WIRELINE COMPETITION BUREAU & OFFICE OF STRATEGIC PLANNING AND POLICY

STAFF REPORT

WC DOCKET NO. 13-184

AUGUST 12, 2014

I.   INTRODUCTION

1.   The staff of the Wireline Competition Bureau and the Office of Strategic Planning and Policy Analysis (Bureaus) have prepared this Staff Report to assist the Commission in its ongoing modernization of the schools and libraries universal service support program, commonly known as E-rate. Our intent is to help stakeholders and the public navigate the large and data-intensive record in the E-rate Modernization proceeding, particularly as they respond to the sections of the *Further Notice* adopted in connection with the *E-Rate Modernization Order* regarding the long term funding needs of the program.[1]

2.   The *E-Rate Modernization Order*, adopted by the Commission on July 11, 2014, refocuses the E-rate program on broadband, while maintaining the basic division of broadband connectivity into two categories of services:

- *Category one: External Connections* – External connections are what connect school and library locations to one another and ultimately to the Internet.

- *Category two: Internal Connections* – Internal connections are the Local Area Networks (LANs) and Wireless LANs (WLANs) that deliver Internet access from the edge of a school or library to each classroom or library room, and then ultimately the actual student, faculty, or patron end-user device. Wireless LANs generally are built with access points that utilize the IEEE 802.11 family of standards (Wi-Fi).[2]

3.   In the remaining sections of this report, we summarize the changes the Commission adopted to E-rate funding of category two services for the next two funding years, and the projected impacts of these changes if they are extended and if they are not. We then address category one services, presenting new staff analysis on the extent of fiber connectivity to school and library premises and on current pricing for school connections. We also present an overview of new broadband funding that is likely to be available due to the phase-out of funding for non-broadband services.

4.   Each of these issues is an important part of the overall assessment of the E-rate program's long term funding needs and relates to specific questions asked by the Commission in the *Further Notice*.

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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, FCC 14-99 (rel. July 23, 2014) (*E-Rate Modernization Order* or *Further Notice*).

[2] *E-Rate Modernization Order* at para. 77.

We do not, however, seek to draw any overall conclusions from these data at this time, or to integrate them into an overall analytic framework. Instead, it will be useful for commenters to submit their views based on these data, provide feedback on the analyses we have described, and submit any additional analyses they may conduct to respond to the *Further Notice*. We thank the many stakeholders who have contributed to the analyses herein and look forward to further input.

II. INTERNAL CONNECTIONS

5. The *E-Rate Modernization Order* made a number of significant changes to E-rate's mechanisms for supporting category two services. In this section we review some of the data that informed the Commission's adoption of these changes, and then briefly summarize their projected impact. Some of these changes, including in particular the adoption of five-year applicant budgets, are effective only for the next two years absent further action by the Commission because they are "closely linked to the question of the long-term funding levels for category two services" and the Commission chose to "evaluate the longer-term application of [the budget] approach in conjunction with our evaluation of the overall, longer-term program needs."[3] In the *Further Notice*, the Commission sought comment on whether the "budgets should be continued in future funding years, and the closely related question of the $1 billion funding target we adopt for category two services."[4] To help commenters address these issues, we provide an initial staff analysis of how budget requirements may be affected by a Commission decision to extend or terminate the five-year budget approach.

A. Old Priority Two Funding Approach

6. Under the old approach to funding of internal connections, schools and libraries had no overall limit on the amount of support they could request, although applicants could request internal connections funding only twice in any five-year period. From Funding Year 2008 through Funding Year 2012, E-rate provided between $700 million and $1.2 billion for Priority Two Funding each year. However, as illustrated in Figure 1, this funding provided internal connections support for only four to 11 percent of the more than 100,000 schools participating in the program each year.

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[3] *Id.* at para. 106.

[4] *Further Notice* at para. 269.

Figure 1: Internal Connections Funding for Schools[5]
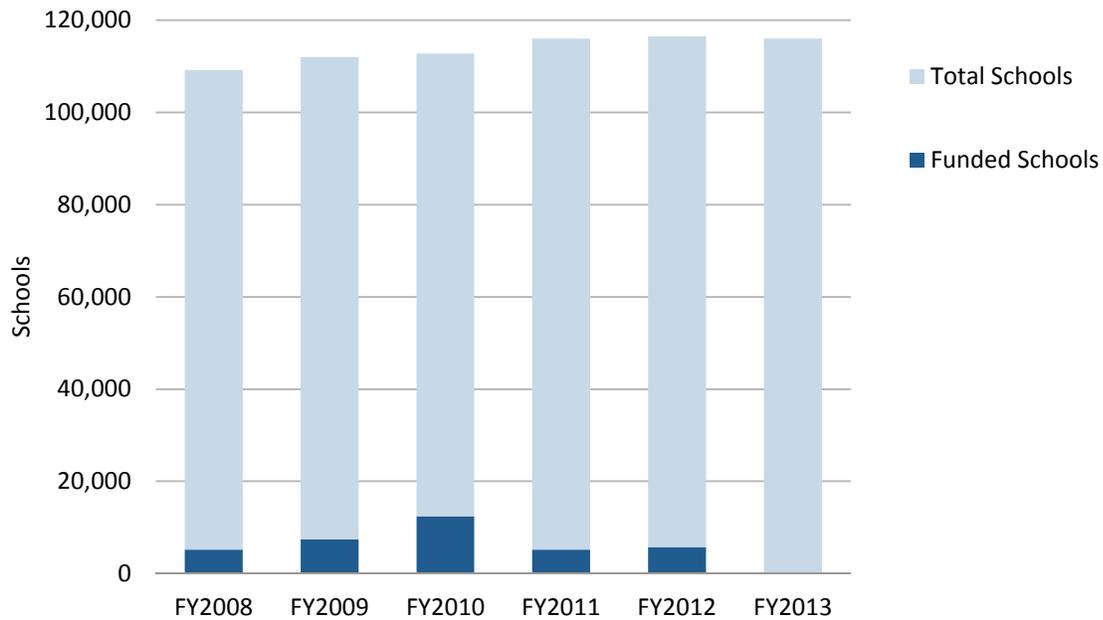
Priority Two Funding	$0.9 billion	$1.2 billion	$1.2 billion	$0.7 billion	$0.8 billion	$0

7. Internal connections support was provided for an even smaller fraction of library locations. As illustrated in Figure 2, no more than three percent each year of public library locations (central libraries and branches) received a funding commitment for internal connections support in Funding Year 2008 through Funding Year 2012.

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[5] "Total Schools" includes all schools (public and private) participating in the E-rate program. "Funded Schools" includes all schools receiving committed funding for "Internal Connections."

**Figure 2: Internal Connection Funding for Libraries[6]**
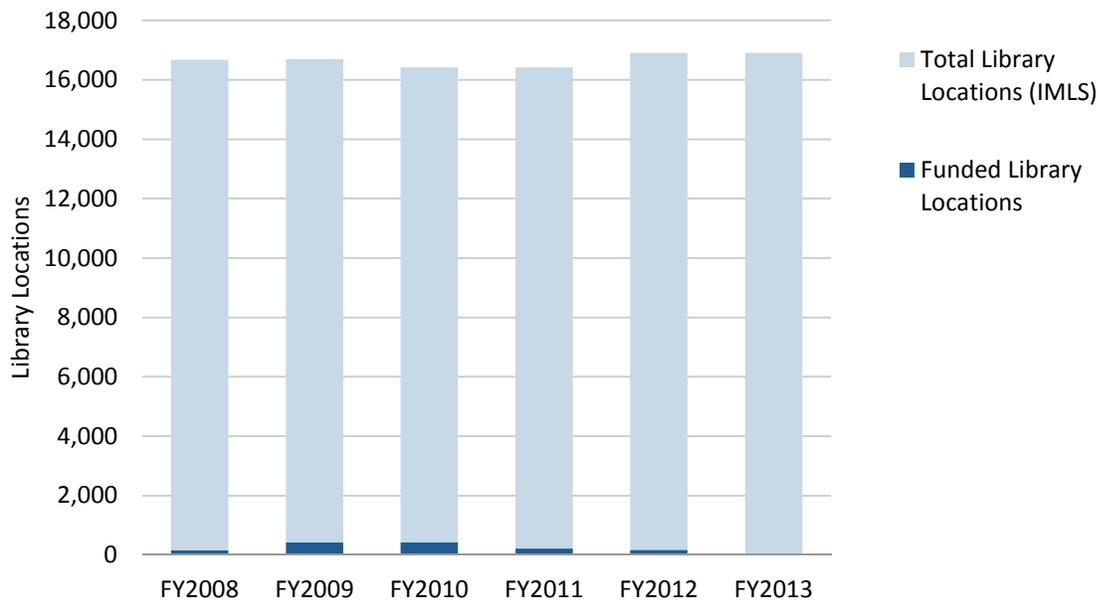
8. Over this period, the data suggest that E-rate applicants recognized that only the highest discount schools and libraries had even the possibility of receiving priority two funding; as illustrated in Figure 3 below, schools and libraries with a discount below 80 percent rarely even applied. Starting in Funding Year 2012, the growth in priority two funding demand from applicants at the 90 percent discount level had effectively eliminated the possibility that applicants below the 90 percent discount level could reasonably expect to receive Priority Two funding.

9. However, even the highest discount schools went without internal connections funding in Funding Year 2013. In February 2014, USAC determined that, for the first time, there was insufficient E-rate funding to fully support *any* internal connections requests after meeting demand for priority one services.[7] Those Funding Year 2013 applications totaled over $1.7 billion, far more than remained after priority one services were funded. Under the old rules, one option would have been to commit to each applicant at the 90 percent discount level a pro rata share of the limited funds available - about 60 percent of their requested funds - and their required match would have been more than four times larger than for the amount for which they had planned. Thus, a large fraction of any funds committed to these applications would likely have gone unused, but only after extended paperwork and delay.

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[6] "Total Library Locations" includes central libraries and branches. *See* Institute of Museum and Library Services, Public Libraries in the United States Survey: Fiscal Year 2011, Table 3 (2014), http://www.imls.gov/research/public_libraries_in_the_us_fy_2011_report.aspx (for 2011 data). A 2012 report has not yet been published; however, public use data files for 2012 are available at http://www.imls.gov/research/pls_data_files.aspx. Libraries for Funding Year 2012 are calculated from these data by summing the total number of central and branch outlets. Because Funding Year 2013 is not yet available from IMLS, we've assumed the same number of "Total Library Locations" as reported for Funding Year 2012. "Funded Library Locations" includes central libraries and branches that received a funding commitment for "Internal Connections."

[7] *See* USAC, Schools and Libraries (E-rate), Latest News, http://usac.org/sl/tools/news/default.aspx (last visited Aug. 12, 2014) (entry titled "2/27/2014 – Update on Priority 2 Commitments for FY2013").

Figure 3: Priority Two Requests by Discount Band
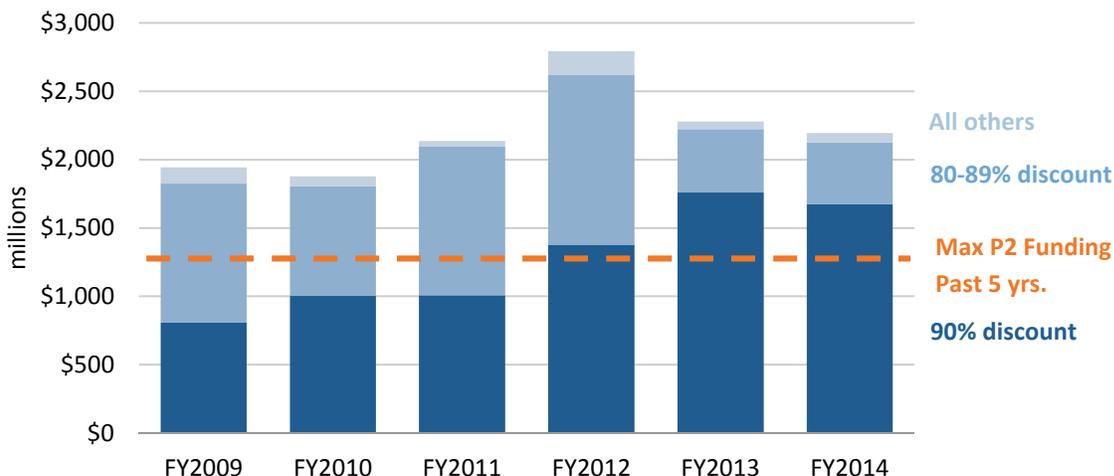
10.   The old approach to funding internal connections also may have failed to provide sufficient incentives to pursue cost-effective purchasing. There has been a wide variation in the internal connections funding requested by school districts and library systems. Even within the 90 percent discount band, the small fraction of applicants requesting the highest levels of internal connection support per student drove overall funding demand. Figure 4 below illustrates this issue. The figure categorizes, by decile, committed internal connection funding request applications for Funding Year 2012 on a pre-discount, per-student cost basis.[8] For each decile, the figure shows the average pre-discount cost for which USAC committed funding. Because only applications at the 90 percent discount level were funded in FY 2012, all applications in the chart are 90 percent discount applications. As this figure shows, close to half of applicants spent less than $150 per-student, the budget adopted by the Commission in the *E-Rate Modernization Order*.[9] Some applicants, however, spent far more. Indeed, as detailed in Figure 5 below, the schools and districts that had per student internal connections costs in the two highest deciles spent almost as much ($247.1 million) as the most cost effective 60 percent of schools and districts receiving funding combined ($235.2 million). While some variation is to be expected due to differences in local needs and conditions, internal connections costs are largely based on the costs of equipment, which tend to have consistent prices nationwide. In contrast, the most expensive deciles shown in Figure 5 requested support at levels many multiples higher than the range of actual necessary costs filed with the Commission to date.[10] Although a number of drivers could explain these very high requested support levels – ranging from particularly challenging deployments in areas with high labor costs, to schools seeking to build internal connection networks at service levels well in excess of the goals established in the *E-Rate Modernization Order*, to particularly inefficient network planning and purchasing – the *E-Rate*

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[8] In Funding Year 2012, priority two funding was only available for the 90 percent discount band. USAC, Schools and Libraries News Brief, Commitments for Funding Years 2013 and 2012 (Mar. 7, 2014), http://www.usac.org/sl/tools/news-briefs/preview.aspx?id=536 (2012 Priority Two Funding Announcement).

[9] *See E-Rate Modernization Order* at paras. 91-93.

[10] *See id.*

Modernization Order squarely addresses this issue. The Commission's adoption of the $150 budget and decision to increase applicants' minimum contribution for internal connections from 10 to 15 percent will spread available universal service funds more widely and increase the incentive for applicants to find the most cost-effective options that meet their internal connection needs.[11]

Figure 4: Funding Year 2012 Internal Connection Costs per Student[12]

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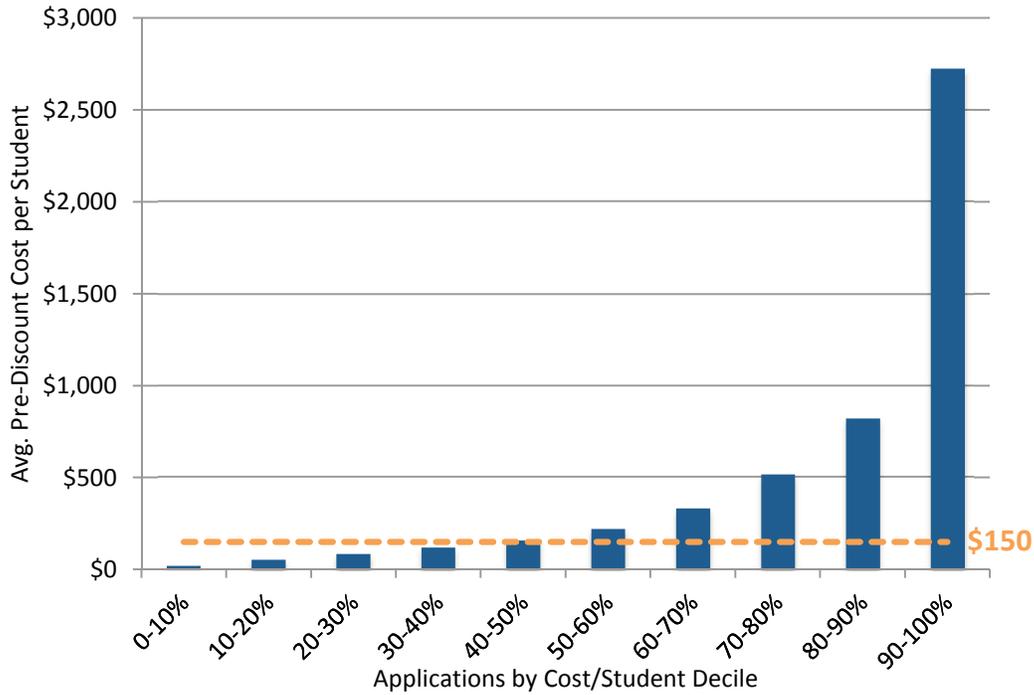
[11] *See id.* at paras. 82, 116.

[12] For Funding Year 2012, we normalized committed, internal connection, pre-discount amounts based on associated student counts.

Figure 5: Funding Year 2012 Internal Connection Costs per Student Table

Applications by Cost/Student Decile	Average Pre-Discount Cost per Student	Supported Students	Total Pre-Discount Cost
0-10%	$20.59	655,107	$13,255,645
10-20%	$54.61	451,107	$24,153,659
20-30%	$85.63	449,385	$36,398,549
30-40%	$119.22	428,590	$49,648,722
40-50%	$157.24	212,552	$33,118,463
50-60%	$220.32	354,628	$78,671,201
60-70%	$331.23	340,790	$110,891,261
70-80%	$515.24	209,312	$102,968,731
80-90%	$822.20	216,884	$180,263,133
90-100%	$2,724.95	37,913	$66,871,025

B.   New Category Two Funding Approach

11. To address these issues, and "provide broader and more equitable support for category two services," the *E-Rate Modernization Order* revised the Commission's approach to internal connections funding.[13] Under the new approach, "schools in districts that seek category two funding during funding years 2015 or 2016 will be eligible to request E-rate discounts on purchases of up to $150 (pre-discount) per student for category two services over a five-year period. Likewise, library systems and libraries that seek category two funding in funding years 2015 or 2016 may request E-rate discounts on purchases of up to $2.30 (pre-discount) per square foot over a five-year period."[14] The Commission established a pre-discount funding floor of $9,200 over a five-year period for each school or library,[15] and raised the minimum contribution rate for category two services from 10 to 15 percent to encourage applicants to pursue the most cost-effective options.[16] The Commission also set a $1 billion target for annual internal connections support.[17]

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[13] *E-Rate Modernization Order* at para. 86.

[14] *Id.*

[15] *Id.* at para. 103.

[16] *Id.* at para. 82.

[17] *Id.* at para. 118.

12. To estimate the potential impact of these changes, staff examined Funding Year 2012 internal connection committed funding requests to estimate the number of students for which $1 billion in funding could support internal connections.[18] We modified the Funding Year 2012 funding request distribution to reduce any request that exceeded $150 per-student expenditure to $150 times the number of students, while retaining the actual costs for those schools with a per-student amount below the maximum. We compared this result to the number of students that could be supported with $1 billion in the absence of any limit on applicants' funding requests.[19]

13. The results of our analysis are illustrated in Figure 6 below. This analysis suggests that in the absence of budgets, $1 billion in funding would support internal connections requests from schools serving about 3.8 million students. In contrast, we project that the five-year budget approach adopted by the Commission should enable at least 10.5 million students to receive support in Funding Year 2015, or approximately 6.7 million additional students.

Figure 6: Students Supported by $1 Billion of Internal Connections Funding
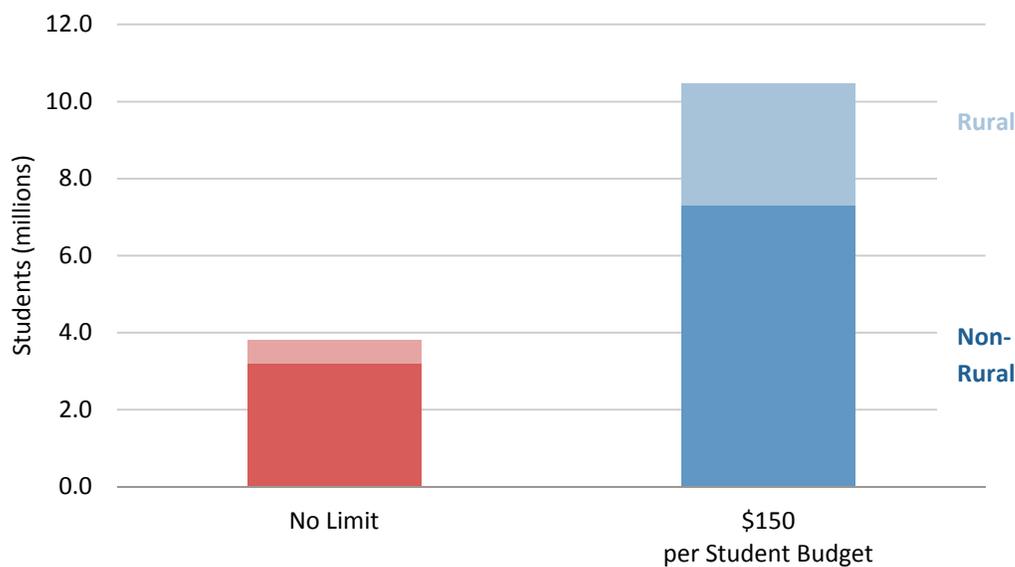
C.   Budget Impact of Extending or Not Extending Changes

14. Using the five-year budgets set in the *E-Rate Modernization Order*, funding category two requests for all schools and libraries nationwide will require approximately $1 billion per year over each of the next five years. To estimate the budget requirements if the five-year budgets adopted in the *E-Rate Modernization Order* are not extended, we estimated the funding required to support 10 million students

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[18] 2012 Priority Two Funding Announcement, *supra* note 8.

[19] We also assumed that funding requests totaled $1 billion so that there was no pro-rata distribution of funds at any discount level. In the absence of applicant budgets that limit the largest requests, $1 billion would be insufficient to meet demand at the highest discount level in the face of demand trends since 2012. Our projection of the "no-budget" scenario assumes that applications would be funded based on NSLP percentage within the highest discount band, as directed in the *E-Rate Modernization Order*, rather than using a reduced discount rate, as under the prior rules.

and 3,000 libraries annually in the absence of such budgets.[20] We estimate that approximately $2.5 billion in support would be required to support 10 million students and 3,000 libraries annually, in the absence of per-applicant budgets.[21] That is, an additional $1.5 billion would be required annually in addition to the $1 billion annual target established by the Commission in the *E-Rate Modernization Order*. Alternatively, if the Commission were to maintain funding at the $1 billion level, only about one third of the students and libraries that would have benefited from support under the adopted budgets actually would receive support.

III.   EXTERNAL CONNECTIONS

15. In the *E-Rate Modernization Order*, the Commission distinguished between two basic types of external connections: Internet Access and WAN connections. In this section we employ the same distinction:[22]

- *Internet Access* – Many school districts and some library systems purchase Internet access for the entire district or system at a single point of aggregation. In this report, as in the *E-Rate Modernization Order*, we refer to "Internet access" as the connection or connections that allow traffic to flow from that aggregation point to the public Internet. As part of the purchase of Internet access, the school district (or library system) may purchase dedicated connectivity (e.g., dedicated transport) from its point of aggregation to its Internet Service Provider's (ISP) point of presence. For schools and libraries that are not connected to a district Wide Area Networking (WAN), Internet access simply refers to the school or library's direct connection to the public Internet.

- *WAN/Last-Mile* – As just described, school districts and library systems frequently connect individual schools and libraries to a central aggregation point, such as a district data hub, that hosts the Internet demarcation point for the entire district or library system. We refer to these connections from individual school, library, or other building locations to an aggregation point as WAN or last mile connections.

16. In the *Further Notice* the Commission noted that "several states and providers have submitted . . . data" regarding "schools' and libraries' current connectivity" for WAN and Internet connections.[23]

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[20] Support at this level would be sufficient to fund all schools and libraries over five years, assuming a 90 percent program participation rate.

[21] For schools, we assumed the same per student pre-discount average costs as in the committed Funding Year 2012 applications ($291), but we applied a deflationary factor of 66 percent to the cost per-student at discount levels of 70 percent and below. We made this adjustment because for category one services, requests from applicants at lower discount rates have historically been substantially below those from applicants at the 90 percent discount level, and we assume the same effect would occur for category two services. For libraries, we assumed the same per library pre-discount average costs as in the committed Funding Year 2012 applications ($16,491.50), but did not apply a deflationary factor because we conservatively assumed that all libraries were in the 90 percent discount band. Thus, we obtained our estimate of $2.5 billion by summing (i) the number of students that would have been served in each discount band under the $150 budget multiplied by $291 or $192 (as appropriate for the discount band), and (i) 3000 libraries multiplied by $14,842.22 (i.e., 90 percent of $16,491.50).

[22] *E-Rate Modernization Order* at para 32.

[23] *Further Notice* at para 269.

The Commission also sought comment on "how much funding is needed to bridge [connectivity] gaps in light of likely pricing for broadband services."[24] To assist commenters as they respond to this question, this section summarizes the current record on school and library connectivity and on current pricing levels.

1. Direct Access to Fiber Connectivity

17. In the *E-rate Modernization Order*, the Commission "adopt[ed] [for schools] the State Education Technology Directors Association's (SETDA) target recommendation of Internet access for schools of at least 100 Mbps per 1,000 students and staff (users) in the short term and 1 Gbps Internet access per 1,000 users in the longer term."[25] The Commission also "adopt[ed] as a target for WAN connectivity [for schools] the total number of schools that have a connection capable of providing a dedicated data service scalable to the SETDA long-term WAN target of 10 Gbps per 1,000 students."[26] The Commission found that the record was not sufficiently developed to establish a WAN connectivity target for libraries, but chose to track the total number of libraries that have a connection capable of providing a data service scalable to at least 10 Gbps.[27] In many cases, this type of scalable connectivity can only be provided or can most cost-effectively be provided via fiber, because fiber connections are readily scalable to very high speeds.[28] Accordingly, staff reviewed the record to compile available data on connectivity to school and library premises today.

18. Over the course of the E-rate proceeding, states, providers, applicants, and our partner agencies in the federal government have provided the Commission a large amount of data on school and library connectivity. Commission staff combined these datasets with National Broadband Map community anchor institution connectivity data,[29] using school and library codes from the National Center for Education Statistics (NCES) and the Institute for Museum and Library Services (IMLS) as the unique identifier for each school or library.[30] Collectively, these data sets provide direct, "actual" data on the connectivity status of about half of all U.S. public schools and about two thirds of all U.S. library locations (excluding bookmobiles and books by mail). In the few cases where two data sets provided

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[24] *Id.*

[25] *E-Rate Modernization Order* at para. 34.

[26] *Id.* at para. 39.

[27] *Id.* at para. 43.

[28] *See, e.g.*, *id.* at para. 39 (noting that "[i]n most cases, a 1 Gbps fiber connection can be readily scaled to 10 Gbps with upgraded networking equipment.").

[29] To create the scrubbed sample of community anchor institution data, staff kept only public schools with an NCES or state school identifier. Observations with any logical inconsistencies were dropped (e.g., responding 'yes' to broadband services, but not identifying a technology type), as were any schools with duplicate NCES identifiers. Schools with a 'transtech' code of 50 ("optical carrier/fiber to the end user") were marked as having fiber, regardless of download/upload speeds.

[30] Each school or library in a data source is assigned one of the following scores: (-1) for no fiber, (1) for fiber, or (0) for unknown. Each entity then receives an overall score that is the sum – across the row – of the scores for each source. For example, if one source says that a particular school does not have fiber and another source says that a school does have fiber, the school's overall score will be zero, or unknown fiber status.

conflicting information about connectivity at a given school or library, that location was excluded from the analysis.

19. Based on this analysis, and as illustrated in Figure 7 below, we estimate that roughly 65 percent of public schools have fiber facilities to the building. We further examined those public schools without fiber, with a particular focus on the status of rural schools, which in many cases have limited external connectivity options,[31] and small schools, which due to their small student counts may be able to obtain suitable external connections without access to fiber. We estimate that 11 percent of public schools are rural (as identified by NCES), have more than 100 students, and are without fiber connectivity. In comparison, we estimate that 19 percent of public schools are non-rural, have greater than 100 students, and are without fiber. The remaining five percent of public schools have less than 100 students and are without fiber.

20. We caution that this analysis may somewhat overstate the extent of fiber connectivity to schools. We do not believe that the half of public schools for which we have data are perfectly representative of all schools in the country. Based on conversations with state and local officials, we believe that states with better connectivity data are more likely to have fiber to a larger percent of their schools than those states without statewide connectivity data. Nevertheless, this analysis provides a useful guidepost as we estimate the extent of fiber connectivity to schools.

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[31] *See, e.g.*, Comments of the Imperial County Office of Education and California K12 High Speed Network, WC Docket No. 13-184, at 9 (filed Sept. 16, 2013) (fiber connectivity is not available for many smaller or rural schools in California); Comments of the Kentucky Department for Libraries and Archives, WC Docket No. 13-184, at 6 (filed Sept. 16, 2013) (Internet access is unreliable in Southeastern Kentucky due to mountainous terrain and lack of infrastructure); Letter from Charles Eberle, Attorney Advisor, Telecommunications Access Policy Division, Wireline Competition Bureau, FCC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184, Attach. 1 (filed Spt. 27, 2013) (many rural Oregon school districts do not have access to fiber facilities); Letter from Jeffrey A. Mitchell, Counsel for the Panhandle Area Education Consortium, North East Florida Educational Consortium, and Heartland Educational Consortium, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184, at 2 (filed Feb. 21, 2014) (many rural Florida schools are served by a single provider that does not have fiber facilities); *see also*, Comments of the American Library Association, WC Docket No. 13-184, at 25 (filed Sept. 16, 2013) (rural libraries in several states report that they receive one or no bids for broadband service).

Figure 7: Estimated Public School Fiber Connectivity
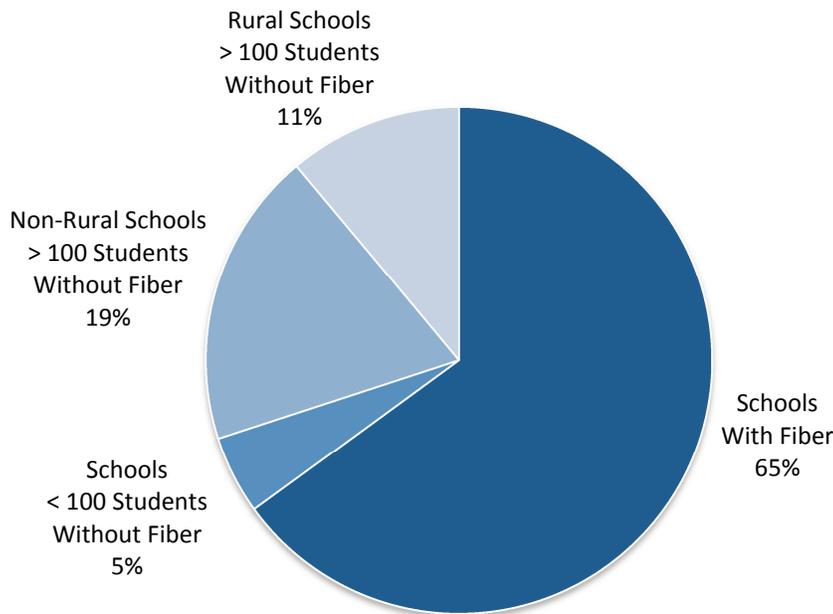
21. The connectivity situation appears to be worse for libraries. Based on a similar analysis using data from various states and the National Broadband Map, we estimate that approximately 15 percent of libraries have fiber connectivity to the building. We do not have sufficient data at this time to estimate the connectivity status of parochial schools or other non-public schools, although these schools are eligible for E-rate.

22. The full school-by-school and library-by-library datasets used to generate these aggregate estimates is available on the E-rate Modernization data site,[32] and as a map of district-level connectivity information.[33] Commenters may wish to provide additional data or to correct any know errors in these datasets.

2. Connection Speeds

23. The fact that a school or library has a fiber facility running to the premise does not ensure that the school or library has affordable access to sufficient bandwidth. One way to analyze the connectivity schools and libraries are purchasing is to consider the amount of bandwidth per-user that schools and libraries are currently purchasing. If we treat the SETDA and Commission longer term connectivity targets of 1 Gbps per 1,000 users for Internet connectivity and 10 Gbps per 1,000 users as the equivalent

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[32] *See* Federal Communications Commission, *E-Rate Modernization Data*, http://www.fcc.gov/encyclopedia/e-rate-modernization-data (last visited Aug. 12, 2014) (providing the full school-by-school and library-by-library datasets under the link labeled "White Paper Direct Access to Broadband Connectivity Datasets").

[33] *See* Federal Communications Commission, *FCC E-Rate Maps of Fiber Connectivity to Schools and Libraries*, www.fcc.gov/maps/E-rate-fiber-map (last visited Aug. 12, 2014).

of 10 Mbps WAN connectivity per student,[34] the available data suggest that schools are far from meeting these speed targets today.

24. As part of the Funding Year 2014 E-rate application process, USAC collected information regarding the type, quantity, and download speed for broadband and other connectivity services ("Item 24" data).[35] Commission staff have combined this data with NCES data to determine a median bandwidth for each school within a district and then have calculated the bandwidth per student.[36] Since Item 24 data focuses on bandwidth of dedicated last-mile connectivity to schools,[37] the analysis only captures the speeds of these connections, rather than other portions of the network.

25. Based on this analysis, we estimate that only 40 percent of schools will purchase at least 1 Mbps per student of last-mile bandwidth in Funding Year 2014, and only 10 percent of schools will purchase the 10 Mbps per student of last-mile bandwidth needed to achieve the SETDA last-mile goal. Similarly, according to a survey by the Consortium for School Networking (CoSN), 43 percent of school districts say none of their schools meet the SETDA goals.[38]

26. EducationSuperHighway has found an even lower connectivity levels in actual nationwide on-site speed tests of school connectivity, finding that over 90 percent of schools are currently below the 1 Mbps per student five-year goal.[39] This is based on EducationSuperHighway SchoolSpeedTest data, which evaluates not just the last-mile connection but the entire connection to the Internet core.[40]

27. We also have analyzed the last-mile bandwidth purchased by over 8,000 library locations, using Funding Year 2014 Item 24 data and the associated FCC Form 471 Block 4 data. Based on that analysis, we estimate that approximately 66 percent of these library locations purchase less than 10 Mbps of last-mile connectivity and approximately 80 percent purchase less than 50 Mbps.

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[34] *See supra* para. 17.

[35] USAC, Funding Year 2014 FCC Form 471, at 5 (Dec. 2013), http://www.usac.org/_res/documents/sl/pdf/forms/471.pdf (Funding Year 2014 Form 471).

[36] Data were matched using the following method: Public schools were sorted by type (high, middle, elementary) and then by size within each category, from smallest to largest. Connections were sorted from lowest bandwidth to highest bandwidth within each unique Billed Entity Number (BEN). Using a BEN-to-NCES crosswalk, one connection was assigned to each school within a district.

[37] *See* USAC, Schools and Libraries, Forms, FCC Form 471 Instructions, at 24 (Dec. 2013), http://www.usac.org/_res/documents/sl/pdf/forms/471i.pdf (noting that applicants should "[c]omplete the information for this funding request only if requesting Telecommunications Services or Internet Access for the purpose of providing broadband connectivity to school and/or library facilities.").

[38] *See* Letter from Reginal Leichty, Partner, EducationCounsel, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184, Attach. at 8 (filed Nov. 11, 2013).

[39] Letter from Evan Marwell, CEO, EducationSuperHighway, to Marlene Dortch, Secretary, FCC, WC Docket No. 13-184, Attach. 3, Connecting America's Students: Opportunities for Action, at 3, 5 (Chart 1), 8 (Chart 3) & n.14 (filed April. 10, 2014) (EducationSuperHighway White Paper).

[40] EducationSuperHighway, SchoolSpeedTest, http://www.schoolspeedtest.org/ (last visited Aug. 12, 2014).

28. The item 24 data on which these analyses are based is publicly available on USAC's website, but we have also posted an aggregate data file on the E-rate Modernization site to facilitate bulk access to these data.[41]

3. Pricing for Broadband Connectivity

29. The prices applicants pay for similar broadband services vary widely. As mentioned above, as part of the Funding Year 2014 E-rate application, applicants were required to include information regarding the type, quantity and download speed for broadband and other connectivity services for which support was sought (Item 24 data).[42] Using this data along with the other Block 5 data,[43] we were able to analyze the distribution of price for a subset of 1-Gbps connections, as illustrated in Figure 13 below.[44]

30. As illustrated below in Figure 8, the monthly price for a 1-Gbps connection ranges from less than $500 to over $10,000, with a median price of approximately $1,300. EducationSuperHighway has provided aggregate pricing data based on its study of Funding Year 2013 item 21 information, which is consistent with this analysis.[45] The EducationSuperHighway analysis also allows comparison within similar geographic areas to ensure accurate treatment of price and cost differences driven by rurality. Even looking at just major metropolitan areas, the level of variation is striking: the bottom quartile ($2,150 per month) pays nearly four times the price for a 1-Gbps connection than the top quartile ($580 per month).[46]

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[41] *See* Federal Communications Commission, *E-Rate Modernization Data*, http://www.fcc.gov/encyclopedia/e-rate-modernization-data (providing the aggregate Item 24 dataset under the link labeled "White Paper Aggregate Item 24 Data").

[42] Funding Year 2014 Form 471 at 5.

[43] *Id*. at 4.

[44] Because applicants can purchase multiple connections at different speeds on a single funding request, staff limited this analysis to requests that only purchased fiber connections at a single speed of 1-Gbps. Price was calculated by dividing original recurring monthly cost by the number of lines.

[45] EducationSuperHighway White Paper at 20.

[46] *Id.*

Figure 8: Pricing for a 1-Gbps Connection
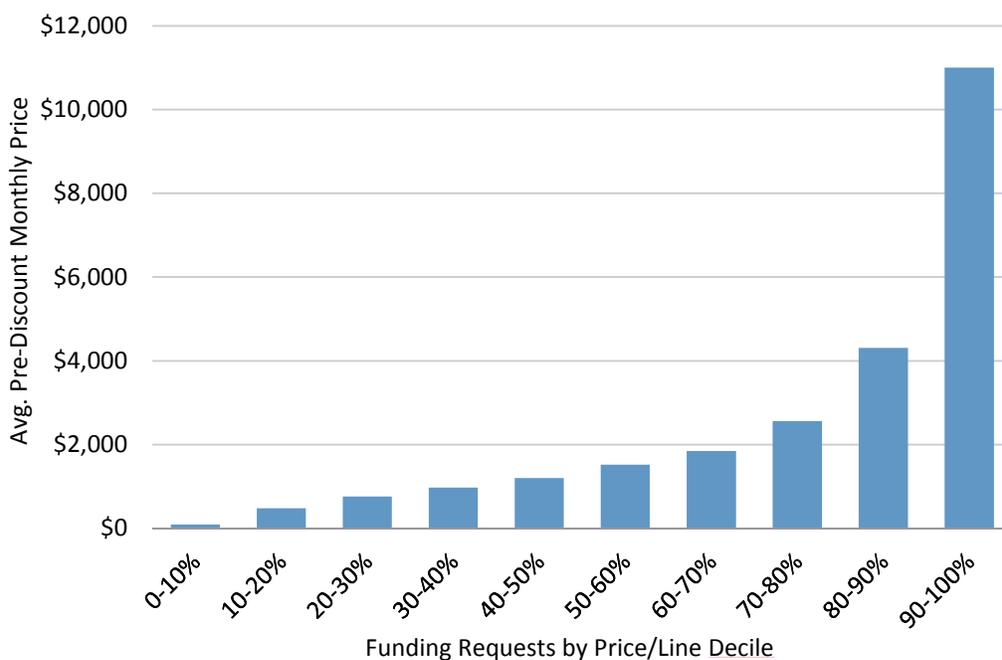
31. The lower price levels found at the more cost effective quartiles in these analyses are confirmed by reports from E-rate program participants. For instance, the State of Mississippi has negotiated a postalized price of $750 per 1-Gbps connection via a state master contract with AT&T.[47] In Vermont, Vermont FiberConnect, a public-private partnership between the Vermont Telecommunications Authority and Sovernet Communications, provides 1-Gbps WAN service to 43 libraries and hundreds of other community anchor institutions for $200 per month per location.[48] In another example, the Peninsula Library System in San Mateo County, CA purchases service from AT&T at a rate of $780/month for each 1-Gbps WAN circuit.[49]

32. The prices applicants pay for commodity Internet access (*i.e.*, raw Internet access obtained from an Internet service provider separately from transport) also vary widely. While schools and libraries in some states report that they can obtain access to the Internet only at $10/Mbps/month or higher,[50] states

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[47] Letter from Charles Eberle, Attorney-Advisor, Telecommunications Access Policy Division, Wireline Competition Bureau, FCC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184, Attach. 1 at 8 (filed Feb. 21, 2014).

[48] *See* Letter from Charles Eberle, Attorney-Advisor, Telecommunications Access Policy Division, Wireline Competition Bureau, FCC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184 (filed May 21, 2014); *see also* Vermont FiberConnect, http://www.vermontfiberconnect.com (last visited Aug. 12, 2014).

[49] *See* Letter from Charles Eberle, Attorney-Advisor, Telecommunications Access Policy Division, Wireline Competition Bureau, FCC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184 (filed Mar. 13, 2014).

[50] *See, e.g.*, Letter from Charles Eberle, Attorney-Advisor, Telecommunications Access Policy Division, Wireline Competition Bureau, FCC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184 (filed April 30, 2014) (listing submissions, including West Virginia Connectivity Data, that have been added to the E-rate Modernization Data Page, http://www.fcc.gov/encyclopedia/e-rate-modernization-data, because their document formats were not

that have formed effective purchasing consortia, especially when a state-level actor is involved, have been able to quickly negotiate commodity Internet rates that are an order of magnitude lower. For example, Network Nebraska, a statewide education network, pays $1.28/Mbps/month, down from $87/Mbps/month;[51] the state of Mississippi lowered the rates available to schools under its statewide master contract from $50/Mbps/month to $5/Mbps/month; and the Utah Education Network has negotiated a rate of $1/Mbps/month.[52]

IV. PHASE-OUT OF NON-BROADBAND SERVICES

33. The *E-Rate Modernization Order* "reorient[ed] the E-rate program to focus on supporting high-speed broadband by phasing down support for voice services and eliminating support for other legacy services."[53] In the *Further Notice*, the Commission sought comment on "the sufficiency of the significant funding freed up by the reforms adopted [in the Order] to meet these needs."[54] In this section, we provide simple projections of funding freed by the phase-out of non-broadband services to assist commenters as they respond to these questions.

34. As Figure 9 illustrates, in Funding Year 2013, nearly 40 percent of priority one funding was directed to voice and other non-broadband services. An additional 12 percent of funding was directed T1s, T3s, and other low-bandwidth broadband services, many of which are likely dedicated in whole or in part to voice services.

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compatible with the Commission's Electronic Comment Filing System); *see also* Letter from Charles Eberle, Attorney-Advisor, Telecommunications Access Policy Division, Wireline Competition Bureau, FCC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184 (filed Sept. 27, 2013) (stating that High Desert (OR) Education Service District pays $25.45/Mbps per month for Internet access at the district demark); Letter from Charles Eberle, Attorney-Advisor, Telecommunications Access Policy Division, Wireline Competition Bureau, FCC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184 (filed Sept. 30, 2013) (stating that Newton (KS) Unified School District 501 pays $23/Mbps per month for Internet access at the district demark); Comments of the American Library Association, WC Docket No. 13-184, at 17 (filed Sept. 16, 2013) (explaining that rural libraries in Apache County, AZ and Idaho pay $300/Mbps and $260/Mbps per month, respectively).

[51] Letter from Shana Knutson, General Counsel, Nebraska Public Service Commission, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 13-184, Attach. at 3 (filed May 12, 2014).

[52] Public Notice Comments of State Consortia Group, WC Docket No. 13-184, at 3 (filed April 21, 2014).

[53] *E-Rate Modernization Order* at para. 6.

[54] *Further Notice* at para. 269. We note that funding is freed because each of the dollars previously allocated to the non-broadband services which are phased out by the *E-Rate Modernization Order* is now available to applicants for eligible category one and category two broadband services.

Figure 9: Funding Year 2013 Priority One Committed Funding by Service[55]
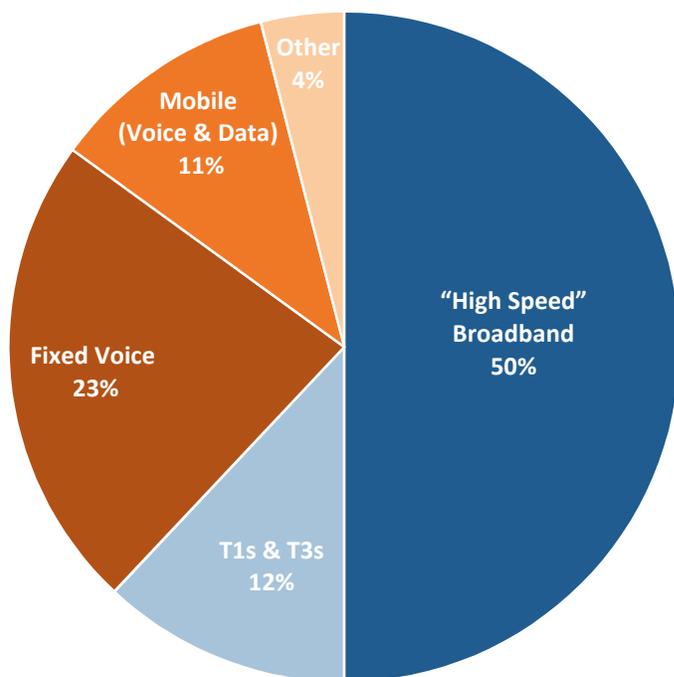
35. Based on this data, we projected the funding freed for broadband services based on phasing down support for non-broadband services. This projection is shown in Figure 10.[56] The projection is

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[55] Letter from Melvin R. Blackwell, Vice President, Schools and Libraries Division, Universal Service Administrative Company, to Lisa Hone, Deputy Chief, Telecommunications Access Policy Division, FCC, WC Docket No. 13-184, at Attach. (filed June 12, 2014) (USAC Broadband Connectivity Data Response FY2012 and 2013). This data was created by USAC's PIA reviewers' classification of each funding request number (FRN) based on the predominant service or product being requested. Because FRNs can contain multiple products or services, and determination of the predominant service or product requires case-by-case judgment, these estimates are inevitably imperfect. For any given product or service, the estimates exclude FRNs where that product or services is listed but judged not to be predominant. The estimates also include funding for other products or services listed together with the predominant product or service on the same FRN. The categorization of priority one services is as follows: "'High Speed' Broadband" (50 percent) includes product types "Ethernet," "Fiber Optics," "Leased Dark Fiber," "Leased Dark Fiber Service," "Leased Lit Fiber," "Leased Lit Fiber Service," "OC-01," "OC-03," "OC-12," and "OC-N." "T1s and T3s" (12 percent) includes product types "ATM," "Broadband Over Power Lines," "Cable Modem," "Dialup," "DS-1," "DS-3," "DSL," "Frame Relay," "Satellite," "Satellite Service," "T-1," "T-1 (Fractional)," and "T-3." "Fixed Voice" (23 percent) includes product types "800 Service," "Centrex," "ISDN – BRI," "ISDN – PRI," "Local Phone Service Only," "Local/Long Distance Phone Service," "Other Telephone Services," "POTS," "Voice Mail," "Voicemail," and "VoIP." "Mobile (Voice & Data)" (11 percent) includes product types "Cellular (including PCS)," "Mobile Hot Spot," "Paging Service," "Text Messaging," "Wireless (for data)," and "Wireless Internet Access." "Other" (4 percent) includes product types "Distance Learning/Video Conf," "Domain Name Registration," "E-mail Service," "Web Hosting," and any other product type not otherwise included.

[56] Demand for priority one services in funding year 2014 was $2.63 billion. As shown in the row labeled "Other" in Figure 10, approximately $100 million of this total was for services that the Commission removed from the Eligible Services List for funding year 2015. *See E-Rate Modernization Order* at para. 78, n.166. In order to estimate savings for "Voice (fixed+mobile)," we assumed that demand for voice services in Funding Years 2015-2019 would be equal to the demand for voice services in 2014, which was 33 percent of the total 2014 demand for priority one services, or $867.9 million. *Id.* We then determined the amount of savings from the voice phase-out for each year

based on an aggregate category one demand level of $2.6 billion, equal to Funding Year 2014 priority one demand. For purposes of this projection, we assumed baseline voice demand remained level from 2013 through the end of the phase-out, and the only change was a reduction in discount level. Actual savings may be larger to the extent spending on voice services decreases as discount levels are reduced. In addition, this analysis assumes no savings from reduction in support for T1s or T3s. Any reduction in E-rate program spending on these services would represent incremental savings available for broadband.

Figure 10: Projected Savings From Phase-Out of Non-Broadband Services (in millions)

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Voice (fixed+mobile)	$242	$482	$689	$837	$868
Other	$100	$100	$100	$100	$100
TOTAL	**$342**	**$582**	**$789**	**$937**	**$968**

36. As Figure 10 illustrates, the savings from the phase-out of non-broadband services should, on completion, be largely sufficient to cover the annual $1 billion funding target for category two services. Additional funding announced by the Wireline Competition Bureau earlier this year will allow the Commission to make $1 billion available for category two services over each of the next two years,[57] with any remaining gap in later years addressed by reductions in per-unit pricing for E-rate supported services driven by the significant new efficiency measures adopted in the *E-Rate Modernization Order*.[58] The Commission continues, however, to evaluate the program's long-term, overall funding needs, particularly in light of general industry trends in broadband pricing and the likelihood that demand for category one services providing connectivity *to* school and library premises will continue to grow.[59]

V. CONCLUSION

37. This report aims to provide some preliminary data and analysis that may be relevant to a number of issues raised in the *Further Notice*, and in particular, to the question of E-rate's long term

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by multiplying $867.9 million by an estimated average voice discount. We derived the estimated average voice discount for each of Funding Year 2015-2019 by estimating the average voice discount for all discount bands for Funding Year 2013 – the most recent year for which there is sufficient data to generate an estimate – and then reducing each discount band by 20 percentage points per year starting with Funding Year 2015. The FRN level dataset used to generate this analysis and our calculations are available the E-rate Modernization data site. *See* Federal Communications Commission, *E-Rate Modernization Data*, http://www.fcc.gov/encyclopedia/e-rate-modernization-data (providing the FRN level data and our calculations under the link labeled "USAC Broadband Connectivity Data Response 2013" at tabs labeled "Data" and "Calculations.").

[57] *Wireline Competition Bureau Seeks Focused Comment on E-rate Modernization*, WC Docket No. 13-184, Public Notice, 29 FCC Rcd 2174, 2177, para. 7 (Wireline Comp. Bur. Mar. 6, 2014).

[58] *See E-Rate Modernization Order* at paras. 155-186 (Section V – Maximizing the Cost-Effectiveness of Spending for E-rate Supported Purchases).

[59] *See Further Notice* at para. 269.

funding needs. As a starting point for stakeholder feedback, the analysis above highlights several questions that were raised in the *Further Notice*: 1) What is the outlook between 2015-2019 for demand growth in category one broadband services? 2) How will that growth vary as between last-mile and Internet access? 3) What are the most important drivers of that growth, and in particular what are the likeliest scenarios for the relationship between volume and price paid by schools and libraries?[60] We appreciate and look forward to the comments of all stakeholders on this analysis and the questions it raises, and to synthesis of this and other information into their comprehensive recommendations regarding E-rate's longer term budget.

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[60] *Id.*