

## Comments of the International Center for Law & Economics

*Proposed BEAD Alternative Broadband Technology Guidance*

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## I. Introduction

On behalf of the International Center for Law & Economics (ICLE), we thank the National Telecommunications and Information Administration (NTIA) for the opportunity to respond to NTIA's Proposed Broadband Equity, Access, and Deployment (BEAD) Alternative Broadband Technology Guidance.<sup>1</sup>

The BEAD program provides \$42.45 billion to U.S. states, territories, and the District of Columbia to help with broadband planning, deployment, mapping, equity, and adoption. To fulfill BEAD's promise, the NTIA's guidance should encourage participation from as many types of broadband providers as possible. Congress required that subgrantees provide broadband service with at least 100 Mbps speeds for downloads and 20 Mbps for uploads, with low latency and low risk of network outages, be made available to every customer served by the project. See 47 U.S.C. §1702(f)(4)(A). In other words, the statutory language does not stipulate any preference for a particular technology, so long as those metrics are met. Currently, the proposed guidance strongly favors fiber projects by placing burdens on other providers that simply do not exist for fiber. This will discourage unlicensed fixed wireless and low-earth-orbit (LEO) satellite services from participating, to the detriment of many areas where those technologies are the best—and perhaps only—available option.

While the NTIA may have reasons to prefer fiber, it must acknowledge the tradeoffs that accompany giving it such strong preferences. Fiber is much more expensive to build out, especially in areas with low population density. Alternative technologies like fixed wireless and LEO satellite services can reach those areas in a much more cost-efficient manner. If grantees fail to maximize the value of BEAD funding by adopting less efficient means to reach unserved locations, it will mean less money available to connect underserved locations and anchor institutions, as well as depleting the funds available for other equity programs. The NTIA should adopt a technology-neutral approach that promotes the most efficient use of BEAD funds.

### A. Summary of Proposed Guidance

The NTIA's proposed guidance on technologies eligible for broadband deployment under the BEAD program establishes a hierarchy for awarding projects:

1. Priority Broadband Projects (end-to-end fiber);
2. Other Reliable Broadband Service projects; and

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<sup>1</sup> *Proposed BEAD Alternative Broadband Technology Guidance*, NTIA (Aug. 26, 2024), available at <https://www.ntia.gov/sites/default/files/publications/bead-alternative-broadband-technology-policy-notice-for-public-comment-final.pdf>.

3. Alternative Technology projects (only where cost exceeds the Extremely High Cost Per Location Threshold).

*Alternative technology* projects are defined as those employing any broadband-access technology that does not qualify as *reliable broadband service* but that meets BEAD's minimum technical requirements (100/20 Mbps speeds,  $\leq 100$ ms latency). The proposed guidance identifies unlicensed fixed wireless and LEO satellite services as examples of alternative technologies.

Before funding new deployments, *eligible entities* (i.e., states, territories, and the District of Columbia) must determine whether (1) there are enforceable commitments to deploy alternative technologies with ongoing performance monitoring, or (2) an existing alternative-technology provider can demonstrate that it currently meets the BEAD program requirements. NTIA's proposed guidance requires the alternative-technology provider to demonstrate that it has the technical and operational capacity, as well as the financial and managerial capacity, to deliver service meeting BEAD's technical requirements to *all* broadband serviceable locations (BSL) in the project area.

For LEO satellite projects, the guidance allows funding for the reservation of network capacity. This, however, comes with additional requirements, including a 10-year performance period and reimbursement based only on actual subscribers served. This differs from how other types of providers are treated, as they receive reimbursement based on areas of coverage regardless of the number of actual subscribers.

## **B. Summary of Our Recommendations**

These comments advocate for a *technology-neutral* approach in the BEAD program guidance. The proposed hierarchy favoring fiber-optic deployment may inadvertently hinder the program's goal of achieving universal broadband access efficiently and expeditiously. By embracing a technology-neutral stance that includes LEO satellite broadband as a viable alternative, the NTIA can foster competition, drive innovation, and maximize the impact of BEAD funding.

Economic analysis demonstrates that technological neutrality promotes market efficiency, allowing the most cost-effective solutions to emerge for diverse geographic and demographic contexts. To implement a technology-neutral framework, we recommend evaluating all proposals based on performance metrics, rather than which specific technologies are employed. Special restrictions on LEO satellite projects should be removed or revised, allowing for equitable treatment in funding structures and performance periods. Additionally, hybrid approaches that combine multiple technologies could yield optimal solutions for challenging deployment scenarios. While concerns about long-term viability and service quality are valid, these can be addressed through performance-based requirements and ongoing monitoring, rather than technology-specific requirements that effectively restrict the use of alternative technologies.

By adopting these recommendations, the NTIA could ensure that the BEAD program leverages the full spectrum of broadband technologies to achieve its goal of rapid and universal broadband access in the most efficient and effective manner possible.

## **II. Economic Analysis Demonstrates that Technological Neutrality Promotes Market Efficiency**

In a technology-neutral environment, different broadband solutions (e.g., fiber, fixed wireless, LEO satellite) compete on their merits. This competition drives providers to innovate and improve their offerings, leading to better service and lower prices for consumers. An ICLE white paper on broadband competition released earlier this year finds that, relative to 2018, more U.S. households are now connected to the internet; broadband speeds have increased, while prices have fallen; more households are served by multiple providers; and new technologies like satellite and 5G have expanded internet access and intermodal competition among providers.<sup>2</sup> For example:

- Starlink’s LEO service was launched a little more than five years ago. Today, the service is available to all locations in the United States with speeds of between 25/5 Mbps and 220/25 Mbps.<sup>3</sup> Project Kuiper has successfully launched its first test satellites, with commercial service expected to begin in 2025.<sup>4</sup>
- In 2018, 5G fixed wireless first launched in the United States.<sup>5</sup> The technology now accounts for roughly 6% of U.S. internet connections and download speeds have nearly tripled.<sup>6</sup>

The fact that providers have invested billions of dollars in LEO satellite and 5G technologies, and that millions of consumers have adopted them, demonstrates that so-called “alternative technologies” already play an important role in a competitive broadband marketplace.

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<sup>2</sup> Eric Fruits, Geoffrey A. Manne, Ben Sperry, & Kristian Stout, *Dynamic Competition in Broadband Markets: A 2024 Update* (ICLE White Paper 2024-06-04), available at <https://laweconcenter.org/wp-content/uploads/2024/06/Broadband-Competition-2024-Update.pdf>.

<sup>3</sup> Dan Heming, *Starlink No Longer Has a Waitlist for Standard Service, and 10 MPH Speed Enforcement Update*, MOBILE INTERNET RESOURCE CENTER (Oct. 3, 2023), <https://www.rvmobileinternet.com/starlink-no-longer-has-a-waitlist-for-standard-service-and-10-mph-speed-enforcement-update>; *Starlink Specifications*, STARLINK, <https://www.starlink.com/legal/documents/DOC-1400-28829-70> (last accessed Sep. 5, 2024).

<sup>4</sup> *Everything You Need to Know About Project Kuiper*, Amazon’s Satellite Broadband Network, ABOUT AMAZON (Jun. 17, 2024), <https://www.aboutamazon.com/news/innovation-at-amazon/what-is-amazon-project-kuiper>.

<sup>5</sup> Robert Wyrzykowski, *5G Fixed Wireless Access (FWA) Success in the US: A Roadmap for Broadband Success Elsewhere?*, OPENSIGNAL (Jun. 6, 2024), <https://www.opensignal.com/2024/06/06/5g-fixed-wireless-access-fwa-success-in-the-us-a-roadmap-for-broadband-success-elsewhere>.

<sup>6</sup> *Id.*

The cost structures and performance characteristics of these various technologies differ in ways that may make them more or less suitable for differing geographies, demographics, and use cases. For instance, fiber might be cost-effective in densely populated areas, while LEO satellite could be more efficient in remote, sparsely populated regions.<sup>7</sup> While 5G fixed wireless is often considered a potential solution for rural areas difficult to serve by fiber, 5G fixed wireless also accounts for 6% of urban connections.<sup>8</sup> That's because the technology can be used to improve connectivity in public areas, such as parks, shopping malls, and transportation centers.<sup>9</sup> By allowing all technologies to compete, resources are more likely to be allocated to the most efficient solution for each specific context.

Technological neutrality encourages ongoing innovation. When policies are technology-specific, they can create lock-in effects that reduce the incentives to develop new technologies. In contrast, a neutral approach would maintain incentives for continuous improvement and disruptive innovations. While the NTIA claims that fiber is "future proof,"<sup>10</sup> other technologies make the same claim, such as Ericsson's claim that 5G is future proof.<sup>11</sup> Regardless, in a little more than five years, the United States went from having no LEO satellite or 5G fixed-wireless broadband that was broadly available to having a vibrant broadband market in which both technologies are viable and competitive alternatives. Technological neutrality allows the market to adapt more quickly to changing economic conditions, technological advancements, and consumer preferences. This flexibility can lead to more resilient and sustainable broadband ecosystems.

Different technologies also may have differing economies of scale or scope. For example, LEO satellite networks might achieve greater economies of scale over large geographic areas, while fiber might have economies of scope in providing multiple services over the same infrastructure. A technology-neutral approach allows these efficiencies to be realized where appropriate.

By allowing these market mechanisms to operate, technological neutrality promotes an environment where the most cost-effective solutions can emerge to serve diverse consumers, technological constraints, and cost factors. A technology-neutral approach not only optimizes

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<sup>7</sup> See Colby Leigh Rachfal, *Low Earth Orbit Satellites: Potential to Address the Broadband Digital Divide*, CONG. RESEARCH SERV. R46896 (Aug. 31, 2021), <https://crsreports.congress.gov/product/pdf/R/R46896>.

<sup>8</sup> *Id.*

<sup>9</sup> *5G Fixed Wireless Access Market*, GLOBAL MARKET INSIGHTS (Feb. 29, 2024), <https://www.gminsights.com/industry-analysis/5g-fixed-wireless-access-market>.

<sup>10</sup> Evan Feinman, *Choosing the Right Mix of Technologies to Achieve Internet for All*, NTIA (Aug. 26, 2024), <https://www.ntia.gov/blog/2024/choosing-right-mix-technologies-achieve-internet-all?source=email>.

<sup>11</sup> ERICSSON, INSIGHT 6 OF 6: 5G OFFERS A FUTURE-PROOF PLATFORM FOR FWA GROWTH (Dec. 2023), *available at* [https://www.ericsson.com/4ade15/assets/local/reports-papers/further-insights/doc/fwa\\_insights\\_6\\_offers\\_extracted.pdf](https://www.ericsson.com/4ade15/assets/local/reports-papers/further-insights/doc/fwa_insights_6_offers_extracted.pdf).

current-resource allocation, but also maintains the incentives for future innovations in broadband technologies, which can thereby lead to greater long-term economic benefits.

### III. Case 2's Unintended Consequences

The proposed guidance provides a three-case hierarchical approach to determining the need for BEAD funding for alternative technologies, identified as Case 1, Case 2, and Case 3. The case hierarchy is intended to ensure that BEAD funds are used efficiently and only where necessary. In concept, this approach should align with the economic principle of avoiding redundant investments and maximizing the effectiveness of public funds.

- Case 1 avoids unnecessary new investments where investment plans are already in place;
- Case 2 attempts to ensure that providers have the technical, operational, financial, and managerial capacity to deliver service, while also recognizing that some providers may already have the capability to meet BEAD requirements without additional funding; and
- Case 3 serves as a fallback option to ensure that all areas can be served, even if they do not fall under the first two cases.

On its face, these guidelines appear to be a reasonable attempt to ensure deployment, minimize redundancies, and avoid the problems the Federal Communications Commission (FCC) encountered with the Rural Digital Opportunity Fund, when it awarded funds to ISPs that subsequently defaulted on their obligations.<sup>12</sup> The proposed structure under Case 2 might, however, inadvertently create significant obstacles to achieving BEAD's universal coverage goals. The proposed criteria—particularly the stringent requirements for alternative-technology providers to demonstrate their capacity—risk narrowing the competitive field and undermining the diversity of technological solutions that the program needs to fulfill its mission. By refining these criteria and reducing the uncertainties that providers face, the BEAD program can better support a competitive and innovative broadband landscape.

For example, the “requirement”<sup>13</sup> to demonstrate a network capacity of at least 5 Mbps or 2 TBs of monthly usage per BSL is particularly wrong-headed, as it may not align with the operational realities of technologies like LEO satellites and fixed wireless, which have different capacity dynamics than traditional fiber-optic networks. LEO satellites and fixed-wireless networks often operate on shared capacity models, where total network capacity is distributed among users dynamically. As such, these technologies may not guarantee a fixed capacity per-user in the same way that fiber-optic networks can.

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<sup>12</sup> See Julia King, *FCC Faces Pressure to Pardon RDOF Defaults*, FIERCE NETWORK (Mar. 6, 2024), <https://www.fierce-network.com/broadband/fcc-faces-pressure-pardon-rdof-defaults>.

<sup>13</sup> It is worth noting here that this “requirement” is contained nowhere in the enabling statute for BEAD. See 47 U.S.C. §1702.

This rigid requirement does not account for the varying performance characteristics across different broadband technologies. Alternative-technology providers, who have the most in-depth knowledge of their own networks and operational capacities, should be afforded the flexibility to determine what level of capacity is sufficient to comply with BEAD service standards and ongoing performance-measurement testing. Moreover, the capacity requirements are likely less relevant to users than cost or performance (e.g., speed and latency).<sup>14</sup>

While such a requirement may make sense for fiber technologies, it makes less sense for some alternative technologies. In areas with lower population density or less intense usage patterns, this high-capacity standard could impose unnecessary burdens, driving up costs and potentially making it financially unfeasible for certain providers to participate in the BEAD program. This could inadvertently reduce competition and stifle innovation, as only the largest and most resource-rich providers would be able to meet such demanding requirements.

By considering a lower capacity requirement that more accurately reflects the operational realities of different technologies, the BEAD program could encourage broader participation. This would foster greater innovation and competition, allowing for a more diverse array of solutions tailored to the specific needs of various geographic and demographic areas, ultimately leading to more effective and efficient broadband deployment across the country. By narrowing the range of available solutions, the proposed capacity requirement could make it difficult for states to consider alternative technologies where such options would be most effective.

While the NTIA understandably seeks to minimize redundancies, the capacity requirements likely will lead to overprovisioning, as not all users consume maximum capacity simultaneously.<sup>15</sup> By mandating capacity that may be idle much of the time, the proposed guidelines could result in inefficient uses of scarce resources. A better approach would be to require providers to demonstrate that they can dynamically allocate adequate capacity during peak usage periods.

The uncertainty and high barriers introduced by Case 2 not only might deter participation, but could also leave some regions without adequate broadband service. In areas where fiber deployment is impractical or exceedingly costly, alternative technologies like fixed wireless or LEO satellites offer potentially effective solutions. The combination of strenuous capacity

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<sup>14</sup> See, *Broadband Basics: How it Works, Why It's Important, and What Comes Next*, PEW TRUSTS (Aug. 18, 2023), <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2023/08/broadband-basics-how-it-works-why-it-is-important-and-what-comes-next> (reporting that the main reason people do not subscribe to broadband is because the monthly cost is too expensive).

<sup>15</sup> See Jacob B. Malone, Aviv Nevo, & Jonathan W. Williams, *The Tragedy of the Last Mile: Economic Solutions to Congestion in Broadband Networks* (May 30, 2021), available at [https://jonwms.web.unc.edu/wp-content/uploads/sites/10989/2021/06/Congestion\\_WP-2021.pdf](https://jonwms.web.unc.edu/wp-content/uploads/sites/10989/2021/06/Congestion_WP-2021.pdf) (showing data usage is lowest around 4 a.m., increases throughout the day, and peaks around 10 p.m.).

requirements and a process that heavily favors fiber could, however, prevent these technologies from being implemented, leading to a scenario where certain geographic areas remain unserved or underserved despite the availability of viable alternatives. This outcome would directly conflict with the BEAD program's mandate to ensure that all unserved and underserved locations receive broadband access.

To mitigate these risks, it is crucial that states establish objective and consistent criteria to evaluate alternative-technology providers under Case 2 that are based on technological and operational realities, rather than unrealistic ideals. This would require potentially revisiting the capacity requirements to better reflect the capabilities of various technologies. Such criteria would allow for a more transparent assessment process, ensuring that all technologies capable of meeting the overarching BEAD requirements reflected in the Infrastructure Investment and Jobs Act (IIJA) are given adequate consideration. By adopting the performance-based approach envisioned in the statute, states could better align the BEAD program with its goal of universal coverage, enabling the deployment of the most effective solutions tailored to the specific needs of different regions.

#### **IV. Mismatch Between LEO Satellite Technical Requirements and Proposed Reimbursement Policy**

The guidance's proposed reimbursement structure would introduce significant challenges for LEO satellite providers, potentially jeopardizing their participation in the BEAD program. NTIA's guidance instructs states to reimburse providers based only on the number of *actual subscribers* within a project area during a specific period, rather than on the mandated capacity reserved for *potential customers*. Technologies like LEO satellites, however, operate very differently from terrestrial technologies like fiber, and these differences must be recognized in the reimbursement model.

A subscriber-based reimbursement requirement for fiber does not impose additional costs beyond the initial capital expenditure of laying dark fiber. Once a customer decides to subscribe, the provider has a reasonable amount of time to establish the last-mile connection. This process involves predictable operational expenses within a defined and constrained footprint.

In contrast, the operational requirements for a LEO constellation are fundamentally different. Demanding a subscriber-based reimbursement model for LEO providers is akin to requiring fiber providers to wire every house in their project footprint, provide functional Wi-Fi to those homes, but merely withholding the password to access the internet until a subscription is confirmed. Just as such an approach would drastically increase the costs of providing fiber, the recommended guidance similarly inflates the costs for LEO providers, who must maintain constant capacity across their entire service area regardless of the actual number of subscribers.



The infrastructure and capacity needs for LEO are inherently more expansive and less predictable, given the wide area that satellites cover and the dynamic nature of space-based networks.

The NTIA's proposed approach would impose an undue burden on LEO-satellite providers, who must make substantial upfront capital investments to ensure sufficient capacity is available, even if subscription levels are unpredictable and unstable in the early stages. By limiting cost recovery to actual subscribers, the guidance not only conflates broadband adoption with access—potentially leaving areas deemed “unserved” until a subscription occurs—but also risks harming LEO providers' ability to serve other customers by requiring them to reserve unused capacity for extended periods. The proposed reimbursement policy might discourage providers from serving areas with initially low adoption rates, even if these areas have strong potential for future growth.

Moreover, discouraging LEO participation could have long-term consequences, particularly in hard-to-reach areas where fiber is infeasible, which would run counter to the BEAD program's goal of universal broadband access. The NTIA's one-size-fits-all reimbursement model may inadvertently exclude certain technologies *de facto*, raising concerns about whether the BEAD program is truly technology-neutral. Ensuring that the program supports a broad array of technologies is crucial to achieve its stated goals and avoid unintended inequities in broadband deployment.

## **V. Recommendations**

The recommendations we offer in these comments are grounded in the economic principles of efficient resource allocation and technological neutrality. They aim to support a framework that promotes competition and innovation, allows for tailored solutions to diverse geographic and demographic contexts, and maximizes the effectiveness of BEAD funding by focusing on outcomes, rather than means. In adopting these recommendations, the NTIA could create a more flexible, efficient, and effective framework to achieve BEAD's goal of universal broadband access.

### **A. Eliminate the Proposed Technological Hierarchy**

The NTIA's proposed guidance establishes a clear hierarchy that favors fiber-optic deployments, followed by other “reliable broadband service” technologies, with alternative technologies like LEO satellites and unlicensed fixed wireless only considered when other options exceed certain cost thresholds. While well-intentioned, this proposed hierarchy inappropriately presumes that one technology (*i.e.*, fiber) is universally superior, which may not be true in all contexts. As such, the proposed guidance potentially excludes innovative solutions that could be more efficient in certain scenarios. Following the guidance might therefore lead to greater overall costs by encouraging the use of more expensive technologies in areas where alternatives could provide equivalent service at lower cost.

Instead, we recommend a technology-neutral approach that evaluates all proposals based on performance metrics. These metrics could include speed (download and upload); latency; reliability (uptime, consistency of service); scalability (ability to increase capacity over time); time to deployment; and cost-effectiveness (both initial deployment and ongoing operation). By focusing on these performance metrics, rather than specific technologies, the NTIA could ensure that the most effective solution is chosen for each unique deployment scenario, maximizing the effect of BEAD funding.

## **B. Remove Special Restrictions on LEO Satellite Projects**

To resolve the mismatch between the LEO satellite technical requirements and proposed reimbursement policy, we recommend adjustments that more closely align the two policies.

We advise NTIA to replace the fixed-capacity requirements with performance-based metrics (e.g., speed, latency, reliability) that are more relevant to user experience and can be tailored to the capabilities of LEO technologies. If, however, NTIA insists on mandating capacity requirements, we advise that, instead of mandating 5 Mbps or 2 TBs per BSL, the agency should adopt a more flexible approach that considers the shared-capacity model of LEO networks. One way would be to require providers to demonstrate sufficient *overall* network capacity and ability to dynamically meet peak demand in the service area, rather than mandating a fixed per-BSL minimum allocation. These revisions would better reflect the technical realities of LEO satellite broadband *vis-à-vis* fiber.

Below, we offer several suggestions to improve the reimbursement policy. Any one of these suggestions would better align incentives and encourage LEO satellite participation in the BEAD program:

- Allow LEO satellite providers to recover costs, or at least a portion of them, for locations where they can connect a customer within 10 business days of a service request. This would ensure that the BEAD program fosters a competitive landscape that includes diverse technological solutions, rather than unduly favoring certain technologies over others.
- Implement a “ramp-up” or “grace” period at the beginning of the project where providers are reimbursed at a higher rate to account for lower initial adoption, while maintaining necessary infrastructure.
- Instead of reimbursing only for actual subscribers, consider a model that compensates for a percentage of total BSLs in the project area, gradually increasing as adoption rates grow.
- Use the reimbursement policy as an incentive to satisfy the Case 2 capacity objectives. For example, providers meeting the capacity objectives would be reimbursed based on all BSLs in the project area, but those that do not meet the objectives would be reimbursed based on actual subscribers. This approach would provide higher payments to providers who invest in adding capacity and provide a financial incentive to encourage providers to meet

the NTIA's capacity objective. Such an approach would better align the reimbursement model with the operational realities of different broadband solutions.

### **C. Consider Hybrid Approaches**

In many challenging deployment scenarios, a combination of technologies may provide the most effective solution. For example, LEO satellites could provide rapid initial coverage to an area, while fiber is gradually deployed for long-term capacity. In addition, a mix of fiber backhaul and fixed-wireless last-mile connections might be optimal in areas with dispersed populations.<sup>16</sup> Such hybrid approaches, integrating multiple technologies, could provide redundancy and improved reliability. By explicitly encouraging consideration of hybrid approaches, the NTIA could promote creative solutions that leverage the strengths of different technologies to overcome deployment challenges.

## **VI. Conclusion**

We applaud the NTIA for seeking to issue guidance that would allow more participation for alternative technologies in the BEAD program. Simply put, building out broadband to hard-to-reach areas with fiber alone is not possible with BEAD funding.<sup>17</sup> The NTIA should embrace a technology-neutral approach to maximize the value of these limited resources.

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<sup>16</sup> Backhaul is also known as the "middle mile," and is the cost of transmitting information from a provider's aggregation points to the internet "backbone." These costs are higher for rural areas and can adversely affect the deployment of broadband to these areas. See generally U.S. GOV'T ACCOUNTABILITY OFF., TELECOMMUNICATIONS: BROADBAND DEPLOYMENT IS EXTENSIVE THROUGHOUT THE UNITED STATES, BUT IT IS DIFFICULT TO ASSESS THE EXTENT OF DEPLOYMENT GAPS IN RURAL AREAS, GAO-06-426 (May 2006), available at <https://www.gao.gov/assets/gao-06-426.pdf>.

<sup>17</sup> See *Broadband Funding Optimization Tool*, VERNONBURG GROUP (last accessed Sep. 5, 2024), <https://www.vernonburggroup.com/broadband-funding-optimization-tool>.