Comments of the

Schools, Health & Libraries Broadband (SHLB) Coalition

In

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To the National Telecommunications and Information Administration

Of the US Department of Commerce

Concerning the

Infrastructure Investment and Jobs Act Implementation

February 4, 2022

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Comments of the Schools, Health & Libraries Broadband (SHLB) Coalition

The Schools, Health & Libraries Broadband (SHLB) Coalition is pleased to present the following views and recommendations for how to implement the broadband programs resulting from the Bipartisan Infrastructure Law (BIL). Before addressing specific questions, we would like to set the stage with a few opening comments.

Lack of adequate broadband continues to constrain American prosperity in many parts of the country, affecting both rural and low-income urban areas. Since 1990, the Federal Communications Commission has spent approximately $100 billion from the Universal Service Fund (USF) to address the infrastructure need, which should have been sufficient to build fiber-to-the-home nationwide, reaching all but the most remote "frontier" areas. Yet tens of millions of rural and inner-city households still rely on decrepit, 1950s-era copper cables that no longer support reliable telephone service, let alone high-speed broadband. In effect, we paid for a superhighway but wound up with a goat path.

1. **Opening Comments: Thinking Long-Term**

We must deploy network infrastructure that will support projected growth for at least thirty years. Investing in "future-proof" networks that support symmetric, multi-gigabit connectivity will cost much less in the long run than short-lived, incremental solutions that will require ongoing capital subsidies to ensure long term profitability. The following chart reflects our view of the growth in bandwidth demand over the next few decades.

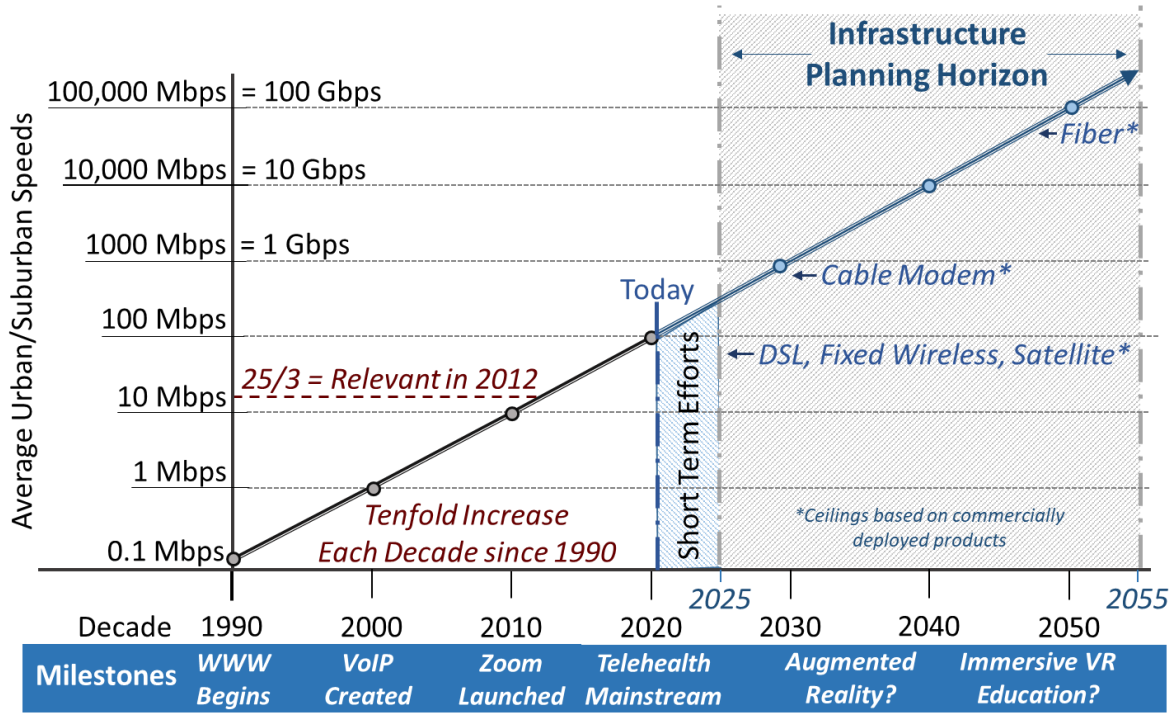

Figure 1:Long-Term Perspective on Broadband Requirements [Credit: ConnectingAppalachia.org]

With demand increasing tenfold per decade, we will need networks capable of reaching speeds of 100 gigabits per second in the foreseeable future (Figure 1). While this may sound extraordinary, the pace of technological change continues to accelerate. As demand for applications like augmented and immersive virtual reality increase, so will the need for faster and faster speeds. Perhaps the trend line will moderate, yet we can already see that 1 Gbps will become the norm in the next several years. Expanding to require 10 Gbps or 100 Gbps may thus not be as outlandish as it may initially seem. Furthermore, our national goal should aim toward services that provide symmetrical speeds both down and up. The internet provides consumers with an unparalleled tool for innovation, content-development and sharing. Consumers, non-profit organizations, anchor institutions and businesses will need upload speeds to be just as fast as download speeds once they are able to create and distribute their own data-rich content. The legislation calls for the Middle Mile program to offer symmetrical gigabit speeds, and last-mile projects funded by the BEAD program should as well. We certainly want to avoid undershooting once again, building a solution that is outdated a few years after construction has been completed.

2. **Anchor institutions should be eligible to receive service from BEAD sub-recipients to promote access by unserved and underserved homes. (Question 7)**

Anchor institutions can play an enormously important role in promoting broadband access, adoption, affordability, digital equity and digital inclusion. There are hundreds of examples of anchor institutions and municipalities contracting with broadband companies to extend affordable broadband service – both wired and wireless - to their communities. Anchor institutions, especially libraries, also provide digital literacy training and promote awareness of broadband subsidy programs such as the Emergency Broadband Benefit/Affordable Connectivity Program.

We are extremely pleased that the legislation recognizes that anchor institutions are eligible to receive service (as set forth in Section 60102 (f)(2)) and that any anchor institution without gigabit level service is eligible to receive service (as set forth in the definition of "eligible anchor institution" in section 60102 (a)(1)(E)). The BEAD program should embrace the same definition of anchor institutions as is contained in the Middle Mile program. Even though the legislation provides that anchor institutions shall be given third priority in the BEAD program, applicants for BEAD funding should nevertheless be able to use such funding for anchor institution connectivity when it helps promote connectivity for unserved and underserved homes. For instance, including service to anchor institutions may help improve the sustainability of the community network (much like "anchor tenants" in a mall). Anchor institutions themselves could use BEAD funding to contract with a private sector company to deliver affordable broadband service to unserved and underserved homes. Anchor institutions can also be included in the 20% of the customer base that is not underserved even if the rest of the area is underserved.

Providing service to anchor institutions has also been shown to generate jobs and economic growth. In evaluating the Broadband Technology Opportunities Program (BTOP), ASR Analytics found

> the additional broadband infrastructure provided by BTOP could be expected to create more than 22,000 long-term jobs and generate $1.1 billion in additional household income each year. Results from Gillett et al. (2006) suggest at least 6,900 long-term jobs could be created in the year following the construction of BTOP infrastructure, and potentially each year for at least the next four years due to increasing employment growth in areas with new broadband availability. These employment increases would result in a $328 million increase in household income for each year employment increases by the estimated amount in newly served areas." (ASR Report, p. 34).

3. **All recipients of both BEAD program funding and Middle Mile funding should have open interconnection obligations, and they should have open access obligations as well except in areas where there is only one bidder to provide service.**

Most government broadband expansion programs in rural areas create de facto monopolies in the service area. Because of the low population density, these areas cannot generate sufficient revenue to support multiple providers each depoying their own infrastructure. Regardless of good intentions, the corporate realities will lead to monopoly behaviors by the single provider that maximize profits, often at the detriment of service and performance.

One way to promote competition and lower prices in areas with a single provider in rural markets is to require funding sub-recipients to adhere to open access and/or open interconnection policies. The successful BTOP program a decade ago demonstrated that requirements of open access, interconnection and nondiscrimination make it easier for third parties to build off of the government-funded network to provide affordable service to the surrounding community.[1] While Middle Mile projects are often highlighted for their open access and interconnection policies, there are also many examples of last-mile open access projects as well. Research performed by ASR evaluating the BTOP program demonstrated that open interconnection increased broadband availability to homes by 2%:

> In other words, 2.00 percent of individuals in the service area gained broadband availability due to the activities of the [broadband infrastructure] case study participants. This represents nearly 650,000 people in the combined case study service area. Applying this estimate to all [broadband infrastructure] grants, more than 4.3 million people gained broadband availability from June 2011 to June 2013 due to the activities of CCI grantees.

Both open interconnection and open access policies can help to stimulate investment, competition and economic growth. The funding recipient can deploy the physical network equipment, such as wireless access points or fiber. With open interconnection, other parties can collocate equipment and build off of this network to deploy their own fiber or wireless networks to service other consumers. Open access creates a wholesale/retail split, allowing multiple independent Internet Service Providers (ISPs) to lease fiber strands and provide retail service. The ISPs then compete for customers, which can spawn greater innovation and lower prices for consumers.[2]

[1] https://www2.ntia.doc.gov/files/Interconnection_Nondiscrimination_11_10_10_FINAL.pdf
[2] An explanation of open access last mile networks and a list of such networks in the US is available at https://muninetworks.org/content/open-access.

An open interconnection/open access policy can be designed to be flexible to accommodate a variety of business models:

> Each of the grantees in the evaluation study sample implemented at least one strategy, and in many cases a combination of strategies, to ensure open access to the BTOP-funded network by third-party service providers. For example, the research and education network and the healthcare network in Arkansas established a partnership to deploy new and upgraded fiber and colocation facilities. Merit Network in Michigan offered indefeasible right-of-use agreements to private third party service providers. MassTech fostered competition by helping CAIs compare services and prices offered by third-party providers that use the BTOP-funded network. Each of these projects developed policies that promote open access to the grant-funded network by third-party providers to help expand service within unserved and underserved areas." (ASR Report, p. 28)

Sweden has operated open access networks for over twenty years. By 2009, 90% of Swedish households had access to broadband service largely driven by municipally-built open access networks. According to one paper:

> The basic idea behind the open access model is to promote the highest degree of competition in order to maximize the freedom of choice for the end users, and avoid monopoly [4]. . . Another important driver has been the failure of traditional large operators to provide broadband access at sustainable prices in remote areas. This is a reason why many rural communities across Sweden have deployed open access networks. Today it is estimated that 95% of the 173 municipality networks and 42% of the housing companies with FTTx currently operate according to an open access model [5], [6].[3]

SHLB believes that open interconnection and open access have many benefits. While SHLB supports measures to encourage, the creation of these networks, we do not necessarily endorse an open access mandate. We are reluctant to dictate a particular business model, as the solutions and economics may vary significantly from one region to the next. It is possible that an open access mandate may discourage all potential providers away from serving some of the most high-cost areas, which would defeat the purpose of the funding. Having said that, an open interconnection, nondiscrimination and colocation policy should be required of all BEAD-funded networks. And in cases where multiple service providers are competing for government funding, the government funders should give a strong preference to those networks that will

[3] See, https://www.researchgate.net/publication/224167522_Open_access_networks_the_Swedish_experience.

implement open access, policies as well.[4]

4. **NTIA and States should incorporate State and local broadband maps and other data to supplement the FCC maps.**

While the legislation directs NTIA to base its funding decisions on the FCC generated broadband maps, NTIA and the states should also consider additional maps and other information to supplement the FCC maps. This will be crucial, particularly given the importance of the ratio of unserved households in the state-by-state funding allocations. While we hope the FCC DATA-based maps will deliver accurate information on availability, we suggest that the weak past-performance of FCC maps necessitate NTIA flexibility in assessing all credible sources of broadband mapping advanced by the states. Furthermore, the FCC maps may be delayed due to legal disputes, and the FCC maps may depend too much on data provided by incumbent providers who have an incentive to exaggerate their actual coverage areas. Many states and local governments have engaged in their own mapping efforts, some of which are likely to be more granular and accurate than the FCC maps.

If the FCC DATA maps and/or the State mapping efforts identify an area as unserved or underserved, the odds are quite high that the finding is accurate. Thus, we recommend that anyone challenging a grant should bear the burden of proof and not the State. The NTIA could require that the objecting party provide subscriber information and end-to-end performance testing results to substantiate claims of coverage. If the objecting party cannot demonstrate availability of speeds of 100/20 or higher, the rules should allow the project proposal to proceed. In such a case, this is not over-building but rather replacing past-end-of-life infrastructure with robust new infrastructure. Further, if an incumbent provider alleges that it is "about to serve" an area as a reason to challenge a BEAD funding award, it should be required to post a bond to ensure that it carries through with that promise. This should provide incumbents a financial incentive to build out to an area.

5. **NTIA should require each State to establish a plan to ensure timely and cost-efficient access for poles and rights of way needed for broadband deployment prior to receiving funding.**

Access to utility poles and rights of way are a critical piece of any broadband deployment, especially in less densely populated communities with greater geographic distance between anchor institutions, households and businesses. SHLB members have seen time and time again how unreasonable delays and excessive costs arising out of pole attachments and rights-of-way

[4] As set forth below, NTIA should require interconnection agreements to be filed with NTIA and available for public inspection (with appropriate restrictions on proprietary data) in order to ensure transparency and promote competition.

access can jeopardize a broadband deployment project.[5] The cost of preparing existing utility poles for fiber attachment, called "make-ready," vary widely from $10,000 per mile to $60,000 per mile. In the vast majority of cases, the cost is an unknown until an Internet Service Provider has engineered the routes, submitted pole-by-pole applications, and received responses back from the pole owners.

The SHLB Coalition recently submitted a letter to the FCC highlighting some of these time consuming and costly challenges associated with access to pole attachments and rights of way.[6] A recent study suggests that delayed pole access is costing taxpayers "between $491 million and $1.86 billion" a month in lost economic gains.[7] Whether the broadband deployment funding being distributed by NTIA reaches its potential and is deemed a success will significantly rely on whether broadband networks in the funded areas are able to obtain access to poles and rights of way quickly and at a reasonable and equitable cost.

The SHLB Coalition strongly urges NTIA to require states and territories seeking funding to have in place specific plans or requirements that will clearly and meaningfully address pole attachment and rights of way problems.[8] These plans need to provide for a quick resolution of disputes, timely access and a reasonable allocation of costs between pole and rights of way owners and attachers. In preparing these plans, states should consult with local governments who have authority over poles and the rights-of-way. We respect the authority of local governments to act in the best interests of their communities and we encourage all levels of government to implement non-discriminatory and cost-based rates. The SHLB Coalition recently adopted its own set of pole and rights of way principles that we believe should provide helpful guidance to funding recipients developing such plans.[9] Further, to help facilitate pole and rights of way access, NTIA should provide guidance to funding recipients that BEAD and Middle Mile funding can (and should) be used to facilitate access to poles and rights of way, as appropriate.

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[5] SHLB members include several nonprofit, state-based research and education networks, as well as some commercial broadband providers. A full list of SHLB members is located at www.shlb.org/about/coalition-members.

[6] *See* https://ecfsapi.fcc.gov/file/101311604409608/SHLB%20Letter%20to%20FCC%20on%20Pole%20Issues%20-%20Final%20with%20Attachments%20-%20Jan%202022.pdf (attached).

[7] *See* https://connectthefuture.com/new-study-utility-pole-access-key-to-speeding-broadband-deployment-across-the-country/.

[8] We note that in the IIJA, Section 60102(e)(1)(D), requires an eligible entity (i.e, a State) that receives funding to submit to NTIA a 5 year action plan. We strongly suggest that NTIA require that such plans address the issue of pole attachments and, furthermore, that the plan propose how to resolve such issues in an expeditious manner based on the SHLB Coalition's non-discrimination principles..

[9] See, https://www.shlb.org/uploads/Policy/SHLB-Pole-Attachment-Principles.pdf. These pole attachment and rights of way principles were also filed last fall with the Federal Communications Commission. *SHLB Ex Parte Notice with Pole Attachment Principles to Expedite Broadband Attachments for Anchor Institutions and Their Communities*, WC Docket No. 17-84 (filed Sept. 2, 2021).

We recommend that the NTIA require states to establish a process for expediting make-ready and a method for ISPs and pole owners to reach equitable cost allocations. Given the large geographic areas in which broadband will be expanded, States may need to work with their Public Utilities Commissions to evaluate fast-track rate cases to enable electric utilities to improve grid resiliency and prepare their poles for fiber attachment.

6. **NTIA should clarify that BEAD funding can be used for cybersecurity.**

Cybersecurity is an important national security issue for communications providers. Section 60102 (g)(1)(B) recognizes that eligible uses of BEAD funding can include "prudent cybersecurity and supply chain risk management practices, as specified by the Assistant Secretary, in consultation with the Director of the National Institute of Standards and Technology and the Commission;". NTIA should make clear that states are expected to fund important cybersecurity software, related firewalls and other cybersecurity measures in the projects of sub-recipients. NTIA should provide guidance for sub-recipients and states to ensure that broadband infrastructure deployments meet basic NSA cybersecurity criteria to mitigate and prevent cyber risks to our communication networks and consumers.

7. **NTIA should clarify that BEAD funding can be used for backhaul/middle mile/new Internet exchanges.**

The lack of backhaul and Middle Mile capacity is a serious problem for many communities. Building last mile connections to homes will be stranded investmentif there is no backhaul available to connect the community to an internet exchange (or "point of presence"). Most Internet exchanges are located in major cities. Adding more Internet exchanges will lower the cost of deploying last-mile projects in rural and remote areas, increase speed, and efficiencies. The legislation specifically recognized that BEAD funding can be used to connect to the middle mile Section 60102(h)(4) says as follows:

> (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.

In addition, Section 60102(f)(6) says allows BEAD funding for "any use determined necessary by the Assistant Secretary to facilitate the goals of the Program." NTIA should clarify that sub-recipients of funding may use BEAD funding to construct or purchase additional backhaul/middle mile if it is necessary to connect unserved/underserved communities.

8. **NTIA should clarify that research and education networks are eligible for both BEAD and Middle Mile funding.**

We are pleased that the legislation ensures that non-profits as well as municipal providers, co-operatives and others cannot be excluded from funding in section 60201(h)(1)(A)(iii). NTIA

should make clear to list non-profit research and education (R&E) networks as a type of non-profit organization that is eligible for funding. Many non-profit R&E networks received BTOP funding and successfully deployed high-capacity networks serving anchor institutions. They also stand ready to help facilitate the provision of residential service by deploying and providing backhaul and middle mile capacity to firms providing last-mile connections to homes. Without affordable back-haul, last mile providers will not be able to provide service to unserved and underserved homes, so such backhaul providers, including R&E networks should be explicitly eligible for funding.

BEAD money could help expansion of these important networks. Cities and counties often need to secure backhaul from R&E networks. Even last mile network providers – such as rural telcos – often need to purchase backhaul and this expense should be eligible for BEAD funding, whether from and R&E network or others.

9. **Recipients of funding for last mile service should provide an affordable rate for minimum 100/20 level of broadband to the home.**

The legislation gives eligible entities (states) some flexibility to define the obligation for BEAD recipients to provide at least one affordable broadband service option, without specifying the bandwidth or the price of such service. NTIA should specify that each BEAD recipient should provide an affordable service offering at least 100 Mbps down/20 Mbps service up. We recognize that this standard is higher than the FCC's current minimum definition of broadband as 25/3. The FCC adopted this definition in 2015. By the time the BEAD program sub-recipients are awarded funding (likely to begin in 2023), eight years will have elapsed, and it is highly likely that the 25/3 standard will be inadequate to meet the needs of most households by that time. Indeed, Comcast is already offering an affordable rate option for 100/10 service in some parts of the country. The IIJA legislation itself finds that any area that does not have 100/20 service is unserved. Furthermore, the investments made by the BEAD program are intended to deploy "future-proof" networks that will last for decades. There is no reason that low-income consumers should be left behind as the rest of country moves toward a minimum 100/20 level of service. NTIA should thus mandate that sub-recipients of BEAD program funding offer a low-cost broadband service offering at least equivalent to the 100/20 level of service to start. Considering that the BEAD program is intended to provide future-proof service for decades, low-income households need not be relegated to inferior network connectivity.

The affordable price level should be set to ensure that low-income families can receive a subsidy to pay for the full cost of the affordable service offering. For instance, if the subsidy of $30 is available through the Affordability Connectivity Program (ACP), then the affordable rate should be set at $30. If a subsidy of $75 is available (such as in high-cost or Tribal areas), then

the affordable rate should be no higher than $75. NTIA should also embrace the same eligibility criteria for this affordable rate as the FCC sets for the ACP.

10. Transparency is important and interconnection agreements should be made publicly available.

We applaud the reporting requirements in the BEAD program legislation. SHLB strongly supports full transparency from states and sub-recipients. In addition to reporting accomplishments, we recommend the NTIA also require forward-looking project schedules. The reported data should ideally be released to the public within 30-days of the close of each six-month reporting period. Additional weight could be given for proposals that increase the frequency of reporting to quarterly. Furthermore, NTIA should also publish the interconnection agreements reached by BEAD funding sub-recipients and providing update network deployment information to improve the nation's broadband maps. Unfortunately, the BTOP program did not make interconnection agreements available, which limited the analysis of their benefits.[10]

11. If an existing provider is only offering 25/3 Mbps service, a new provider offering 100/20 Mbps service or more should not be considered "overbuilding".

The biggest problem in this country has been "underbuilding", not overbuilding. We simply do not have enough broadband infrastructure in place. Incumbent providers often assert that the government should not fund duplicative networks, but that approach is overly simplistic particularly in a competitive environment. The issue is much more complex. While it is true that some areas have no broadband service available and that these areas should receive priority, it is also true that certain areas of the country have some but not enough broadband capacity, or do not have a quality of broadband service to serve the needs of the community. We are pleased that the IIJA recognizes the importance of broadband quality, as the quality of the broadband connection is more important than simply measuring whether it is or is not available.[11] For instance, networks must have low latency and packet loss to ensure a good user experience, , especially since so much of the network is now being used for interactive and

[10] "In particular, BTOP middle mile projects and third-party last mile providers have signed more than 800 agreements as of December 31, 2013.185 These agreements could lead to further increases in broadband availability to organizations, communities, households, and individuals. However, the overall benefit of these potential future agreements is not clear, mostly due to non-disclosure agreements signed by BTOP-funded infrastructure managers and third parties that intend to use the infrastructure to distribute broadband services." (ASR Report, p. 33)

[11] The IIJA correctly identifies quality of service when it defines priority broadband project as meeting the "speed, latency, reliability, consistency in quality of service, and related criteria as the Assistant Secretary shall determine;" as well as scalability, in section 60102 (I).

real-time applications. Redundant network capacity must also be available to guarantee that sufficient connectivity is available in case of natural disaster or cyber-attacks. The capacity needs of the user are also important; if a hospital needs gigabit service to conduct telemedicine or remote surgery or other life-saving services, it should not be denied broadband funding just because a company is offering 25/3 level service to homes in the area. Similarly, the conduit and pole attachment and physical fiber must be good quality – not all fiber deployments are of equal quality. Ideally, the IIJA funding programs should encourage the deployment of multi-fiber cables with dozens of fiber strands and allow third parties to lease fiber strands to expand connectivity across the region. All of these factors should be taken into account as NTIA develops its funding guidelines for the states.

12. NTIA should establish robust specifications for funded broadband infrastructure and give higher scores to applications proposing higher speed, scalable and sustainable networks.

As has been recognized in the IIJA, deploying broadband infrastructure to low-density and low-income households requires government subsidy of capital costs. Largely missing from such programs, though, have been robust requirements and rigorous enforcement, leaving rural America and inner-city areas behind. Fortunately, common sense solutions can address these shortfalls.

The term "future-proof" networks requires robust specifications in order to support 30-40 years of growth in demand, use cases and population. We urge the NTIA to adopt infrastructure specifications for the BEAD program to make the best use of the limited funding. One would not fund a highway project, as an example, without detailed specifications on the materials, design and construction process. In the absence of robust specifications, the BEAD program will not ensure the deployment of "future-proof" infrastructure, which is essential for the success of the program.

Most broadband expansion programs over the past 20-30 years have focused on a single metric – speeds offered when the work is complete. As an example, in 2015, the FCC awarded $9 billion in Connect America Funding - Phase II (CAF II) to incumbent local exchange carriers across the country, securing a modest commitment to deliver 25 Mbps down and 3 Mbps (25/3) up by the end of the funding period in 2021. First, the 25/3 objective was overly conservative as the average speed in well-served areas already surpassed the target. Second, the funding had little enforcement in terms of the infrastructure to be deployed to achieve this modest target. As a result, rather than delivering upgraded infrastructure in rural America, many of the CAF recipients merely attempted to leverage their existing and antiquated 50+ year old twisted pair copper cables.

The CAF II results were disappointing. In addition to many companies missing their target dates, the reality on the ground in much of the area funded is that households cannot even achieve 10/1 speeds. For instance, in Ohio, fully 50% of the populated rural areas remain below the 10/1 threshold despite the commitments made as part of CAF II, a reality shared by much of rural America. The CAF II funding represented just a fraction of the $100 billion in Universal Service Funding distributed by the FCC to improve rural telecommunications since 1990, most of which had similarly unfortunate results.

Similarly, the BEAD objective of achieving 100/20 speeds as the minimum is a short-term target that reflects the current situation in well-served areas. Achieving this speed, however, should not be celebrated as a success. As an example, distributed tap fiber networks generally rely on very low strand-counts, instead inserting taps along a road at each household, daisy chaining as many as 32 households on a single strand of fiber. In contrast, a centralized split design would replace the one strand with 32 strands, one to each household. A low strand-count network reduces material and construction costs as well as the "make-ready" costs while still achieving the 100/20 or 100/100 target speeds. However, as needs grow and change the low strand-count network will not deliver sufficient capacity. As an example, deploying 5G services requires numerous small transmitters located just a few hundred yards apart. The back-haul networks to support 5G require numerous fiber strands and exceptionally high-performance networks. NTIA should take such considerations like these into account as it develops its application guidelines.

The USDA Rural Utilities Service (RUS) has for decades guided the deployment of rural infrastructure including telecommunications, electrical, water and sewer projects. Exhibit A: "Existing RUS Specifications Related to Fiber Broadband Design and Implementation" provides a listing of the most pertinent RUS standards for deployment of fiber optic plant. The NTIA could simply adopt the RUS standards or use the RUS standards as a starting point for development of its own set of specifications.

13. NTIA should also establish performance testing requirements for funded networks.

We recommend that the NTIA establish explicit performance requirements for networks funded under the BEAD program. Latency, as an example, can be measured in terms of responsiveness within an ISP's own network, which offers little value in predicting the usability of the network for end-to-end performance across the Internet. Yet no ISP can guarantee latency across the networks of multiple ISPs.

Thus, performance measures need to be articulated in reference to connectivity with one or more major Internet exchanges. This allows the NTIA to objectively measure performance of an ISP's network as well as the adequacy of its connectivity to the larger Internet, but without burdening the ISP with the variation from network-to-network of other ISPs. This approach will work for latency, jitter, and raw speed.

It is not realistic or workable to place this responsibility on each individual grant recipient. Rather, to make this approach work NTIA will need to contract with a hosting company operating within the Internet exchanges to provision servers against which tests can be conducted. Public access to the testing results and to the load and throughput of the testing servers would offer tremendous transparency. Enabling individual subscribers to utilize the same testing framework would provide crowdsourced truth-on-the-ground.

The performance and related testing requirements need to remain in place for the life of the infrastructure. Otherwise, it will be tempting for ISPs to shave costs through measures such as increasing the over-subscription ratios, resulting in deterioration of end-to-end performance as demand inevitably grows.

14. **State Digital Equity Plans should include the input from libraries, schools and other community anchor institutions, should include data-driven analyses of measures to improve broadband adoption, and should recognize that anchor institutions can help serve unserved and underserved homes by contracting with private sector companies to extend low-cost wireless service to the home.**

NTIA should ensure that each state's Digital Equity Plan incorporate the views of all anchor institutions as well as public interest organizations and the commercial and non-commercial industries. Each state should hold listening sessions, organize roundtable discussions, and invite written comments prior to finalizing the digital equity plans. All comments and transcripts of the listening sessions should be made public.

Community anchor institutions should have a seat at the table when states develop their plans. Anchors have an especially important role to play in 1) educating the community about the availability of broadband access, 2) providing digital literacy training and lending computing devices, 3) receiving high-quality (at least gigabit level service) so that they can share that broadband access with students, teachers, staff, library patrons and community members, and 4) providing low-cost wireless broadband service to unserved and underserved homes through public-private partnerships. Each state's Digital Equity Plan should itemize how it will allow anchor institutions to serve in all four of these roles.

Regarding the fourth item above, the SHLB Coalition is aware of an increasing number of schools, libraries and municipalities that are working with the private sector to provide affordable wireless service to their surrounding communities. The Digital Equity Act permits funding for such services,[12] and the state digital equity plans should invite parties to submit plans to use DEA funding for this purpose. Few anchor institutions are seeking to operate their own broadband networks, but many of them are contracting with Wireless Internet Service Providers (WISPs), or municipal governments, or manufacturers or other service providers to

[12] Section 60305(d)(2)(A)(iv) says that grant funds may be available "To make available equipment, instrumentation, networking capability, hardware and software, or digital network technology for broadband services to covered populations at low or no cost."

expedite the deployment of wireless networks. (See SHLB Letter to the FCC on the ECF program attached.) This is not a wild-eyed theory; these deployments are accelerating in the marketplace because of the availability of unlicensed CBRS spectrum and the opportunities provided by 5G small cell and Wi-Fi mesh networks. For instance, the state of Nevada sought E-rate support for fixed wireless networks that can cover a two-to-three-mile radius around a school site and could bridge 60 percent of the state's student connectivity gaps.[13] The Boulder Valley Colorado school district contracted with a wireless ISP called to deliver wireless service from the school buildings to low-income communities.[14] These are just a few examples, but they demonstrate the nationwide need and the opportunity. We thus encourage NTIA to make clear that such community wireless networks (often including anchor institutions) are eligible for Digital Equity Act funding and should be incorporated in the states' digital equity plans.

Sincerely,

John Windhausen, Jr.
Executive Director
Schools, Health & Libraries Broadband
(SHLB) Coalition
www.shlb.org
jwindhausen@shlb.org

Feb. 4, 2022

[13] According to the Nevada Governor's filing with the FCC last year: "erecting fixed wireless hotspots on roofs of school buildings would allow students to take advantage of the robust fiber connections that Erate and the Nevada Connect Kids Initiative have made possible. Rooftop fixed wireless hotspots could leverage school sites which have a dense cluster of unserved or underserved students near by to the school itself. Thirteen of the seventeen public school districts in Nevada utilize non-Erate-funded internet access from the Nevada System of Higher Education (NSHE). The utilization of rooftop fixed wireless hotspots using NSHE supplied internet reduces costs of the monthly recurring charges to simply the maintenance fee. In this example, school districts would leverage their existing Erate funded fiber Wide Area Networks (WANs) to transport the Internet to their schools and then propagate a wireless signal to school district registered devices. This framework would approximately cost a one-time $15,000 charge for construction and equipment and $600 per month for maintenance. See, Nevada reply comments.

[14] Petition for Waiver of Boulder Valley School District and Samuelson-Glushko Technology Law & Policy Clinic, WC Docket Nos. 13-184, 10-90 (filed May 16, 2016), https://ecfsapi.fcc.gov/file/60001843683.pdf. (Petition).

Exhibit A

Existing RUS Specifications Related to Fiber Broadband Design and Implementation

Bulletin	PDF	Description
1751F-626	.pdf	Staking of Aerial Plant (5/4/94)
1751F-630	.pdf	Design of Aerial Plant (includes drawings) (1/19/1996)
1751F-635	.pdf	Construction of Aerial Plant (includes drawings) (6/12/1996)
1751F-640	.pdf	Design of buried plant, physical considerations (includes drawings) (3/3/1995)
1751F-641	.pdf	Construction of Buried Plant (includes drawings) (6/30/1995)
1751F-642	.pdf	Construction route planning of buried plant (includes drawings) (6/30/1995)
1751F-643	.pdf	Underground Plant Design (includes drawings) (8/28/02)
1751F-644	.pdf	Underground Plant Construction (includes drawings) (Update 8/28/02)
1751F-650	.pdf	Aerial Plant Guying and Anchoring (includes drawings) (7/3/1996)
1751F-802	.pdf	Electrical Protection Grounding Fundamentals (includes drawings) (4/12/1994)
1751F-805	.pdf	Electrical Protection at Customer Locations (.pdf version includes drawings) (5/22/1995)
1751F-810	.pdf	Electrical Protection of Digital & Lightwave Telecommunications Equipment (7/31/1997)
1751F-815	.pdf	Electrical Protection of Outside Plant (5/22/1995)

1751H-601	.pdf	Lightwave Fundamentals, Systems and Applications (5/17/1991)
1753F-152	.pdf	RUS Form 515c - Specifications and Drawings for Construction of Aerial Plant (.pdf includes drawings) (8/21/01)
1753F-153	.pdf	RUS Form 515d - Specification and Drawings for Service Installation at Customer Access Locations (.pdf includes drawings) (8/21/01)
1753F-201	.pdf	Acceptance Tests and Measurements of Telecommunications Plant (.pdf includes drawings) (8/26/1997)
1753F-208	.pdf	Specifications for Filled Telephone Cables with Expanded Insulation (PE-89) (6/4/1993)
1753F-302	.pdf	Specifications for Outside Plant Housings and Serving Area Interface System (PE-91) (.pdf includes drawings) (7/3/1996)
1753F-401	.pdf	Standards for Splicing Copper and Fiber Optic Cable (PC-2) (.pdf includes drawings) (3/3/1995)
1753F-601a	.pdf	Minimum Performance Specification for Fiber Optic Cables (For Backbone, Feeder and Distribution Plant)(PE-90a) (12/22/09)
1753F-601b	.pdf	Minimum Performance Specifications for Filled Fiber Optic Cables (Subscriber Drop Cables) (12/22/09)
1753F-801	.pdf	Service Installations at Customer Access Locations (PC-5A) (.pdf includes drawings) (9/11/01)

APPENDIX

"TO AND THROUGH" BROADBAND EXAMPLES

The SHLB Coalition believes that deploying broadband service "to and through" community anchor institutions can be a cost-effective way to bring affordable broadband to surrounding residential consumers. The following provides examples of schools and libraries implementing this "to and through" approach or partnering with private sector companies to help solve the digital divide.

APRIL 2021

Mayer Public Library, Mayer, AZ.

Mayer Public Library was provided a grant to give Mayer families internet access so they can safely learn and access important resources virtually. The funds will be used to purchase 10 hotspots, 10 Arizona Science Center CONNECT Explore Subscriptions, and 10 months' worth of data for the hotspots. Community members will benefit because families will have access to STEM learning through the Arizona Science Center in the safety of their homes. They will also have internet access for important needs, such as job applications, filing for unemployment, and virtual schooling.

Arlington Public School: Arlington, VA

Through a $500K Arlington County Government grant, the Arlington Public Schools (APS) began a program in the 2020-21 school year in partnership with Comcast to pay for up to twelve months of Comcast Internet Essential Services. Eligible families receive a bandwidth of 25/3 mbps download/upload in their home. APS also established a 1-2-3-Connecte Me program to use CBRS spectrum on a trial basis to reach additional families. This initiative financed by the Governor's Fasttrack Broadband Funding program, is an extension of broadband services off of the APS & County owned fiber network using CBRS (Citizen's Broadband Radio Service). This technology allows for the set up of a private network solely for student use, to connect to the APS network from home, to continue distance learning instruction and access APS resources, but does not require the County to build additional fiber to create the extension.

Berkeley Unified School District: Berkeley, CA.

The district partnered with existing service provider SONIC to allow families who did not already have a contract with SONIC to sign up for high speed fiber-optic internet service without cost to them for the school year. The current program will last through July 2021, though the school hopes to explore options to continue the program for low-income families.

BiblioTech: San Antonio, TX

BiblioTech is the nation's first all-digital public library and serves Bexar County, an area southwest of San Antonio. The library has launched BiblioTech Connect, an effort to provide Internet access for up to

100 disadvantaged and/or rural area students within Southwest Independent School District. The Library targeted an area where 32% of homes have no broadband access. It is providing wireless Internet by placing small cells on water towers to extend wireless service from the school buildings to homes over CBRS spectrum.

Brooklyn Public Library: Brooklyn, NY

Brooklyn has the largest broadband access gap of any borough; nearly 30 percent of all Brooklynites and 40% of low-income households have neither home nor cellular broadband with even higher rates of disconnection among lower-income residents. Brooklyn public libraries began a program called BKLYN Reach, installing rooftop antennas on their buildings in October 2020 to boost their wifi signals an additional 300 feet beyond their building. The library estimates between 1100 and 3600 people live within 300 feet of their branches, all of whom should be able to access this wifi today at 23 current branches with more to come. The Library is also adding Wi-Fi service to bookmobiles to deliver the service throughout the borough.

Boulder Valley School District: Boulder, CO.*

The Boulder Valley School District's ConnectME pilot program partners with Live Wire Networks to give nearly 1,000 families to the Internet since the COVID crisis closed schools in the spring of 2020. The district added routers on school buildings in those communities so students can at least upload and download assignments. The partnership also provides about 60 students, those who qualify for federally subsidized lunch, free internet service.. In exchange for installing short-range towers on the school campuses, the city allows Live Wire Networks access to the district's fiber network.

Council Bluffs Community: Omaha, NE.*

The Council Bluffs city council and school district manages the community's free wifi network, called BLink, covering the city including its schools. The Council Bluffs Area Wi-Fi Consortium (CBAWC) is charged with maintaining the network and relationships between the partners. BLink is low bandwidth and is not meant for streaming; it is primarily intended to deliver basic internet to as many as possible. The network project began in 2014 and is a permanent fixture of the community.

Dallas School District: Dallas, TX.

The Dallas School District is putting up towers to broadcast Internet service for free to students in need. Five towers, which cost about $500,000 each, broadcast the district's internet service into neighborhoods with high levels of need, determined by students on free and reduced lunch programs. They hope to build permanent infrastructure for the community for post-pandemic life. Note: This article quotes then-Commissioner Rosenworcel as saying, ""We need to give schools the tools they need to help solve the Homework Gap," said acting FCC Chairwoman Jessica Rosenworcel. "Thanks to the FCC's efforts, the 3.5 GHz band is a powerful slice of wireless spectrum that

can do just that. I hope we can use the early success of these schools as a model for other parts of the country too."

Digital Lead: The Public Library Association and Microsoft Corp.: 22 Various Locations.

Microsoft teamed up with the Public Libraries Association to grant $400,000 to 22 rural libraries to purchase hotspots to bring Internet access to consumers in need. These libraries were selected through an application process eligible to public libraries in rural areas.

East Side Union High School District: San Jose, CA.*

A $2.7 million tech bond allowed the East Side Union High School District to create 211 wifi access points which provides Internet access to 75% of San Jose's students. This was part of a pre-COVID pilot project which has already shown demonstrable increases in student performance. According to New America, the district's students no longer suffer from a homework gap, thanks to a "Wi-Fi for Everyone" partnership with the City of San Jose that has built out a dual-use, mesh Wi-Fi network, which is currently being expanded into additional neighborhoods.

Fredericksburg City Public Schools: Fredericksburg, VA.*

The Fredericksburg City Public Schools is poised to transmit Internet access service to some of its students using CBRS spectrum, although it would prefer to use the Educational Broadband Service (EBS) spectrum. The school district filed an FCC petition to use EBS in 2020 because the range of EBS signals is much farther (8 miles radius) and would cover another 40% of the city. T-Mobile filed an official opposition to the city's EBS petition and the FCC has not acted. The school district intends to keep pushing for a permanent EBS network while using CBRS to provide Internet to as many students as possible in the meantime.

Fontana Unified School District: Fontana, CA.

The Fontana Unified School District is partnering with Crown Castle Fiber to establish a private LTE wireless network using citizen's broadband radio service (CBRS). The school distinct will cover the cost of the limited trial to connect some of the 55% to 60% of students who say they do not have reliable internet at home. This program, approved in April 2020, is intended (as of now) to last five years. Fontana Unified's private network will deliver high-speed, unmetered access using the existing CBRS spectrum, supported by nearly 400 cellular nodes positioned throughout school district boundaries. Those nodes can also benefit the Fontana community by laying the infrastructure to support the expansion of technologies, such as 5G.

Imperial County Office of Education: El Centro, CA.

Imperial County established a private network using a Department of Agriculture grant in 2018. The LTE network is called Borderlink and connects students' and teachers' school devices anywhere in 120 sites, including 30 anchor institutions. The county is hopeful that the network will last beyond COVID.

Kings County Office of Education: Hanford, CA.

The Kings County Office of Education decided in 2009 to build its own LTE broadband network, called KingsNet, using the EBS frequencies. Kings County consists of mostly farmland in southern San Joaquin Valley. KingsNet provides students and employees with subsidized internet service and is in the process of improving its infrastructure by building more towers. The subsidies are designed to make access more affordable specifically to staff members and students of the school system. The school system administration manages applications and creates accounts for families. School districts pay KCOE $10 a month for each 4G LTE device, but expects the cost per unit will decrease as the program expands. KingsNet currently provides approximately 3,500 devices to students, distributed through schools and/or districts. KCOE believes the program has resulted in improved student academic performance, increased student participation, fewer disciplinary issues, improved parent/student collaboration, and greater overall benefits to their communities.

Lindsay Unified School District: Lindsay, CA.*

The Lindsay Unified School District worked with the city and community to install antennas on schools, city buildings, and private homes to create a cellular network and provide its 4200 families Internet at no cost to them. In 2016, the school district estimated the startup cost of $1.25 million to

install antennae and hotspots. The anticipated ongoing maintenance cost is $75,000 per year ($17 per Lindsay student).The network is planned to last beyond the pandemic and benefit the students and their families.

Maryland Department of Education: MD.*

Using $15 million of CARES Act and Governors Emergency Education Relief (GEER) funding, the state of Maryland is in the process of rolling out a rural wireless network to serve unserved communities in Maryland primarily using the CBRS frequencies. Funding will flow through the Department of Education, which will work with nonprofits, and the Office of Rural Broadband. Officials are currently engaged in a feasibility study to explore using existing towers to deploy antennas. They hope the network will be up and running by the end of 2021. This project would provide Internet access for students at first and then expand to other rural Maryland residents.

McAllen Independent School District: McAllen, TX.*

Using a $6 million CARES Act reimbursement, the McAllen Independent School District created a CBRS network by mounting antennas on city water towers, light poles, and utility poles in September 2020. The town is located just 11 miles from the Mexican border. Initially, the district purchased more than 8,000 Wi-Fi hotspots for homes without connectivity, but officials soon learned that this was not an adequate

solution. The district partnered with Cambium Networks and Federated Wireless who provided expertise, service, and equipment at no cost. While initially built for the district's 8,000 students, the city has allowed all residents access to the network. This network intends to last beyond the pandemic.

Murray City School District: Salt Lake City, UT.

Using a CARES Act grant, the Murray City School District created a private LTE network using CBRS that will provide Internet service to 6,000 students at no cost to the families. This dedicated centrally managed cellular network will enable students to keep their critical online studying, class sessions, and coursework separate from all other traffic at home. The network is intended to last beyond the pandemic and create a lasting benefit for students and families in the area.

Nebraska Indian Community College: Various Locations, NE.

Nebraska Indian Community College is a public tribal land-grant community college with three locations on tribal land in NE. The College worked with five other K-12 school districts to establish a private LTE network in the area using an Educational Broadband Service (EBS) license. They partnered with Red Rover Ltd. and Baicells to install base stations at each of the three community college campuses and used the fiber to each location for backhaul. This ensures affordable connectivity to rural students in Nebraska.

Northern Michigan University: Marquette, MI.

Northern Michigan University created the Educational Access Network (EAN), a private LTE network connecting 50 mostly rural Michigan communities with internet service, including 21,000 miles of connectivity and 6 tribal communities. The University works with municipalities to attach LTE equipment to existing public infrastructure in order to connect under-connected areas. The service has been so popular that NMU expanded service beyond the students to allow the general population access to its network.

Patterson Unified School District: Patterson, CA.*

The Patterson Unified School District explored deploying hot spots but found them unsatisfactory. Instead, the district used CARES funding to create a CBRS network, contracting Bearcom for the installation of the 10 Motorola Solutions towers. The LTE network will be accessible to 6,000 students and their families across 8 schools. The total cost of the project is roughly $2 million. All traffic on the CBRS network is routed back to the district central office and through its firewall.

Pittsburg Community Schools: Pittsburg, KS.

The Pittsburg school district partnered with the city of Pittsburg to create a private LTE network, Dragonnet, to service approximately 500 families at no cost to them. The program is for all students, though those who engaged in remote learning may be prioritized. Using a Broadband Partnership

Adoption grant from the second round of Kansas' COVID relief, the city will put up 6 antennas with the intention of creating full coverage for the city. The connections will last beyond the pandemic.

Pottsboro Area Public Library: Pottsboro, TX.*

Pottsboro Library Director Diane Connery said the library initially tried using hot spots but they did not work very well. Using CARES Act funding, the rural library began installing equipment at the regional airport in July 2020 to expand its wifi to 40 nearby homes. They intend to use further grants to provide hotspots specifically geared at connecting K-12 students to Wifi.

Poultney Public Library: Poultney, VT.

The Poultney Library expanded its Wifi service into the city's downtown, creating free broadband access at all hours. Access to this service is open to citizens as well as businesses, who are able to access the Wifi for their staff as well as allow customers access. This has made their downtown area a permanent WiFi "zone" which will benefit the town into the future.

Texas Education Agency: TX.

The greater Texas Education Agency is working to close the digital divide by providing free at-home internet available to every public school student beyond the pandemic. They have stated they intend to connect students and that they are working with private ISPs. The plan is in early stages but would likely be a cooperative effort between the school system and private ISPs. This would create permanent infrastructure for students in Texas.

Vermont Department of Public Service: VT.

When the COVID crisis hit, the Vermont Department of Public Service contracted for the rapid installation of 190 commercial-grade outdoor Wireless Access Points around the state of Vermont to provide adequate wireless internet and Wi-Fi calling services for telehealth, contact tracing, distance learning, e-government, remote working, and other COVID-19-related needs.

Utah Education and Telehealth Network: Salt Lake City, UT.*

Operated out of the University of Utah, the Utah Education and Telehealth Network services all schools, libraries, universities, colleges, hospitals, clinics, and health departments. UETN is providing private LTE networks, which according to UETN, extends internet access across a wide area without incurring high data usage or infrastructure investment costs. A CBRS pilot that was planned for four locations turned into an $800,000 project that will connect 25 schools at the outset. TLC Solutions installed Quortus core platforms for 5G service. Schools are provided with SIM cards that connect to the CBRS and edge routers that function as LTE hotspots and connect the students of Utah schools.

Williamsburg Libraries: Williamsburg, VA.

Williamsburg is repurposing bookmobiles as WiFi hot spots as a way to extend broadband access into communities which may be lacking adequate broadband. The library has been parking its bookmobile outside schools, grocery stores, and community centers so that locals can connect to their Wi-Fi hotspots from their cars. Anyone can connect to their wireless network for free from up to 30 feet away.The mobiles drive in and stay in these communities as long as possible in order to share the library's Wi-Fi resources.

*updated examples from the New America's Nov. 2020 Report: "The Online Learning Equity Gap"