms must provide free public Wi-Fi. (Each applicant shall commit in the application to provide free Wi-Fi access in the community room of the development and such access shall be restricted to resident-only usage.)

- Residents must be provided access in their unit to free Wi-Fi with minimum speeds of 10/3 Mbps.

- Newly constructed units must include the necessary infrastructure for high-speed internet/ broadband service. These provisions are now mandatory, whereas they previously earned extra points.

- Property managers must provide potential residents with educational materials and service options at the time of application.

While not directly related to broadband, additional points will be awarded during the 2023 cycle for projects including social service supports. Southside has plans to provide services to its residents, which could help give the project’s LIHTC application an advantage in a competitive field. A fiber-to-the-premise architecture would be flexible enough to facilitate connectivity to any additional community areas and offices where community services are offered, including digital literacy

11 https://www.virginiahousing.com/partners/rental-housing/rental-housing-tax-credits

workshops, coding camps, or community IT support. This architecture allows for electronics and hotspots to be deployed flexibly and will not affect the capacity of connections to other tenants in the MDU. Other funding sources may be leveraged for the purpose of supplementing service costs to residents.

While LIHTC provides a substantial subsidy towards capital costs over a decade, credits for this highly competitive program are not realized until several years after planning has begun. As federal funding addresses rural broadband needs over the next few years, there will be increased demand to provide improved connectivity to underserved, low-income populations in urban areas who reside in multi-tenant housing. The need for programs that provide immediate funding for retrofit and rehab of low-income housing projects will be necessary to bridge the capital expense gap for housing providers. Existing programs in California and New York may serve as models for other state-administered grant programs, including the California Emerging Technology Fund, a non-profit established to identify and deploy resources that enable internet access, and RetrofitNY, offering grant opportunities to developers that adopt carbon neutral technologies for low-income retrofit projects.

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