THE PEW CHARITABLE TRUSTS

2005 Market Street, Suite 2800
Philadelphia, PA 19103-7077
P 215.575.9050
F 215.575.4939

901 E Street NW, 10th Floor
Washington, DC 20004
P 202.552.2000
F 202.552.2299

pewtrusts.org

Memo

To: State broadband offices

From: Jake Varn, The Pew Charitable Trusts

Date: November 29, 2021

Subject: How 'Open Access Middle-Mile Networks' Can Facilitate Broadband Expansion

The following memo details a variety of ways that states have funded, operated, or otherwise supported open access middle-mile networks and includes statewide and regional examples.

State Policies for Open Access Middle-Mile Networks

The following memo contains information on how states fund, operate, or otherwise support open access middle-mile networks, as of November 2021.

Summary

- Open access networks are those in which the owner/operator leases out portions of the available bandwidth to multiple providers. The Institute for Local Self-Reliance defines "open access" as "an arrangement in which one network is open to independent service providers to offer services. In many cases, the network owner only sells wholesale access to the service providers who offer all retail services."
- The middle mile of a network is the connection from the internet backbone, the data centers, and major lines (including transoceanic cables) to the last-mile connections serving individual residential and commercial buildings.
- Open access middle-mile networks allow for states to make a centralized investment in a critical link of infrastructure.
- Over the past decade, states have increasingly invested in these networks to further universal access and affordability goals.
- State investment in open access middle-mile networks can lower the cost for last-mile deployment, increase competition, and create a reliable infrastructure backbone for anchor institutions and government facilities.
- Some states with existing middle-mile networks for research institutions have expanded these networks to provide retail service.

State Investment in Open Access Middle-Mile Networks

Many states and territories have dedicated funding mechanisms to address middle-mile and last-mile broadband expansion. These are often supplemented by federal programs that offer grants to states, municipalities, and other entities to accelerate broadband deployment.

Several states fund or operate their own broadband networks through a model known as "open access middle-mile" (OAMM) networks. Traditionally, these networks directly serve anchor institutions (schools, libraries, and government facilities) and sell capacity on the network to provide a bridge for providers to reach last-mile connections to residents and businesses through public-private partnerships. By making the upfront infrastructure investment in the middle-mile portion of the network, this approach can lower the overall cost of service to both households and the anchor institutions. For reference, the Benton Institute issued a report in 2020 on lessons learned from past OAMM networks and strategies for sustainable management.

Types of OAMM Networks

OAMM networks can come in different forms, depending on their scale and the types of clients that are served. Below are different types of networks and their respective purposes, as outlined by the Benton Institute. However, these networks can also change over time. For example, the Illinois Century Network began as a research and education network, but added last-mile service to providers, bringing it closer to a statewide network.

Statewide Networks

At their most expansive form, statewide networks operate middle-mile infrastructure for the entirety of the state, serving a combination of anchor institutions, communities, government services, and providers.

Research and Education Networks

As one of the original forms of open-access networks, these typically connect a combination of higher education institutions and other anchor institutions. These networks typically do not provide commercial data transport services.

Intrastate, Regional, and Local Networks

Intrastate networks may serve only a specific region of the state or are exclusively used for specific government entities, such as the state department of transportation. For particularly hard-to-reach communities, a local investment in a stand-alone OAMM network can bridge the gap needed to provide last-mile service.

Federal Funding Update

Under the Infrastructure Investment and Jobs Act, passed in November 2021, the National Telecommunications and Information Administration (NTIA) has received $1 billion for a middle-mile infrastructure grant program. The program is designed to support the construction, improvement, or acquisition of middle-mile infrastructure for a wide range of eligible entities, including states, with the stated purposes of encouraging the expansion of these networks to reduce the cost of reaching unserved and underserved areas and increasing overall connection resiliency with multiple redundancies to prevent a single point of failure in a network. Congress has prescribed NTIA to give priority to applicants that meet two or more of the following conditions:

- Adopts fiscally sustainable middle-mile strategies.
- Commits to offering nondiscriminatory interconnection to terrestrial and wireless last-mile broadband providers and any other party making a bona fide request.

- Identifies specific terrestrial and wireless last-mile broadband providers that have 1) expressed written interest in interconnecting with middle-mile infrastructure planned to be deployed by the eligible entity and 2) demonstrated sustainable business plans or adequate funding sources with respect to that interconnection.
- Identifies supplemental investments or in-kind support (such as waived franchise or permitting fees) that will accelerate the completion of the planned project.
- Demonstrates that the middle-mile infrastructure will benefit national security interests of the United States and the Department of Defense.

Congress has also instructed NTIA to prioritize projects that:

- Leverage existing rights of way, assets, and infrastructure to minimize financial, regulatory, and permitting challenges.
- Route the middle-mile infrastructure to enable the connection of unserved anchor institutions (e.g., schools, libraries, health care, and other community support institutions, including Tribal anchor institutions).
- Facilitate the development of carrier-neutral interconnection facilities.
- Improve the redundancy and resiliency of existing middle-mile infrastructure and reduce regulatory and permitting barriers to promote the construction of new middle-mile infrastructure.

NTIA is expected to provide additional details on this program in the coming months, with a deadline to issue a notice of funding opportunity by May 2022, with grants to be awarded by February 2023.

Select Examples of State OAMM Networks and Policies

Statewide Networks

California

California has a variety of experience with OAMM networks and in 2021 passed a historic $3.2 billion bill to build new middle-mile infrastructure.

The Corporation for Education Network Initiatives in California (CENIC), a nonprofit organization, operates an 8,000-mile fiber network for anchor institutions in the state. This network serves more than 20 million users across California, including the vast majority of K-20 students together with educators, researchers, and individuals at other vital public-serving institutions. CENIC is governed by representatives of the charter institutions that it serves: California community colleges, California K-12 schools, California public libraries, the California State University, the University of California, and private universities (Caltech, Naval Postgraduate School, Stanford University, and the University of Southern California). In eastern California, the OAMM network Digital 395 was funded by a 2009 ARRA grant and now spans 580 miles with service areas in 36 communities. Operated by the California Broadband Cooperative, the network provides last-mile services only to "government, educational, [and] medical institutions and points of interconnection (service providers)."

As previously mentioned, California recently passed H.B. 156 to build, operate, and maintain a $3.25 billion open access, state-owned network, with American Rescue Plan Act state and local fiscal recovery funds—to be available for last-mile providers, anchor institutions, and Tribal entities. CENIC was recently selected to be the administrator for the network. This bill builds off the California State Broadband

Action Plan (December 2020), which estimated that the cost to build a statewide, middle-mile, dark fiber network along highway corridors would be $2.2 billion. The California Public Utilities Commission has previously awarded both middle-mile and last-mile infrastructure grants through the California Advanced Services Fund.

Illinois

The Illinois Century Network connects more than 6,000 community anchor institutions with over 2,100 miles of fiber-optic network managed by the Illinois Department of Innovation and Technology. Originally designed to serve anchor institutions and supported by a $62 million federal American Recovery and Reinvestment Act (ARRA) grant, the Illinois Century Network in 2013 began offering access to the network to commercial providers, lowering the cost of entry in rural and underserved regions of Illinois with 40 providers currently delivering last-mile service through the state's network.

Kentucky

The KentuckyWired public-private partnership operates a 3,200-mile fiber optic network across all 120 of Kentucky's counties. The project was financed through a combination of $30 million in appropriations from the general fund, a $23.5 million federal grant from the Appalachian Regional Commission, and $271 million in private bonds, with the repayment repurposed from the fees paid for existing internet services.

Maine

The Three Ring Binder project in Maine started as a state-led effort but eventually went forward through an independent company—the Maine Fiber Company, which was sold in 2019 to FirstLight. This investment in middle-mile infrastructure from ARRA funds has been proved to have decreased last-mile deployment costs.

Maryland

The One Maryland Broadband Network is a middle-mile connection between three existing networks that service state agencies, county governments/anchor institutions, and a rural cooperative. The network was launched with the support of a $115 million ARRA grant through the Broadband Technology Opportunities Program, with $40 million in matching state and local funds.

Massachusetts

In Massachusetts, the MassBroadband 123 network spans more than 1,200 miles, covering 120 communities in western and central Massachusetts, and directly connects hundreds of public facilities. For Longmeadow High School, access to the MassBroadband 123 network has lowered monthly fees and will allow the school district to "pay back the $500,000 investment they made in technology upgrades at the school within five years, a much shorter time frame than with other infrastructure projects." MassBroadband 123 received $45 million in ARRA funding and $44 million in matching funds from the state.

Vermont

Vermont's Department of Public Service owns or holds license to roughly 340 route miles of open access dark fiber optic cable. The department's fiber is available to any paying applicant, for either long haul transmission or last-mile service. The latest pricing information is publicly available and included below:

Standard Pricing (all rates shown in $/month)				
	15+ year term	*10-year term*	*5-year term*	*3-year term*
Per strand mile	*$17.00*	*$19.00*	*$22.00*	*$27.00*
>100 strand miles	*$17.00*	*$17.00*	*$20.00*	*$25.00*
>500 strand miles	*$13.00*	*$15.00*	*$18.00*	*$23.00*
>1,000 strand miles	*$9.00*	*$11.00*	*$14.00*	*$19.00*
Hourly rates: *Management of fiber contractors - $100* *Accounting - $75*				

Funding for Local/Regional Middle-Mile Networks

Colorado

Colorado's broadband program funds middle-mile deployment through its middle-mile infrastructure grants. The program, operated by the Colorado Department of Local Affairs (DOLA), is funded by the Energy/Mineral Impact Assistance Fund and has $5 million annually dedicated for broadband planning and middle-mile grants between 2019 and 2024. Funds come from the state severance tax on energy and mineral production and from a portion of the state's share of royalties paid to the federal government for mining and drilling of minerals and mineral fuels on federally owned land. The program lists the following eligibility requirements:

Colorado's Middle-Mile Infrastructure Grant Requirements

"Middle-mile infrastructure is considered any infrastructure that is utilized to provide or enhance the network connection between communities and a provider of core network services, including the interconnection of community anchor institutions (CAI's). Typically, middle-mile infrastructure will be considered to terminate at local fiber loops connecting CAI's. Such loops should be designed with good access points ("hand holes") for last-mile connections. Where appropriate, fiber to publicly owned towers or other critical public infrastructure will be considered middle mile.

- Not for service provision to end user: The funds shall not be used for "last-mile" deployments, which will be considered any infrastructure that terminates at a residential, business**,** or other nongovernmental address ("fiber to the curb"). Thus, connections from CAI loops to neighborhoods are considered last mile. This limitation excludes service provision equipment such as routers, switches**,** and the like from consideration for funding from this program. However, projects submitted for funding must demonstrate plans for eventual use of the system, including plans for maintenance and system upgrades. Public/private partnerships to provide service are encouraged.

- Basic Infrastructure: Conduit systems, fiber, towers, right of way access, appurtenances, and similar systems necessary to enhance middle-mile connections will be considered for funding. For applicants who are subject to the restrictions of SB 05-152 (CRS 29-27-101 et seq.), funding for fiber that is intended to benefit nongovernmental users (e.g., private citizens, businesses) will be limited to dark fiber.

- The awarding of any grants as part of this program does not constitute an acknowledgment that the funded project is in compliance with applicable laws and regulations. As with all DOLA grant programs, it is the responsibility of the applicant to ensure such compliance.

- Any infrastructure built with program funds and offered to private entities must be done so in an open access, competitively neutral model. Access and rates must be provided on a competitively neutral and nondiscriminatory basis for all providers regardless of technology.

- Applicant will be required to allow use of any infrastructure for public safety purposes and encouraged to work with local public safety entities to define their specific needs.

- Applicant must agree to share infrastructure geographic location information (GIS) to assist the state in building an asset inventory.

- Applicant is encouraged to work with the private sector to investigate and secure other available funding, such as from the Broadband Deployment Fund (HB 14-1328, CRS 40-15-208). Applications which have a private sector application counterpart under consideration by the Broadband Deployment Fund will be given special consideration in order to leverage State funds.

- Match: As with other capital construction projects, applicants are required to match grant funds on a dollar-for-dollar basis. In cases where the applicant's financial condition does not permit a 50/50 match, a minimum match of 25% is required."

Examples of funded projects: Project THOR, a 400-mile open access network in northwest Colorado serving 14 communities, and Region 10, a 200-mile network in western Colorado.

Other Models

Washington

In 2021, the Washington Legislature passed legislation to allow "port districts"—areas with coastal or inland ports, governed by an elected commission and independent of other local jurisdictions—to provide open access retail telecommunications service in unserved areas of the state.

Virginia

In 2019, Virginia passed H.B. 2691 to allow electric utility providers Dominion Energy and Appalachian Power to participate in a pilot program to provide broadband middle-mile service. Both companies have entered into partnerships to lease fiber for last-mile service through local providers (both with traditional internet service providers and electric cooperatives). However, the pilot allows for the companies to enter into exclusive agreements, rather than the open access approach.

Another OAMM network in Virginia, the Mid-Atlantic Broadband Communities Corporation (MBC), was funded in 2004 by the state's Tobacco Region Revitalization Commission, using money from a 1998 legal settlement with tobacco producers. The MBC operates nearly 2,000 miles of open access middle-mile fiber in southern Virginia. The MBC also received ARRA Broadband Technology Opportunity Program funds to expand its network in 2010.