

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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

To: The Commission

REPLY COMMENTS OF CISCO SYSTEMS, INC.

Cisco Systems, Inc. (“Cisco”) files these reply comments in response to the public notice seeking further comment on certain issues related to the modernization of the schools and libraries universal service (“E-rate”).¹ As discussed in more detail below, the comments in response to the Public Notice show compelling support for ensuring adequate E-rate funding for internal connections, including by allocating a substantial portion of the \$2 billion in additional funding that Commission staff has identified, as well as ensuring a sufficient ongoing stream of support, such as by eliminating the distinction between Priority 1 and Priority 2 services. In this reply, Cisco also provides extensive data, in response to the request in the Public Notice, on the scope of equipment and services that are necessary for internal connection funding and their costs. Finally, consistent with several comments and the Public Notice, Cisco urges the Commission to phase down support for voice services by linking support levels to more economical IP-based voice services.

¹ *Wireline Competition Bureau Seeks Focused Comment on E-rate Modernization*, WC Docket No. 13-184, Public Notice, DA 14-308 (rel. March 6, 2014) (“Public Notice”).

I. THERE IS STRONG SUPPORT FOR ENSURING ADEQUATE FUNDING FOR INTERNAL CONNECTIONS, INCLUDING BY ALLOCATING ADDITIONAL FUNDING FOR THEM IN THE NEAR TERM

The initial comments in response to the Public Notice, like the record previously generated in this proceeding, demonstrate strong, broad-based support for ensuring “consistent and broadly available support for the equipment and services needed to enable high-capacity wireless broadband within schools and libraries.”² For many commenters, part of the answer is to use all or a significant portion of the additional \$2 billion that Commission staff believes it can free up over the next two years to support internal connections.³ Schools and libraries across the country have been starved for access to Priority 2 funding under the current system, with no funding for internal networks available to most schools in most years, and no internal network funding available to *any* schools in recent years.⁴ Cisco thus agrees that the additional funding should be directed as soon as possible to provide needed bandwidth within schools and libraries.

In addition to the supplementary funds that may become available, commenters present a range of views about how to ensure that, over the long term, adequate support will be available for schools’ and libraries’ crucial internal networks. For example, some commenters support the approach Cisco has advocated – eliminating the priority system that allocates greater support for external connectivity than internal connectivity in order to ensure that schools can provision

² Public Notice at ¶ 3 & n.4 (citing educational parties’ prior comments).

³ *See, e.g.*, Alliance for Excellent Education comments at 4; Cox comments at 2; Education and Library Networks Coalition comments at 10-12; Mississippi Educational Technology Leaders Ass’n comments at 3; Nebraska Office of the CIO comments at 7; Verizon comments at 3-4. Unless otherwise noted, references herein to parties’ “comments” refer to initial comments in response to the Public Notice filed on or about April 7, 2014.

⁴ *See, e.g., Modernizing the E-rate Program for Schools and Libraries*, WC Docket No. 13-184, Notice of Proposed Rulemaking, 28 FCC Rcd 11304, 11323 ¶¶ 62-63 (2013)

whole networks all the way to devices in students’ and educators’ hands.⁵ The Public Notice seeks comment on a range of other alternatives for ensuring that an adequate share of the overall E-rate support is available to fund internal connections.⁶ Whichever approach the Commission takes, it should ensure that it provides the support needed for schools to provide “cohesive, cost-effective end-to-end networks.”⁷ Any viable support mechanism for internal connections must provide predictable and sufficient funding to all eligible schools and libraries.

II. CISCO’S EXPERIENCE PROVIDES USEFUL DATA ON THE SCOPE OF SERVICES THAT ARE ESSENTIAL FOR INTERNAL CONNECTIONS FUNDING

As it has noted previously in this docket, Cisco has over 15 years of experience implementing technology solutions at schools and libraries across the country.⁸ Through this experience, Cisco is well positioned to provide input on the scope of “equipment and supporting software that is essential to getting high-capacity broadband from the building’s front door to the computer, tablet, or other learning device.”⁹

In response to this proceeding, Cisco directed its network engineering staff to gather information regarding the components needed for effective internal networks over the next three to five years. This review produced the following recommendations regarding the equipment and services that should be supported in the internal connections category:

⁵ See, e.g., Amplify Education comments at 3-5; California Emerging Technology Fund comments at 13; NCTA comments at 2.

⁶ Public Notice at ¶¶ 13-23.

⁷ Comments of Cisco Systems, Inc., WC Docket No. 13-184 (filed Sept. 16, 2013) at 6 (“Cisco NPRM comments”).

⁸ Cisco NPRM comments at 4.

⁹ Public Notice at ¶ 11.

- District Core routers and switches, with switching capability for up to 10 Gigabit Ethernet links, traffic management capabilities mentioned below, and control plane redundancy. Inside the data center itself, higher bandwidth between components.
- School Building Edge router, with switching capability for up to 10 Gigabit Ethernet links, and traffic management capabilities mentioned below for lower capacity inter-building links
- School Building Core switch, with switching capability for up to 10 Gigabit Ethernet links, and traffic management capabilities mentioned below
- Building Closet switches, supporting up to 10 Gigabit Ethernet uplinks to building core, with traffic prioritization and QOS capability
- Building WiFi Access points, with one access point per classroom, to support high-density throughput and performance for 1:1+ student-to-device ratio for up to 30 students per classroom, as well as common areas and large high-density spaces
- Wide Area Broadband Traffic Optimization and Acceleration software and hardware
- Fiber Optic Transmission and Aggregation equipment, including building edge optical interfaces
- Network Device Configuration Management software, for network policy control
- Network Performance and Visibility software, supporting Netflow collection and monitor
- Network Quality of Service management software
- Wireless LAN Management software, including cloud-based management
- Building Wiring capability, to support Gigabit Ethernet transmission speed to all wired wall jacks, up to 4 jacks per classroom
- Power-over-Ethernet enabled closet switches, centralizing power management and efficiency, and ceiling-mounted wireless access points
- Data Center High-performance Servers, to support applications for basic infrastructure management
- Network Security appliances, including network firewall, Intrusion Protection System (IPS), Intrusion Detection System (IDS), email filtering, web filtering, virus detection
- Virtual Private Networking (VPN) equipment, to support secure remote access to school data center(s) and confidential student information

- Voice-over-IP infrastructure equipment, including call control systems, gateways, and management software, and Survivable Remote Site Telephony (SRST) components

Cisco's experience reveals that network management tools, including caching of data, can significantly increase the effective bandwidth delivered to and within the school or library. Cisco's experience suggests that proper network management and caching tools can improve the user experience by 60 percent, and reduce bandwidth consumption by 66 percent, allowing schools to support two to three times more users at a given network capacity level. Other necessary network management tools include network performance visibility and diagnostics, policy management, quality of service enforcement, and configuration management. These tools hide the complexity of managing a large data network, and enable schools to effectively and efficiently provide a smooth running infrastructure. These tools are thus essential elements of an internal network and effective uses of E-rate funding to support 1:1+ student-to-device ratio and other digital learning initiatives throughout the country

Schools are having success with the integration of 1:1 ratios of students to personalized devices in the educational environment. In the second year of a pilot program, Katy Independent School District in Texas distributed smartphones to 10 new schools and 1,500 fifth-graders. Teachers and administrators witnessed surging levels of engagement and achievement among students who had access to the technology tools. In some instances, performance on math tests increased from the 70th to 90th percentile, with similar results in all subject areas. "There wasn't one teacher who didn't see improvements in engagement and test scores," according to Lenny Schad, then CIO for KISD. "We heard so many testimonials from teachers who said, 'I've been teaching for 20 years, and I've never seen anything like this.' The creativity these tools allowed was just amazing. Plus, the Mobile Learning Devices really reinforced the notion of

differentiated learning. By giving students the options of using pencil, paper, podcasts and so forth, we were allowing them to tap into their individual learning preferences.”

This is an observation across 1500 students in one grade. As this success spreads, and more of these student and educator devices come online across more classrooms, it is critical that the network infrastructure be in place, ready and able to support high-speed access from any student to the cloud, including within-district learning resources.

In addition, as Cisco previously has observed, internal connections are only useful to the extent they are available.¹⁰ Basic maintenance ensures that the E-rate program’s investment in internal networks is not wasted when those networks experience problems. As the Council of the Great City Schools points out, “faster networks tend to be more complex, cost more to maintain and are harder to troubleshoot. Just as it has been to date, maintenance funding will be a critical component to ensure the success of the E-rate moving forward.”¹¹ Basic maintenance is an essential part of E-rate-funded internal networks and should continue to be eligible for funding like other current priority two services.

III. THE RECORD DEMONSTRATES THE CONTINUED IMPORTANCE OF VOICE SERVICE AND SUGGESTS WAYS TO PROVIDE IT MORE ECONOMICALLY

As the Public Notice points out, the need for greater funding for broadband, together with the increasing availability of voice services provided over broadband networks, suggests a need to reduce E-rate funding for stand-alone voice services.¹² At the same time, the comments in

¹⁰ Cisco NPRM comments at 9-11.

¹¹ Council of the Great City Schools comments at 7.

¹² Public Notice at ¶ 40.

response to the NPRM, like earlier comments in this proceeding, show that schools and libraries have a continuing need for voice service.¹³

As a result, the Commission should reduce support for voice services by transitioning to a model in which support is provided for the cost of an economical hosted voice over Internet protocol (“VoIP”) solution. This will be more cost-effective than continuing to support traditional, circuit-switched voice services while still providing schools and libraries with funding for mission-critical voice services and incentives for investment in next-generation networks. Increasingly, managed VoIP solutions also provide access to video conferencing capability, which in Cisco’s experience is an important educational tool, facilitating distance learning, a “flipped” learning model, and other effective educational strategies.¹⁴ Many commenters advocate using the cost of managed VoIP as the target for reduced voice support levels,¹⁵ and it is consistent with the Public Notice’s observation that, “[a]s schools and libraries increasingly transition to [VoIP] services, we expect the price they pay for voice services to decrease.”¹⁶ Thus, the Commission should target the reduction in voice support to levels consistent with economical managed VoIP products that also support video capability.

CONCLUSION

Cisco urges the Commission to reform the E-rate program consistent with these reply comments and Cisco’s earlier comments in this proceeding. The Commission should make

¹³ See, e.g., Boston comments at 8-9; Chicago Schools and Libraries comments at 3; Council of the Great City Schools comments at 7; National Ass’n of Elementary School Principles comments at 9; Nebraska Office of the CIO comments at 11; Wisconsin Dept. of Public Instruction comments at 7.

¹⁴ Cisco NPRM comments at 2. See also, e.g., GCI comments at 13-14.

¹⁵ See, e.g., Chicago comments at 4; Cox comments at 7-8; NCTA comments at 3-4.

¹⁶ Public Notice at ¶ 40.

additional funding available for internal connections for more schools and libraries as early as practicable.

Respectfully submitted,

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