

**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 THE QUILT

April 7, 2014

Executive Summary

The Quilt appreciates the title and goal of this proceeding, which is to “modernize” the E-rate program for the future. When the program was first adopted in 1997, the program was largely intended to provide low-cost telecommunications services for the benefit of school administrators, and providing Internet connections to schools and libraries was new and experimental. In 2014, schools and libraries are integrating Internet-based services into their daily operations, and Internet-based services are seen as instrumental in promoting personalized learning in schools and community broadband needs in public libraries. School students and library patrons require access to Internet-based services in order to develop the skills they need for higher education, future careers, and to improve their quality of life.

- The Quilt believes that expanding the number of entities that are able to receive support for internal connections on a regular basis is essential to ensuring that students, teachers and learners of all ages are able to access high-capacity Internet services. We suggest utilizing a portion of the additional \$2 billion in one-time funds announced for the E-rate program for an initial down payment for internal connections for schools and libraries while a longer-term model is created to support these internal connections needs.
- The Quilt continues to support the idea of a short-term investment program within the E-rate fund to spur additional build-out of last-mile broadband networks to school and library buildings. In designing this capital investment approach, the E-rate program should not pick winners and losers among technologies arbitrarily. The selected technology should meet a set of criteria vital to supporting services and applications in high-demand by teachers, students and digital citizens.
- The Quilt supports the effort to equalize the treatment of “dark” and “lit” fiber. By denying E-rate support for construction costs and the electronics used for dark fiber, the current E-rate rules skew the marketplace in favor of lit fiber, even when dark fiber may be the better option.
- By leveraging economies of scale and the shared technical and marketplace expertise of the R&E Network communities, R&E Networks are able to deliver value to member institutions through improved efficiencies and reduced bandwidth costs. We have found that the benefits of consortium purchases extend into technical support where consortium buyers often receive higher priority in technical support. The Quilt’s experience with consortia purchases has found that bulk purchases for more local, customized services, such as last mile broadband connections, are more difficult to aggregate across several jurisdictions with variability among local providers as well as procurement rules. One of the best ways to encourage consortium purchasing and bulk buying under the program is to allow consortia to leverage existing purchasing vehicles.

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The Quilt appreciates the opportunity to supplement its initial comments¹ in this proceeding by filing these additional comments pursuant to the March 6, 2014 request for “focused” comments on E-rate Modernization.²

I. Introduction

The Quilt³ is a non-profit 501(c)(3) organization that represents over thirty of our nation’s most advanced Research & Education (R&E) Networks in a variety of states across the United States. R&E Networks are non-profit organizations that provide broadband services, advanced networking, Internet access and related services to schools and libraries in their states, often over fiber optic networks.

Most of the state network members of the Quilt began service by providing high-capacity data services among institutions of higher education. Over time, and with the help of the Broadband Technology Opportunities Program (BTOP),⁴ many of our networks have expanded to provide broadband services to K-12 schools, libraries, state and local government agencies, non-profit organizations, health care providers, and private industry engaged in research and educational partnerships. About ½ of Quilt members participate in the E-rate program, either as consortium applicants (4 organizations) filing on behalf of a number of their member school and library institutions, or as Internet access service providers (10 organizations).

¹ See Initial Comments of The Quilt submitted in this proceeding on Sept. 16, 2013.

² “WIRELINE COMPETITION BUREAU SEEKS FOCUSED COMMENT ON E-RATE MODERNIZATION,” WC Docket 13-184, DA 14-308, released March 6, 2014. (“*E-rate Modernization Public Notice*”)

³ More information about the Quilt, including a list of our members, is available at www.thequilt.net.

⁴ <http://www2.ntia.doc.gov/>.

While all members of The Quilt are non-profit organizations, they are funded, governed and structured very differently. These differences reflect the diverse and complex environments of the communities and states in which they operate:

- 35% of Quilt members are 501(c)(3) non-profit corporations;
- 40% of Quilt members are university-based organizations;
- 25% of Quilt members are either a division of the State Board of Regents, State Dept. of Higher Education or another State Government agency.

R&E Networks have several core competencies which allow them to provide high-value services to schools and libraries, such as:

- Most R&E Networks own and control their own middle-mile and some last mile network infrastructure. This allows R&E Networks to respond to the unique requirements of community anchor institutions (CAIs) and support the sustained increases in bandwidth utilization by these institutions over time.
- As consortium purchasers, R&E Networks have a successful history of forming lasting public/private partnerships with commercial telecommunications carriers and other industry partners. These partnerships have resulted in the ability for schools, libraries and other CAIs to cost-effectively access R&E Networks' shared infrastructure while increasing revenue and lowering administrative costs for these commercial partners.
- R&E Networks have been designed to meet the needs of some of the most demanding Internet users in the country: scientists, academics and researchers in our nation's leading academic institutions. These networks are engineered to support high-quality services that are consistent regardless of the number of users on the network. The networks must readily adapt to new experiments or projects that place new demands on the network. The network speed, quality, flexibility and support offered by R&E Networks also provide schools and libraries with exceptional service that adapts easily to specific demands of these users.
- Many of these R&E Networks received BTOP grant funding to build out middle mile infrastructure, upgrade broadband connections and add new connections to community anchor institutions in their states. These projects resulted in lower costs and increased capacity to K-12 schools and libraries and other community anchor institutions that previously did not have such broadband access at affordable prices.

II. Focused Funding for High-Capacity Broadband

A. Internal Connections

Internet connectivity must be ubiquitous within and throughout each school and library building. The Quilt agrees with the *E-rate Modernization Public Notice's* suggestion⁵ that E-Rate needs to focus more on internal connections and in-building infrastructure. As network operators, Quilt members understand that bandwidth is only as good as its weakest link. If that weakest link is inside the school or library building, then the chokepoint in the network begins and ends with each individual student and library patron, and there is no way to engineer around that limitation. Therefore, we urge the FCC to bring Internet connectivity into the classroom and library rooms where students, educators, and library patrons need it most.

The results of surveys from some states performed in conjunction with Quilt member networks found that even when school buildings in these states have access to fiber, they lack access to the internal wiring and WiFi necessary to reach the student. The largest hurdle to overcome in creating digitally capable classrooms is insufficient in-building capacity.

- In Ohio, approximately 90% of school buildings have Internet capacity at 100 Mbps or higher. Deploying fiber to the remaining 10% of restricted school buildings is estimated to cost \$60M-\$80M. This does not include estimates for upgrades within the school building.
- In North Carolina, all the school districts are connected to the North Carolina Research and Education Network via fiber, and 94% of the school buildings have access to fiber. Deploying fiber to the remaining restricted K-12 schools in the state is estimated to cost \$25M-\$30M. This estimate does not include estimates for upgrades within the school building. It is estimated to cost an additional \$50M to deploy wireless access points in every classroom.
- In Missouri, approximately 92% of the Missouri Research and Education Network member E-rate eligible locations have access to fiber but currently very few meet the SETDA external bandwidth recommendations.
- The Utah Education Network has largely accomplished the goal of providing 1 Gbps/1,000 students by deploying fiber-based WAN services to the urban K-12 schools in Utah. Of the 35 public libraries that connect to the Utah Education Network, over 35% connect at speeds of 1 Gbps and 80% connect at speeds of at least 100Mbps.

As a result, the Quilt recommends the creation of a designated pool of funds for on-going support for connections inside the building and classroom. This funding should be provided to support the costs of internal wiring, switches and routers, wireless access points and the

⁵ See *E-rate Modernization Public Notice*, paragraph 3 (“More specifically, the record underscores the importance of providing consistent and broadly available support for the equipment and services needed to enable high-capacity wireless broadband within schools and libraries”)

software supporting these components. Because all of these items must be capable of being managed to ensure they are installed and working properly, a managed wireless LAN service from a third-party provider should also be eligible for funding if the school or library prefers that option.

The Quilt believes that expanding the number of entities that are able to receive support for internal connections on a regular basis is essential to ensuring that students, teachers and learners of all ages are able to access high-capacity Internet services and develop the technological tools they need for the future. Given that the demand for Priority 1 funds is so great that little or no funding will be available for Priority 2/Internal connections under the traditional program going forward, we suggest utilizing a portion of the additional \$2 billion in one-time funds announced for the E-rate program for an initial down payment for internal connections for schools and libraries while a longer-term model is created to support these internal connections needs.

B. Capital Investment Fund

While R&E networks in some states have made great progress in connecting schools and libraries with high-capacity bandwidth over the past few years, in many states there is still much more work to be done. To address these broadband needs in the most efficient, cost-effective manner possible, the E-rate program must be reformed to incent greater investment in scalable, high-speed broadband networks for schools and libraries to meet the President's goals for the ConnectED initiative and for sufficient broadband in the future.

Two recent studies conducted in partnership with R&E networks demonstrate the shortage of broadband services for schools and libraries and the need for greater investment in broadband networks.

- The California State Librarian's Office released a study in February 2014 called "High-speed Broadband in California Public Libraries: A Needs Assessment and Spending Plan". The plan found that "California public libraries are undersized in [Internet] capacity and over-subscribed in their utilization levels . . . which makes the user experience extremely frustrating and renders the network unusable for many applications."⁶
- The Missouri Department of Education released a study in January 2014 called "School Readiness Assessment Project Report", which found that very few of the 320 school districts in Missouri meet the SETDA external bandwidth goals for either 2014-15 or 2017-18.⁷

The Quilt continues to support the idea of a short-term investment program within the E-rate fund to spur additional build-out of last-mile broadband networks to school and library buildings. In designing this capital investment approach, the E-rate program should not pick

⁶ <http://www.library.ca.gov/lids/broadband.html>, p. 5.

⁷ See, <http://dese.mo.gov/ccr/documents/School-Readiness-Assessment-Report.pdf>, p.5.

winner and loser among technologies arbitrarily. The selected technology should meet the following criteria:

1. The broadband technology should be capable of allowing schools and libraries to meet the national broadband goals for each location;
2. The broadband technology must provide a high-quality connection – symmetrical, low latency, low jitter, and capable of handling bursting capabilities for flash events/usage;
3. The broadband technology must be scalable – capable of being upgraded easily – to support longer-term capacity needs;
4. The broadband technology must be cost-effective – the capital investment required should lead to lower recurring annual bandwidth charges over 3-5 years that can be used to quantify the return on the investment; (Several Quilt members use a 3-5 year return on investment (ROI) on fiber builds to justify the capital investment.)

To support the capital investment fund, dark fiber must be treated equally as lit fiber under the program. As we stated in our comments in September 2013, Quilt members have been strong supporters of the E-rate program, and the FCC’s 2010 decision⁸ to allow fiber-based services provided by non-telecommunications carriers to be E-rate eligible has allowed R&E Networks to expand the scope of services they provide to eligible schools and libraries. Fiber, and especially dark fiber services, can offer several important long-term advantages, such as:

- R&E Networks have been able to construct/build fiber laterals directly to schools and libraries, which has allowed them to lower their rates and provide more affordable broadband services when aggregated on-net to their network infrastructure shared by other community anchor institutions.
- As an example, Merit Networks in Michigan provided the following analysis of its fiber builds to several member institutions and the return on investment:

⁸ In the Matter of Schools and Libraries Universal Service Support Mechanism, CC Docket No. 02-6, A National Broadband Plan For Our Future, GN Docket No 09-51, Sixth Report and Order, FCC 10-175, 25 FCC Rcd 18762. (“2010 E-rate Reform Order”), released Sept. 28, 2010.

Description	Current Capacity Level	Current OpEx Annual Recurring E-Rate Circuit Costs	CapEx Cost to Build Fiber	New Capacity Level	New OpEx Annual On-going Cost to E-Rate Program	On-going Savings to E-Rate Program	Notes/Comments	Network Usage with Fiber
Northern Michigan Rural K-12 School	3.0 Mbps	\$11,700	\$25,084	1 Gbps	\$3,000	(\$8,700)	When the school needs more capacity the current cost would increase by \$5,700/T1	Pent-up demand went from 3.0 Mbps to 60 Mbps
Northern Michigan Rural Library	3.0 Mbps	\$12,000	\$5,538	1 Gbps	\$2,250	(\$9,750)	Same as above, this site T1 cost is also \$5,700.	Pent-up demand went from 3.0 Mbps to 20 Mbps
Upper Peninsula Michigan Library	3.0 Mbps	\$4,800	\$12,481	1 Gbps	\$1,950	(\$2,850)	Same as first example above, however, the cost of a T1 \$2,400.	Pent-up demand went from 3.0 Mbps to 10 Mbps and growing
Upper Peninsula Michigan K-12 School	1.5 Mbps	\$5,970	\$15,077	1 Gbps	\$1,950	(\$4,020)	Same as first example above, however, the cost of a T1 \$3,600	Pent-up demand went from 1.5 Mbps to 10 Mbps to 20 Mbps and school hasn't started yet.
Totals		\$34,470	\$58,180			(\$25,320)	Total Annual Savings to E-Rate Program	

- Additionally, the competition from non-telecommunications providers has created marketplace pressure on traditional telecommunications service providers to offer affordable Ethernet service solutions to schools and libraries where traditionally only TDM services such as T1s and T3s were offered.
- The availability of fiber to schools and libraries with open interconnection helps to drive down the costs of last mile connections for other telecommunications providers, allowing them to expand their last mile services to surrounding residential and business consumers.

Where schools and libraries have the opportunity to own fiber (i.e. dark fiber), it insulates these sites against future budgetary constraints for program funding or marketplace fluctuations in pricing. We are pleased that the Eligible Services List specifically recognizes that certain fiber-based expenses provided by non-telecommunications carriers are eligible for E-rate support. However, in order for schools and libraries to receive the maximum benefit from dark fiber deployment, we suggest treating lit and dark fiber in a similar way by offering no distinction between their eligible costs. For example, special construction charges for dark fiber as well as the modulating electronics necessary to light dark fiber should be eligible program costs as they are for a leased lit fiber option. This will provide more options for schools and libraries by making dark fiber a more cost effective solution. In addition, to determine where school or library ownership of fiber is a feasible alternative, a return on investment calculation showing how the capital investment ameliorates annual bandwidth costs should be part of the analysis. As discussed above, several Quilt members use a 3-5 year ROI on fiber builds to justify the capital investment.

Fiber ownership by the schools and libraries also helps to ensure that there is no financial gain to other providers in building duplicative fiber to the same location to connect the same set of institutions. We can cite 5 examples in North Carolina where fiber has been built twice in the same school district within a 5 year period. These duplicate builds were all funded with 60%+ Priority one E-rate reimbursements. If the school/library owned and managed its own fiber infrastructure, there would be no incentive for any other provider to spend limited E-rate dollars deploying duplicative infrastructure.

It has been suggested that not all schools or libraries have staff with the technical know-how to build and manage fiber networks. We wish to note that fiber ownership does not mean that schools and libraries must operate and manage the fiber on their own. Fiber operations and maintenance agreements with third-parties are commonplace and provide the opportunity for individual schools and libraries as well as consortia to evaluate and secure the most cost-effective bids for these services. Traditional service providers, which have these types of skills and competencies, would be able to bid on these types of services as well.

C. Encouraging Cost-Effective Purchasing

By leveraging economies of scale and the shared technical and marketplace expertise of the R&E Network communities, R&E Networks are able to deliver value to member institutions through improved efficiencies and reduced bandwidth costs. As consortium purchasers, R&E Networks have a successful history of forming lasting public/private partnerships with commercial telecommunications carriers and other industry partners. These partnerships have resulted in the ability of schools, libraries and other community anchor institutions (CAIs) to cost-effectively access R&E Networks' shared infrastructure while increasing revenue and lowering administrative costs for these commercial partners. We have found that the benefits

of consortium purchases extend into technical support where consortium buyers often receive higher priority in technical support. Consortium buyers often receive access to flexibly-priced last mile circuits that allow connectors to grow into higher bandwidth commitments in an economical and efficient fashion.

In general, our experience is that some services and equipment are better suited to benefit from the scale of regional or national bulk purchases when there is less variability due to local factors, e.g. customer premise equipment, network equipment, and internet access. Other services, such as last mile broadband connections, are more difficult to aggregate across several jurisdictions because local providers vary from region to region and state to state along with the additional challenges that come with adhering to varying procurement rules. One of the best ways to encourage consortium purchasing and bulk buying under the program is to allow consortia to leverage existing purchasing vehicles.

For over 10 years, The Quilt has held master service agreements on behalf of its members and their institutions for Internet access and network equipment including network switches enabled with software-defined networking technology. The keys to the success of these bulk purchasing programs include issuing a public request for proposals targeted to meet most procurement guidelines, dedicated vendor liaisons and a tiered pricing structure so both vendor partners and members benefit as program purchases increase. In this manner, the total amount of Internet access purchased through The Quilt's commodity Internet service program for members has grown from 4 Gbps at the program's inception in 2002 to over 335 Gbps of committed bandwidth as of December 2013.

As operators and managers of advanced networks and network applications, REN organizations have highly experienced, highly technical resources on staff that support member institutions such as K-12 schools and libraries, providing education, know-how and technical advice. Based on the successful outcomes of demonstration projects, the FCC could consider including limited E-rate support for services that help to improve broadband connectivity to and within schools and libraries, such as technology planning and consultation services that are associated with individual projects. Eleven R&E networks submitted or were included in "expressions of interest" for demonstration projects in the Connect America Fund proceeding. We would be pleased to work with the FCC to develop best practices or submit other recommendations that can leverage our experiences with connecting schools and libraries with high-speed broadband connections.

D. Streamlining the Administrative Process

We submitted several suggestions in our September 2013 comments regarding opportunities to streamline the application and administrative processes. In brief,

1. The approval process for build-out projects must be streamlined and simplified. We recommend adopting a rolling application process, similar to the Healthcare Connect Fund. Currently, the fixed application deadlines can force an applicant to make a rushed decision to choose a technology plan in order to meet the application deadline, rather than spending the time to choose the technology plan that works best for the school/library. A rolling application process will give applicants more flexibility to consider the most cost-effective technology solution to meet the customers' needs. This is particularly helpful for fiber applicants who require more extensive up-front planning for fiber.
2. The approval process for consortium applications (which often include a mix of schools and libraries) is very lengthy. Frequently, consortium filers wait 12 months just to receive a response to an application. In these situations, consortium members must make the decision whether or not to shoulder the risk of paying bills to their telecommunications provider in-full while waiting on a response to their application. Many schools and libraries are not able to assume this risk and are thus discouraged from participating in the E-rate process. Some consortia filers assume this financial risk/burden on behalf of their members by fronting the costs of the reimbursable services. A modernized E-rate program should offer prioritized/preferential review of consortia application as they are submitted, thereby encouraging more consortia filings and better supporting those that already file as consortia today. Per our prior comments, there should be a team of reviewers within USAC dedicated to reviewing consortia applications with a targeted review timeframe not to exceed 120 days.
3. It is expected that projects requiring construction to deploy broadband capabilities will take longer than a single funding year to complete. Special construction, build-outs or complex internal connection projects should be given additional time and granted extensions beyond the funding year as warranted to complete such projects. A realistic time frame for completing such deployment projects will need to be created in order to allow these types of projects to reasonably cross into the next funding years without penalties and without holding up E-rate approval.

III. Conclusion

Serving the unique bandwidth requirements of higher education, K-12 schools, libraries and other community anchor institutions is the common mission of our country's Research and Education Networks. By charter, Research and Education Networks aim to accomplish many of the same broadband goals that are contained in the President's ConnectED Initiative and that are set forth in this proceeding. The need for high-capacity broadband services will become even more urgent for schools and libraries in the next few years as states adopt initiatives which focus on more personalized digital learning, digital textbooks and national Common Core testing. Public libraries are increasingly using advanced technology to provide community

broadband access, digital literacy training, digital content such as books and video as well as providing on-line access to e-government, health and job training services. We appreciate the opportunity to contribute the experience of the Research and Education Networks to these proceedings. By adopting the changes recommended above, a modernized E-rate program will be ready to provide schools and libraries the broadband capabilities they need to equip students and patrons with the technological skills that they need in the 21st Century.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Jen Leasure". The signature is written in a cursive style with a large initial "J" and a long, sweeping underline.

Jen Leasure
President and CEO
The Quilt

April 7, 2014