

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In The Matter of)
)
Modernizing the E-rate) WC Docket No. 13-184
Program for Schools and Libraries)

COMMENTS OF EDUCATIONSUPERHIGHWAY

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EducationSuperHighway respectfully submits these comments in response to the Further Notice of Proposed Rulemaking in the above referenced proceeding.

INTRODUCTION AND SUMMARY

EducationSuperHighway thanks the Chairman and the Commission for their leadership in recognizing the importance of ensuring that every child, regardless of income or location, has the same opportunity to utilize digital learning to learn the skills necessary to compete in the global economy.

Unfortunately, as the school year begins, too many of our children are entering the classroom without the speeds they need. Today, 63% of America’s schools, representing nearly 40 million students, do not have the broadband they need to take advantage of the promise of digital learning.¹ While other countries are racing ahead, America must act with a sense of urgency to bring gigabit broadband to every school, Wi-Fi to every classroom and digital learning opportunities to every child.

In its July 23, 2014 Report and Order on the E-rate program (the E-rate 2.0

¹ See EducationSuperHighway, *Connecting America’s Students: Opportunities for Action* (April 2014), available at http://www.educationsuperhighway.org/uploads/1/0/9/4/10946543/esh_k12_e-rate_spending_report_april_2014.pdf (“*Connecting America’s Students*”).

Order)², the Commission took historic action to meaningfully change the course of the digital divide in America's K-12 schools and libraries. Thanks to the Commission's work, we are now much closer to being able to leverage the power of digital learning to empower teachers, transform learning and give every student equal access to educational opportunity.

The E-rate 2.0 Order represents the most sweeping changes to the program since its inception in 1996 and will significantly enhance the impact of the E-rate program on America's schools and libraries by:

- Establishing clear connectivity targets for schools and libraries that recognize the importance of scalability and, if met, will allow every teacher and student to take advantage of the promise of digital learning;
- Doubling the Commission's annual investment in broadband in our schools and libraries by phasing out over \$1 billion per year of subsidies for legacy services such as voice telephony, cellular phones, web hosting and email;
- Restructuring the program into Category 1 and Category 2 eligible services and targeting \$1 billion per year of funding for Category 2 which, if spent effectively, should provide sufficient funding to put high speed wireless access in every classroom and library in America;
- Establishing a five-year \$150-per-student budget for Category 2 subsidies, which will provide all schools with the resources they need to upgrade their internal networks;
- Dramatically increasing the transparency of the program in order to track progress

² Modernizing the E-rate Program for Schools and Libraries, FCC 14-99, WC Docket No. 13-184, Report and Order and Further Notice of Proposed Rulemaking, Order Released July 23, 2014. This Order is hereinafter referred to as "E-rate 2.0 Order."

toward the Commission's connectivity targets, improve accountability for the effective use of program resources and lower the cost of broadband; and

- Simplifying the application and review process in order to make it easier for more schools and libraries to benefit from the program and reduce the program's administrative costs.

The Commission should also be commended for the process it used to arrive at the E-rate 2.0 Order. From the beginning, the Commission stated that E-rate modernization would be a data-driven process and the record shows that this was clearly the case. Never before has so much data been submitted into the record of an E-rate proceeding and never before have the Commission's decisions so clearly reflected the conclusions that could be drawn from that data.

The importance and wisdom of the E-rate 2.0 Order is reflected in the broad bipartisan support it has received. America's educators, librarians, governors, mayors, representatives, innovators and CEOs have all offered support, reflecting the broad consensus that upgrading America's schools is a national priority.

But the Commission's work is not done. While the E-rate 2.0 Order takes a major step forward in enabling high-speed broadband in America's K-12 schools and libraries, it does not ensure that every school and library will have access to the connectivity it needs at a price it can afford.

To finish the job of E-rate modernization, and ensure that every student, teacher and library patron has the connectivity they need, the Commission must take additional steps to:

1. Ensure that every school and library has access to the physical

infrastructure they need to meet the Commission’s connectivity targets. For 98% of schools and all libraries, this will most likely require a fiber optic broadband connection;

2. Dramatically lower the cost of broadband so that schools and libraries with access to fiber can afford to purchase the capacity they need. In most cases, this will involve expanding the broadband options available to schools, encouraging the effective use of purchasing consortia and multi-year contracts, and leveraging transparency;
3. Enhance the systems and data used by USAC, the Commission and other E-rate stakeholders to monitor and manage the program; and
4. Right-size the program to ensure that there are sufficient resources available to schools and libraries to meet the Commission’s connectivity targets by 2018, in the context of the cost-saving actions the Commission has and will take to lower the cost of broadband.

By implementing these actions, the Commission can enable the widespread adoption of digital learning while fulfilling its role as a good financial steward of the E-rate program.

I. THE COMMISSION MUST ENSURE THAT SCHOOLS AND LIBRARIES HAVE ACCESS TO AFFORDABLE FIBER

In the E-rate 2.0 Order, the Commission adopted the following targets for broadband connectivity to schools and libraries:³

- Internet access connectivity of 1 Mbps per student and staff in schools;

³ Here we reference the “longer term” Internet access targets established by the Commission. These correspond to the 2018 targets established by the State Education Technology Directors Association.

- WAN connectivity capable of scaling to 10 Gbps per school;
- Internet access connectivity of at least 100 Mbps for all libraries that serve fewer than 50,000 people; and
- Internet access connectivity of at least 1 Gbps for all libraries that serve greater than 50,000 people.

When applied to the actual student populations of America’s K-12 schools,⁴ the Commission’s connectivity targets reveal that 98% of schools, representing 99% of students are in districts that will require at least 100 Mbps of Internet connectivity, with 94% requiring at least 200 Mbps of Internet access and 83% requiring at least 1 Gbps. Table 1 shows the breakdown of districts, schools and students by district size:

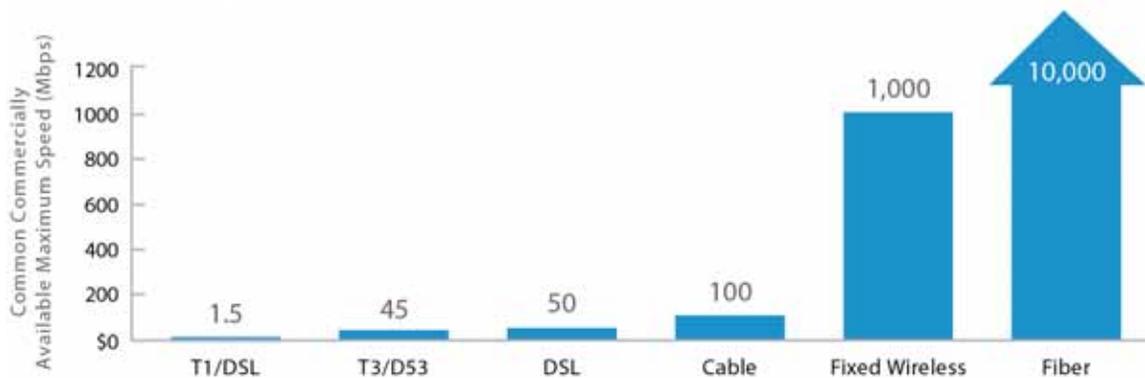
Table 1: Breakdown of districts, schools, and students by district size

District Size	Districts		Schools		Students	
	Number of Districts	Percentage of Total	Number of Schools	Percentage of Total	Number of Students	Percentage of Total
0-50	630	4%	817	1%	15,915	.03%
51-100	686	4%	917	1%	52,176	.1%
101-200	1,502	9%	2,220	2%	226,100	.5%
201-500	3,233	20%	6,138	6%	1,090,590	2%
501-1000	2,852	17%	7,559	7%	2,050,940	4%
> 1000	7,403	45%	83,536	83%	46,504,637	93%

⁴ Source: National Center For Education Statistics, 2011 schools database.

This has significant implications for the physical infrastructure required to meet school and library connectivity requirements. As seen in Chart 1 below, only fiber optic and fixed wireless connections are today able to deliver greater than 100 Mbps broadband. Moreover, fixed wireless connections are generally twice as expensive as fiber, are only effective in limited geographic situations, and cannot scale as effectively with demand. By contrast, fiber is a high-speed, scalable, cost-effective and future-proof broadband technology able to meet the speed needs of schools not just for the next school year, but also for the next generation. As a result, in order to meet the Commission’s Internet access connectivity targets, 98% of schools and all libraries will require access to affordable fiber connections.⁵

Chart 1: Significantly higher speeds are available over fiber connections compared to other service types



⁵ In some cases, fixed wireless connections will be able to meet the needs of schools and libraries and will be more cost effective than installing fiber. In addition, it is likely that some additional percentage of schools and libraries may be able to meet their connectivity needs using cable modem as the capacity of these connections expand in the future.

Yet today, according to the Commission's own data, 35% of schools and 85% of libraries currently do not have access to fiber.⁶ Half of these schools are in rural areas, where access to broadband is perhaps the most critical, and the costs to provide it most expensive.⁷ Nor is it likely that commercial providers will soon bring fiber to those who don't have it. After over a decade of investment in fiber networks, most schools and libraries without fiber are in areas that cannot provide commercial providers with a sufficient return on their investment.

As a result, if we are going to deliver every student, teacher and library patron the speed they need, at a price they can afford, the Commission must be prepared to shoulder the responsibility of promoting the deployment of broadband. The most cost effective way to accomplish this is to utilize E-rate discounts to enable existing service providers to extend their networks to schools and libraries without fiber access. However, in the event that these providers are unwilling or unable to provide fiber based connectivity at prices that are comparable to national benchmarks, the Commission must enable the E-rate program to provide the investment required for new entrants to build fiber to these locations or schools and libraries to self-provision their own fiber.

II. THE COMMISSION MUST TAKE STEPS TO DRAMATICALLY LOWER THE COST OF BROADBAND

A. Broadband Affordability Is The Key Factor Preventing Schools and Libraries From Purchasing The Bandwidth They Need

⁶ See Wireline Competition Bureau & Office of Strategic Planning & Policy Staff Report, WC Docket 13-184, August 12, 2014 at 11-12

⁷ WC Docket 13-184 White Paper Direct Access to Broadband Connectivity Datasets, updated 27 Aug 2014 and available at <http://www.fcc.gov/encyclopedia/e-rate-modernization-data>

Unfortunately, connecting schools and libraries to fiber is necessary, but not sufficient to ensuring that students, teachers and library patrons will have access to the connectivity they need for the 21st century. As seen in Chart 2a below, even among schools with fiber connections, only 17% meet the Commission’s short term goal of 100 Kbps / student of Internet access and only 1% meet the longer term goal of 1 Mbps per student. Similarly, only 39% of schools with fiber are meeting the generally accepted goal of 1 Gbps WAN connectivity as seen in Chart 2b.

Chart 2a: 83% of schools with Internet access over fiber still are not meeting Current Goals

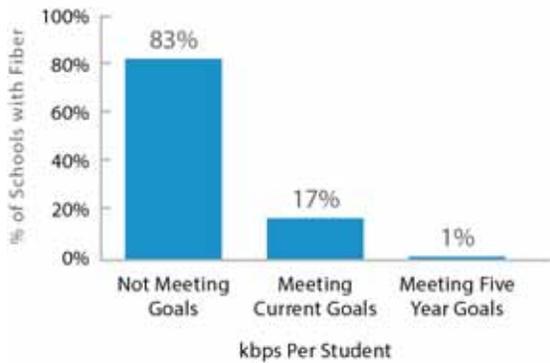
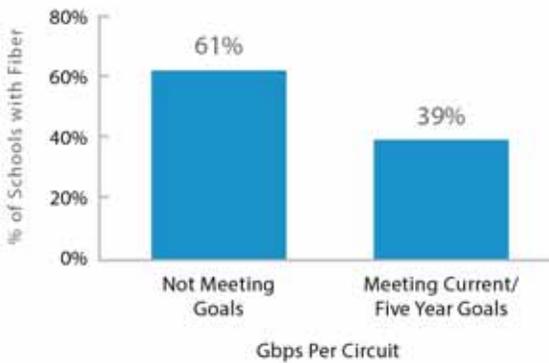
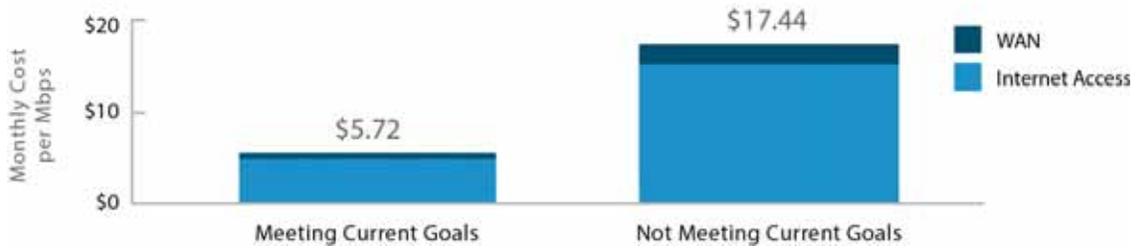


Chart 2b: 61% of schools with fiber WAN connections are not meeting Current Goals



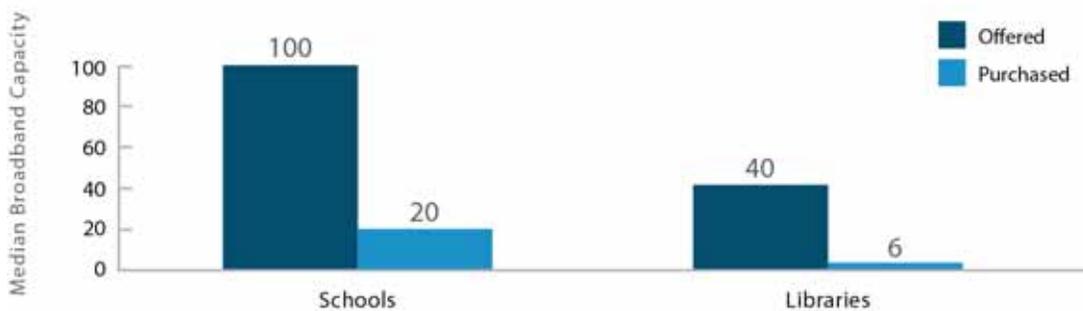
EducationSuperHighway’s extensive analysis of actual E-rate spending found that the key factor that prevents many districts from purchasing enough bandwidth to meet the Commission’s connectivity targets is the affordability of high-speed connections. As seen in Chart 3, districts that do not meet the Commission’s short-term goals reported connectivity cost that were three times higher on average than those reported by districts that meet the targets. When the price of connectivity is too high, districts are unable to purchase the level of bandwidth they need.

Chart 3: Districts not meeting Current Goals face a price for connectivity that is too high to buy sufficient bandwidth



The affordability challenge is also a barrier in rural America as reflected in NTCA – the Rural Broadband Association’s member survey. As seen in Chart 4, rural schools and libraries are generally purchasing only 15-20% of the available bandwidth from NTCA’s members due to the cost of those connections.⁸ This is not surprising when one considers that the cost of Internet access at these levels ranges from \$74 to \$114 per Mbps / month.⁹

Chart 4: Median broadband capacity reported by NTCA Members



Improving the affordability of broadband is also critical to the long-term financial sustainability of the program. Even accounting for the natural declines in the cost of

⁸ See NTCA Member Survey, September 2013. (there may be a NTCA comment we can reference).

⁹ See *Connecting America’s Students* at 14

connectivity,¹⁰ if the Commission does not adopt policies that significantly reduce the cost of broadband, the E-rate program will have to grow to approximately \$11 billion per year (more than the entire Universal Service Fund) to enable all schools and libraries to meet the connectivity targets established by the Commission in its E-rate 2.0 Order.¹¹

B. The Commission Can And Should Take Steps To Improve Affordability

Providing the investment to connect every school and library to fiber will significantly reduce the required growth in the E-rate program to meet the Commission's connectivity targets while also future-proofing K-12 broadband networks.

EducationSuperHighway's research shows that for those schools with fiber-based connectivity, the average cost per Mbps for Internet access and WAN is \$11/Mbps.¹² If, by investing to connect every school to fiber, these prices were extended to every school, the total size of the E-rate program required to meet the Commission's connectivity targets would be less than \$5 billion per year.¹³

However, many opportunities exist to lower the cost of broadband even more significantly. The top quartile of schools pays approximately \$4/Mbps per month for their Internet access and WAN connectivity.¹⁴ At these prices, the total size of the E-rate program required to meet the Commission's Internet access and WAN connectivity targets would be less than \$2 billion per year.

To make these cost savings as widespread as possible, the Commission must

¹⁰ Comcast and others have commented that broadband costs are declining 10% per annum. However, the demand for broadband is growing at least 50% per annum.

¹¹ See *Connecting America's Students* at 27.

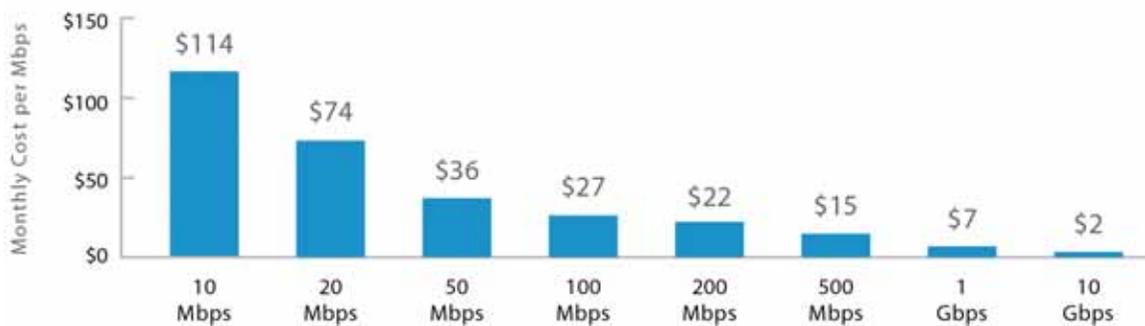
¹² See *Connecting America's Students* at 11.

¹³ Note that this is only for Internet access and WAN subsidies and does not include subsidies required for Category 2 eligible services.

¹⁴ See *Connecting America's Students* at 20.

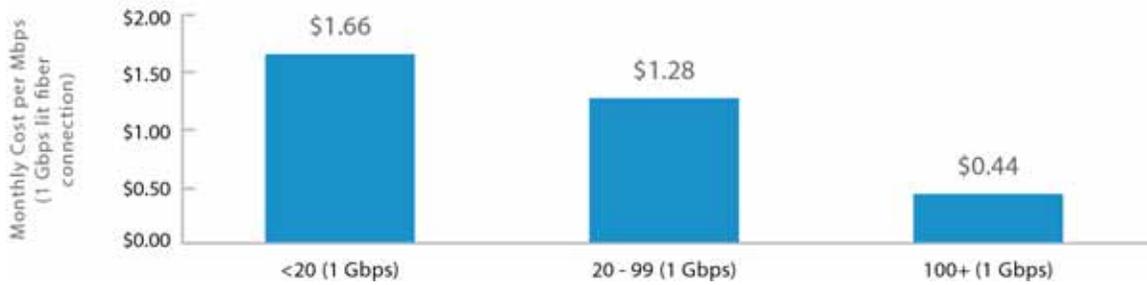
modernize the E-rate program in ways that ensure schools and libraries benefit from economies of scale, encourage consortia purchasing, increase price transparency and enhance choices and competition. As seen in Chart 5, economies of scale have a significant impact on the cost of broadband and the Commission must take steps to ensure that as schools scale their broadband purchases to meet the Commission’s connectivity targets, they are benefitting from pricing that reflects these economies of scale.

Chart 5: Internet access costs decrease significantly as more bandwidth is purchased



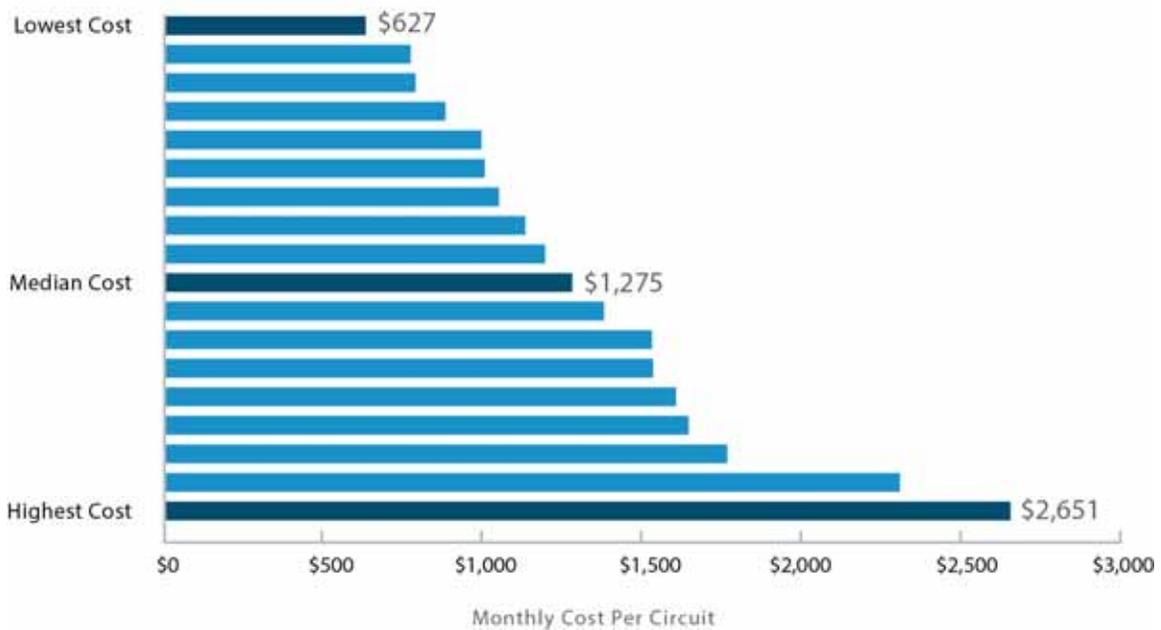
Similarly, as seen in Chart 6, aggregating demand for WAN connectivity across districts can significantly reduce costs. This is a natural consequence of the economics of telecommunications networks where the cost of extending an existing network to new locations is significantly cheaper than building an entirely new network. However, to achieve these cost savings, the Commission must enact policies that encourage schools and libraries to form consortia for WAN purchases. This is because less than 10% of school districts and very few library districts have greater than 20 locations and only the very largest urban districts have greater than 100 locations.

Chart 6: District WAN cost per Mbps



Price transparency is another important lever in reducing the cost of broadband. As seen in Chart 7, schools pay widely varying prices for connectivity, even when the normal explanations of price variance (quantity, contract length, purchase date) are held constant. In this example, simply ensuring that no school or library pays more than the median cost would have saved 20% per year and leveraging transparency to move everyone to the average of the top 50% would save 30% per year.

Chart 7: Cost per circuit (vendor A, 1 Gbps WAN, contracted in 2013)



In the E-rate 2.0 Order, the Commission took an important step in providing schools and libraries with the price transparency they need to reduce their cost of connectivity. By adopting an open data policy for the E-rate program, and particularly the information contained in Form 471 Item 21, the Commission has made it possible for schools and libraries to understand benchmark prices and best practices. However, the Commission's job is not complete. In order to make price transparency a more effective tool for reducing the cost of broadband, the Commission must modify the E-rate forms to ensure that all necessary data is being collected and provide USAC with the systems and resources it needs to make this data publicly available.

We also urge the Commission to reconsider its ruling regarding historical Form 471, Item 21 data and to make the 2013-14 data subject to its open data policy. By delaying the availability of this data by a year, the Commission is likely to cost the E-rate

program well over \$100 million as 20,000-35,000 schools and libraries sign new, multi-year contracts for connectivity in 2014-15 without the benefit of price transparency.

In the E-rate 2.0 Order, the Commission based its decision to delay disclosure of Item 21 information until the 2014-15 filing year on the notion that filers submitted their information with the expectation that it would be held in confidence.¹⁵ This conclusion is flawed in two respects. First, the language in Form 471 states that “consistent with the Communications Act of 1934, FCC regulations and orders, the Freedom of Information Act, 5 U.S.C. S 552, or other applicable law, information provided in or submitted with this form or in response to subsequent inquiries may be disclosed to the public.” As a result, the assumption of most filers should have been that the information could be made public even if it was not made public in the past. Second, even if filers had some expectation of confidentiality, the Commission can condition receipt of E-rate support going forward on waiving any right to confidentiality of previously filed Item 21 information. Because of the significant public interest benefits that flow from making this information public, the Commission has ample justification to make this determination.

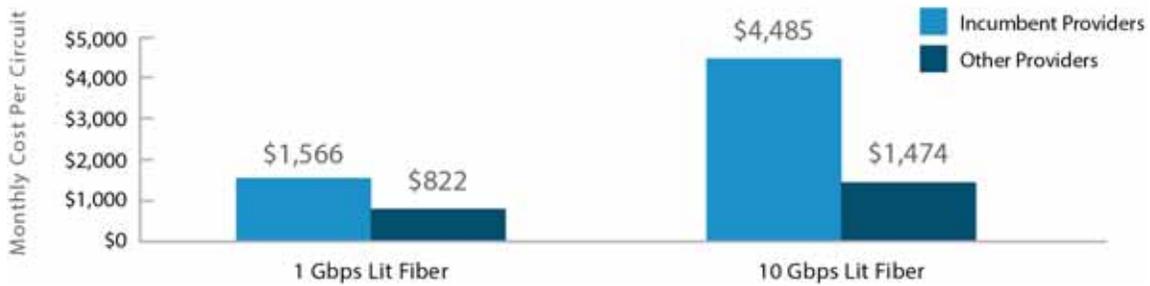
Economies of scale, aggregated purchasing and price transparency can help schools and libraries significantly lower their cost of broadband. However, as was recently recognized in the Chairman’s speech on an Agenda for Broadband Competition,¹⁶ the most powerful lever for ensuring that every school and library has access to the speed it needs at a price it can afford is competition. As seen in Chart 8, schools without choices

¹⁵ E-Rate 2.0 Order at 166

¹⁶ Prepared Remarks of FCC Chairman Tom Wheeler, “The Facts and Future of Broadband Competition”, 1776 Headquarters, Washington, D.C., September 4, 2014.

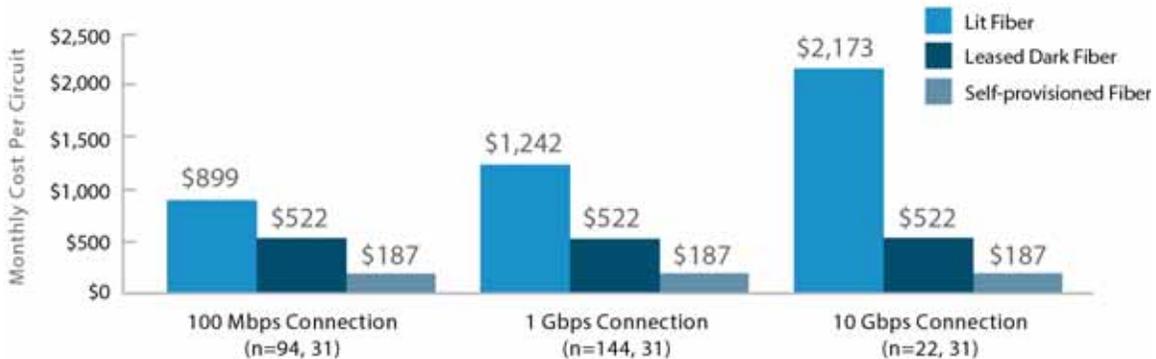
beyond the incumbent telephone and cable companies pay two to three times as much for their connectivity as those in competitive markets.

Chart 8: Market competition results in significant cost reductions for district WAN



Similarly, increasing the service options available to schools can dramatically reduce the cost of broadband. As seen in Chart 9, when schools have the financial resources to leverage dark fiber and self provisioning, they can save as much as 90% on the cost of high speed WAN connections.¹⁷

Chart 9: Dark fiber WANs offer significant cost advantages over lit fiber



¹⁷ Note that schools and libraries choosing to use dark fiber or self provision will need to make up-front investments in optical equipment to light their fiber. For 1 Gbps circuits this investment is less than \$500 per circuit while a 10 Gbps circuit requires less than \$5,000 of equipment.

In its further efforts to modernize the E-rate program, the Commission would be well served by following the Agenda for Broadband Competition laid out by Chairman Wheeler. In markets where municipal broadband networks or state research and education networks exist, the Commission should ensure that schools and libraries can access these networks and adopt policies that make it easier for these networks to serve schools and libraries within the rules of the E-rate program. In markets where greater competition can exist, the Commission should adopt rules within the E-rate program that encourage competitive entry by commercial providers. This might include policies that encourage aggregating demand across districts to reach minimum efficient scale, requiring E-rate recipients to make dark fiber available to schools and libraries, or providing subsidies for fiber builds in areas where incumbent providers are unwilling to meet national pricing benchmarks. Finally, similar to what it has been adopted in other parts of the Universal Service Fund, for example in the Rural Healthcare Program, the Commission should adopt E-rate rules that create competition where it does not exist by allowing schools and libraries to self-provision their own fiber networks in the event that commercial providers are unable or unwilling to provide fiber connectivity at prices that meet national pricing benchmarks.

III. THE COMMISSION MUST ENSURE THAT IT HAS THE SYSTEMS AND DATA NECESSARY TO EFFECTIVELY MANAGE AND MONITOR THE PROGRAM

In order to meet the Commission's connectivity targets while remaining good financial stewards of the E-rate program, it is critical that the Commission modernize the program to ensure that every E-rate dollar has maximum impact. To accomplish this

goal, the Commission and USAC must be able to effectively monitor and manage how E-rate funds are spent, the effectiveness of school and library purchases using E-rate funds and progress toward the Commission's targets.

In determining what data it needs to collect and make available through the E-rate open data rules the Commission adopted in the E-rate 2.0 Order, the Commission should ensure that it has the information and systems it needs to accomplish the following objectives:

1. Track progress toward the Commission's connectivity targets;
2. Increase price transparency at the national and local level;
3. Reduce costs by focusing resources on lowering prices in high cost areas;
4. Improve competition by informing schools and libraries of competitive options;
5. Accelerate the application review process and focus reviews on the highest value cases;
6. Improve enforcement of the program's Lowest Corresponding Price rules;
7. Minimize waste, fraud and abuse; and
8. Evaluate the impact of policy and rule changes.

The Commission took a major step forward in the E-rate 2.0 Order by adopting open data policies for the E-rate program and directing the Wireline Competition Bureau to collect the data needed to effectively manage the program. Unfortunately, both USAC and the Wireline Competition Bureau are significantly inhibited in their ability to deliver the information required to effectively monitor and manage the program.

In order to address these challenges, the Commission should establish clear deadlines for identifying the data to be collected, revising the forms needed to collect this

data and implementing the systems required to make the data available to the public. The Commission should also adopt a “government as platform” approach to achieving its open data goals by focusing USAC on building and maintaining the underlying database of information while relying on third parties to develop user interface platforms for entering, analyzing and retrieving information from the database. This approach, which has been articulated by the Office of the Managing Director, would recognize the severe limits of USAC’s systems and the lack of technical and data analysis staff at both USAC and the Wireline Competition Bureau.

IV. THE COMMISSION MUST UTILIZE A DATA-DRIVEN APPROACH TO ESTABLISH THE APPROPRIATE LEVEL OF FUNDING FOR THE PROGRAM

In its FNPRM, the Commission asks what level of resources is required to meet the goals it has established for the E-rate program. We support the data-driven approach the Commission is taking to answering this question and believe that such an approach must assess the likely impact of the following elements in any effort to appropriately size the program:

1. The projected growth in demand for Internet access and WAN connectivity;
2. The reduction in funding for legacy services as they are phased out in accordance with the E-rate 2.0 Order;
3. The Commission’s \$1 billion per year funding target for Category 2 services;
4. The one-time investment required to connect 98% of schools and all libraries to fiber; and

5. The impact of policies the Commission might adopt that can lower the cost of broadband, expand access to affordable high speed choices or reduce the demand for commercial Internet access.¹⁸

It is important to note that the \$1 billion Category 2 funding target the Commission has already adopted is premised on the \$150 per student budget approach adopted for the next two years of the program. As the Wireline Competition Bureau and Office of Strategic Planning & Policy have made clear, a reversion to the historic “no limits” approach to Category 2 funding would require significantly greater funding to meet the Commission’s internal connections connectivity targets.¹⁹ Specifically, if the Commission reverts to the historic “no limits” approach, an additional \$1.5 billion of funding per year would be required in years three through five to ensure that every school and library is able to meet the Commission’s internal connections targets.²⁰ Thus, we urge the Commission to make permanent the per-student budget approach to distributing Category 2 funding.

Based on the analysis in the EducationSuperHighway / CoSN LAN / Wi-Fi model, \$150 per student should be sufficient to meet the Commission’s internal connections goals provided that schools make effective purchasing decisions.²¹ This means buying the equipment and services that a school needs to deliver Wi-Fi to every

¹⁸ These might include many of the policy options discussed in these comments as well as increased use of peering and caching.

¹⁹ See Wireline Competition Bureau & Office of Strategic Planning & Policy Staff Report, WC Docket 13-184, August 12, 2014 at 2-9

²⁰ See Wireline Competition Bureau & Office of Strategic Planning & Policy Staff Report, WC Docket 13-184, August 12, 2014 at 9

²¹ See EducationSuperHighway and Consortium for School Networking, *Analysis of Costs to Upgrade and Maintain Robust Local Area Networks for all K-12 Public Schools* (May 2014), available at http://www.educationsuperhighway.org/uploads/1/0/9/4/10946543/esh_cosn_lan_wifi_analysis.pdf

classroom and avoiding the natural tendency to buy the equipment with all the bells and whistles that are at the top end of a vendor's product line.²² However, in conjunction with making the per student budget approach for Category 2 funding permanent, EducationSuperHighway would support a review of the \$150 per student budget at the end of two years to determine if the per student budget needs to be adjusted to meet the Commission's internal connections connectivity targets.

CONCLUSION

For the reasons discussed above, the Commission should build on the success of the E-rate 2.0 order and finish the job of E-rate modernization by addressing the infrastructure, affordability, data and resource issues discussed in these comments.

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²² Historically, when schools and libraries had no certainty regarding Priority 2 support, buying top of the line equipment made sense, as they had no idea when they would be able to upgrade their LAN and Wi-Fi networks.