



October 2023

# BROADBAND INFRASTRUCTURE

## Middle-Mile Grant Program Lacked Timely Performance Goals and Targeted Measures

Accessible Version

## Why GAO Did This Study

Broadband is essential for employment, healthcare, public safety, and other vital services. Middle-mile infrastructure plays a key role in keeping Americans connected. Some areas of the country have no middle-mile networks, and other areas are served by only one middle-mile connection. In 2021, the Infrastructure Investment and Jobs Act authorized NTIA to establish a \$1 billion middle-mile grant program.

You asked GAO to examine issues related to middle-mile infrastructure, including its availability. This report (1) describes the challenges stakeholders identified that affect middle-mile coverage and access, and (2) examines the extent to which NTIA established the middle-mile grant program in accordance with selected recommended practices.

GAO conducted case studies in three states and interviewed middle-mile operators, last mile providers, and state officials. GAO also interviewed federal agency officials, academics, and industry participants. GAO assessed NTIA program documentation against recommended practices related to grants management, duplication, and performance management.

## What GAO Recommends

GAO is recommending that NTIA (1) establish performance measures for the middle-mile grant program and ensure the measures have specified targets, and (2) establish a process for developing performance goals and measures during program planning and design. NTIA agreed with GAO's recommendations.

View [GAO-24-106131](#). For more information, contact Andrew Von Ah at (202) 512-2834 or [vonaha@gao.gov](mailto:vonaha@gao.gov).

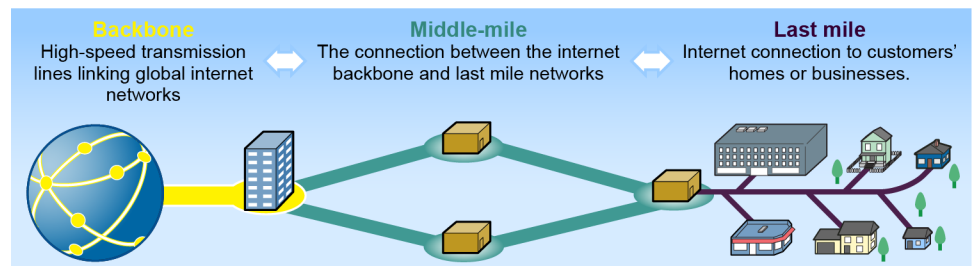
## BROADBAND INFRASTRUCTURE

### Middle-Mile Grant Program Lacked Timely Performance Goals and Targeted Measures

#### What GAO Found

An important part of broadband infrastructure is referred to as “middle-mile.” This is the portion of the internet that connects the last mile (internet connections to homes or businesses) with the backbone (transmission lines linking global internet networks), as shown in the figure. Reports GAO reviewed and stakeholders GAO interviewed identified challenges that affect middle-mile network coverage and access. These challenges include the cost of serving areas with low population, deploying infrastructure across challenging terrain, and obtaining permits. Stakeholders also discussed challenges related to providers' ability to access middle-mile networks, such as a lack of redundant networks and lack of competition. For example, providers told GAO that rural areas often lack redundant middle-mile networks—that is, they are served by middle-mile networks with only a single route into a community. If the sole fiber route into a community is damaged, the entire community could lose internet service.

#### Infrastructure Components of the Internet



Source: GAO analysis of National Telecommunications and Information Administration data; GAO (icons). | GAO-24-106131

The National Telecommunications and Information Administration (NTIA) established its middle-mile grant program in accordance with most recommended practices. In particular, GAO found NTIA followed all recommended grants management practices, and took steps to ensure program funding did not duplicate other federal funding.

However, NTIA did not follow leading practices and federal regulations related to performance management. Leading practices call for performance goals to be quantifiable and the associated measures to have numerical targets. Federal regulations also require agencies issuing a notice of funding opportunity to develop program performance goals and measures during planning and design, and include this information in the funding notice. GAO found NTIA had not developed such goals or measures prior to issuing its funding notice. By not doing so, NTIA missed the opportunity to inform applicants on how they could contribute to the goals during its applicant review and selection process. GAO reported earlier this year that for two other programs, NTIA also did not develop performance goals and measures during program planning and design as required. By establishing performance measures with specified targets, NTIA can provide Congress with key information on program outcomes. Moreover, by establishing a process to ensure that goals and measures are developed during a program's planning stages NTIA can better target grant funding that links to desired outcomes.

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### **Abbreviations**

FCC	Federal Communications Commission
IJA	Infrastructure Investment and Jobs Act
NOFO	Notice of funding opportunity
NTIA	National Telecommunications and Information Administration
OMB	Office of Management and Budget
USDA	Department of Agriculture

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October 19, 2023

The Honorable Cathy McMorris Rodgers  
Chair  
Committee on Energy and Commerce  
House of Representatives

The Honorable Robert E. “Bob” Latta  
Chairman  
Subcommittee on Communications and Technology  
Committee on Energy and Commerce  
House of Representatives

The Honorable Richard Hudson  
House of Representatives

Broadband is essential for employment, education, healthcare, public safety, and more in Americans’ daily lives. To connect to broadband in their homes and businesses, customers typically purchase access from a local broadband service provider. This local service provider must connect to the global internet and does so using middle-mile infrastructure. In other words, middle-mile infrastructure makes the connection between the global internet and the end user—customers’ homes and businesses—possible.

In light of the key role middle-mile infrastructure plays in keeping Americans connected, it is important that this infrastructure have adequate coverage, redundancy, and resilience.<sup>1</sup> However, according to the National Telecommunications and Information Administration (NTIA), some areas of the country have no middle-mile networks, and other areas are served by only one middle-mile connection.<sup>2</sup> In areas with a sole connection, this lack of redundancy can result in an entire community losing internet service if that connection is severed, such as from accidental damage to the middle-mile network by construction crews. In other areas, middle-mile networks may not be sufficiently resilient to withstand natural disasters, such as networks in coastal areas that are

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<sup>1</sup>Resilient networks are able to adapt to changing conditions and withstand and recover rapidly from disruptions.

<sup>2</sup>Nat’l Telecomm. & Info. Admin., Notice of Funding Opportunity Middle Mile Grant Program (May 13, 2022).

prone to hurricanes and flooding. Moreover, some areas of the country are served by older middle-mile infrastructure, and these communities experience slower data transfer speeds, possibly limiting data-intensive uses such as video conferencing. Complicating these concerns is the relative lack of information about what areas of the country remain unserved or underserved by middle-mile infrastructure because no such nationwide, public data exist.

While many federal programs focus on providing last-mile broadband access to unserved and underserved areas, in 2021 the Infrastructure Investment and Jobs Act (IIJA) authorized a \$1 billion program specifically for middle-mile infrastructure.<sup>3</sup> This program—*Enabling Middle Mile Broadband Infrastructure Program* (middle-mile grant program)—is administered by NTIA within the Department of Commerce. The middle-mile grant program provides funding to states, Tribes, broadband providers and other eligible groups for construction, improvement, or acquisition of middle-mile infrastructure. Because relatively little is known about what areas of the country remain unserved or underserved by middle-mile infrastructure, NTIA is identifying these areas as part of its grant program.

You asked us to review issues related to middle-mile infrastructure, including its availability. This report (1) describes the challenges stakeholders have identified that affect middle-mile network coverage and access, and (2) examines the extent to which NTIA established the middle-mile grant program in accordance with selected recommended practices.

To describe the challenges identified by stakeholders that affect middle-mile network coverage and access, we reviewed documentation from stakeholders, including trade associations and academics, and interviewed a non-generalizable sample of stakeholders. In total, we interviewed stakeholders from 32 middle-mile network operators and last mile network providers, four state-level agencies, four academics with

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<sup>3</sup>Last mile access refers to the connection from the middle-mile network to customers' premises. For a list of programs providing last mile access, see GAO, *Broadband: National Strategy Needed to Guide Federal Efforts to Reduce Digital Divide*, [GAO-22-104611](#) (Washington, D.C.: May 31, 2022). For the middle-mile program, see Infrastructure Investment and Jobs Act of 2021 ("IIJA"), div. F, tit. IV, § 60401, Pub. L. No. 117-58, 135 Stat. 429, 1231. Congress also appropriated \$1 billion to the middle-mile grant program in the IIJA. IIJA, div. J, tit. II, 135 Stat. at 1355.

telecommunications experience, three trade associations, an economist, and an internet exchange company.<sup>4</sup>

We conducted case studies in three states (Alabama, Missouri, and New Mexico). We selected these states based on various criteria, including:

- the state's ranking in the bottom quartile of access according to Federal Communications Commission (FCC) data;<sup>5</sup>
- the presence of both publicly and privately owned middle-mile networks;
- the presence of middle-mile providers in that state that have previously received federal infrastructure funding; and
- geographic diversity.<sup>6</sup>

For each of the three selected states, we interviewed a range of stakeholders from the public and private sectors, including middle-mile and last mile providers, cooperatives, and state officials, about middle-mile network coverage, capacity, and challenges. We also reviewed reports and other documentation provided to us from both state governments and providers. For the middle-mile providers, we selected a mixture of those who applied and did not apply to NTIA's middle-mile grant program. The information we obtained from case studies is not generalizable to all states.

In this report, we use "providers" to mean middle-mile network operators, last mile internet service providers, and those that operate both middle-mile and last mile networks. We interviewed providers about challenges with middle-mile networks because of their experience operating these networks or their reliance on middle-mile networks to connect their last mile networks. We selected these individuals to obtain a range of perspectives on challenges that relate to middle-mile network coverage

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<sup>4</sup>We use the following indefinite modifiers to describe the collective responses from the 32 providers, "a few" (three to seven), "some" (eight to 16), "a majority" (17-24); and "most" (25 or more).

<sup>5</sup>Broadband providers are generally required to submit to FCC information about the locations where they provide service. For our analysis, we used FCC Form 477 data from June 2021. For more information about this kind of data, see GAO, *Broadband Internet: FCC's Data Overstate Access on Tribal Lands*, [GAO-18-630](#) (Washington, D.C., Sept. 7, 2018).

<sup>6</sup>There are four U.S. Census Regions and the states we selected are in three of the four regions.



and access, and NTIA's efforts to establish the middle-mile grant program. To identify these stakeholders, we reviewed publicly available information and our prior work.

To evaluate the extent to which NTIA's middle-mile grant program aligned with recommended practices, we first selected applicable practices related to (1) awarding grants, (2) avoiding duplicative funding, and (3) establishing performance management metrics. Since NTIA was in the process of establishing its grant program and making initial funding decisions at the time of our review, we selected these practices due to their relevance to earlier stages of agency grant programs.

Regarding NTIA's efforts for awarding grants, we assessed NTIA's plans, documents, and actions for awarding grants against our previously identified recommended practices. Specifically, we previously identified six recommended practices to ensure a fair and objective evaluation and selection of grant awards across the federal government, each of which has a number of associated attributes of practice.<sup>7</sup> We assessed NTIA's actions against the leading practices and determined whether they generally aligned with each practice.<sup>8</sup> The scope of our evaluation was limited to NTIA's plans and actions for the awarding process and excludes NTIA's program implementation since the program had not been fully implemented at the time of our review.

Regarding NTIA's efforts to mitigate duplicative funding with its middle-mile grant program, we met with knowledgeable officials to determine the steps and procedures NTIA has in place to coordinate with other agencies with similar funding programs. We also reviewed documents related to these coordination efforts. We compared these efforts with our leading practices regarding duplication, which we define as two or more agencies or programs that are engaged in the same activities or that

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<sup>7</sup>GAO, *Intercity Passenger Rail: Recording Clearer Reasons for Awards Decisions Would Improve Otherwise Good Grantmaking Practices*, [GAO-11-283](#) (Washington, D.C.: Mar. 10, 2011). GAO has applied these leading practices regularly since identifying them. See, for example, GAO, *Broadband Funding: Stronger Management of Performance and Fraud Risk Needed for Tribal and Public-Private Partnership Grants*, [GAO-23-105426](#) (Washington, D.C.: Jan. 24, 2023).

<sup>8</sup>"Generally aligned" indicates NTIA actions aligned with all or nearly all attributes of practice for a particular recommended practice. "Generally did not align" means NTIA actions aligned with none or nearly none of the attributes of practice for a particular recommended practice. One analyst assessed NTIA's actions against recommended practices and assigned a rating. Another analyst verified the assessment.

provide the same services to the same beneficiaries.<sup>9</sup> We also interviewed officials from two federal agencies with broadband programs, the Federal Communications Commission (FCC) and Department of Agriculture (USDA), to understand how their funding programs may support middle-mile infrastructure.

Regarding NTIA's efforts to establish the program's performance metrics, we assessed NTIA's stated performance goals and measures against the key attributes of successful performance goals and measures from the Government Performance and Results Act, as amended.<sup>10</sup> Although these requirements apply at the departmental level (e.g., the Department of Commerce), we have previously stated that they can serve as leading practices at the program level.<sup>11</sup> Furthermore, we used requirements in federal regulations that guide agencies to develop performance goals and measures, as appropriate, during the program's initial planning and design.<sup>12</sup> We then assessed the extent to which NTIA's efforts to develop performance goals aligned with these regulations.

We conducted our analysis of NTIA's efforts while the agency was still establishing the grant program and accepting and reviewing applications. On June 15, 2023, NTIA announced grant awards to 35 states and Puerto Rico totaling over \$930 million and noted that it would announce additional grants on a rolling basis. Since NTIA was in the process of announcing the grants when we concluded our analysis in mid-July 2023, we do not include any actions it may have taken after that date.

Additionally, we reviewed middle-mile grant program-related documentation—such as the program's Notice of Funding Opportunity

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<sup>9</sup>GAO, *Fragmentation, Overlap, and Duplication: An Evaluation and Management Guide*, [GAO-15-49SP](#) (Washington, D.C.: Apr. 14, 2015).

<sup>10</sup>Pub. L. No. 103-62, § 4(b), 107 Stat. 285 (1993) (codified as amended at 31 U.S.C. § 1115(b)(2), (6)). See also, GAO, *Agencies' Strategic Plans under GPRA: Key Questions to Facilitate Congressional Review*, [GAO/GGD-10.1.16](#) (Washington, D.C.: May 1997), and GAO, *Executive Guide: Effectively Implementing the Government Performance and Results Act*, [GAO/GGD-96-118](#) (Washington, D.C.: June 1996).

<sup>11</sup>See, for example, GAO, *Environmental Justice: EPA Needs to Take Additional Actions to Help Ensure Effective Implementation*, [GAO-12-77](#) (Washington, D.C.: Oct. 6, 2011). See also, [GAO/GGD-10.1.16](#) and [GAO/GGD-96-118](#).

<sup>12</sup>2 C.F.R. §§ 200.202, 200.301(a).

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(NOFO)<sup>13</sup> and the Department of Commerce’s Grants and Cooperative Agreements Manual—which NTIA follows in administering its grant programs.<sup>14</sup> We interviewed NTIA officials to obtain additional information regarding NTIA’s planning and implementation of the middle-mile grant program and other middle-mile related topics. See appendix I for a full list of the agencies and organizations we interviewed.

We conducted this performance audit from June 2022 to October 2023 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

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### Middle-mile Infrastructure and Providers

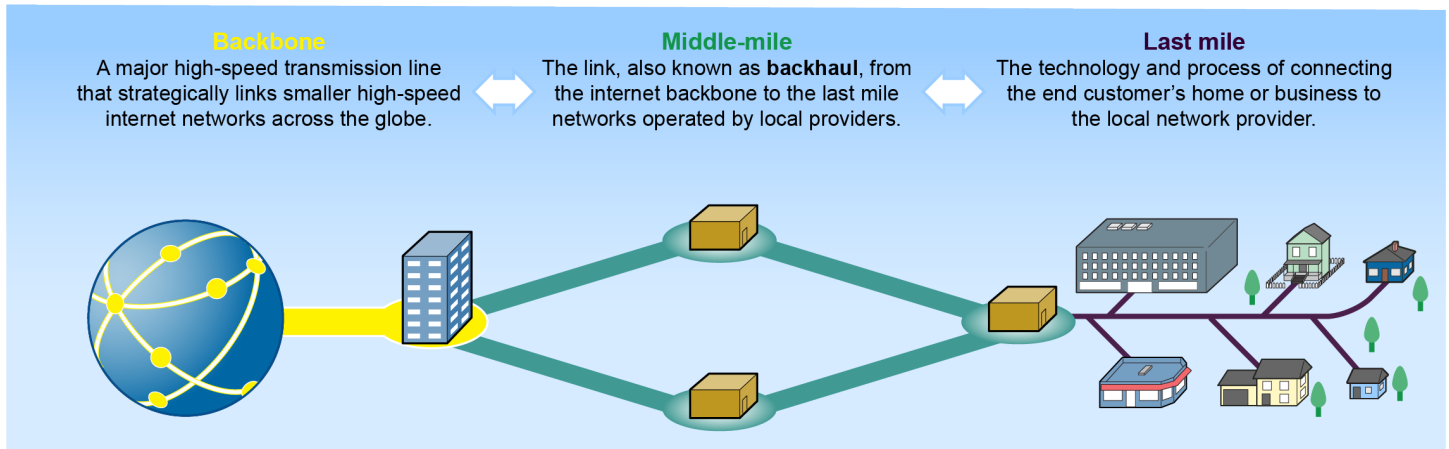
The broadband infrastructure that connects homes and businesses to the internet is typically divided into three component parts, as shown in figure 1. Middle-mile infrastructure connects the internet backbone to the last-mile infrastructure of local internet service providers, such as cable or phone companies. In some cases, middle-mile infrastructure may only travel a short distance such as from a suburban community to an urban center, where a connection to the internet backbone may be available. In other cases, middle-mile infrastructure may connect smaller rural communities across entire states or regions back to the internet backbone.

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<sup>13</sup>Nat’l Telecomm. & Info. Admin., Notice of Funding Opportunity Middle Mile Grant Program (May 13, 2022).

<sup>14</sup>Dep’t of Com., Grants and Cooperative Agreements Manual (2021).

**Figure 1: Infrastructure Components of the Internet**



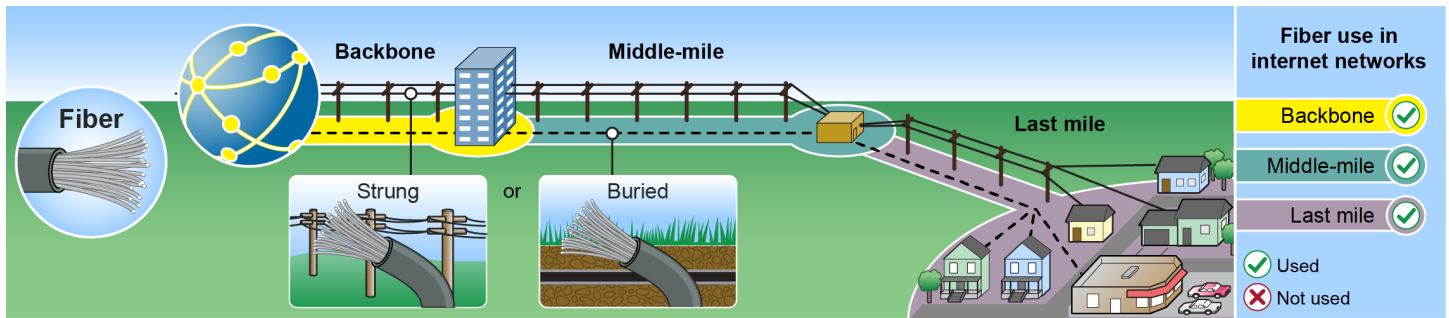
Source: GAO analysis of National Telecommunications and Information Administration data; GAO (icons). | GAO-24-106131

Internet service providers use various types of technologies for the different components of the internet. The technology used is often driven by factors such as geography, population served, and cost for deployment. Middle-mile networks use many of the following technologies to connect last mile providers to the backbone.

- **Fiber-optic cable (fiber).** Fiber is the primary technology used in the backbone and middle-mile and the preferred technology due to its high capacity. (See fig. 2). It is composed of bundled glass or plastic strands that transmit data as pulses of light which allows it to send more data faster and with lower latency than other technologies. When deploying fiber, internet service providers bury fiber lines or run them along utility poles above ground. In middle-mile networks, fiber is the most common technology deployed. FCC estimates that once the capacity required to maintain a network exceeds 155 megabits per second, fiber is the most effective technology for middle-mile infrastructure.<sup>15</sup>

<sup>15</sup>FCC, *The Broadband Availability Gap: OBI Technical Paper No. 1*, Washington, D.C. (Apr. 2010).

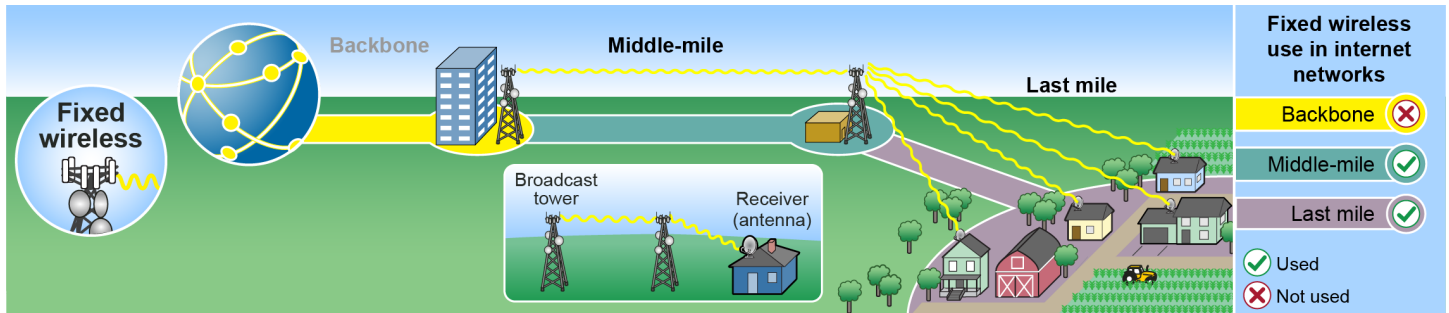
Figure 2: Fiber-optic Cable Use in Components of the Internet



Source: GAO (information and illustration). | GAO-24-106131

- Fixed wireless/microwave.** Fixed wireless technology can be used as part of both middle-mile and last mile networks. (See fig. 3). Fixed wireless technology generally consists of towers with antennas connecting two fixed locations using microwaves to transmit data. Companies have traditionally used fixed wireless technologies as a more cost-effective way of connecting rural communities than fiber, particularly communities separated by rugged terrain, bodies of water, or other difficult geography.

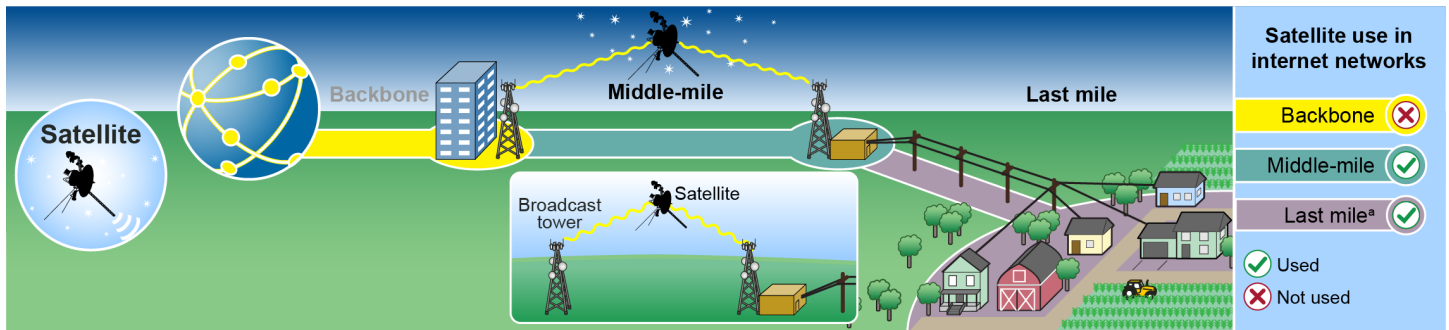
Figure 3: Fixed Wireless Use in Components of the Internet



Source: GAO (information and illustration). | GAO-24-106131

**Satellite.** Internet service providers may use satellite infrastructure as part of both their middle-mile and last mile networks. (See fig. 4). The technology consists of land-based satellite dishes that transmit internet traffic to an orbiting satellite and back to a facility where traffic is distributed to last-mile customers. Use of satellite for middle-mile infrastructure is rare and often used only in the most rural and remote locations where fiber and fixed wireless solutions are too expensive or impractical, such as parts of rural Alaska.

Figure 4: Satellite Use in Components of the Internet

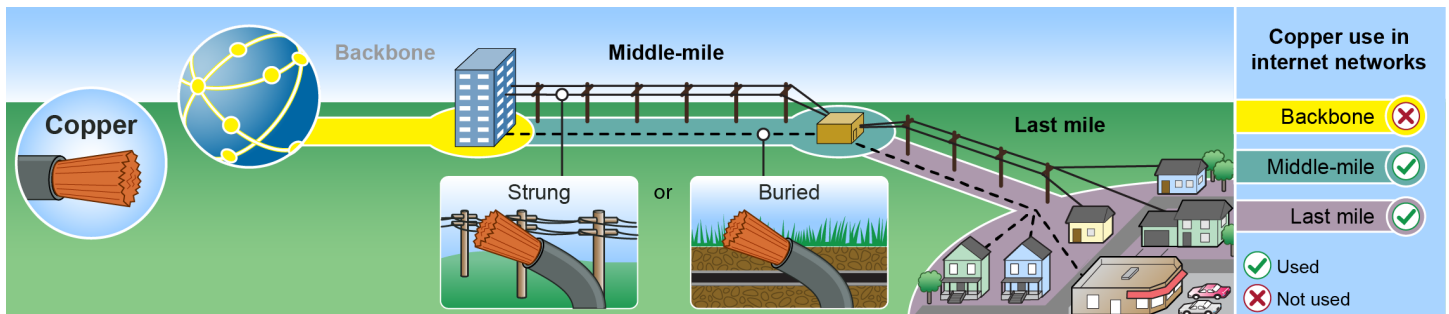


Source: GAO (information and illustration). | GAO-24-106131

<sup>a</sup>Satellite can be used as a last mile component but is not part of last mile in this figure.

**Copper wire.** Copper wire technology may also be used in the middle-mile and last mile components of the internet. (See fig. 5). Copper wire is in place because it is often part of a legacy voice telephone service. These old telephone systems were modified to support data transmission through digital subscriber line service. In some cases, this infrastructure is being replaced by fiber. Similar to fiber, providers bury copper wire in the ground or string it along utility poles.

Figure 5: Copper Wire Use in Components of the Internet



Source: GAO (information and illustration). | GAO-24-106131

Several types of middle-mile service providers operate across the country. Providers may be a single entity who owns and operates the infrastructure or a collection of entities who operate the infrastructure as a consortium. Types of middle-mile service providers include:

- **Private-sector companies.** Middle-mile service providers are often private-sector companies that provide access for internet service providers that serve homes and businesses. Some of these companies are dedicated middle-mile providers or operate as middle-

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mile and last-mile broadband providers, but others provide additional services like telephone or cable television service.

- **Nonprofit cooperatives.** Some entities providing middle-mile service are set up as nonprofit cooperatives that may earn revenues but reinvest any profits and not distribute them. These entities provide broadband services in addition to utility services like telephone or electricity. Like private-sector companies, some nonprofit cooperatives exclusively provide middle-mile services, while others provide both middle-mile and last mile services.
- **Public-sector entities.** Some state, local, tribal governments, and other public-sector entities also provide middle-mile infrastructure either as part of a public agency or as another type of entity. Some of these networks are set aside for use by specific public service entities for purposes such as education or healthcare, while other networks were built specifically to provide access for last mile providers.

Some middle-mile providers operate their middle-mile infrastructure as “open-access networks.” Open-access networks generally have few restrictions on who can connect to their infrastructure. As a result, open-access networks might increase competition because multiple providers can connect to the network thereby enabling consumers to have a choice in internet service providers for potentially better service or pricing. Moreover, open-access networks can promote private investment in last-mile service by reducing capital expenditures required to build last-mile connections.<sup>16</sup> Specifically, such networks could reduce the cost for a provider to be able to reach an unserved community when compared with the cost to the provider of building new middle-mile infrastructure to serve the community. However, offering non-discriminatory access, often at wholesale price, may provide fewer financial incentives for private companies to operate an open-access middle-mile network. Consequently, several states and nonprofit organizations have funded or operated their own open-access middle-mile networks.

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## Enabling Middle-Mile Broadband Infrastructure Program

The statute identified two purposes for the middle-mile grant program: (1) encourage the expansion of middle-mile infrastructure with the end goal

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<sup>16</sup>See, for example, Jordan Arnold and Jonathan Sallet, “If We Build It, Will They Come? Lessons From Open-Access, Middle-Mile Networks,” Benton Institute for Broadband & Society, December 2020; and “How ‘Open Access Middle-Mile Networks’ Can Facilitate Broadband Expansion, Memo from the Pew Charitable Trust,” November 2021.

of improving affordability for unserved or underserved areas, and (2) build redundant middle-mile connections to improve network resilience and reduce the risk of connectivity issues due to single points of failure.<sup>17</sup> Program funds may be used for construction materials, engineering design, permitting, and personnel, among others. Although other federal programs can fund middle-mile infrastructure, this is the only existing federal grant program specifically for constructing middle-mile infrastructure.<sup>18</sup>

NTIA issued a notice of funding opportunity (NOFO) for the program on May 13, 2022. According to the NOFO, NTIA will grant awards to “eligible entities”<sup>19</sup> within the range of \$5 million to \$100 million to be used for up to 70 percent of the total cost of the project. Eligible projects must agree to complete buildout within 5 years from the date funds are made available to complete their projects.<sup>20</sup> These projects may include any commonly used middle-mile technology with no preference given to any particular technology. Infrastructure funded by the grant cannot include last-mile connections to homes, businesses, or anchor institutions.

The application period ran from June 21, 2022 to September 30, 2022 and the program was substantially oversubscribed.<sup>21</sup> Specifically, NTIA received more than 260 applications requesting over \$7 billion in funding, substantially more than the \$1 billion made available for the program.

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<sup>17</sup>IIJA, div. F, tit. IV, § 60401(b)(1).

<sup>18</sup>Other programs like the Broadband Equity Access and Deployment program and the Broadband Infrastructure Program allowed awardees to spend grant funds on middle-mile infrastructure, but were not exclusively designed for middle-mile projects.

<sup>19</sup>The middle-mile grant program defines eligible entities as “states, political subdivisions of a state, tribal governments, technology companies, electric utilities, utility cooperatives, public utility districts, telecommunications companies and cooperatives, nonprofit foundations, corporations, institutions, and associations, regional planning council, Native entities, economic development authority, or partnerships between any of these types of entities.” IIJA, div. F, tit. IV, § 60401(a)(3).

<sup>20</sup>NTIA may grant extensions of not more than 1 year in limited circumstances. IIJA, div. F, tit. IV, § 60401(e)(5).

<sup>21</sup>The Deputy Secretary of Commerce extended this deadline to November 1, 2022 for entities applying from states and territories under emergency declaration due to inclement weather.



## Recommended Practices for Awarding Grants, Avoiding Duplication of Federal Funding, and Managing Program Performance

We have previously identified recommended practices for agencies in managing grant awards and avoiding duplication across federal funding programs.<sup>22</sup> In conjunction with Government Performance and Results Act requirements, as amended, we also previously identified recommended practices related to performance management for federal programs,<sup>23</sup> as explained in more detail below.

- Managing grant awards.** As described in table 1, we previously established six recommended practices to ensure a fair and objective evaluation and selection of grant awards across the federal government.<sup>24</sup> These practices provide a framework for reviewing NTIA’s plans and actions to award grants under the middle-mile grant program.

**Table 1: Recommended Practices for Awarding Grants**

Recommended practice	Attributes of practice
Communicate with potential applicants prior to the competition	Provide information prior to making award decisions on available funding, key dates, competition rules (i.e., eligibility, technical review, and selection criteria), funding priorities, types of projects to be funded, outreach efforts to new applicants and pre-application assistance.
Plan for administering the technical review	Develop a plan for the technical review that describes the number of panels and reviewers. This plan should include methods for assigning applications to review panels, identifying reviewers, recording the results of the technical review, resolving scoring variances across panels, and overseeing the panel to ensure a consistent review.
Develop a technical review panel with certain characteristics	Use a technical review panel consisting of reviewers who hold relevant expertise, do not have conflicts of interest, apply the appropriate criteria, and are trained.

<sup>22</sup>Regarding grant management, see [GAO-11-283](#). Regarding duplication, see [GAO-15-49SP](#).

<sup>23</sup>Pub. L. No. 103-62, § 4(b), 107 Stat. 285 (1993) (codified as amended at 31 U.S.C. § 1115(b)(2), (6)). GAO, *The Results Act: An Evaluator’s Guide to Assessing Agency Annual Performance Plans*, GGD-10.1.20 (Washington, D.C.: Apr. 1, 1998); and GAO, *Telecommunications: FCC Should Enhance Performance Goals and Measures for its Program to Support Broadband Service in High-Cost Areas*, [GAO-21-24](#) (Washington, D.C.: Oct. 1, 2020).

<sup>24</sup>[GAO-11-283](#).

Recommended practice	Attributes of practice
Assess applicants' capabilities to account for funds	Assess applicants' capabilities to account for funds by determining if applicants meet eligibility requirements, checking previous grant history, assessing financial management systems, and analyzing project budgets.
Notify applicants of awards decisions	Notify unsuccessful and successful applicants of selection decisions in writing and provide feedback on applications.
Document rationale for awards decisions	Document the rationale for awards decisions, including the reasons individual projects were selected or not selected and how changes made to requested funding amounts may affect applicants' ability to achieve project goals.

Source: GAO. | GAO-24-106131

- **Avoiding duplication of federal funding.** We have previously identified practices for agencies to reduce duplication.<sup>25</sup> These practices include improving coordination and collaboration; improving performance management; and making changes to define roles and responsibilities. While it is not necessary to implement all these practices, including some of them in the implementation of a new program can help better manage fragmentation across federal programs to reduce or mitigate potential duplicative funding from these agencies.
- **Managing program performance.** We have also previously reported that establishing performance measures that clearly link to performance goals is a leading practice for effective performance management.<sup>26</sup> Performance measurement is the ongoing monitoring and reporting of a program's accomplishments and progress.<sup>27</sup> Key attributes of successful performance measures, which we identified in prior work, include identifying a measurable target and linking to

<sup>25</sup>GAO-15-49SP.

<sup>26</sup>GAO/GGD-96-118 and GAO-21-24.

<sup>27</sup>GAO, *Program Evaluation: Key Terms and Concepts*, GAO-21-404SP (Washington, D.C.: Mar. 22, 2021).

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strategic goals.<sup>28</sup> Performance goals are the specific results an agency expects its program to achieve in the near term. The Government Performance and Results Act, as amended, states that performance goals should be quantifiable.<sup>29</sup> According to the Office of Management and Budget (OMB) regulations, the agency should establish performance goals and measures during the program planning and design phase.<sup>30</sup>

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## Stakeholders Identified Various Challenges Affecting Middle-Mile Network Coverage and Access

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### Challenges Affecting Middle-Mile Coverage

Stakeholders we interviewed and related reports identified challenges that affect the extent of middle-mile network coverage in unserved and underserved areas. These challenges mostly relate to the costs to deploy networks in these areas, but some are related to construction delays and

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<sup>28</sup>Our past work has identified nine key attributes of successful performance measures: (1) *linkage*: a relationship between the performance goals and measures and an agency's goals and mission; (2) *clarity*: clearly stated performance measures; (3) *measurable targets*: quantifiable, numerical targets or other measurable values that allow for easier comparison with actual performance; (4) *objectivity*: reasonably free of significant bias or manipulation that would distort the accurate assessment of performance; (5) *reliability*: likely to produce the same results if applied repeatedly to the same situation; (6) *measure core program activities*: measure the activities that an entity is expected to perform to support the intent of the program; (7) *limited overlap*: minimal overlap between different measures that provide the same information; (8) *balance*: measure the organization's various priorities; and (9) *government wide priorities*: a range of related performance measures to address government wide priorities, such as quality, timeliness, efficiency, cost of service, and outcome. GAO, *Tax Administration: IRS Needs to Further Refine Its Tax Filing Season Performance Measures*, [GAO-03-143](#) (Washington, D.C.: Nov. 22, 2002). Recent work has used these key attributes to evaluate agencies' performance measures. See, for example, [GAO-21-24](#).

<sup>29</sup>Pub. L. No. 103-62, § 4(b), 107 Stat. 285 (1993), as enhanced by Pub. L. No. 111-352, § 3, 124 Stat. 3866, 3867 (2011) (codified at 31 U.S.C. § 1115(b)(2)). Our past work identified additional key attributes of successful performance goals that were outside our scope. GAO, *Agencies' Annual Performance Plans Under the Results Act: An Assessment Guide to Facilitate Congressional Decisionmaking*, GGD/AIMD-10.1.18 (Washington, D.C.: Feb. 1, 1998); and [GAO/GGD-10.1.20](#). Although these requirements apply at the departmental level, we have previously stated that they can serve as leading practices at the program level.

<sup>30</sup>2 C.F.R. § 1327.101 (adopting OMB guidance in 2 C.F.R. pt. 200, including 2 C.F.R. § 200.202, and giving regulatory effect to the guidance).

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availability of workers and supplies. Furthermore, some challenges may also affect network resilience.

- **Low population density.** Providers we spoke with reported that in areas with low population density (and therefore limited last-mile customers), it is difficult for providers to recover middle-mile network deployment costs. This is because network deployment costs are typically recovered over time as last-mile service providers pay for access to the middle-mile network. However, in areas with few potential consumers, the middle-mile is not always economically viable because the cost for last-mile subscribers to access the internet may not be affordable to allow middle-mile network providers to recover their deployment costs. In New Mexico, a few providers told us that some sparsely populated areas of the state lack middle-mile coverage because it would be impossible to recover the network deployment costs without a subsidy. We heard from providers in rural areas that fixed wireless is sometimes a better solution because it is not as expensive to deploy as fiber. For example, a fixed wireless service provider in New Mexico told us they can provide middle-mile and last mile service in some rural areas of the state and still recover their costs. See figure 6 for an example of a fixed wireless tower.

**Figure 6: Example of Fixed Wireless Tower Providing Middle-mile Service in Low Population Areas of Rural New Mexico**



Source: La Cañada Wireless Association. | GAO-24-106131

- **Challenging terrain.** Stakeholder we interviewed and reports noted that certain terrain can make installing fiber and using other technologies difficult and expensive. For example, although fixed wireless might be a cost-effective solution in some rural areas, we heard from one provider in northeast Alabama that for areas with dense foliage, this technology cannot be used because it requires direct line of sight between the antenna and the receiver. Also in Alabama, a middle-mile operator told us they sometimes need to deploy “aerial” fiber on utility poles, even in areas prone to hurricanes, rather than bury it because of the high cost to bury the fiber. However, such practices affect the resilience of the middle-mile infrastructure because aerial fiber is not resilient to hurricanes and other climate-related challenges. In New Mexico, we heard from providers that areas around El Malpais National Monument with old lava flows experience challenges using both fixed wireless (because of interference caused by the lava rocks) and buried fiber (because of the rocky terrain). Thus, they rely on placing fiber on utility poles.

- **Permitting delays.** Providers we contacted told us that the number of permits required and the process for getting permits approved cause delays, additional costs, and other challenges. Some providers noted that obtaining permits to access federal, state, or tribal lands delayed middle-mile deployment in their state. For instance, one provider in New Mexico stated that permitting approval could take 2 to 3 years. In other cases, providers told us that permitting added costs to the process. For example, in Missouri providers reported that permits to cross railroads and levees can increase both costs and construction timelines. Finally, according to some stakeholders we spoke with, the number of entities a provider needs approval from can cause delays. For example, in New Mexico, providers must work with local, state, tribal, federal, and private landowners. Some stakeholders told us that each of these jurisdictions have separate permitting requirements that can create challenges to middle-mile deployment.
- **Labor market and supply chain concerns.** Providers we spoke with said that it can be challenging to find labor to support the increased demand for broadband deployment funded by federal dollars, including deployment of middle-mile networks.<sup>31</sup> Additionally, a few providers expressed concerns over the availability of fiber, which was in short supply during the COVID-19 pandemic. These providers expressed concern about both cost and availability of fiber once the federal programs start distributing funds due to increased demand that would drive the cost of fiber higher.

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### Challenges Affecting Middle-Mile Network Access, Including Affordability and Capacity

Stakeholders we interviewed identified additional challenges service providers face accessing reliable and resilient middle-mile networks in unserved and underserved areas. These network access challenges include:

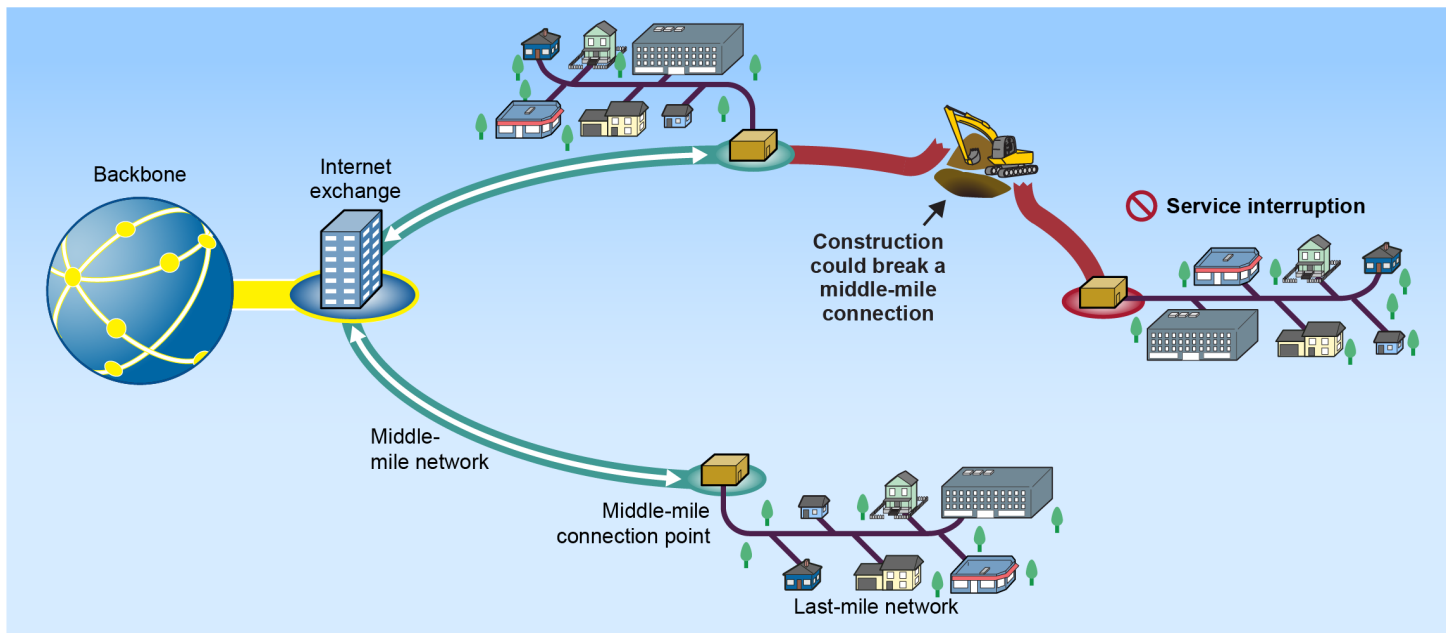
- **Lack of redundant networks.** Stakeholders we spoke with, and reports identified that rural areas sometimes lack redundant middle-mile networks—that is, they are served by middle-mile networks with only a single route into a community. If the sole fiber route into a community is damaged, the entire community could lose internet

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<sup>31</sup>We previously reported on how federal funding could affect the telecommunications workforce. See GAO, *Telecommunications Workforce: Additional Workers Will Be Needed to Deploy Broadband, but Concerns Exist About Availability*, [GAO-23-105626](#) (Washington, D.C.: Dec. 15, 2022).

service. For example, a provider we spoke with in New Mexico told us that an entire community lost internet service when the single middle-mile fiber connection in the community was accidentally cut during road construction. Redundant networks support more resilient middle-mile service by providing multiple middle-mile connections and routes. (See fig. 7). However, providers we met with stated that building redundant middle-mile networks does not always come with a promised return on investment through last-mile or additional middle-mile connections.

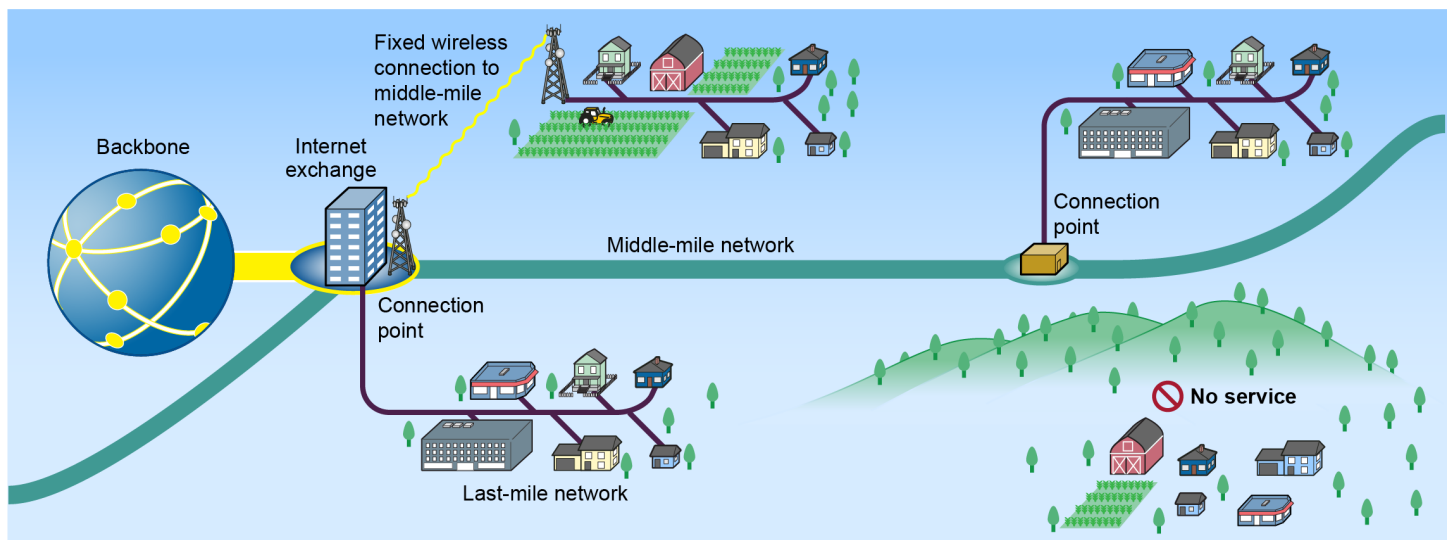
**Figure 7: Example of Connectivity Challenges Associated with Non-Redundant Middle-Mile Networks**



Source: GAO (information and illustration). | GAO-24-106131

- Limited connection points.** Providers reported limited access to existing middle-mile networks in some areas of their states. In particular, providers discussed areas of their state with middle-mile networks that they were unable to access since there were no connection points to the networks in unserved and underserved areas. For example, in New Mexico, one provider reported that their network could not connect to a middle-mile network due to a lack of interconnection points. While NTIA recommends designing middle-mile networks with frequent connection points, providers do not always do this because it can impact the performance of the network. See figure 8 for an illustration of limited middle-mile connection points.

Figure 8: Middle-Mile Network with Limited Connection Points



Source: GAO (information and illustration). | GAO-24-106131

- Lack of competition.** Last-mile providers we spoke with reported that in rural areas with only one middle-mile provider, affordable access can be a challenge due to a lack of middle-mile competition. In contrast, two providers stated that in urban areas, where there is often more than one middle-mile provider, middle-mile access is less expensive. In addition, several providers stated that in areas with open-access networks or networks operated by cooperatives, the cost to connect is similarly less expensive than in areas with only one provider.
- Insufficient capacity.** When technologies other than fiber, such as fixed wireless, are used because of low population density or terrain challenges, providers told us that access to sufficient capacity can become a concern. For example, two providers in New Mexico that rely on fixed wireless middle-mile reported that streaming technologies can be a burden on their network. They noted that while fixed wireless can support such services, it can overwhelm their network at times. Providers noted that there are no concerns about capacity if high-capacity fiber is used as the primary technology for middle-mile networks.

NTIA acknowledged the significance of many of the challenges stakeholders identified in its notice of funding opportunity for the middle-mile grant program. Later in this report, we discuss how some of these challenges are being addressed in NTIA's review of grant applications.



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## NTIA Followed Most Recommended Practices for its Grant Program, But Lacks Quantifiable Performance Goals and Measures

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### NTIA Followed Recommended Practices for Reviewing Grant Applications

We found NTIA followed all six recommended practices for its review of grant applications, as shown in table 2. NTIA’s adherence to the six recommended practices for awarding grants and its selection criteria for assessing applications is summarized below.

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**Table 2: Assessment of NTIA’s Middle-Mile Grant Program Alignment with Recommended Practices for Awarding Grants**

Recommended practice	GAO assessment
Communicate with potential applicants prior to the competition	Met
Plan for administering the technical review	Met
Develop a technical review panel with certain characteristics	Met
Assess applicants’ capabilities to account for funds	Met
Notify applicants of awards decisions	Met
Document rationale for awards decisions	Met

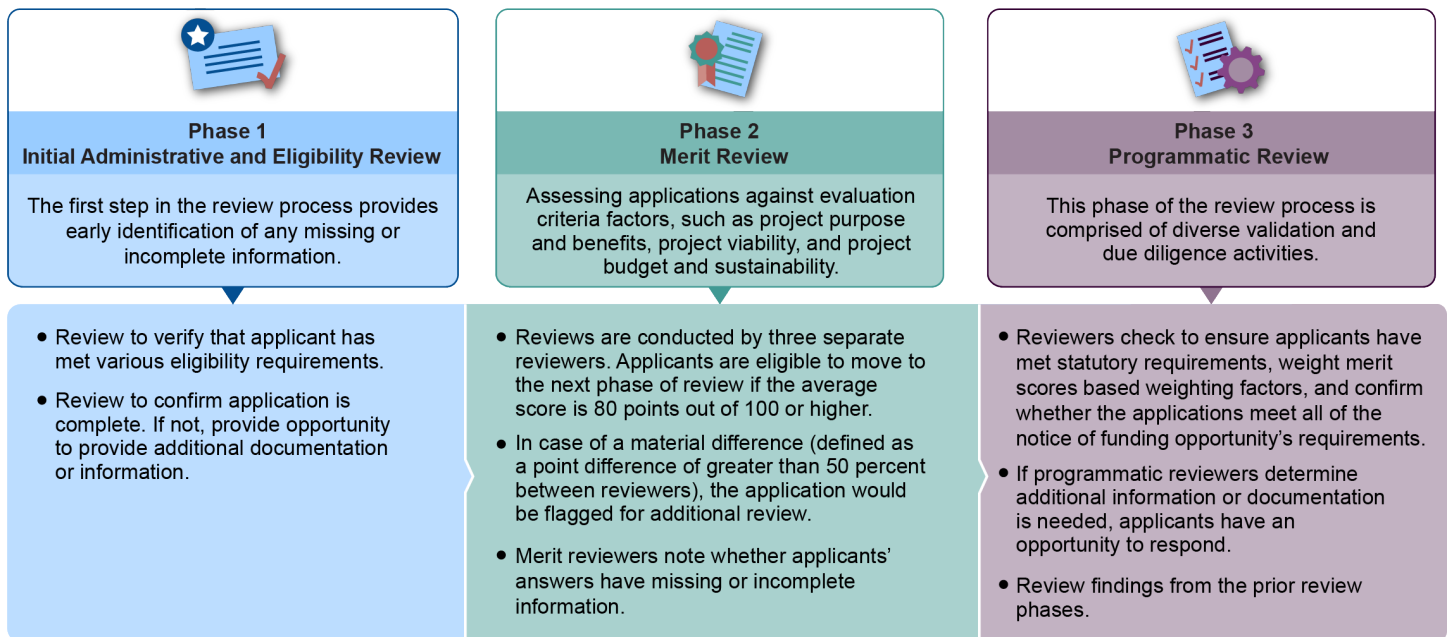
Source: GAO. | GAO-24-106131

**Communicate with potential applicants prior to the competition.** NTIA’s efforts to provide potential applicants information related to the middle-mile grant program before the application period generally aligned with the recommended practice. Specifically, NTIA’s efforts aligned with communicating available funding amounts, eligible projects, funding priorities, and key dates to potential applicants. It communicated this information through its grant application NOFO. Additionally, NTIA conducted outreach efforts to help new applicants prepare their application package. For example, it conducted several webinars that conveyed information about anticipated funding levels, key dates, and types of eligible projects. NTIA also held technical assistance webinars to support the application process. In addition, it developed an 81-page public document to address frequently asked questions.

**Plan for administering the technical review.** NTIA’s plan for administering the program’s technical review generally aligned with the recommended practice. NTIA developed and documented a plan in

alignment with the recommended practice including for identifying reviewers, assigning applications to reviewers, and recording the results of the technical review. NTIA used a three-phase technical process in reviewing applications, which entailed an initial administrative and eligibility review, a merit review, and a programmatic review. Figure 9 contains a brief overview of each phase.

**Figure 9: National Telecommunications and Information Administration’s Plan for Administering the Technical Review for the Middle-mile Grant Program**



Source: GAO analysis of the National Telecommunications and Information Administration’s guidance and documentation related to the Enabling Middle Mile Broadband Infrastructure Program; GAO (icons). | GAO-24-106131

**Text of Figure 9: National Telecommunications and Information Administration’s Plan for Administering the Technical Review for the Middle-mile Grant Program**

- Phase 1: Initial Administrative and Eligibility Review. The first step in the review process provides early identification of any missing or incomplete information.
  - Review to verify that applicant has met various eligibility requirements.
  - Review to confirm application is complete. If not, provide opportunity to provide additional documentation or information.

- Phase 2: Merit Review. Assessing applications against evaluation criteria factors, such as project purpose and benefits, project viability, and project budget and sustainability.
  - Merit reviewers note whether applicants' answers have missing or incomplete information. Reviews are conducted by three separate reviewers. Applicants are eligible to move to the next phase of review if the average score is 80 points out of 100 or higher.
  - In case of a material difference (defined as a point difference of greater than 50 percent between reviewers), the application would be flagged for additional review.
- Phase 3: Programmatic Review. This phase of the review process is comprised of diverse validation and due diligence activities.
  - Reviewers check to ensure applicants have met statutory requirements, weight merit scores based weighting factors, and confirm whether the applications meet all of the notice of funding opportunity's requirements.
  - If programmatic reviewers determine additional information or documentation is needed, applicants have an opportunity to respond.
  - Review findings from the prior review phases.

Source: GAO analysis of the National Telecommunications and Information Administration's guidance and documentation related to the Enabling Middle Mile Broadband Infrastructure Program; □GAO (icons). | GAO-24-106131

Each application was assigned a group of three application reviewers. In identifying and assigning reviewers, NTIA procured services from a third-party firm that randomized reviewers' assignments to specific applications while taking steps to avoid potential conflict of interest issues. Furthermore, NTIA established an oversight system that included, among other things, a lead reviewer for the entire grant program who ensured consistent review standards were applied throughout each applicant's reviews. For instance, the guidance documentation provides specific procedures for how to address cases wherein two or more reviewers provided scores that varied by more than 50 percent, disagreed on matters of fact, or disagreed on the completeness of an application package.

### Linkages Between Selection Criteria and Stakeholder-Identified Middle-mile Challenges

We found the selection criteria used by the technical review panel related to the previously discussed challenges stakeholders identified during our review. For example:

- A lack of redundancy was a challenge identified, and one of the selection criteria is whether the project will improve “the redundancy or resiliency of existing middle mile infrastructure.”
- Affordability was a challenge identified, and the selection criteria include whether the project will “improve affordability” as well as “whether the provider commits to offering open access” which can result in lower costs. In addition, the criteria include a weighting factor that favors projects that can demonstrate the potential to reduce end user prices for internet services.
- A lack of connection points, particularly in unserved and underserved areas, was a challenge identified. The selection criteria include “the extent to which the project will facilitate deployment of high-speed broadband networks to currently unserved or underserved areas” as well as whether the project includes “direct interconnect facilities that will facilitate the provision of broadband service to anchor institutions.”

Source: GAO. | GAO-24-106131

**Develop a technical review panel with certain characteristics.** NTIA actions to develop review panels consisting of quality reviewers for the technical review generally aligned with the recommended practice. NTIA took necessary steps to ensure these reviewers had the necessary expertise related to telecommunications infrastructure, were adequately trained, and had clear criteria with which to assess application packages. For example, NTIA developed a list of qualifications for the reviewers, which at a minimum required an eligible reviewer to have experience with federal grants, experience in telecommunications or related industries, or technical knowledge of broadband infrastructure and technologies. Additionally, NTIA written guidance included clear, specific instructions on how reviewers should assess each application against the selection criteria, including the key components of the application the reviewer should consider in determining their score for each criterion.

For a summary of the full selection criteria and scoring, see appendix II.

**Assess applicants’ capability to account for funds.** NTIA’s efforts to assess applicants’ funding capabilities generally aligned with the recommended practice. The program NOFO indicates that reviewers were to assess applicants’ capabilities to account for funds by evaluating and assessing risks posed by applicants.<sup>32</sup> Toward this aim, NTIA required applicants to submit documents regarding, among other things, their previous grant history. This may include any funds received from the federal government, third party audits of their financial management practices, and their proposed budgets for the project to be funded. Subject matter experts from the National Institute for Standards and Technology’s Grants Managements Division performed a final review of these financial documents prior to NTIA’s final decision of whether to approve a grant.

**Notify applicants of awards decisions.** NTIA provided written notifications to applicants regarding their applications’ award decisions. NTIA officials further told us they are offering unsuccessful applicants’ information regarding why their application did not receive grant funding, including their applications’ strengths and weaknesses.

**Document rationale for awards decisions.** NTIA documentation requires that each application be scored against specific selection criteria, that the score be documented, and that each applicant be awarded

<sup>32</sup>This risk assessment is required by OMB regulations. 2 C.F.R. § 200.206.

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funding or not based on that score, among other factors. Application reviewers formally documented the reasons individual projects were selected or not selected, and for one case at the time of our review, NTIA also documented why it needed to reduce the funding amount requested by the applicant.

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### NTIA Took Steps to Avoid Duplication of Federal Funding

We found NTIA took steps to ensure program funding was not duplicative with other federal program funding.<sup>33</sup> Duplication occurs when two or more agencies or programs are engaged in the same activities or provide the same services to the same beneficiaries. Avoiding duplicative funding improves agencies' and programs' operating efficiency and effectiveness. As previously stated, while the middle-mile grant program is the only dedicated funding program for middle-mile infrastructure, other programs can fund middle-mile infrastructure.

As specified by an interagency agreement, NTIA coordinates with FCC, USDA, and the Department of the Treasury to share information about projects that have received or will receive funds for broadband infrastructure deployment.<sup>34</sup> At the time of our review, NTIA officials told us they hold regular meetings with representatives from FCC and USDA. During these meetings they share lists of projects they were considering awarding and discuss whether the other agencies have awarded projects that could be duplicative.

NTIA uses geographic data to assess whether its potential funding would be duplicative with any FCC, USDA, or prior NTIA programs. These data are reviewed during the programmatic review step of the middle-mile grant program application review process and are then cross referenced against FCC and USDA data. If any other agencies' projects are found to deploy infrastructure within a 30-mile radius of any project that NTIA is considering funding, that project is flagged for discussion during the interagency meetings, according to NTIA officials.

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<sup>33</sup>Because we ended our analysis in July 2023 when NTIA had just begun to make funding awards, we were unable to independently verify if duplication occurred.

<sup>34</sup>This interagency agreement requires these agencies to coordinate and share information related to existing or planned projects that have received or will receive funds for new broadband deployment from certain of their agencies' programs.

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## NTIA Did Not Establish Timely Performance Goals or Measures that Align with Key Attributes

We found NTIA had not fully developed quantifiable performance goals and associated measures that align with those goals for the middle-mile grant program during program planning and design. Leading practices call for performance goals and measures to have a quantifiable, numerical target or other value and indicate specifically what should be observed, in which population or conditions, and in what time period.<sup>35</sup> Furthermore, OMB regulations require agencies to develop performance goals and measures during program planning and design, and require that the program's performance measures be based on these goals.<sup>36</sup> These regulations also require notices of funding opportunity to include program goals, objectives, indicators, targets, baseline data, data collection, and other outcomes that the agency expects to achieve through the program.<sup>37</sup>

NTIA officials told us they developed performance goals for the middle-mile grant program and included them in the May 2022 NOFO. Specifically, they said the program's performance goals were the same as five of the selection criteria they developed for the program, as follows:<sup>38</sup>

- Extent to which the project will either (a) facilitate deployment of high-speed broadband networks to currently unserved or underserved areas or (b) improve affordability in already-served markets.
- Whether the project will offer non-discriminatory interconnection in perpetuity, where technically feasible without exceeding current or reasonably anticipated capacity limitations, on reasonable rates and terms to be negotiated with requesting parties.

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<sup>35</sup>Pub. L. No. 103-62, § 4(b), 107 Stat. 285 (1993), as enhanced by Pub. L. No. 111-352, § 3, 124 Stat. 3866, 3867 (2011) (codified at 31 U.S.C. § 1115(b)(2)). See also, GAO, *Agencies' Strategic Plans under GPR: Key Questions to Facilitate Congressional Review*, [GAO/GGD-10.1.16](#) (Washington, D.C.: May 1997), and GAO, *Executive Guide: Effectively Implementing the Government Performance and Results Act*, [GAO/GGD-96-118](#) (Washington, D.C.: June, 1996).

<sup>36</sup>200 C.F.R. § 200.202.

<sup>37</sup>2 C.F.R. Part 200 Appendix I.

<sup>38</sup>NTIA's stated performance goals are the same as the first five selection criteria NTIA included in the NOFO and used during the merit review phase of assessing grant applications. See appendix II for additional details about NTIA's selection criteria.

- Whether the provider commits to offering access to the funded middle mile infrastructure, in perpetuity, on an open access basis.
- Extent to which the project will otherwise benefit the proposed service area.
- Comprehensiveness and appropriateness of the proposed technical solution for meeting the community's needs, considering the offering's capacity and performance characteristics.

While these goals are aligned with the purposes Congress set forth in establishing the program and generally address the challenges stakeholders identified with middle-mile infrastructure, we found that these goals are not quantifiable—a key attribute of successful performance goals. For example, with respect to the goal of “whether the provider commits to offering access to the funded middle mile infrastructure, in perpetuity, on an open access basis,” NTIA does not specify any value, such as a minimum percentage of grant recipients operating open-access networks, as a target or describe how they will measure their performance in meeting that goal. Similarly, the goal to “improve affordability in already-served markets” does not quantify or define affordability, nor does it specify a target, such as a particular percentage decrease in end-user subscription rates.

NTIA officials said they did not develop performance measures or targets prior to issuing the middle-mile grant program NOFO because NTIA did not know what types of projects applicants would propose. NTIA asked for stakeholder input on future data collection requirements related to the middle-mile grant program's performance reporting.<sup>39</sup> After receiving input, NTIA created a list of data it intends to collect from grant recipients, which NTIA officials said they would use for performance measurement. These data include information that NTIA could use to measure aspects of the program's performance toward its goals. For example, the number of miles of fiber-optic cable deployed, the number of anchor institutions gaining broadband access, and the number of new middle-mile interconnection points.

The list of data NTIA intends to collect, however, will not enable it to fully report on its performance goals. For example, although NTIA is collecting information on the number of miles of fiber-optic cable deployed, it is not clear how it will determine the extent to which these new networks are

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<sup>39</sup>NTIA issued a Notice of Information Collection in the *Federal Register*, on November 4, 2022. 87 Fed. Reg. 66,667.

connecting underserved or unserved communities, which is a key element of one of its goals. Similarly, while NTIA is collecting information on interconnection points, it is not clear how it will determine whether these interconnection points are offering nondiscriminatory access—another key element of another one of its goals. Furthermore, NTIA has not developed measures associated with the stated goals to improve affordability, or to enable open-access networks. This situation may result in stakeholders', including Congress', uncertainty about whether NTIA's efforts are making progress on improving middle-mile infrastructure through its middle-mile grant program. Establishing performance measures for the middle-mile grant program that align with the stated goals would give NTIA a valuable tool to demonstrate the program's effectiveness in meeting its objectives and helping to connect unserved and underserved communities.

In addition, without developing quantifiable performance goals and associated performance measures that align with recommended practices during the grant program's planning and design, NTIA missed an opportunity to include a clear assessment of how an applicant could help the program's performance goals in the review and selection process. Furthermore, if NTIA had provided quantifiable performance goals to potential grantees in its NOFO, applicants could have crafted their applications to demonstrate how they could have contributed to the program's performance goals. Earlier this year, we similarly reported that for at least two other programs established in recent legislation, NTIA also did not develop performance goals and measures during program design and planning as required.<sup>40</sup> Specifically, for both the Tribal Broadband Connectivity Program and the Broadband Infrastructure Program, we noted in that report that neither of these programs developed their performance goals and measures prior to awarding grants.

Although OMB regulations require that agencies develop performance goals and measures during grant programs' design and planning phases, NTIA does not have a process to ensure NTIA follows those regulations. In the absence of such a process, NTIA lacks assurance that any future grant programs will develop quantifiable performance goals and measures during program design.

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<sup>40</sup>GAO, *Stronger Management of Performance and Fraud Risk Needed for Tribal and Public-Private Partnership Grants*, [GAO-23-105426](#) (Washington, D.C.: Jan. 24, 2023).



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## Conclusions

Ensuring federal funding is spent in such a way that maximizes its effectiveness is a key responsibility of agencies that spend public funds. For the middle-mile grant program, NTIA followed recommended practices for reviewing grants and avoiding duplicative funding with other projects. However, NTIA did not establish the program's performance goals and measures in alignment with leading practices. Performance goals and measures are a useful mechanism by which agencies can assess whether they are meeting programs' desired outcomes, and, therefore, are effectively using public funds. However, lacking performance goals and associated measures that align with leading practices at the time NTIA designed and advertised its grant program, NTIA could not fully evaluate program applicants based on their likelihood of meeting specific program outcomes. Furthermore, without performance measures that have specified targets, it is unclear how NTIA will ultimately evaluate the program's performance. By establishing performance measures that align with the goals of the program and have specified targets, NTIA will be able to provide Congress with the program outcomes and the extent to which it helped address key challenges in middle-mile infrastructure. Moreover, by ensuring that performance goals and measures are developed during a program's planning stages and included in its funding notices, NTIA can better ensure that it is awarding grant funding that maximizes its programs' desired outcomes in the future.

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## Recommendations for Executive Action

We are making two recommendations to NTIA.

The Administrator of NTIA should develop performance measures for the middle-mile grant program that align with key attributes of successful performance measures, including ensuring that measures clearly link with stated program goals and have specified targets. (Recommendation 1)

The Administrator of NTIA should establish a process to ensure NTIA develops performance goals and measures that align with leading practices for its grant programs during program planning and design and to ensure it includes these goals and measures as part of its future notices of funding opportunities. (Recommendation 2)

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## Agency Comments

We provided a draft of this report to the Department of Commerce and NTIA for review and comment. In written comments, reproduced in appendix III, the Department and NTIA agreed with our recommendations and indicated they would take appropriate steps to implement them. NTIA also provided one technical comment, which we incorporated.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Commerce, and other interested parties. In addition, the report is available at no charge on the GAO website at <https://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or [vonaha@gao.gov](mailto:vonaha@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Andrew Von Ah  
Director, Physical Infrastructure Issues

# Appendix I: List of Organizations Interviewed

**Table 3: List of Organizations Interviewed**

<b>Internet service providers and internet exchange</b>
Albuquerque Internet Exchange
AT&T
Bluebird Network
Callaway Electric Cooperative/Callabyte Technologies
Central Electric Power Cooperative
Chariton Valley
Comcast
Co-Mo Electric Cooperative/Co-Mo Connect
Continental Divide An Energy and Telecommunications Cooperative
C Spire
Do?a Ana County Broadband
Farmers Telecommunications Cooperative
Green Hills Communications
HFT Fiber
Higher Speed Internet
La Ca?ada Wireless Association
Massachusetts Broadband Institute
Millry Communications
Northwest Open Access Network
NM Fiber Network, LLC
Pea River Electric Cooperative
Pemiscot Dunklin Electric Cooperative/Pemiscot Dunklin Fiber Network
Ralls County Electric Cooperative/Ralls Tech
REDINet
Sacred Wind Communications
Seven States Power Corporation
Sho-Me Technologies, LLC
Socket Telecom
Tombigbee Electric Cooperative
Total Highspeed, LLC

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**Appendix I: List of Organizations Interviewed**

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**Internet service providers and internet exchange**

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Utah Telecommunication Open Infrastructure Agency (UTOPIA) Fiber

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Verizon

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Zayo

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**State government offices**

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Alabama Department of Economic and Community Affairs

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Missouri Department of Economic Development – Office of Broadband Development

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New Mexico Department of Information Technology

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New Mexico Office of the State Auditor

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**Academics and economist**

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Dr. Victor Glass, Rutgers University

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Dr. Roslyn Layton, Strand Consult

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Dr. Petrus Potgieter, Strand Consult

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Dr. Revati Prasad, Benton Institute

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Dr. Matthew Gregg, Federal Reserve Bank of Minneapolis

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**Trade associations**

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ACA Connects – America’s Communications Association

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Fiber Broadband Association

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NTCA – The Rural Broadband Association

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**Federal agencies**

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Department of Agriculture – Rural Utilities Service

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Department of Commerce – National Telecommunication and Information Administration

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Federal Communications Commission

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Source: GAO. | GAO-24-106131

## Appendix II: Middle-mile Grant Program Application Selection Criteria

The National Telecommunications and Information Administration (NTIA) used a set of criteria and associated points during the merit review portion of its technical review process of the Enabling Middle-mile Broadband Infrastructure Program (middle-mile grant program) applicants. (See table 4.) Most of these criteria come from requirements of the Infrastructure Investment and Jobs Act (IIJA), which created the middle-mile grant program,<sup>1</sup> and also from NTIA's program office in charge of the middle-mile grant program. These criteria include the middle-mile grant program's two main purposes identified by the IIJA, (1) to expand middle-mile infrastructure with the end goal of improving affordability, and (2) to build redundant middle-mile connections to improve network resilience and reduce the risk of connectivity issues due to single points of failure.

NTIA assigned each criteria a value and scored each application from 0 to 100 using these criteria. Those applications that scored 80 or higher and met several additional requirements were prioritized for advancement to the final review stages. For example, NTIA allocated 20 points for the extent to which a project facilitates deployment to underserved or unserved areas, and 5 points to, among other things, the extent to which the project creates redundant connections to the global internet. These two criteria directly align with the purposes of the program identified by the IIJA.

**Table 4: National Telecommunications and Information Administration's Selection Criteria for the Middle-mile Grant Program**

Application selection criterion	Criterion points
<i>Extent to which the project will either (a) facilitate deployment of high-speed broadband networks to currently unserved or underserved areas or (b) improve affordability in already-served markets.</i> For example, does the project reduce interconnection costs for last mile providers or provide opportunities for competitive providers to offer last-mile service	20

<sup>1</sup>Infrastructure Investment and Jobs Act of 2021, div. F, tit. IV, § 60401, Pub. Law No. 117-58, 135 Stat. 429, 1231.

**Appendix II: Middle-mile Grant Program  
Application Selection Criteria**

<b>Application selection criterion</b>	<b>Criterion points</b>
<i>Whether the project will offer non-discriminatory interconnection in perpetuity, where technically feasible without exceeding current or reasonably anticipated capacity limitations, on reasonable rates and terms to be negotiated with requesting parties. Such interconnection must include both the ability to connect to the public internet and physical interconnection for the exchange of traffic</i>	10
<i>Whether the provider commits to offering access to the funded middle mile infrastructure, in perpetuity, on an open access basis. As used in this context, "open access" refers to an arrangement in which the eligible entity offers nondiscriminatory access to and use of its network on a wholesale basis to other providers</i>	10
<i>Extent to which the project will otherwise benefit the proposed service area. This includes, but is not limited to, by (a) facilitating development of carrier-neutral interconnection facilities; (b) improving the redundancy or resiliency of existing middle mile infrastructure; or (c) including direct interconnect facilities that will facilitate the provision of broadband service to anchor institutions located within 1,000 feet of the middle mile infrastructure at speeds of at least 1 GBPS symmetrical</i>	10
<i>Comprehensiveness and appropriateness of the proposed technical solution for meeting the community's needs, considering the offering's capacity and performance characteristics. Reviewers will consider the proposed network's ability to serve anticipated last mile networks, and to meet the increasing needs of the households, businesses, and anchor institutions in the areas linked by the middle mile facilities at issue. Reviewers will score favorably construction projects that are "shovel ready" and capable of completion within a two-year period.</i>	10
<i>Applicant's organizational capability to complete the specific project proposed. While applicants must demonstrate their capability in order to enter Merit Review at all, this scoring criterion will account for the extent to which an applicant is particularly capable of completing the project at issue. Reviewers will consider the experience and expertise of the project management team and the organization's track record with respect to projects of similar size and scope, as well as the organization's capacity and readiness. Reviewers will also assess the applicant's partnership and/or sub-recipient strategy, including how that strategy complements the applicant's organizational capacity, as well as the project approach, feasibility, and timely completion of the proposed project</i>	5
<i>Reasonableness of the applicant's proposed budget. Reviewers will evaluate the reasonableness of the budget based on (a) its clarity, level of detail, comprehensiveness, appropriateness to the proposed technical and programmatic solutions, (b) the reasonableness of its costs, (c) whether the allocation of funds is sufficient to complete the tasks outlined in the project plan, (d) the extent to which the project will leverage existing rights-of-way, assets, and infrastructure, and (e) the extent to which the applicant has secured reduction in permitting or other regulatory barriers</i>	10
<i>Project's fiscal sustainability beyond the award period. Reviewers will consider business plans, market projections, third-party funding commitments, and such other data as may be appropriate to the nature of the applicant and the proposed project. Reviewers will consider, among other things, demonstrations of community commitments or anchor tenant commitments that would help promote sustainability</i>	10
<i>Applicant's commitment to contribute a non-federal cost share of more than 30 percent of the total eligible project costs as reflected in the proposed project budget. 5 points for non-federal share between 30 and 40 percent, 10 points for non-federal share between 41 and 50 percent, 15 points for more than 50 percent non-federal share</i>	15

Source: GAO analysis of official agency documentation. | GAO-24-106131

## Appendix III: Comments from the Department of Commerce



UNITED STATES DEPARTMENT OF COMMERCE  
Office of the Chief Financial Officer and  
Assistant Secretary for Administration  
Washington, D.C. 20230

October 2, 2023

Mr. Andrew Von Ah  
Director, Physical Infrastructure Issues  
U.S. Government Accountability Office  
441 G Street NW  
Washington, DC 20548

Dear Mr. Von Ah:

Thank you for the opportunity to respond to the GAO draft report entitled GAO-24-106131, *Broadband Infrastructure: Middle-Mile Grant Program Lacked Timely Performance Goals and Targeted Measures*. The U.S. Department of Commerce (Department) appreciates the work that GAO has done to evaluate middle mile coverage and access and how the National Telecommunications and Information Administration (NTIA) established the middle-mile grant program in accordance with recommended practices.

GAO made two recommendations in this report. I have enclosed comments to the Draft Report from NTIA that address the specific GAO recommendations. The Department and NTIA agree with the GAO about the importance of establishing performance goals and measures governing the middle mile program and future grant programs. The Department and NTIA agree with the GAO recommendations and will take appropriate steps to implement them.

If you have any questions, please contact MaryAnn Mausser, Department GAO Audit Liaison, at (202) 482-8120 or [mmausser@doc.gov](mailto:mmausser@doc.gov).

Sincerely,

JEREMY  
PELTER

Digitally signed by JEREMY  
PELTER  
Date: 2023.09.28 19:21:55  
-04'00'

Jeremy Pelter

Deputy Assistant Secretary for Administration,  
performing the non-exclusive functions and duties of  
the Chief Financial Officer and Assistant Secretary  
for Administration

Enclosure: NTIA Response to Recommendations

ENCLOSURE

**RESPONSE OF THE NATIONAL TELECOMMUNICATIONS AND INFORMATION  
ADMINISTRATION TO RECOMMENDATIONS**

**GAO REPORT 24-106131**

**Recommendation 1.** The Administrator of NTIA should develop performance measures for the middle-mile grant program that align with key attributes of successful performance measures, including ensuring that measures clearly link with stated program goals and have specified targets.

*Response:*

*NTIA agrees with this recommendation. As a competitive grant program in which applicants were permitted to propose a broad range of projects with various technologies in diverse geographic areas, performance measures could not be defined until the scope of projects proposed by applicants were identified through application review and slated for award. Now that all middle mile projects have been awarded, NTIA is able to develop specific and quantified performance measures using baseline project data provided by each recipient. This positions NTIA to evaluate project progress and effectiveness and assess specific outcomes against the stated program goals and objectives.*

**Recommendation 2.** The Administrator of NTIA should establish a process to ensure NTIA develops performance goals and measures that align with leading practices for its grant programs during program planning and design and to ensure it includes these goals and measures as part of its future notices of funding opportunities.

*Response:*

*NTIA agrees with this recommendation. In alignment with leading practices, NTIA develops performance goals and measures during program planning and design and will continue to include them in its future notices of funding opportunities (NOFOs). For grant programs in which targeted and quantitative performance measures cannot be defined until the scope of proposed projects are identified through the application review process (See NTIA's response to GAO recommendation 1), NTIA will develop specific performance measures upon award in alignment with leading best practices.*



---

## Text of Appendix III: Comments from the Department of Commerce

October 2, 2023

Mr. Andrew Von Ah

Director, Physical Infrastructure Issues

U.S. Government Accountability Office 441 G Street NW

Washington, DC 20548 Dear Mr. Von Ah:

Thank you for the opportunity to respond to the GAO draft report entitled GAO-24-106131, Broadband Infrastructure: Middle-Mile Grant Program Lacked Timely Performance Goals and Targeted Measures. The U.S. Department of Commerce (Department) appreciates the work that GAO has done to evaluate middle mile coverage and access and how the National Telecommunications and Information Administration (NTIA) established the middle-mile grant program in accordance with recommended practices.

GAO made two recommendations in this report. I have enclosed comments to the Draft Report from NTIA that address the specific GAO recommendations. The Department and NTIA agree with the GAO about the importance of establishing performance goals and measures governing the middle mile program and future grant programs. The Department and NTIA agree with the GAO recommendations and will take appropriate steps to implement them.

If you have any questions, please contact MaryAnn Mausser, Department GAO Audit Liaison, at

(202) 482-8120 or [mmausser@doc.gov](mailto:mmausser@doc.gov).

Sincerely,

Jeremy Pelter

Deputy Assistant Secretary for Administration, performing the non-exclusive functions and duties of the Chief Financial Officer and Assistant Secretary for Administration

Enclosure: NTIA Response to Recommendations

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ENCLOSURE :RESPONSE OF THE NATIONAL  
TELECOMMUNICATIONS AND INFORMATION  
ADMINISTRATION TO RECOMMENDATIONS GAO REPORT 24-  
106131

Recommendation 1. The Administrator of NTIA should develop performance measures for the middle- mile grant program that align with key attributes of successful performance measures, including ensuring that measures clearly link with stated program goals and have specified targets.

**Response:**

NTIA agrees with this recommendation. As a competitive grant program in which applicants were permitted to propose a broad range of projects with various technologies in diverse geographic areas, performance measures could not be defined until the scope of projects proposed by applicants were identified through application review and slated for award. Now that all middle mile projects have been awarded, NTIA is able to develop specific and quantified performance measures using baseline project data provided by each recipient. This positions NTIA to evaluate project progress and effectiveness and assess specific outcomes against the stated program goals and objectives.

Recommendation 2. The Administrator of NTIA should establish a process to ensure NTIA develops performance goals and measures that align with leading practices for its grant programs during program planning and design and to ensure it includes these goals and measures as part of its future notices of funding opportunities.

**Response:**

NTIA agrees with this recommendation. In alignment with leading practices, NTIA develops performance goals and measures during program planning and design and will continue to include them in its future notices of funding opportunities (NOFOs). For grant programs in which targeted and quantitative performance measures cannot be defined until the scope of proposed projects are identified through the application review process (See NTIA's response to GAO recommendation 1), NTIA will develop specific performance measures upon award in alignment with leading best practices.

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## Appendix IV: GAO Contact and Staff Acknowledgments

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### GAO Contact

Andrew Von Ah, (202) 512-2834 or [vonaha@gao.gov](mailto:vonaha@gao.gov)

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### Staff Acknowledgments

In addition to the contact named above, Sally Moino (Assistant Director); Eric Hudson (Analyst in Charge); Tammy Conquest; Emily Crofford; Saar Dagani; Jennifer Franks; Richard Hung; Thomas James; Benjamin T. Licht; Dan Luo; Joshua Ormond; Timothy Smith; Sean Standley; Andrew Stavisky; Hai Tran; Amelia Michelle Weathers; Alicia Wilson; and Griffen Wolfe made key contributions to this report.

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