FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 18, 2017

The Honorable Edward J. Markey
United States Senate
255 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Markey:

As you know, in 2014 the Commission adopted two landmark orders comprehensively modernizing the E-rate program. These orders initiated a fundamental reset of E-rate, the first such effort since the program's creation 18 years ago, so that it can keep pace with the exploding demands for ever-faster Internet service placed on school and library networks by digital learning applications.

Attached is a report that examines the progress of E-Rate modernization since the adoption of the two major *E-rate Modernization Orders* in 2014 and identifies potential next steps for future action. Given your leadership on this issue in the United States Senate, I thought you would find this paper of interest.

Sincerely,

Tom Wheeler

MEMORANDUM

TO: Chairman Tom Wheeler

FROM: Jon Wilkins

Advisor for Management

SUBJECT: E-rate Modernization Progress Report

DATE: January 18, 2017

Mr. Chairman –

The attached report examines the progress of E-rate modernization since the adoption of the two major *E-rate Modernization Orders* in the second half of 2014. The report focuses on reforms in three major policy areas:

1) Expanding E-rate support for the equipment and services needed to deliver high speed Wi-Fi to classrooms and libraries.
2) Connecting all schools and libraries to high-speed broadband services.
3) Ensuring the financial stability of the E-rate program.

The report provides a brief summary of each set of reforms, an analysis of available data on the impact of those reforms to date, and a discussion of potential next steps for future Commissions.

E-rate Modernization: Progress and the Road Ahead

In the second half of 2014, the Commission released two landmark orders comprehensively modernizing E-rate, the largest federal educational technology program.[1] This staff paper examines progress as a result of the *E-rate Modernization Orders* in three critical areas:

1) Expanding E-rate support for the equipment and services needed to deliver high speed Wi-Fi to classrooms and libraries.
    - $1.3 billion in Wi-Fi commitments in 2015.
    - Funding to schools in every state and territory in 2015- 2016.
2) Connecting all schools and libraries to high-speed broadband services.
    - 61 percent decline in schools not connected to fiber.
    - Increasing number of states matching special construction funding.
3) Ensuring the financial stability of the E-rate program.
    - Stable funding commitments, under the $3.9 billion cap, in 2015 and 2016.
    - Cost per Mbps reduced from $22 in 2013 to $7.05 in 2016.

This paper identifies measurable progress toward each goal and also identifies the next steps that future Commissions should take to build upon that progress.

The E-rate Modernization Orders

Since its inception in 1996, E-rate has helped to ensure that virtually all schools and libraries are able to connect to the Internet. However, the need to modernize E-rate became clear in recent years as online tools revolutionized classroom instruction and high-speed internet access and Wi-Fi became necessities for modern digital learning.

- The *First E-rate Modernization Order* took major steps to modernize and streamline the E-rate program with a focus on supporting Wi-Fi networks and robust broadband connectivity for all schools and libraries.
- The *Second E-rate Modernization Order* addressed the connectivity gap facing many schools and libraries by expanding options for purchasing affordable broadband and increasing the E-rate funding cap to fully meet applicants' needs.

The Commission adopted aggressive Internet access connectivity targets, at least 100 Mbps per 1,000 users short-term and 1 Gbps per 1,000 users long-term, to encourage school districts to prioritize connectivity upgrades.[2] Highlighting the need for bandwidth produced results:

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[1] *Modernizing the E-rate Program for Schools and Libraries*, WC Docket No. 13-184, Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 8870 (2014) (*First E-rate Modernization Order*); *Modernizing the E-rate Program for Schools and Libraries, Connect America Fund*, WC Docket Nos. 13-184, 10-90, Second Report and Order and Order on Reconsideration, 29 FCC Rcd 15538 (2014) (*Second E-rate Modernization Order*) (collectively, *E-rate Modernization Orders*).

[2] *First E-rate Modernization Order*, 29 FCC Rcd at 8885, para. 34.

- In 2013, only 30 percent of school districts met the short-term target.[3]
- As of early 2016, 77 percent of school districts, representing 68 percent of schools and 67 percent of students, met the short-term target.[4]

I. Expanding Wi-Fi support for All Schools and Libraries

The *First E-rate Modernization Order* provided enhanced and more equitable Wi-Fi support. Previously, the E-rate rules categorized Wi-Fi equipment and other internal connections as Priority Two services, meaning that support was only available if dollars remained after all Priority One (telecommunications and Internet access) applications had been funded.[5] As demand for high-speed broadband both to and within schools and libraries grew, two problems arose:

1) Insufficient support. Priority Two requests greatly exceeded available funding almost every year. For funding years 2013 and 2014, Priority One support consumed all available E-rate support and applicant received no Priority Two funding.
2) Inequitable distribution of support. Only four to 11 percent of schools received Priority Two support in funding years 2008-2012.[6] Funding limitations also created an urban/rural disparity, with rural schools on average receiving 25 percent less Wi-Fi support per student and 50 percent less per school.[7]

The *First E-rate Modernization Order* took a number of steps to help ensure full funding of WiFi and other internal connections. Recognizing the importance of both external and internal broadband connections, the FCC changed the nomenclature from "Priority One and Two" to "Category One and Two" services. It redesignated Wi-Fi equipment and other internal connections needed to provide broadband within schools and libraries as "Category Two" services, reduced the highest discount rate for Category 2 services by five percentage points, and set an annual support target of $1 billion for Category Two services.

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[3] EducationSuperHighway, 2015 State of the States Report (2015) at 6, http://stateofthestates.educationsuperhighway.org/. (2015 State of the States)

[4] This analysis relies on applicant responses to the connectivity survey questions on the certified funding year 2016 E-rate applications submitted to USAC. The Consortium for School Networking (CoSN) found similar results: 68% of school districts responded that all schools met the short term internet access target, up from 19%in 2013, with 80% of districts responding that three-fourths of their schools met the targets. CoSN noted that progress was equal across urban rural, and suburban districts. *See* Consortium for School Networking, 2016 Annual E-rate and Infrastructure Survey, at 9-10 (2016), http://www.cosn.org/about/news/school-technology-makes-progress-yet-challenges-remain%E2%80%94cosn%E2%80%99s-2016-infrastructure-survey. (2016 CoSN Survey)

[5] The E-rate Eligible Services List contains a complete list of services and equipment eligible for E-rate support as well as descriptions of service Categories. *See* USAC, Eligible Services List, http://www.usac.org/sl/applicants/beforeyoubegin/eligible-services-list.aspx.

[6] E-rate Modernization Staff Report, WC Docket No. 13-184, Public Notice, 29 FCC Rcd 9644, attach. at 9647-48, para. 6 (WCB 2014).

[7] FCC, Modernizing E-rate: Providing 21st Century Wi-Fi Networks for Schools and Libraries across America at 5 (2014), https://apps.fcc.gov/edocs_public/attachmatch/DOC-327993A1.pdf.

The Order also phased out support for legacy services in both categories such as paging and voice services, and adopted other reforms, in part to make more funding available for Category Two support.[8] In the Order, the FCC also rationalized the amount of support applicants can receive for Category Two support by establishing five-year Category Two budgets of $150 (pre-discount) per student so that all E-rate applicants could have predictable, flexible, and equitable funding sufficient to support robust Wi-Fi networks. In the *Second E-rate Modernization Order* the FCC extended the Category 2 budget approach through funding year 2019, with a few modifications, and raised the annual E-rate cap to $3.9 billion in order to ensure the availability of full funding for all E-rate eligible services.

Progress: Increased, Equitable Wi-Fi Funding

With two funding years on the books, E-rate's new approach to Wi-Fi has had a rapid and widespread impact. Nearly 50,000 schools and libraries received Wi-Fi support in 2015, compared to zero in funding years 2013 and 2014. All eligible funding year 2015 requests for Wi-Fi services and equipment received support, totaling over $1.3 billion. Likewise, all eligible requests for funding year 2016 are receiving commitments,[9] and requests for Wi-Fi surpassed $1 billion for funding year 2016.

Figure 1: Funds Requested and Committed for Internal Connections, 2009-2016[10]
**USAC is currently reviewing FY2016 funding requests and releasing commitments*

The per-student budget approach has also resulted in a more equitable and widespread distribution of Wi-Fi funding. In previous years, schools and libraries had no way to know whether funding for WiFi would be available for any given funding year. But, they did

[8] *See infra* at 5-6.
[9] *See* E-rate Funding Year Public Notice available at https://apps.fcc.gov/edocs_public/attachmatch/DA-16-629A1_Rcd.pdf. (Announcing that there is sufficient funding available to fully meet the Universal Service Company's (USAC) estimated demand for category one and category two requests for E-rate supported services for funding year 2016) .
[10] Funding data based on FCC staff analysis of USAC data. *See*, Schools and Libraries Data Retrieval Tool http://www.slforms.universalservice.org/drt/default.aspx.

know that if funding was available it would be allocated first to the schools and libraries that applied with the highest discount rate. The result was to retard applications for WiFi funding by all schools and libraries, and particularly those with lower discount rates, including many rural schools and libraries.[11] By adopting per-student five year budgets and a target of making at least $1 billion available every year for WiFi services, the E-rate program has been able to provide support for Category Two service for schools and libraries in every state and all but two territories, American Samoa and the Northern Marianas (which have not requested support) in both 2015 or 2016. The table below compares the average Wi-Fi funding committed to every state and territory from 2010-2014 compared to 2015. As noted above, application review and funding commitments for funding year 2016 remain in progress.

Figure 2: 2010-2014 vs. 2015 Category Two Funding by State and Territory

State	Average 2010-2014	2015	% increase
Alaska	$1,246,205	$3,115,114	150%
Alabama	$9,640,061	$28,488,146	196%
Arkansas	$2,504,897	$14,351,987	473%
American Samoa	$4,991	$0	-100%
Arizona	$19,828,508	$33,808,436	71%
California	$110,209,540	$174,119,063	58%
Colorado	$5,418,842	$9,158,527	69%
Connecticut	$3,380,878	$11,741,360	247%
District of Columbia	$2,030,465	$2,631,893	30%
Delaware	$76,216	$1,955,842	2466%
Florida	$18,403,203	$89,298,913	385%
Georgia	$19,686,087	$64,050,309	225%
Guam	$73,330	$2,325	-97%
Hawaii	$2,247,731	$9,337,225	315%
Iowa	$865,783	$8,910,710	929%
Idaho	$758,130	$3,858,172	409%
Illinois	$27,705,145	$65,518,789	136%
Indiana	$3,568,180	$22,452,772	529%
Kansas	$790,025	$7,089,952	797%
Kentucky	$9,196,461	$26,398,513	187%
Louisiana	$10,255,811	$44,628,594	335%
Massachusetts	$5,379,831	$20,725,355	285%
Maryland	$3,252,784	$6,346,630	95%
Maine	$631,525	$2,569,625	307%

[11] Wireline Competition Bureau Releases E-rate Modernization Staff Report and Online Maps of School and Library Fiber Connectivity Data, Public Notice, 29 FCC Rcd 9647 (Attach)(2014).

Michigan	$8,966,040	$29,734,035	232%
Minnesota	$4,409,006	$18,619,022	322%
Missouri	$5,467,813	$25,382,605	364%
N. Mariana Islands	$24,884	$700,136	2714%
Mississippi	$4,902,493	$21,782,687	344%
Montana	$480,267	$2,287,958	376%
North Carolina	$14,594,295	$52,027,261	256%
North Dakota	$221,188	$1,773,674	702%
Nebraska	$253,827	$6,572,626	2489%
New Hampshire	$138,586	$2,058,192	1385%
New Jersey	$12,974,733	$30,365,785	134%
New Mexico	$9,531,373	$7,109,252	-25%
Nevada	$2,645,411	$4,500,062	70%
New York	$36,752,091	$47,238,998	29%
Ohio	$11,227,778	$30,813,176	174%
Oklahoma	$10,996,025	$30,232,304	175%
Oregon	$2,267,677	$10,538,891	365%
Pennsylvania	$14,295,850	$34,275,616	140%
Puerto Rico	$15,512,043	$12,028,336	-22%
Rhode Island	$1,677,498	$2,348,270	40%
South Carolina	$8,765,692	$25,927,803	196%
South Dakota	$903,784	$1,728,498	91%
Tennessee	$6,254,553	$20,156,831	222%
Texas	$103,133,203	$167,503,727	62%
Utah	$1,083,158	$5,670,216	423%
Virginia	$3,549,004	$21,866,656	516%
Virgin Islands	$2,620,271	$1,210,570	-54%
Vermont	$63,448	$1,054,945	1563%
Washington	$8,045,509	$21,953,727	173%
Wisconsin	$1,962,185	$17,304,308	782%
West Virginia	$2,382,036	$6,691,395	181%
Wyoming	$713,956	$868,752	22%

The increase in and more equitable distribution of Wi-Fi funding has had a significant impact. Local school leaders report high and growing levels confidence that E-rate will be able to support long-term needs for Wi-Fi connectivity. According to the Consortium for School Networking's (CoSN) annual survey of superintendents, chief technology officers, and other school district leaders, 81 percent of respondents in 2016 were confident their district's Wi-Fi could support one wireless device per student.[12] That response is a significant improvement over 2015 (64% confident) and 2014 (54% confident).

[12] CoSN 2016 Survey at 15.

Next Steps: Examining and Extending the Per-Student Budget

The five-year Category Two budget will begin to expire after funding year 2019. The Commission will need to revisit the per-student budget framework in the near future so that schools that purchase new Wi-Fi networks during the 2015-2019 budget cycle can plan to replace aging equipment. If the Commission does not act, E-rate will return to the pre-modernization Category Two rules under which only the highest discount applicants typically received funding and commitments were not subject to a per-student budget. The Commission instructed the Wireline Competition Bureau (Bureau), in coordination with USAC and the Office of the Managing Director, to monitor the applicant budgets and provide a report on their sufficiency before the opening of the funding window for funding year 2019.[13]

When it takes up the issue, the Commission will need to consider whether to keep the per-student budget-based approach to Category Two, whether to adjust the amount of the budget, and which services should be eligible for Category Two support. In particular, because the applicant budgets naturally limit wasteful spending, the Commission allowed basic maintenance, managed Wi-Fi, and caching to be eligible for support, but their eligibility sunsets with the budgets after funding year 2019 and the Commission will need to consider whether to continue to provide E-rate support for those services.[14]

II. Connecting All Schools and Libraries to High-Speed Broadband

The *Second E-rate Modernization Orders* aimed to ensure that all E-rate applicants had access to, and affordable options for purchasing, high-speed broadband connectivity. For almost all school districts and library systems, this means connecting every school and library to fiber. The Commission adopted several reforms focused on upgrading connectivity, improving cost effectiveness, and encouraging competition so that all E-rate applicants could keep pace with rapidly growing bandwidth demand. As explained below, analysis of data available through two funding years demonstrates significant progress toward closing the fiber gap.

The *Second E-rate Modernization Order* provided additional tools and competitive options for purchasing fiber broadband connectivity, with the dual goals of closing the rural connectivity gap and increasing cost effectiveness for all E-rate applicants. To help schools and libraries overcome barriers to access and affordability, the Commission adopted four major reforms.

- Flexible payment options. To reduce financing challenges for applicants and incent more vendors to bid on fiber builds, the FCC directed USAC to suspend its requirement that special construction charges in excess of $500,000 be amortized and also permitted applicants to pay their non-discounted share of special construction costs in installments over up to four years.

[13] *Second E-rate Modernization Order*, 29 FCC Rcd at 15575, para. 93.
[14] *Id*. at 15576-77, paras. 95-96.

- Equalizing leased lit fiber and leased dark fiber. Prior to funding year 2016, applicants that pursued a leased dark fiber solution could not receive E-rate funding for special construction beyond the applicant property line or for the purchase of modulating electronics to light the dark fiber. The Commission made all special construction and modulating electronics for leased dark fiber E-rate eligible, "equalizing" leased dark fiber and leased lit fiber because those costs were already an element of the recurring rates charged by leased lit fiber providers.
- Self-provisioned networks. E-rate will now support construction and operation of applicant-owned self-provisioned high-speed networks. Applicants that seek support for self-provisioning are required to seek bids for services provided over third party networks and demonstrate that self-provisioning is more cost effective.
- State match. To incentivize state funding for school and library broadband infrastructure, E-rate now provides additional Category One funding of up to ten percent of costs to match state dollars for special construction of high-speed broadband connections that meet the Commission's capacity goals and measures. E-rate will also match Tribal and federal agency support for special construction to connect Tribal schools and libraries.

The benefits of these reforms extend beyond new high-speed broadband connections for applicants that lease dark fiber or self-provision their own network. Competitive fiber options have the potential to improve cost effective purchasing for all E-rate applicants, including those that ultimately select a leased lit service. The Commission recognized that increasing flexibility and supporting more options for broadband connectivity are consistent with the direction in section 254 of the Act to "enhance, to the extent technically feasible and economically reasonable, access to advanced telecommunications and information services" for schools and libraries.[15]

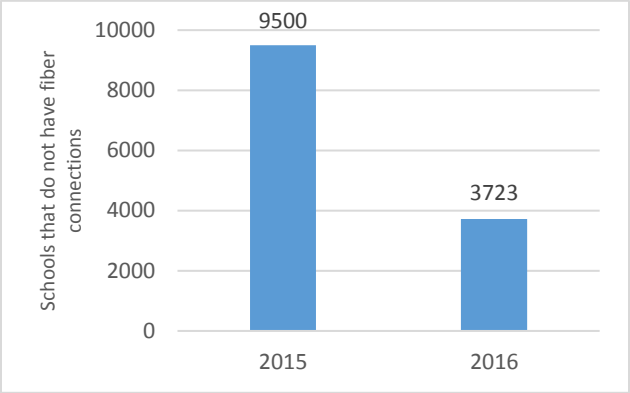
Progress: More Fiber Connections and More Competitive Options

The past two years have seen both increased access to high-speed broadband and reduced per-megabit costs for school districts.

- Comprehensive analysis recently released by EducationSuperHighway (ESH) determined that the number of schools without fiber connectivity declined by 61 percent from 2015 to 2016.[16]

[15] *Id*. at 15544, para. 14.
[16] EducationSuperHighway, 2016 State of the States at 12 (2017), https://s3-us-west-1.amazonaws.com/esh-sots-pdfs/2016_national_report_K12_broadband.pdf (2016 State of the States).

Figure 3: Schools Not Connected to Fiber[17]



- Even more schools will gain access to fiber in 2017 and beyond due to the competitive fiber options adopted in the *Second E-rate Modernization Order*. Funding year 2016 data from USAC shows a significant number of applicants pursuing competitive fiber options.[18]
    - 113 applicants requested funding for special construction of leased lit fiber.
        - Of those, 58 applications took advantage of the reformed amortization and installment payment rules.
    - 342 applicants requested funding for leased dark fiber.
        - 99 applicants requested funding for special construction or modulating electronics for a leased dark fiber network.
    - 236 applicants requested funding for a self-provisioned fiber network.
    - 87 applicants requested state matching funds.

Next Steps: Connecting Remaining Schools to Fiber

Despite this recent success, many schools and libraries are not yet connected to fiber or other high-speed broadband services sufficient to meet the Commission's targets. For applicants with E-rate discounts of 80 percent or greater, the *Second E-rate Modernization Order* offered a solution: E-rate will now match state funding to eliminate all out-of-pocket special construction costs for applicants. However, there are districts with discounts below 80 percent that cannot afford the non-discount share of special construction costs.

The table below illustrates out-of-pocket cost for school districts of different discount levels for a $1 million special construction project, presuming a state match is available. As demonstrated by this example, the one-time special construction costs can be prohibitive for lower discount districts.

[17] The ESH analysis counts "campuses," which include physical sites containing co-located schools (e.g. a middle school and high school sharing a building and therefore a single fiber connection), as a single school. ESH developed an algorithm that estimates the total number of campuses by detecting schools with the same street address or very close physical proximity. *See* 2015 State of the States at 120.
[18] USAC funding year 2016 data as of January 17, 2017.

Figure 4: Cost Distribution for a $1 million Special Construction Project

E-rate Discount	E-rate Funding	State Funding	E-rate Match	Applicant Cost
90%	$900,000	$50,000	$50,000	$0
80%	$800,000	$100,000	$100,000	$0
70%	$700,000	$100,000	$100,000	$100,000
60%	$600,000	$100,000	$100,000	$200,000
50%	$500,000	$100,000	$100,000	$300,000
40%	$400,000	$100,000	$100,000	$400,000

Recent ESH analysis concluded that approximately half of the schools that lack fiber connections are part of districts with an E-rate discount of less than 80 percent and therefore cannot eliminate out-of-pocket special construction costs even with a state match.[19] Further reforms may be necessary to connect these remaining schools to fiber.

ESH and a bipartisan group of governors have recommended that the Commission provide a 90 percent E-rate discount for special construction costs to all schools that currently lack fiber connections when the state provides a ten percent match.[20] ESH's analysis concluded that the additional cost to E-rate, assuming state matching funds, would be approximately $129 million or just over $30 million per year over four years. ESH notes that this proposal would directly address the urban/rural connectivity gap, with over half of the additional funding going to rural or small town districts.

ESH and the three governors also proposed that the Commission extend the temporary suspension of USAC's multi-year amortization policy for two years through funding year 2020, explaining that an extension would give states and school districts additional time to approve state matching funds and develop plans for special construction projects.

IV. Financial and Programmatic Reforms

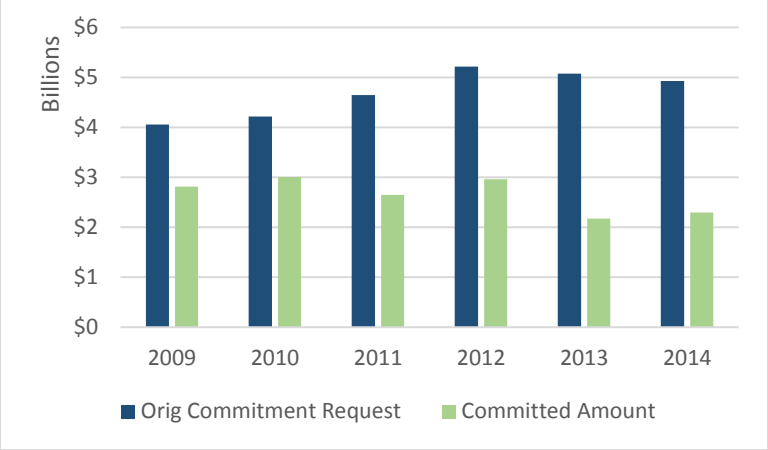
Background

The Commission adopted the *E-rate Modernization Orders* to ensure the financial stability and sustainability of the E-rate program so that available funding could sufficiently support all eligible funding requests as the demands of modern digital learning continue to grow.

[19] Letter from Evan Marwell, CEO, EducationSuperHighway, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184, attach. at 4 (filed Nov. 18, 2016) (ESH Funding the Gap Presentation).
[20] Letter from Governor Susana Martinez, New Mexico, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184 (filed Aug. 15, 2016); Letter from Governor Greg Abbott, Texas, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184 (filed Nov. 14, 2016). Governor Hassan was elected to the U.S. Senate in 2016.

Funding requests had far outpaced available funding[21] in the years leading up to E-rate modernization, driven primarily by increasing demand for bandwidth and Wi-Fi to meet the needs of modern digital learning. Total support requested by E-rate applicants consistently exceeded $4 billion from 2009-2014, peaking at $5.3 billion in 2012.

Figure 4: E-rate Funding Requests vs. Commitments, 2009-2014



The *Second E-rate Modernization Order* increased the program's annual cap to $3.9 billion, adjusted for inflation moving forward, so that E-rate could d fully fund all requests for high-speed broadband to and within schools and libraries.[22] In addition, several other reforms in *First E-rate Modernization Orders* were designed to put the program on sound financial footing by narrowing the scope of supported services and promoting cost-effective purchasing. These reforms included:

- Phasing out support for several legacy non-broadband services, including voice services, outdated telephone services, email, web hosting, and voicemail.[23]
- Adopting a goal of maximizing the cost effectiveness of E-rate purchases, with a particular emphasis on reducing average bandwidth prices.[24]
- Increasing price transparency so that E-rate applicants could find the best prices for eligible services and the E-rate program could ensure cost effective purchasing.[25]
- Support for competitive fiber options, as discussed above.

[21] Prior to funding year 2015, the annual E-rate budget was $2.41 billion. That budget was based on an initial $2.25 billion budget that the Commission began adjusting the budget for inflation in the 2010. *See Schools and Libraries Universal Service Support Mechanism, A National Broadband Plan for our Future*, CC Docket No. 02-6, GN Docket No. 09-51, Order, 25 FCC Rcd 18762, 18780-83, paras. 35-40 (2010).
[22] *Second E-rate Modernization Order*, 29 FCC Rcd at 15569, para. 77.
[23] *First E-rate Modernization Order*, 29 FCC Rcd at 8922-8931, paras. 134-150.
[24] *First E-rate Modernization Order*, 29 FCC Rcd at 8890, para. 50.
[25] *Id.* at 8934 para. 156.

Progress: Improved Cost Effectiveness and Stable Program Finances

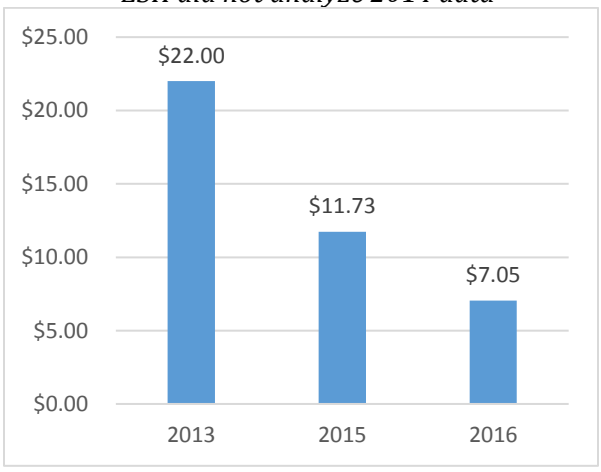
Funding requests and commitments have been stable, and under the $3.9 billion spending cap, in the two funding years since the cap increase. For funding year 2015, commitments total $3.28 billion. USAC received funding requests totaling $3.61 billion for funding year 2016,[26] and commitments currently stand at $1.87 billion.

There are several reasons that funding requests and commitments have come in below the spending cap, despite rapidly increasing demand.

- *Cost-effective bandwidth*. A major driver behind E-rate demand is the price paid per Mbps for Internet access. The Commission recognized that many E-rate applicants pay very high monthly rates for internet access that are not sustainable as bandwidth demand in the coming years.[27] ESH analysis shows that the price per Mbps paid by E-rate applicants has declined 68% since funding year 2013.

Figure 5: Median Price per Mbps[28]

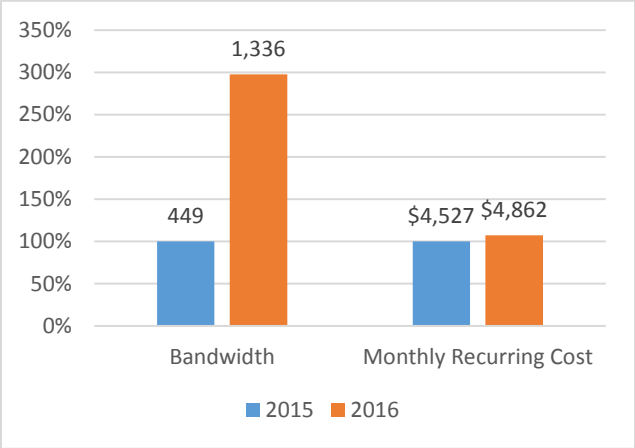
**ESH did not analyze 2014 data*



The single largest factor contributing to this price decline has been school districts increasing the amount of bandwidth they are purchasing for a small increase in cost. ESH found that 42 percent of districts increased their bandwidth in 2016, and that most "upgraders" did so without significant increases to their monthly recurring costs. Among districts that upgraded, the average bandwidth increase was nearly 200% with an average cost increase of only 7%.

[26] USAC FY2016 Demand Letter, http://www.usac.org/_res/documents/sl/pdf/tools/FY2016-Demand-Estimate-May26-Window.pdf.
[27] *First E-rate Modernization Order*, 29 FCC Rcd at 8934-35, paras 155-157.
[28] 2016 State of the States at 8.

Figure 6: Average Bandwidth and Cost Increases for 2016 for Upgraders[29]



- *Connectivity Targets*. The connectivity targets adopted by the Commission drew attention to the urgent need for affordable broadband for all schools. ESH analysis concluded that the Commission's adoption and promotion of connectivity targets has been a "significant driver of improvements" in the number of districts meeting the targets because "districts knew they needed internet access but did not have a clear sense of how much was needed to support effective digital learning."[30]

- *Competition and Pricing Transparency*. Competitive fiber providers are entering the E-rate market, and the leased dark fiber and self-provisioning options made eligible in the *Second E-rate Modernization Order* are giving applicants even more options. ESH's examination of school districts that upgraded bandwidth in 2015 and 2016 found that districts that switched providers received twice as much additional bandwidth as those that remained with their current provider. In addition, switchers on average reduced monthly costs 8 percent, compared to a 12 percent increase for non-switchers.[31]

Next Steps

A continued focus on cost effective purchasing will be necessary if every school is to achieve the 1 Gbps per 1,000 users connectivity target within the current E-rate spending cap. ESH estimates that the average price for internet access must be reduced to $3/Mbps in order to reach the long-term connectivity target.[32] The data shows that this is a realistic goal and that the reforms adopted in the *E-rate Modernization Orders* will continue to improve cost effectiveness in the coming years.

[29] *Id*. at 7.
[30] 2015 State of the States Report, p. 25.
[31] 2016 State of the States at 25.
[32] 2015 State of the States at 25-26.

Conclusion

The two years since the adoption of the *E-rate Modernization Orders* have seen numerous changes for the E-rate program, USAC, and E-rate applicants. Though many reforms have only been fully implemented for one funding year, available data already demonstrates progress toward the Commission's goals of expanding support for Wi-Fi, connecting all schools to fiber, and ensuring financial stability.