



**Comments of Connected Nation, Inc.
Infrastructure Investment and Jobs Act
Implementation**

Submitted to the
National Telecommunications and Information Administration
U.S. Department of Commerce

Request for Comment
Docket No. NTIA-2021-0002

February 4, 2022

Connected Nation is pleased to present the following comments and recommendations regarding NTIA's implementation of the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL). We begin with introductory remarks, followed by responses to the individual questions posed in the Request for Comments.

Introduction

Connected Nation congratulates NTIA on having been entrusted by Congress to play the leading role in addressing one of the greatest economic and societal challenges of our generation by administering programs critical to closing the digital divide. While the goal of bringing internet access to more Americans has been recognized and pursued for a generation, the political will to fund and achieve universal broadband access has hitherto been lacking for many reasons—that is, until the COVID-19 pandemic highlighted just how wide the digital divide has become. Now, with the passage of the IIJA, some degree of universal broadband access is within reach.

The COVID-19 pandemic made it clear that universal broadband access is required not only for economic productivity and opportunity, civic participation and social justice, but also for national and personal security. In a pandemic, broadband saves lives by enabling people to do from the safety of their homes many things—from working to shopping to studying to worshipping to socializing—that otherwise would require them to go out to crowded places where they face a risk of contagious disease. The fact that broadband was widely available when the COVID-19 pandemic struck enabled the organizational backbone of the US economy to transition swiftly to telework and continue to function with a significant degree of effectiveness, even as industries more dependent on physical presence were devastated. Regardless of when COVID-19 eventually subsides, universal broadband access will remain critical to an effective societal response to any future pandemic or natural disaster.

At the same time, many of the lifestyle and societal changes that have been widely adopted as COVID-19 emergency responses measures have been welcomed by many and will likely persist even after the pandemic subsides. Telework promises to be to the 21st century what the 40-hour workweek was to the 20th century—that is, a family-friendly workplace evolution that will become a largely self-sustaining norm after being established with the help of a nudge from government. Online retail and service options keep businesses operational when physical stores become no longer practical, while making more affordable products and services available to families with limited income. Telehealth can make health care more accessible, affordable, and competitive, and online education opens up new possibilities for easily accessible, flexible and affordable personal enrichment and skills development. But the same societal changes that improve opportunities and quality of life for the digitally connected exacerbate the disadvantages suffered by those still lacking connectivity. By making universal broadband service and digital literacy part of the American social contract, NTIA and its state and federal partners can enable the US economy and society to fully embrace the opportunities and conveniences of the Information Age, while avoiding inadvertent discrimination against the digitally disadvantaged.

While the IIJA provides sufficient funding to make significant progress toward closing the digital divide, the U.S. is still far from enjoying a coherent policy framework for achieving and sustaining universal broadband service. In channeling this new wave of broadband deployment funding through NTIA to the states, Congress may be hoping that states will metaphorically serve as “laboratories of broadband innovation,” with some states developing and implementing innovative policies from which others can learn—culminating in the emergence of a new consensus around popular, intuitive, durable policies for universal broadband service. NTIA faces a delicate task in giving states enough flexibility to experiment, innovate, and adapt, while at the same time using its oversight authority to limit any negative impacts that derive from policy errors and/or administrative failures.

We have every confidence that NTIA will rise to this historic challenge and provide the leadership necessary to ensure the IIJA programs make significant headway in closing the digital divide for all Americans. We hope our responses to the questions below will aid NTIA in that endeavor.

Respectfully submitted,

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General Questions: Bringing Reliable, Affordable, High-Speed Broadband to All Americans

- 1. What are the most important steps NTIA can take to ensure that the Bipartisan Infrastructure Law’s broadband programs meet their goals with respect to access, adoption, affordability, digital equity, and digital inclusion?***

NTIA should work vigorously to educate the general public, state and community leaders, broadband service providers, and the telecommunications equipment and cabling industry about IIJA programs. It should reach out to grassroots organizations and community leaders to mobilize engagement in state policymaking processes. This engagement should include regional councils and planning districts, a wide variety of state agencies including education, economic development, agriculture, and many others.

NTIA should encourage and accommodate creative policymaking by states, allowing them to play their respective roles as laboratories for broadband innovation. At the same time, NTIA should exemplify and enforce strong norms of transparency and public accountability throughout the process. Transparency is key, not only in regard to the rules for the competitive selection for grant awards (since bidders can only compete effectively if they know them in advance), but also in regard to how funding decisions will ultimately be made. Requiring transparency also dovetails nicely with promoting stakeholder engagement, since it enables stakeholders to provide informed and timely input to policymaking processes.

While accommodating states' ideas and preferences to the greatest degree possible, NTIA should keep its eye on the goal of achieving universal broadband access and evaluate state proposals in light of how effectively they promise to achieve this goal. While giving states some latitude to set their own priorities and settle edge cases according to their own judgment, NTIA should seek to foresee any broadband access gaps that state BEAD Program plans may fail to address and negotiate with states to implement changes that will minimize the risk of leaving any substantial population behind. To that end, NTIA should encourage states to proactively map and independently validate broadband availability for themselves, in parallel with the new address-level FCC maps that will soon become available. Doing so will help states provide better inputs to the FCC, and where necessary and prudent, challenge areas that may be identified as served on the FCC's maps.

With regard to the Middle-Mile Broadband Infrastructure Program, and the BEAD Program as it impacts middle-mile infrastructure, we strongly encourage NTIA to review our comments in response to question 13 and questions 32 through 36. We believe NTIA should be intentional about maximizing the impact of the IIJA programs to shape a more robust, competitive, and resilient middle-mile connectivity landscape across the U.S. NTIA should empower states to seek ways to avert inefficient local monopolization of the backhaul business, in favor of local carrier-neutral interconnection points and backhaul availability on an open, transparent, and nondiscriminatory basis. Specifically, NTIA should prioritize projects that enable the construction of carrier-neutral Internet Exchange Points (IXPs) that will have the effect of reducing latency, bringing cloud and content delivery closer to the network edge, keeping local traffic local, and serving as a marketplace for backhaul and IP transit competition.

We also believe that Digital Equity Act initiatives should encourage mission-driven, creative social entrepreneurship and not be too prescriptive or bureaucratic. State leaders should engage designated entities or contractors in the development of state Digital Equity Plans that have deep expertise in both broadband infrastructure development and strategies to overcome barriers to broadband adoption and use among disadvantaged communities.

2. *Obtaining stakeholder input is critical to the success of this effort. How best can NTIA ensure that all voices and perspectives are heard and brought to bear on questions relating to the Bipartisan Infrastructure Law's broadband*

programs? Are there steps NTIA can and should take beyond those described above?

It is difficult to overstate the necessary role that NTIA must play, alongside state broadband offices, nonprofit organizations, and advocacy coalitions, in both educating stakeholders about the IJA's provisions and receiving feedback regarding the law's implementation. The consequential nature of this once-in-a-generation broadband investment warrants ongoing engagement that is both earnest and meaningful. NTIA must also ensure that there is a realistic mechanism to evaluate feedback and institute programmatic changes when warranted.

The public listening sessions that NTIA has hosted to-date have been very helpful in providing a venue for both questions and feedback. NTIA should make every effort to foster an ongoing forum for meaningful dialogue with the following groups:

- Industry experts on middle-mile infrastructure in general, and network interconnection and peering, cloud services, submarine cable systems, and content delivery specifically
- The American Farm Bureau Federation and state Farm Bureau organizations
- Broadband advocacy non-profits
- Tribal organizations
- K-12 school districts, state education agencies, and state E-rate coordinators
- Research and education networks, including The Quilt and Internet2
- State-level county and municipal associations
- Public safety entities and associations
- Planning districts and regional councils

By engaging groups like these, NTIA will ensure that all voices and perspectives are not only heard, but that they have a genuine opportunity to make programmatic adjustments that will increase the likelihood of achieving the IJA's goals.

3. Transparency and public accountability are critical to the success of the Bipartisan Infrastructure Law's broadband programs. What types of data should NTIA require funding recipients to collect and maintain to facilitate assessment of the Bipartisan Infrastructure Law programs' impact, evaluate targets, promote accountability, and/or coordinate with other federal and state programs? Are there existing data collection processes or templates that could be used as a model? How should this information be reported and analyzed, and what standards, if any, should NTIA, grant recipients, and/or sub-grantees apply in determining whether funds are being used lawfully and effectively?

NTIA should set high standards for transparency and public accountability in the BEAD, MMBI, and DEA programs. The public should know what areas are targeted, what

companies receive grant funding, what obligations are incurred by the companies with respect to network performance and pricing, and how to raise concerns if grant awardees are not meeting their BEAD Program obligations.

Specifically, before awarding BEAD Program grants, NTIA should require states to publish maps that communicate to the public as clearly as possible what areas are being targeted by grant-funded project implementation, and in what category (i.e., unserved vs. underserved). Maps should be published both online and as downloadable in multiple geospatial formats so that ISPs, nonprofits, advocacy coalitions, economic development agencies, and watchdog groups can conduct their own analyses.

Moreover, as grants are awarded competitively, the public should know *why* the decisions were made. If some states implement reverse auctions, bids should be published *ex post*. If scoring rubrics are applied, scores should be published. The NTIA should prescribe a uniform and simplified process that states must follow that makes scoring data and decision justifications available for residents and watchdog groups to analyze.

It may be claimed that stringent transparency requirements can deter companies from participation in the program. While this might be true in some cases, the NTIA should push back against requests for confidentiality (or the marking information as proprietary) by grant recipients or subrecipients. It may be worth sacrificing some applicant participation in the programs for the sake of accountability and keeping the public well-informed.

While it is to be hoped that the FCC's new broadband maps will greatly improve what information on broadband availability is currently available to states and the general public, we do not currently know to what degree the FCC will be making information available to states, particularly with regard to the Broadband Serviceable Location Fabric data (given the usage restrictions that the winning vendor will likely place on such data). Therefore, we believe NTIA should encourage states to be ambitious in producing their own broadband availability datasets and maps, both before and after the new FCC maps are released. This will not only help states manage their state broadband programs more effectively, but will also help states challenge the new federal maps where necessary. Physical asset maps of broadband infrastructure and speed test data collection (for the purpose of validating provider-reported availability) should be encouraged, among other approaches. Later, as projects are completed, NTIA should coordinate with the FCC to ensure that the public has a means of filing complaints if IJJA-funded projects do not deliver services as promised.

4. *NTIA has an interest in ensuring that the Bipartisan Infrastructure Law is implemented in a way that promotes the efficient use of federal funds. How should NTIA and grant recipients verify that funding is used in a way that complements other federal and state broadband programs?*

In designing IIJA programs to complement other federal and state broadband programs, there are two negative outcomes that the NTIA and states should seek to avoid.

The first is a scenario in which an ISP is funded by a previously awarded state or federal program to serve an area but has not yet built out service. The ISP is able to disqualify that area from BEAD Program eligibility, only to then fail to fulfill their buildout obligations under the previous program—leaving the area to still be unserved after the BEAD Program has run its course.

The second is a scenario in which an ISP is working hard to get an area served thanks to a previously awarded state or federal grant. The project is on track to succeed, but then is subsequently caused to fail when the BEAD Program subsidizes a competitor to build out service in the same area. Aside from unfairness to the pre-BEAD grant recipient, this scenario also keeps valuable funding from being directed to areas that actually need it.

NTIA should work with the FCC, the USDA, and states to design the BEAD Program in a way that complements existing broadband funding while minimizing potentially detrimental impacts to ISPs that were previously funded and are conscientiously striving to bring broadband service to funded areas. This should be done while also avoiding the unnecessary exclusion of any unserved or underserved areas from BEAD Program funding unless there is a high degree of confidence that broadband service will be imminently available as a result of projects that are already well underway.

With these scenarios in mind, we offer the following suggestions regarding how best to maximize BEAD Program outcomes.

The most potential program interference, by far, can be expected from the RDOF program because of its very large geographic footprint and, relative to other programs, its greater level of uncertainty regarding the ultimate performance of its awardees.

For simplicity, conflicts with other federal programs can be addressed by applying two principles already established in the administration of the CCPF and SLFRF programs funded by ARPA, namely: (a) no costs should be doubly reimbursed, and (b) projects should establish and achieve additional goals in return for additional funding. NTIA can defer to states in how to apply these principles.

RDOF should be treated somewhat differently, because it was extraordinarily successful in securing ambitious promises from bidders for relatively little subsidy funding. At the same time, there is cause for concern that some RDOF winners may have bid more aggressively to win, but then will fail to actually deliver upon their commitments. Therefore, in limited circumstances, the use of BEAD Program dollars to supplement RDOF subsidies may be a prudent use of public funds, without any need to ask RDOF winners to upgrade their already-ambitious service level commitments in return. However, for the BEAD Program to subsidize RDOF winners who irresponsibly overbid would be unfair to RDOF participants who acted more responsibly. Also, it is entirely

possible that some RDOF winners may not be the companies most qualified and capable to provide broadband service in the areas they won, and some smaller companies may have become economically distressed due to the ongoing COVID-19 pandemic. Economy-wide inflation, and disproportionate increases in the cost of fiber deployment in particular, may serve as an appropriate justification for, and limitation on, the provision of additional BEAD Program funding for RDOF winners.

NTIA should coordinate with the FCC's Rural Broadband Accountability Plan to help states discern which RDOF projects deserve to be supported and protected, and which ones may need to be overbuilt to avert post-BEAD broadband coverage gaps.

The somewhat-prolonged timeline involved in implementing the BEAD Program, such that funds are unlikely to be distributed to ISPs for broadband deployment for well over a year from now, may in itself yield a solution to the potential conflicts between the BEAD and RDOF Programs. With regard to RDOF winners that have completed their funded deployments prior to the launch of BEAD, NTIA should, of course, render their territories ineligible for BEAD Program funding since they will no longer be unserved. NTIA should perhaps consider encouraging states to use ARPA funds—only where necessary and feasible—to assist RDOF winners in completing their deployments prior to the launch of the BEAD Program so that it can achieve the greatest possible impact on communities that are truly unserved or underserved.

Supporting States, Territories, and Sub-Grantees to Achieve the Goal

5. In implementing the Bipartisan Infrastructure Law's programs, NTIA will offer technical assistance to states, localities, prospective sub-grantees, and other interested parties. What kinds of technical assistance would be most valuable? How might technical assistance evolve over the duration of the grant program implementation?

NTIA should work aggressively to promote clarity regarding its own rules and requirements, be proactive in explaining them to states, and work in close coordination with states to apply them within the context of each state's own unique situation. NTIA should be generous, for example, with feedback on whether and in what respects existing state broadband grant programs are, or are not, BEAD-compliant. Beyond that, it is problematic for NTIA to *both* provide technical assistance *and* to play an oversight role. Could the NTIA, for example, objectively evaluate a grant program for BEAD compliance if that grant program had been developed with its own technical assistance?

Another important consideration is that the process of developing state programs that satisfy BEAD requirements will be a learning experience for states, and it will help build the capacity to administer the program in a BEAD-compliant manner.

For prospective subgrantees (i.e., network operators wishing to apply for BEAD Program funds), NTIA should foster participation by providing public and transparent technical assistance to all comers. NTIA should listen to, and act upon, complaints from

network operators that states' grant application processes are unduly burdensome or nontransparent, and help states to design and administer programs that facilitate well-meaning participation.

6. *The Bipartisan Infrastructure Law requires states and territories to competitively select subgrantees to deploy broadband, carry out digital equity programs, and accomplish other tasks. How should NTIA assess a particular state or territory's subgrant award process? What criteria, if any, should NTIA apply to evaluate such processes? What process steps, if any, should NTIA require (e.g., Request for Proposal)? Are there specific types of competitive subgrant processes that should be presumed eligible (e.g., publicly released requests for proposals and reverse auctions)?*

The key to competitiveness is transparency. In order to compete for grants, prospective subgrantees need to know what areas are eligible, how grant award decisions will be made, and what obligations will be required of them if they win. Before approving initial and final proposals for BEAD Program grants, the NTIA should make sure that:

- detailed eligibility maps are made public, with sufficient advance notice to enable ISPs to plan projects;
- decision rules are clearly stated *ex ante*;
- decision rationales are clearly explained, in public, *ex post*; and
- there are plans to document the decision process and publish the details *ex post* so that both the NTIA and the public can confirm that grant award decisions were made in ways consistent with the rules.

After grant awards are announced, the NTIA should review the documentation of grant award decision-making processes and confirm that decisions were made properly. If, after conducting a transparent review, it finds that states awarded grants in ways that are inconsistent with pre-announced criteria without reasonable justification, it should require states to revoke awards.

Transparency considerations aside, NTIA should bear in mind that broadband service delivery often has a “natural monopoly” character and/or relies on legacy infrastructure, so that competition can sometimes be a difficult goal to achieve. It may be infeasible to induce multiple ISPs to bid to deploy to a particular unserved area. And of course, the goal of universal broadband access should trump a policy preference for competitive selection when the two conflict. This limits the extent to which the NTIA should encourage program designs such as reverse auctions, which achieve competitiveness across geographies at the expense of leaving areas with the highest bid prices unserved by design.

See our response to question 3 for more discussion regarding transparency.

As a topic for future policy debate and consideration, rural broadband “vouchers” may be an alternative means of promoting rural broadband availability in a way that favors

competition among providers. They do not *directly* promote broadband access, but they encourage adoption, and their availability can incentivize deployment *by raising expected take rates*, and there may be creative ways to use them as part of competitive selection processes for broadband grant programs.

7. *NTIA views the participation of a variety of provider types as important to achieving the overall goals of the Bipartisan Infrastructure Law broadband programs. How can NTIA ensure that all potential subrecipients, including small and medium providers, cooperatives, non-profits, municipalities, electric utilities, and larger for-profit companies alike have meaningful and robust opportunities to partner and compete for funding under the programs?*

As we suggested in response to question 5, NTIA might consider fostering participation by providing education and technical assistance to potential sub-grantees, especially those with little or no experience in applying for government grants.

Additionally, strong transparency requirements, as we advocated in our responses to questions 3 and 6, facilitate broad-based participation, since one of the main advantages that larger/incumbent ISPs often enjoy is privileged, insider access to information.

8. *States and regions across the country face a variety of barriers to achieving the goal of universal, affordable, reliable, high-speed broadband and broadband needs, which vary from place to place. These challenges range from economic and financial circumstances to unique geographic conditions, topologies, or other challenges that will impact the likelihood of success of this program. In implementing the Bipartisan Infrastructure Law's broadband programs, how can NTIA best address such circumstances?*

We believe that NTIA should allow states themselves to adapt their programs to state-specific circumstances, while also making allowable expenses broad enough to give states flexibility. NTIA can also play a role in facilitating discussions and knowledge-sharing among states that face similar challenges.

9. *Several Bipartisan Infrastructure Law broadband programs provide that, absent a waiver, a grant or subgrant recipient must contribute its own funding, or funding obtained from a non-federal source, to "match" funding provided by the BIL program. Under what circumstances, if any, should NTIA agree to waive these matching fund requirements, and what criteria should it assess (in accordance with any criteria established by the statute) when considering waiver requests?*

One primary reason that policymakers include match requirements in legislation authorizing broadband grant programs is to safeguard the programs from unqualified applicants that could waste public funds. With that objective in mind, NTIA should consider the circumstances under which a waiver can be granted to applicants that are

able to clearly demonstrate their qualifications, but for various reasons have financial limitations that would prevent them from providing the required match. NTIA should consider the following circumstances, among potentially others, that may warrant the issuance of match waivers:

- the applicant is demonstrably unable (not merely unwilling) to meet the match requirement
- no applicant that is able to meet the match requirement is willing to bid for a given area
- the applicant has non-collateralizable assets which could be reasonably valued as adequate to meet the match if the applicant could borrow against them
- the applicant has a track record of experience in providing quality service
- the applicant demonstrably enjoys the confidence of the community or state leadership
- the state wishes to award the grant

Transparency in determining when match waivers will be permitted is critical. Otherwise, situations will arise in which one applicant receives a grant with a match waiver, while another, better or equally qualified applicant declined to participate because of its inability to meet the match.

In circumstances in which a waiver cannot reasonably be granted, NTIA should use its administrative authority to allow broad flexibility in counting in-kind contributions as credit toward any match requirements.

Ensuring the Future of America is Made in America by All of America's Workers

10. The COVID-19 pandemic has disrupted global supply chains and impacted employment patterns. What is the likely impact of current workforce and supply chain constraints on the speed with which states, service providers, and others achieve the Bipartisan Infrastructure Law's network-deployment objectives? Are the areas unserved or underserved by broadband networks, which will see substantial new deployments under the Bipartisan Infrastructure Law's broadband provisions, likely to face particularly significant workforce or supply-chain constraints? What steps, if any, should NTIA take to mitigate the impact of workforce or supply-chain limitations?

Although workforce and supply chain constraints are likely to be a major problem in the execution of BEAD Program-funded projects, NTIA may not be the best-equipped federal agency to address those issues. Other federal agencies, such as the EDA, DOE, and FTC (with leadership and coordination provided by the White House) may be better positioned to deal with workforce and supply chain issues affecting the success of IJJA implementation. The best role for the NTIA to play may be to *research* the broadband workforce and the broadband deployment supply chain, and then provide

reliable information to ISPs, states, other federal agencies, and the network equipment and supply industry, so that they can foresee, adapt to, and/or address workforce and supply chain problems that jeopardize the success of IJA programs.

To that end, NTIA and its other federal agency counterparts should consider proactively engaging the industry trade associations that represent network equipment and cabling manufacturers to determine if steps could be taken now to enhance production and ensure that necessary equipment and cabling is available when needed. Given that full program implementation may still be months away, the time to engage the supplier community (and the other federal agencies that have more direct jurisdiction on these issues) is now.

11. *One objective of the Bipartisan Infrastructure Law is to ensure American workers have access to high quality jobs, especially those who were impacted the most by the pandemic, including women and people of color. What federal policy tools can NTIA apply to help ensure that broadband funding is deployed in a way that maximizes the creation of good paying jobs and that women and people of color have full opportunity to secure those jobs.*

It is difficult to see how the NTIA can directly shape the hiring practices of the engineering and construction firms that plan and build broadband networks because it will be several steps removed from those hiring decisions. However, by making broadband service available in disadvantaged communities, it will certainly promote the creation of well-paid jobs for all people, including women and people of color.

With that said, NTIA can be taking steps now to work with the Department of Labor, service provider trade associations, community colleges, and universities across the U.S. to ensure that the projected labor shortage of skilled workers to engineer and physically build broadband network is addressed. This is a monumental challenge facing the industry, and while there are no easy solutions, the journey must begin now. NTIA, given its expanded broadband leadership role, is well-positioned to lead the charge.

12. *What steps, if any, should NTIA take to ensure maximum use of American-made network components and that supply shortages are addressed in ways that create high quality jobs for all Americans? What impact, if any, will application of the “Buy American” requirements in the Bipartisan Infrastructure Law have on supply-chain and workforce challenges and on the speed with which the nation can reach the goal of 100% broadband connectivity?*

Section 60102(g)(1)(D)(ii) of the IJA forbids the import of “fiber optic cable and optical transmission equipment manufactured in the People's Republic of China, *except that the Assistant Secretary may waive the application of this clause with respect to a project if the eligible entity that awards a subgrant for the project shows that such application would unreasonably increase the cost of the project*” (our emphasis added). NTIA must

make sure to respect the will of Congress that states should be able to opt out of unreasonable cost increases induced by “buy American” requirements on broadband deployment inputs.

Broadband Equity, Access, and Deployment (BEAD) Program: Ensuring Publicly Funded Broadband Networks that Sustain and Scale

13. *NTIA is committed to ensuring that networks built using taxpayer funds are capable of meeting Americans’ evolving digital needs, including broadband speeds and other essential network features. What guidance or requirements, if any, should NTIA consider with respect to network reliability and availability, cybersecurity, resiliency, latency, or other service quality features and metrics? What criteria should NTIA establish to assess grant recipients’ plans to ensure that service providers maintain and/or exceed thresholds for reliability, quality of service, sustainability, upgradability and other required service characteristics?*

Faster “speeds,” in the sense of increased bandwidth, have long been the focus of federal and state broadband development policies and programs—and rightly so. We are encouraged that the ARPA and IIJA legislation place an emphasis on raising the standard for a greater bandwidth floor among the programs funded by those bills. The projected need for bandwidth growth is discussed further in our response to question 15 below.

Telehealth and telework uses of broadband, and some online education functions as well, characteristically demand as much upload as download capacity. The COVID-19 pandemic—and the societal shift to increased telework and remote learning—has demonstrated that the future evolution of the internet will involve the increased generation of data by the end-user that must be uploaded to the network. The spike in two-way video communication over the past two years is just the beginning of the internet’s movement away from, primarily, content consumption by the user.

As such applications become more critical functions of broadband networks, the traditional “asymmetric” model of broadband service where download speeds greatly exceed upload speeds is likely to become less suitable over time. This consideration underscores the appropriateness of the IIJA’s focus on “scalable” networks that can be upgraded to a minimum of 100 Mbps in upload capacity, and the BEAD Program should be designed effectually to advance this objective.

Beyond the provision of greater bandwidth, however, NTIA must consider how other aspects of network performance are increasing in relative importance and take steps to ensure that BEAD-funded networks are capable of addressing those needs as well, particularly with regard to lowering latency and ensuring network resiliency.

The explosion of “internet of things” (IoT) devices and applications available on the market—and their widespread adoption by the public—is an advent that must be taken into consideration by policymakers. While these devices and applications are often less demanding with respect to bandwidth, their effectual use is often very dependent upon network latency.

The trend towards “edge computing”—and neutral interconnection closer to the edge—are developments that are working toward latency reduction objectives, while also increasing network resiliency. This topic is something we explore further in our responses to questions 32 through 36. By establishing points of network interconnection, content caching, storage, and compute closer to end-users, network response times are reduced by decreasing the physical distance that data must traverse. **Therefore, we strongly recommend that NTIA should define allowable expenses under the BEAD Program broadly enough to cover the establishment of carrier-neutral internet exchange points, including the physical buildings that house them, as a critical mechanism to reduce network latency and increase network resiliency, and ensure that BEAD-funded networks are capable of meeting future demands.** Similarly, other “middle-mile” infrastructure development can be justified as BEAD-eligible expenses in some circumstances as well.

14. NTIA is committed to ensuring that networks constructed using taxpayer funds are designed to provide robust and sustainable service at affordable prices over the long term. What criteria should NTIA require states to consider to ensure that projects will provide sustainable service, will best serve unserved and underserved communities, will provide accessible and affordable broadband in historically disconnected communities, and will benefit from ongoing investment from the network provider over time?

We discuss ways in which NTIA can ensure that BEAD-funded networks provide robust and sustainable service in our responses to question 13 above and questions 32-36 below. Beyond the provision of scalable, symmetrical bandwidth, BEAD-funded networks must also work to lower latency and ensure network resiliency, and that can be accomplished by moving points of network interconnection, content caching, storage, and compute closer to end-users.

To a certain extent, the inherent cost structure of broadband networks, involving high fixed costs of construction followed by relatively low ongoing costs for operation and maintenance, combined with the economywide trend towards increased bandwidth demand, will largely make the financial sustainability of networks take care of itself. The FCC’s Affordable Connectivity Program should also help, by raising take rates among low-income households.

It’s still possible, however, that some BEAD-funded networks will be built and then fail to be maintained. Regulatory frameworks at the state and federal levels will need to shift in order to “lock in” universal broadband access, and the FCC and/or state public utility commissions are likely better-suited than the NTIA to develop and administer such

regimes. The NTIA should consult with these agencies about broadband network sustainability, and plan for a handoff as BEAD projects are completed.

15. In its effort to ensure that BEAD-funded networks can scale to meet Americans' evolving needs, and to ensure the public achieves the greatest benefit from the federal investment, NTIA seeks to understand reasonably foreseeable use cases for America's broadband infrastructure over the next five, ten, and twenty years. What sort of speeds, throughput, latencies, or other metrics will be required to fully connect all Americans to meaningful use over the next five, ten, and twenty years? How can the BEAD program meet our nation's broadband network connectivity needs in the future and what other benefits can Americans expect from this program and the networks it will help fund in other industries and across the economy? How can existing infrastructure be leveraged to facilitate and amplify these benefits? What are the best sources of evidence for these questions and for predicted future uses of broadband?

In 1998, researcher Dr. Jakob Nielsen developed what is now known as “Nielsen’s Law of Internet Bandwidth.”¹ Nielsen’s Law has been used by the broadband service provider industry to plan broadband network growth needs for more than two decades. The law simply states that a high-end user’s connection speed will need to grow by 50% each year, doubling every 21 months. Since Nielsen first published his model, the law has largely held true, showing exponential growth from 1982 to 2019 that is consistent with Nielsen’s predictions.

While some recent research suggests that such exponential growth is unsustainable and is indeed slowing, demand for increased bandwidth will continue—albeit possibly at a slower pace. At the same time, we are yet to fully understand how the COVID-19 pandemic will have a long-term effect on bandwidth consumption trends, although it’s fairly clear that an increased reliance on two-way video for telework, telehealth, and remote learning is here to stay—and that the continued exponential growth of devices and applications will drive the need for increased bandwidth and reduced latency.

Indeed, as we discuss in our response to question 13, reducing latency may become the more important need as symmetrical, higher capacity networks are deployed. There are key steps that NTIA can take now to ensure that BEAD-funded networks make latency reduction a priority—by placing an emphasis on network interconnection, cloud, and content closer to the network edge.

Latency reduction has largely not been a focus of policymakers and advocates to this point. To that end, we encourage NTIA to proactively engage industry leaders in the neutral colocation, internet exchange, content delivery, and IP transit space for their ideas and input. With so much historical emphasis having been placed on last-mile network buildout, these areas of the internet ecosystem have largely been overlooked

¹ See <https://www.nngroup.com/articles/law-of-bandwidth/>

and ignored. The size and scope of the BEAD Program's impending investments demand a dialogue on these issues, too.

Allocation and Use of BEAD Funds to Achieve Universal, Reliable, Affordable, High-Speed Broadband

16. *Broadband deployment projects can take months or years to complete. As a result, there are numerous areas where an entity has made commitments to deploy service – using its own funding, government funding, or a combination of the two – but in which service has not yet been deployed. How should NTIA treat prior buildout commitments that are not reflected in the updated FCC maps because the projects themselves are not yet complete? What risks should be mitigated in considering these areas as “served” in the goal to connect all Americans to reliable, affordable, high-speed broadband?*

We explore this topic in detail in our response to question 4.

17. *Ten percent of total BEAD funding is reserved for distribution based on how many unserved locations within a state or territory are also locations in which the cost to deploy service is higher than the nationwide average. The Bipartisan Infrastructure Law provides that, in calculating the cost of deployment, NTIA should consider factors such as the area's remoteness, population density, topography, poverty rate, or “any other factor identified by the Assistant Secretary, in consultation with the [FCC], that contributes to the higher cost of deploying broadband service in the area.” BIL § 60102(a)(2)(G). What additional factors, if any, should NTIA consider in determining what constitutes a “high-cost area”?*

Congress wisely acknowledged that certain areas of the country have characteristics that drive higher broadband infrastructure deployment costs. Certainly, an area's remoteness, low population density, and challenging topography have the greatest effect on capital construction costs, while an area's poverty rate and the cost of backhaul and IP transit in remote areas may affect the operational viability of a network. In the context of the IJJA programs, the impact of definition is limited because it only affects state-by-state funding allocations, and only for 10% of the BEAD Program budget. At the same time, any vagueness in the definition will invite conflict since funding is a zero-sum game of state vs. state. Therefore, while the additional factors of environmental impact, historic preservation, and proximity to backhaul might reasonably be incorporated into the definition of a “high-cost area,” we believe the NTIA's priority should be to avoid potential controversy and delay. A simplistic definition that settles the matter—one that focuses on the greatest drivers in the cost of capital construction—is the best path forward to advance the program.

18. *The Bipartisan Infrastructure Law provides that BEAD funding can be used in a variety of specific ways, including the provision of service to unserved and underserved areas, connection of community anchor institutions, data*

collection, installation of service within multi-family residential buildings, and broadband adoption programs. The law also permits the Assistant Secretary to designate other eligible uses that facilitate the program’s goals. What additional uses, if any, should NTIA deem eligible for BEAD funding?

NTIA should clarify that “provision of service to unserved and underserved areas” can include construction of middle-mile assets for backhaul, including the acquisition of existing fiber or rights-of-way, and the construction of facilities that house carrier-neutral internet exchange points (including land acquisition and site make-readiness).

The lack of sufficient middle-mile/transport capacity is a significant problem for many rural and remote communities—one that drives end-user prices higher, constrains capacity, and creates a second-class internet experience for all end-users. The construction of high-capacity last-mile networks alone will simply not achieve the BEAD Program’s objectives without also ensuring robust middle-mile/transport capacity is available. We believe Congress acknowledged this fact in Section 60102(h)(4) of the IIJA, which states that an entity that receives a subgrant for the deployment of a broadband network:

“(E) may use the subgrant to deploy broadband infrastructure in or through any area required to reach interconnection points or otherwise to ensure the technical feasibility and financial sustainability of a project providing broadband service to an unserved location, underserved location, or eligible community anchor institution.”

Additionally, we agree with the Schools, Health, and Libraries Broadband Coalition (SHLB) that nonprofit research and education (R&E) networks should be eligible for BEAD Program funding, as many of them have a long history of building and operating high-capacity networks that serve anchor institutions. The Utah Education and Telehealth Network (UETN) is a model example of how statewide R&E network investment can have a significant impact on improving a state’s overall telecom landscape, including the delivery of transport capacity to remote areas.

We also believe that R&E networks should be permitted to make excess fiber strands on network builds available, on an open-access basis, to encourage greater transport capacity and competition to and within unserved and underserved communities. This can be done at a small incremental cost to the program, but would yield enormous value to the communities that would benefit—including local ISPs themselves.

Establishing Strong Partnerships Between State, Local, and Tribal Governments

19. Community engagement is critical to eliminating barriers to broadband access and adoption. NTIA views strong involvement between states and local communities as key to ensuring that the broadband needs of all unserved and underserved locations are accounted for in state plans submitted for funding.

What requirements should NTIA establish for states/territories to ensure that local perspectives are critical factors in the design of state plans?

We believe that NTIA itself can serve as a model for stakeholder engagement at the state and local level. This is a topic we explore further in our response to question 2. While we are aware of many state broadband offices that are already conducting broad stakeholder outreach, it is important for states to listen to, and incorporate feedback from, a broad array of organizations, advocates, industry experts, and the individual voices of the unserved and underserved.

State broadband offices should, at a minimum, engage the following groups:

- K-12 school districts, state education agencies, and state E-rate coordinators
- Other community anchor institutions, such as hospitals, libraries, public safety agencies
- The state Farm Bureau organizations and its members, to account for the needs of farmers and ranchers
- Tribal organizations
- State research and education networks
- County and municipal associations
- Planning districts and regional councils
- Industry experts on middle-mile infrastructure in general, and network interconnection and peering, cloud services, submarine cable systems, and content delivery specifically
- Independent ISPs and their trade associations

When conducting outreach, states should ask key questions about program design, process their responses to account for varying perspectives, and then make decisions based on that input. States should define, in the plans they submit to NTIA, precisely how they incorporated feedback from these stakeholders.

Also critical to stakeholder engagement is transparency, as explained in our responses to questions 3 and 6. Real-time transparency enables stakeholders to follow what is happening at each step in the process and weigh in in a timely manner.

20. When formulating state broadband plans, what state agencies or stakeholder groups should be considered in the development of those plans?

A list is suggested in our response to question 19. Each state broadband office should be cognizant of where it sits in relation to other state and local agencies within the hierarchy of state government, and ensure the perspectives of other agencies are taken into account. For instance, if a state broadband office sits in the state commerce department, the perspective of officials in the state agriculture department may be very useful to ensuring that the state's plan accounts for the needs of local farmers and ranchers.

21. How can NTIA ensure that states/territories consult with Tribal governments about how best to meet Tribal members' needs when providing funding for broadband service to unserved and underserved locations on Tribal lands within state boundaries?

State broadband offices should be required to conduct face-to-face meetings with the leadership of each Tribal community within their respective state's borders, either in person or by two-way video, except in cases where tribal leadership is non-responsive to the office's requests. Written communications can supplement those meetings where necessary, and states should consider issuing a public comment opportunity that specifically requests, but does not require, written input from Tribal communities.

Low-Cost Broadband Service Option and Other Ways to Address Affordability

22. The Bipartisan Infrastructure Law requires that BEAD funding recipients offer at least one low-cost broadband option and directs NTIA to determine which subscribers are eligible for that low-cost option. BIL § 60102(h)(5)(A). How should NTIA define the term "eligible subscriber?" In other words, what factors should qualify an individual or household for a low-cost broadband option?

A natural baseline, or default, should be the eligibility criteria established for the FCC Lifeline and/or Affordable Connectivity Program. However, we believe NTIA should let states customize and brand the low-cost option, while making sure that whatever eligibility criterion is used to define eligibility for the low-cost broadband option is objectively well-defined, administratively efficient, and fair.

23. Under the Bipartisan Infrastructure Law, states and territories are charged with developing low-cost broadband service options in consultation with NTIA and broadband providers interested in receiving funding within the state. BIL § 60102(h)(5)(B). What factors should NTIA consider in guiding the states in design of these programs to achieve this goal? Should NTIA define a baseline standard for the "low-cost broadband service option" to encourage states/territories to adopt similar or identical definitions and to reduce the administrative costs associated with requiring providers to offer disparate plans in each state and territory? What are the benefits and risks, if any, of such an approach?

These questions seems to be answered by the IIJA itself. Section 60102(h)(5)(D) of the law includes the following language:

"No regulation of rates permitted.--Nothing in this title may be construed to authorize the Assistant Secretary or the National Telecommunications and Information Administration to regulate the rates charged for broadband service."

We believe that NTIA should leave the pricing, eligibility definitions, and branding of the low-cost option to individual states.

24. *Affordability is a key objective of the Bipartisan Infrastructure Law’s broadband programs. What factors should be considered in the deployment of BEAD funds to help drive affordability beyond the low-cost option?*

We attempt to address other factors that improve affordability in our responses to questions 13, 14, and 32 through 36. Lowering the cost of IP transit—that is, wholesale services that provide access to the entire internet routing table—is one way to help local ISPs reduce the cost of last-mile services. This is tangential to the reduction of middle-mile transport costs through competition and new construction, and the need for carrier-neutral interconnection and cloud/content delivery to occur closer to end-users. All of these things provide downward pressure on pricing, while making the internet work more efficiently for everyone.

Implementation of the Digital Equity Act of 2021: State Digital Equity Plans

25. *The Bipartisan Infrastructure Law includes historic investments in digital inclusion and digital equity, promising to bring all Americans the benefits of connectivity irrespective of age, income, race or ethnicity, sex, gender, disability status, veteran status, or any other characteristic. NTIA seeks to ensure that states use Digital Equity Planning Grants to their best effect. What are the best practices NTIA should require of states in building Digital Equity Plans? What are the most effective digital equity and adoption interventions states should include in their digital equity plans and what evidence of outcomes exists for those solutions?*

One of the most important considerations for every state will be the selection of a designated entity or contractor to lead the development of its Digital Equity Plan. The entity must have significant experience working on digital equity and inclusion initiatives, and must possess a deep understanding of how infrastructure issues intersect with the adoption and use issues that affect disadvantaged communities. The entity must be capable of taking relevant and reliable data on covered populations and overlaying it on top of infrastructure and service availability data to yield insights that identify root issues and barriers that must be overcome. The entity must also be capable of engaging *all* disadvantaged communities—and the existing community-based organizations that serve them—in order to ascertain barriers that may not otherwise be readily identifiable.

26. *Some states and territories will benefit from technical assistance in preparing Digital Equity Plans. What types of technical assistance, support, data, or programmatic requirements should NTIA provide to states and territories to produce State Digital Equity Plans that fully address gaps in broadband adoption, promote digital skills, advance equitable access to education,*

healthcare and government services, and build information technology capacity to enable full participation in the economy for covered populations? What steps, if any, should NTIA take to monitor and assess these practices?

NTIA should provide electronic access to resources necessary for states and territories to successfully develop their Digital Equity Plans, such as the most current NTIA Internet Use Survey results [administered by the Census Bureau as a supplement to the Current Population Survey (CPS)]. This data, along with other datasets like the American Community Survey (ACS) and those collected by the Pew Research Center on broadband adoption and use, will help in defining the state's digital equity challenge for covered populations in their plans.

Additionally, NTIA should host technical assistance workshops to provide guidance on programmatic requirements and frequently asked questions for the entities designated to develop the plans. NTIA should facilitate a process so that states can teach and learn from each other as they prepare their plans. However, NTIA should allow the planning process to play out organically and should avoid being overly prescriptive so that each plan can be a genuine state product.

There are likely excellent opportunities to facilitate mutual learning and assistance among grantees under the two DEA components—the State Digital Equity Capacity Grant Program and the Digital Equity Competitive Grant Program. It is our hope that the latter program will fund the development of greater knowledge and expertise on digital equity issues nationwide, and that one of the end-results will be the identification of mission-driven experts/specialists in the various aspects of, and approaches to, digital equity. NTIA can play a role in connecting digital equity specialists with national reach to state-level entities that may want to replicate their ideas and methods.

27. Equity is also a named goal of the BEAD program described above. How should NTIA ensure that State Digital Equity Plans and the plans created by states and territories for the BEAD program are complementary, sequenced and integrated appropriately to address the goal of universal broadband access and adoption?

BEAD Program implementation should be closely aligned with a state or territory's Digital Equity Plan because the BEAD Program's very purpose is to help address the baseline need for universal broadband access for every household in the U.S. Without a broadband connection, successful implementation of any digital equity plan is untenable.

It may be helpful to think of digital equity as a ladder with five steps:

- 1. Access.** A broadband connection must be available, with adequate bandwidth, performance, and reliability.
- 2. Adoption.** People must be able to subscribe to broadband services to realize its benefits. This includes providing access to affordable broadband services for

covered populations as stated in the Digital Equity Act, via the Affordable Connectivity Program, Lifeline, and other ISP low-cost programs.

3. **Devices.** People must possess internet-capable devices, including computers. Smartphones are helpful, but "screen size matters" when it comes to some uses.
4. **Basic skills and digital literacy.** It takes a bit of "know-how" to use the internet effectively.
5. **Digital upskilling.** It takes significantly more skill to make full use of what the internet has to offer in the areas of education, healthcare, career development, personal finance, entrepreneurship, and self-realization and discovery.

The BEAD Program seeks, above all, to solve the access problem (1). That's a complex task, but is nonetheless sufficiently understood, and states should be able to establish and achieve defined goals. Depending on how NTIA writes its program parameters and guidance, the BEAD Program may also impact adoption (2) and devices (3) at some level.

We recommend that NTIA should be rather expansive in defining allowable expenses under the BEAD Program to include broadband adoption and provision of devices, for at least two reasons. First, in at least some states, BEAD Program funding may be more than sufficient to establish universal broadband access, so extra funds can be used to promote higher take rates and more widespread and suitable device ownership. Second, higher take rates incentivize deployment indirectly, by raising consumer revenues for companies that install broadband infrastructure. NTIA should be open to states using BEAD funds for rural broadband vouchers and other adoption programs, as well as well-targeted device ownership campaigns.

Digital Equity Act funds might reasonably cover *any* step on the ladder, since all the steps are part of achieving a more digitally inclusive society. However, DEA activities should probably focus on (2) through (5), since the BEAD and Middle-Mile Broadband Infrastructure Programs should achieve objective (1). Relative to building infrastructure, addressing the human aspect of the digital divide is far less understood, and policy will need to be more opportunistic and experimental, as both the nature of the problems and the organizational wherewithal to address them vary greatly from community to community. We believe NTIA should seek to foster an ecology of social entrepreneurs who are empowered to try different things and then learn from one another in the pursuit of helping disadvantaged individuals and communities to thrive in the digital age.

28. How should NTIA ensure that State Digital Equity Plans impact and interact with the State's goals, plans and outcomes related to: (i) economic and workforce development; (ii) education; (iii) health; (iv) civic and social engagement; (v) climate and critical infrastructure resiliency; and (vi) delivery of other essential services, especially with respect to covered populations mentioned in Bipartisan Infrastructure Law § 60303(2)(C)?

NTIA should give states generous flexibility in setting priorities with respect to the six areas listed. NTIA should not require that all states pursue plans and outcomes that

affect all six areas. Deference to states' existing programs and priorities will help DEA-funded activities to get integrated into routine state government processes, leading to a longer-term impact.

29. *The Bipartisan Infrastructure Law directs states and territories to include in their digital equity plans “measurable objectives for documenting and promoting: (i) the availability of, and affordability of access to, fixed and wireless broadband technology; (ii) the online accessibility and inclusivity of public resources and services; (iii) digital literacy; (iv) awareness of, and the use of, measures to secure the online privacy of, and cybersecurity with respect to, an individual; and (v) the availability and affordability of consumer devices and technical support for those devices.” What best practices, if any, should states follow in developing such objectives? What steps, if any, should NTIA take to promote or require adoption of these best practices? What additional guidance and oversight about the content of the State Digital Equity Plans should NTIA provide?*

Since DEA-funded activities are likely to be, and probably should be, various and experimental, NTIA should avoid being too prescriptive in specifying metrics. States should look for opportunities to quantify their activities and impact (e.g., a DEA-funded digital literacy program could count the number of participating students and define specific performance measures that assess learning outcomes). NTIA itself should study the impact of DEA-funded activities in creative ways in order to discern what is worthy of emulation elsewhere. NTIA should perhaps also consider developing measures of digital literacy, privacy and cybersecurity awareness, and other desired outcomes listed above in ways that can be tracked and researched in the future. At present, we believe the risk of insufficient accountability for performance is less than the risk of distorting future incentives by focusing on ill-conceived or inappropriate metrics.

Digital Equity Coordination Requirements

30. *The Bipartisan Infrastructure Law requires state and territories to consult with historically marginalized and disadvantaged groups, including individuals who live in low-income households, aging individuals, incarcerated individuals (other than individuals who are incarcerated in a Federal correctional facility), veterans, individuals with disabilities, individuals with a language barrier (including individuals who are English learners and have low levels of literacy), individuals who are members of a racial or ethnic minority group, and individuals who primarily reside in a rural area. What steps should NTIA take to ensure that states consult with these groups as well as any other potential beneficiaries of digital inclusion and digital equity programs, when planning, developing, and implementing their State Digital Equity Plans? What steps, if any, should NTIA take to monitor and assess these practices?*

States have regular contact with these populations through the administration of unemployment insurance, EBT, Medicaid, law enforcement, K-12 schools, refugee

resettlement, and other services, and should be encouraged to leverage this access to engage directly with populations covered by the DEA. Collecting data from such populations—whether through surveys, focus groups, creative use of administrative data, etc.—will inherently generate documentation which the NTIA should accept as evidence of consultation.

Mission-oriented advocacy and relief organizations that engage with populations covered by the DEA can also shed a valuable light on how their needs for digital inclusion might best be met. States can engage with these groups, and written comments from them should suffice as evidence of consultation.

In some cases, state agencies may have important insights about digital needs that arise from their own experiences serving covered populations. They should be encouraged to articulate these perspectives, as a supplement to stakeholder consultations and a legitimate and desirable motivating factor in the design of stakeholder engagement strategies. However, the NTIA should resist letting state agencies' experience-based perspectives on digital equity substitute for the actual voices of the digitally disadvantaged.

31. The Bipartisan Infrastructure Law also requires states and territories to coordinate with local governments and other political subdivisions in developing State Digital Equity Plans. What steps should states take to fulfill this mandate? How should NTIA assess whether a state has engaged in adequate coordination with its political subdivisions?

States should solicit input from municipal leagues, county associations, and any other local government associations that are active and influential. Written comments from such organizations forwarded to NTIA should suffice to meet the consultation requirement.

Since local government actors may often be unfamiliar with the concept of digital equity and/or Digital Equity Act programs, states could find it difficult to foster engagement. To assist states, NTIA should consider publishing materials, conducting listening sessions and surveys, and sending representatives to local and national events, in order to raise awareness and encourage local governments to participate in state digital equity planning.

Implementation of Middle Mile Broadband Infrastructure (MMBI) Grant Program

32. Middle-mile infrastructure is essential to American connectivity. Lack of affordable middle-mile access can have a substantial impact on the retail prices charged for broadband services. How should the Assistant Secretary ensure that middle-mile investments are appropriately targeted to areas where middle-mile service is non-existent or relatively expensive? To what extent should middle-mile grants be targeted to areas in which middle-mile facilities

exist but cannot economically be utilized by providers that do not own them? Should NTIA target middle-mile funds to areas where interconnection and backhaul costs are impacted by a lack of competition or other high-cost factors?

We believe that NTIA should target middle-mile investments to areas where such infrastructure is non-existent, but **also** to areas where interconnection and backhaul costs are negatively impacted by a lack of competition or other factors.

To justify the latter, one must consider *why* most major metropolitan areas have robust broadband ecosystems that deliver superior bandwidth, lower latency, lower cost services, while many smaller cities, towns, and rural areas do not. At a high level, the answer is that urban markets generally have robust competition, facilitated by the existence of multiple backhaul networks that freely interconnect (in local carrier-neutral interconnection facilities) with local ISPs and cloud and content networks. Competition and local interconnection drives investment that makes greater bandwidth at lower prices possible, while also lowering latency and significantly improving the end-user experience. Simply put, many rural areas lack carrier-neutral *real estate* to provide a home for interconnection and competition to thrive.

The benefits of middle-mile network construction are significantly impaired when either end of the network terminates in a facility (such as a telco “central office”) that is privately controlled to the exclusion of other networks. Across the U.S., many smaller cities and rural markets are controlled by one or two incumbent last-mile networks—such as a telephone and/or cable TV company. Because those companies have a vested interest in making a profit (and keeping prices as high as possible), they also have a vested interest in limiting access to competitive middle-mile backhaul.

The lack of local real estate to facilitate network interconnection—on a level playing field across all network operator types—is actually a major reason why there is a lack of competition in smaller markets. This is why Congress prioritized network interconnection—and by extension, the construction of carrier-neutral internet exchange points (IXPs)—in the middle-mile grant program provisions of the Infrastructure Investment and Jobs Act (IIJA). The existence of these facilities is arguably more important than middle-mile fiber construction itself, because *all* local networks must have a physical place to interconnect on a neutral and open basis with competitive middle-mile networks. **Otherwise, the utility of those networks is severely limited, and borders on being a waste of resources.** The incumbent’s central office is inherently *not neutral*, so the lack of a neutral facility is a preeminent concern to the success of the middle-mile grant program.

Therefore, **we believe NTIA should require all network operators that receive a grant for middle-mile network construction to terminate locally in an independent carrier-neutral facility.** Where no such facility exists, NTIA should fund the construction of one, preferably with minimum footprint of 12 full-size racks and a 100

kW power capacity, with backup mechanical, electrical, and plumbing to ensure resiliency.

The “middle-mile problem” in the United States consists of both a lack of middle-mile fiber in some areas, and the fact that existing middle-mile is very expensive in many other areas. This is particularly true as compared with other industrialized nations across the globe. We applaud the inclusion of data from the Organisation of Economic Cooperation and Development (OECD) that demonstrates these high costs in the U.S., relative to the rest of the world, in the U.S. Treasury’s State and Local Fiscal Recovery Fund (SLFRF) Interim Final Rule². Competition is key to changing the status quo, and in order to drive a more competitive marketplace, we must stop using taxpayer money to fund fiber and other middle-mile network facilities that are not network-neutral or open-access. A 2017 study by Ookla found that 70% of broadband subscribers in the U.S. had one or zero options for broadband internet service³, and one of the reasons for this is a lack of competitive middle-mile options to service last-mile ISPs. The status quo clearly isn’t working.

We are witnessing a paradigm shift regarding the need for content and cloud services to be more geographically distributed, moving closer to the edge and the end user. Applications that require real-time, low-latency data exchange—such as those that support autonomous vehicle safety communications or camera-driven maintenance checks on passenger trains—will become more common. The passage of the IIJA gives us the opportunity to develop infrastructure to not only address today’s needs, but also prepares communities large and small for the innovations that will drive the future. We must get this right, and it starts with the right philosophy governing the types of projects that are approved. We therefore urge NTIA to prioritize projects that facilitate carrier-neutral interconnection and peering, as those will make other investments in middle-mile and last-mile connectivity more impactful.

33. *The Bipartisan Infrastructure Law’s provisions regarding the Middle Mile Broadband Infrastructure Grant Program set out a range of considerations governing NTIA’s assessment of proposals seeking middle-mile funding, including improving affordability, redundancy and resiliency in existing markets, leveraging existing rights-of-way, assets, and infrastructure, and facilitating the development of carrier-neutral interconnection points. See BIL § 60401(e), (b)(2), (d)(2). How should NTIA implement these requirements, and the others listed in the legislation, in prioritizing middle-mile grant applications?*

As discussed above, the economic and social impact of new middle-mile infrastructure to (or within) a given region can vary widely, from limited to substantial. The extent of

² To quote from the SLFRF Interim Final Rule: “However, even in areas where broadband infrastructure exists, broadband access may be out of reach for millions of Americans because it is unaffordable, as the United States has some of the highest broadband prices in the Organisation for Economic Co-operation and Development (OECD).120” <https://home.treasury.gov/system/files/136/SLFRF-Final-Rule.pdf>. Accessed Jan 27, 2022.

³ See “Exclusive: Check Out the Terrible State of US ISP Competition.” <https://www.pcmag.com/news/exclusive-check-out-the-terrible-state-of-us-isp-competition>. Accessed Jan 27, 2022.

the impact is largely determined by whether the infrastructure is open and whether local access to it is available at a carrier-neutral interconnection facility or a facility that is controlled by a single local incumbent. We believe that NTIA should support and prioritize middle-mile connectivity projects that foster a more competitive landscape, such as open-access dark fiber networks. But in many cases, the establishment of carrier-neutral interconnection facilities—or IXPs—can have the broadest impact, from driving competition for IP transit and backhaul, to bringing cloud services and content closer to local users, thereby making existing backhaul more efficient by keeping traffic local that needs to stay local.

According to our own research, there are approximately 56 metro regions across the United States where network interconnection primarily occurs—in cities like New York, DC (Ashburn, VA), Atlanta, Dallas, Chicago, Kansas City, Minneapolis, Denver, Los Angeles, and Seattle. But alarmingly, there are 17 states that do not have a carrier-neutral internet exchange point (IXP) at all. In those states, nearly all internet traffic is backhauled to IXPs in distant cities, sometimes traversing distances of 500 miles or more, oftentimes returning back to the state where it originated to reach another end-user. This “trombone effect” is incredibly inefficient and makes the internet slow and less reliable. We developed an educational video on this subject, available here: <https://vimeo.com/637977595>

We believe Congress’s intent in the IIJA is to prioritize middle-mile infrastructure, including the construction of carrier-neutral IXPs, in states and regions that do not have them. Doing so will improve affordability, as well as network reliability and resiliency, for end-users, community anchor institutions, and last-mile ISPs alike.

On a separate but related note, NTIA should also adopt clear interconnection requirements for all grantees that receive funding to build middle-mile connectivity—namely, that they must peer in a local carrier-neutral facility, and that this requirement shall be conveyed to any future owners of the assets should they ever be sold or transferred. Otherwise, a sale could severely jeopardize the original intended impact of the asset and foster a situation where local incumbent networks are incentivized to pursue the purchase of NTIA-funded projects down the road.

This, in fact, occurred in the State of Hawai‘i in 2021 when Hawaiian Telecom purchased the assets of the Paniolo cable system—a 358-mile long subsea and overland cable system that connects the major Hawaiian Islands⁴. It was originally built using American Recovery and Reinvestment Act (ARRA) dollars a decade ago, and until its acquisition was the only non-incumbent interisland middle-mile network operating in Hawai‘i.

34. What requirements, if any, should NTIA impose on federally funded middle-mile projects with respect to the placement of splice points and access to

⁴ See “Hawaiian Telcom to Acquire Inter-Island Submarine and Terrestrial Fiber Infrastructure Assets from Paniolo Cable Company.” <https://www.businesswire.com/news/home/20201130006003/en/Hawaiian-Telcom-to-Acquire-Inter-Island-Submarine-and-Terrestrial-Fiber-Infrastructure-Assets-from-Paniolo-Cable-Company>. Accessed Jan 28, 2022.

those splice points? Should NTIA impose other requirements regarding the location or locations at which a middle-mile grantee must allow interconnection by other providers?

Within the context of the middle-mile grant program, splice point requirements and lateral connections to neutral interconnection facilities would promote competition, maximize the availability of the assets for the benefit of last-mile networks, and maximize the impact of taxpayer funding. As discussed at length above, middle-mile grantees should be required to have a presence in a neutral interconnection facility and provide fiber access to anyone who wants to buy it.

The alternative scenario would be one in which middle-mile fiber is built into an incumbent central office. What incentive would that incumbent have to open its doors to other network operators, including last-mile competitors, and provide access to those who may want to buy middle-mile capacity? Such a scenario would only be a threat to the incumbent's business. That is why open-access fiber, and carrier-neutral interconnection points, are so vitally important—to break monopolies, improve affordability, and drive better network speeds and lower latency. Taxpayer funding should not subsidize monopolistic behavior.

35. How can the Middle Mile Broadband Infrastructure program leverage existing middle-mile facilities, access to rights of way, poles, conduit, and other infrastructure and capabilities that are owned, operated, or maintained by traditional and non-traditional providers (public and investor-owned utilities, grid operators, co-ops, academic institutions, cloud service providers, and others) to accelerate the deployment of affordable, accessible, high-speed broadband service to all Americans? What technical assistance or guidance should NTIA provide to encourage applications for this program? Are there examples of successful deployments and/or benefits provided by non-traditional providers to highlight?

The establishment of carrier-neutral interconnection facilities, or IXPs, in regions that do not have them may be the best overall way to improve a region's telecom landscape and leverage existing facilities—both middle and last-mile—to increase competition, lower pricing, reduce latency, and give cloud services and content a physical home in which to reside. If public and investor-owned utilities, grid operators, co-ops, academic institutions, and CDNs support the facility and establish their own physical presence to peer within it, everyone will benefit. The more traffic that is driven to and through such a facility, the more successful and impactful it will be.

Because most federal broadband grant programs have focused almost exclusively on supporting the construction of last-mile networks, it is highly likely that states, communities, and even local ISPs may not know how to effectively leverage this program. More workshops should be held to educate stakeholders on these topics, and state and local officials should become involved in organizations like the North American Network Operators Group (NANOG), the Pacific Telecommunications Council

(PTC), and the SubOptic Association. Additionally, NTIA, state broadband offices, and the service provider trade associations should invite company leaders and industry veterans—particularly those with expertise in the development of carrier-neutral facilities—to speak on the subject at conferences and events. The topic of carrier-neutral interconnection has been noticeably absent at workshops and conferences that are customarily attended by state and local broadband leaders. This needs to change, and NTIA can play a leading role in making sure that it does.

36. As network demand grows, capacity needs in the middle mile and network core grow as well. What scalability requirements, if any, should NTIA place on middle-mile grant recipients?

As network demands grow, capacity needs will indeed grow in parallel. NTIA should fund, to the maximum extent possible, high-count fiber cables in all of its funded deployments—balancing projected future network growth with the cost of the cables. In the most challenging build environments—particularly on routes that would be most costly to build again in the future (e.g., subsea deployments)—NTIA should consider requiring the use of the highest technically feasible strand count for a given route. In those scenarios, the cost of construction will drive the project cost, not the cable itself. Doing so will maximize future upgradeability and the number of network operators that can obtain capacity on the route.

To further promote the role that network-neutral interconnection facilities should play in driving competition and minimizing monopolistic behavior (such as price-gouging), we believe the *minimum* requirement for fiber strand count into any carrier-neutral facility should be equivalent to the *maximum* strand count deployed in any part of a grant-funded build. For example, if a 288-strand fiber was constructed along a highway, the strand count that must be built into the nearest carrier-neutral interconnection facility must be a minimum of 288 strands. Also, as mentioned in our response to question 33, there should be conveyance of open access and peering requirements with any sale or transfer of fiber assets that were funded by taxpayers.