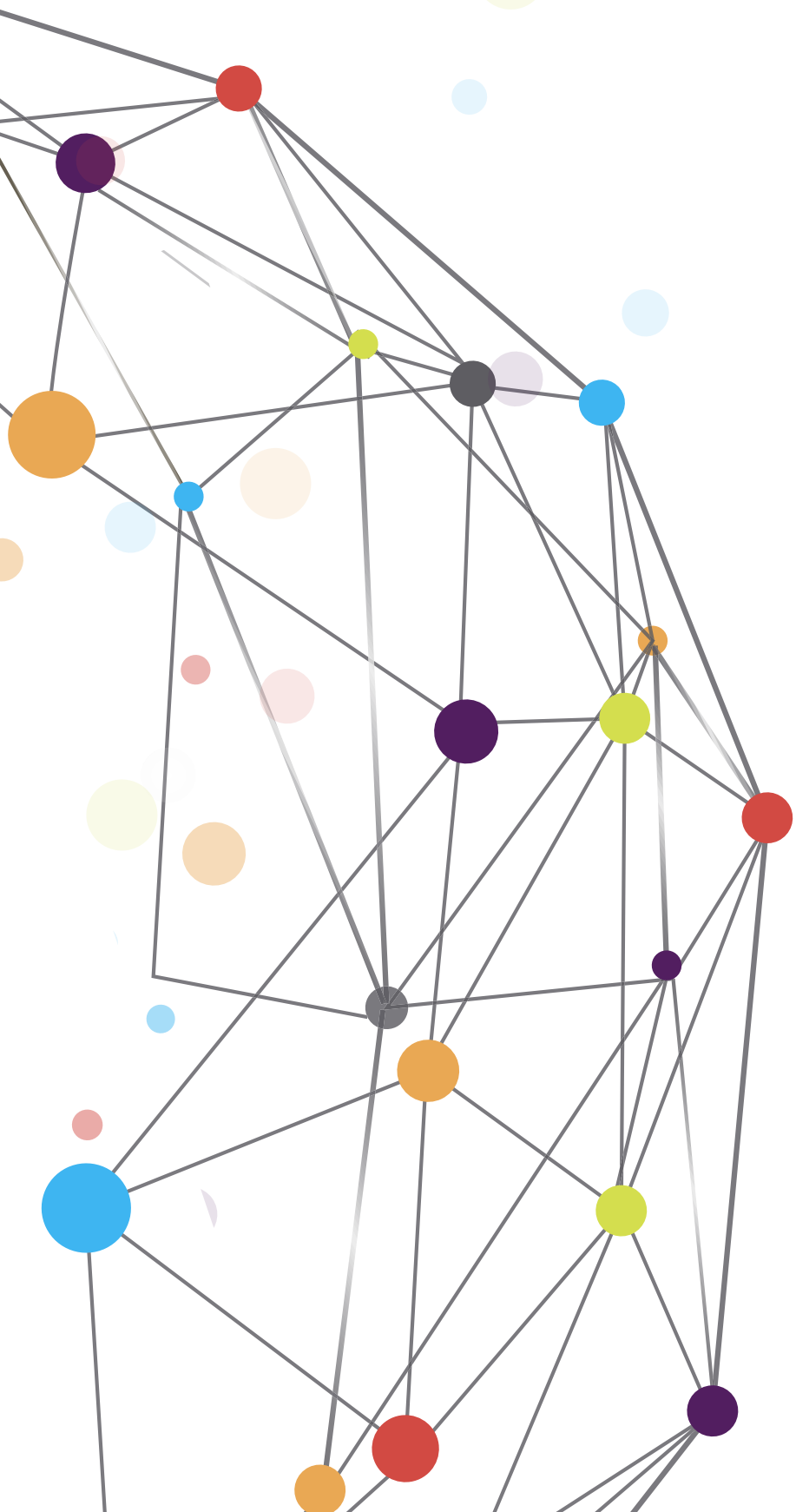
CoSN's 2018-2019 ANNUAL INFRASTRUCTURE REPORT

In Partnership with
AASA, MDR, and Forecast5



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OVERVIEW

This is the sixth year CoSN has conducted a survey of U.S. K-12 district connectivity. Formerly known as "CoSN's E-Rate and Broadband Survey," the survey has since expanded to include broader questions about school infrastructure. As a result, the survey has nearly doubled in size from 31 questions in 2013 to 59 questions this year. While some questions have been phased out, added questions about the Cloud, data security, interoperability, and school bus Wi-Fi have resulted in a net-sum gain in questions. The increase in the number of questions reflects the increased complexity of variables now commonplace within school districts' infrastructure. This report—based on 386 district responses, with one authorized response per district—will hopefully serve as a valuable resource for starting edtech conversations with policy and decision-makers and understanding the full range of infrastructure issues

Metropolitan Status

As in prior years, suburban districts comprise the largest segment of respondents at 48% of the total. Rural districts comprise the next largest segment (39%) of responses. Twenty-seven percent (27%) of districts are classified as urban, nationwide. Since 14% of the respondents to this survey identify as urban, they are under-represented. However, the relative breakdown of suburban, rural, and urban in the CoSN survey results has not changed over the years. The year-over-year results reflect a consistent breakdown.

Enrollments

The enrollment demographics of this year's respondents also remain consistent, varying only slightly between years and within the margin of error. The largest percentage (41%) of respondents come from small school districts—enrollments less than 2,500—as compared to 42% the prior year and 41% in 2016. Medium size districts, those with enrollments of 2,500 – 9,999, account for 38% of respondents as compared to 37% in 2017 and 35% in 2016. This year, districts with enrollments of 10,000 or more comprise 22% of the total responses, slightly more than the 21% of the prior year and slightly less than the 24% in 2016. While consistent response rates enable reasonably accurate year-over-year comparisons, the breakdowns do not fully align with general U.S. demographics. Small districts comprise 71% of the nation's school districts, meaning they are under-represented in the survey results. However, in terms of total U.S. enrollments, small districts enroll only 16% of all students.

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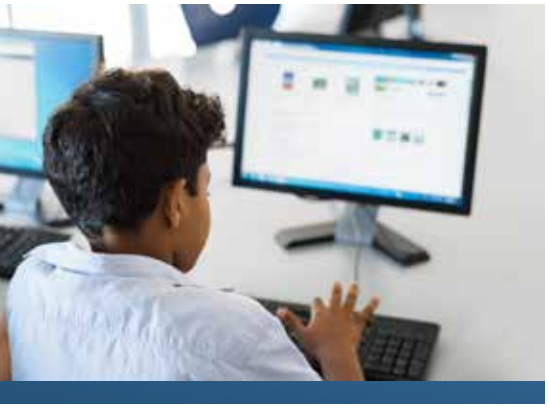
[1]Results have a +/- 4.91 reliability.



TOP FINDINGS

1. Good News: Wi-Fi @ School

Thanks to the E-rate modernization, which provides funding for Wi-Fi and internal school network connections, tremendous progress has been made over the past three years. Districts' confidence in their wireless networks to support one device (or more) per student is increasing. A large majority (69%) of respondents report they are "very confident" in their network's ability to support one or more devices per student as compared to the prior year's 58%. *This matters because student devices are an increasingly important component of learning and networks must be able to support their use.*

2. Momentum on Broadband @ School

Broadband to the classroom continues to improve, again due to the focused investment of E-Rate funding. Ninety-two percent (92%) of districts are meeting the FCC short-term goal of 100 Mbps per 1,000 students for all their schools. Even more impressive, this year over a third (35%) of districts achieved the FCC long-term goal (1 Gbps per 1,000 students) for all schools – up nearly 100% from last year. There was also marked reduction in the cost of Internet access for the majority of school districts. Three quarters (75%) of districts report paying less than $5 per Mbps for their Internet as compared to 60% the prior year. The majority of districts are also in the lowest paying bracket for WAN, with 68% paying less than $5 per Mbps. *This matters because districts need robust, affordable broadband access to enable digital teaching and learning. While there are several factors driving broadband demand, the number of student devices continues to be the top driver for three consecutive years.*

3. Not all Schools Have Broadband, Especially in Rural Areas

While we are making overall progress on broadband, many rural schools lack affordable broadband access often due to lack of broadband competition. Rural districts account for half of all districts with zero or one broadband provider under E-rate Category 1. *This matters because rural students are being left behind compared to their urban and suburban counterparts. Policy makers and educators need to stay focused on continuing efforts to provide affordable broadband access to all students, especially in rural communities.*

4. The Homework Gap Persists

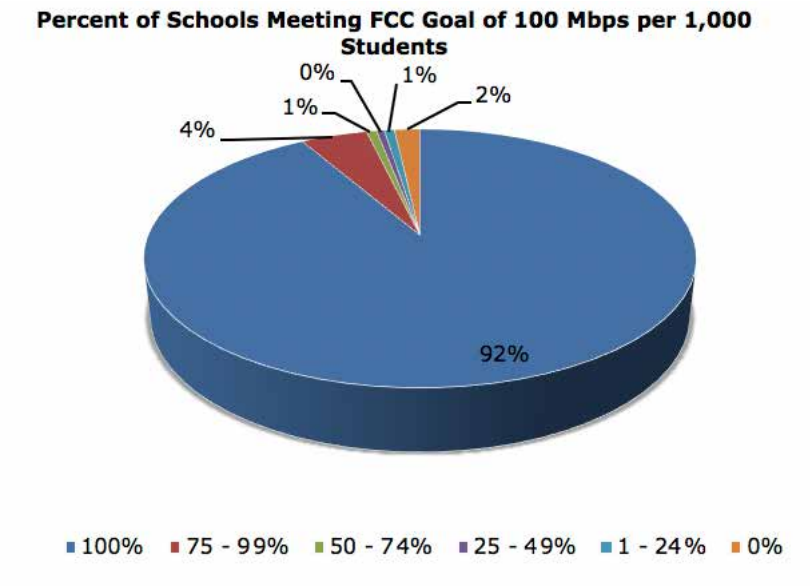
Fewer than 10% of districts report that every student has access to non-shared devices at home. *This matters because digital learning is not limited to the classroom. Students need access to devices and robust Internet connectivity in school and at home. Students lacking 1:1 device access at home have more limited learning opportunities and may have difficult completing their homework. That difficulty puts them at a disadvantage compared to their better-resourced peers.*

5. Cybersecurity Threats

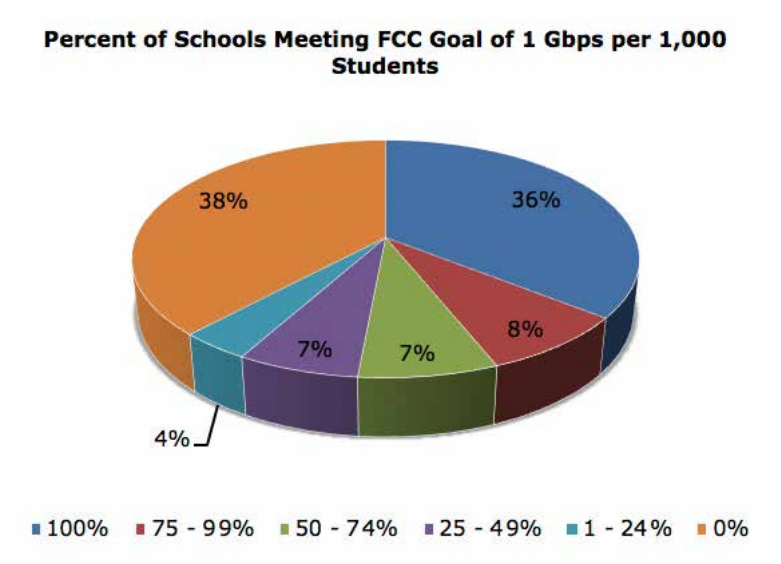
Cybersecurity is a top-tier challenge for school district technology leaders, as noted in the 2018 CoSN IT Leadership Survey (March). The majority of districts (52%) say breach detection is their highest cybersecurity service concern. Despite concerns about a myriad of network security threats, only 12% of districts have a dedicated network security person to manage the challenges. *This matters because cybersecurity threats can compromise district operations and student records. Without adequate staffing, these threats cannot be addressed and managed adequately and effectively.*

FCC GOALS

Year-over-year progress continues to be made in districts' ability to meet the FCC short-term goal of 100 Mbps per 1,000 students. Ninety-two percent (92%) of respondents report all of the schools in their district have achieved that goal, compared to 85% in 2017. Districts reporting that none of their schools meet the short-term were cut in half to 2% this year, as compared to 4% the year prior.

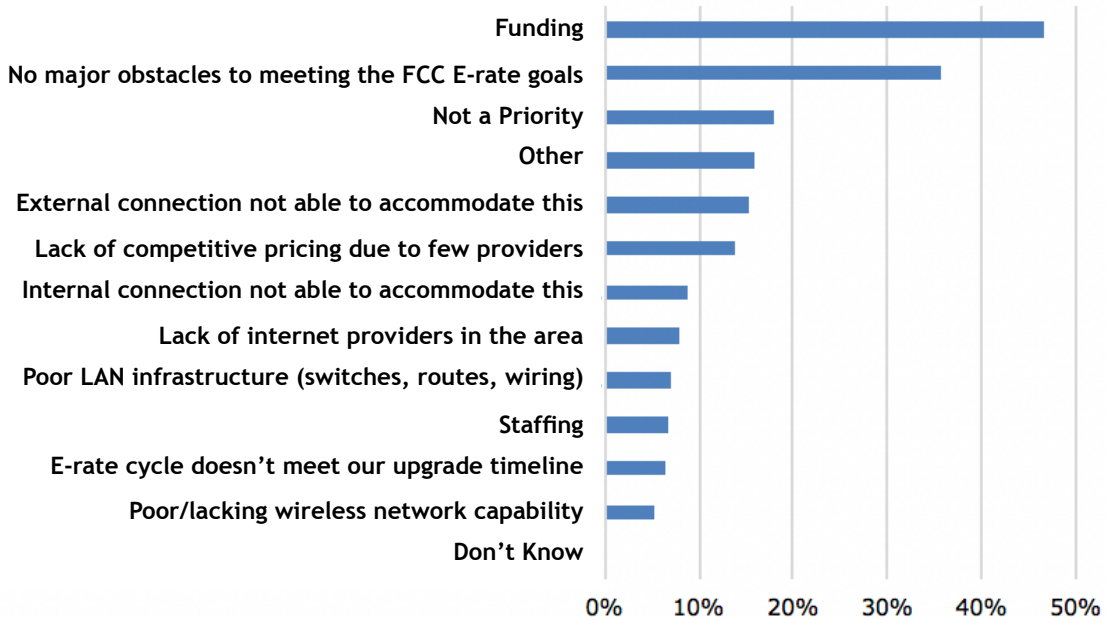


Districts have also made progress in meeting the FCC long-term goal of 1 Gbps per 1,000 students. Over a third (36%) report that all their schools have achieved this goal, a significant increase over just 16% in the prior year. While less dramatic, there was also improvement at the other end of spectrum. The percentage of districts reporting that none of their schools meet the long-term goal is 38%, down from 47% in 2017.



Funding has consistently been cited as the primary factor preventing districts from achieving FCC goals. However, for the first time since 2013, it is a factor for under half (46%) of respondents. This is a marked improvement over the prior year's 61% majority. In addition, more than a third (36%) of respondents reported that they faced no major obstacles to meeting the FCC's E-Rate goals, compared to 25% the previous year. Only 14% of respondents cited the lack of competitive pricing as a problem, compared to 16% last year. With the exception of "other" increasing from 9% to 16%, the year-over-year percentages moved in the right direction for all categories. With more districts meeting FCC goals, it is logical that fewer would be citing barriers.

Factors Keeping Districts From the E-Rate FCC Goals



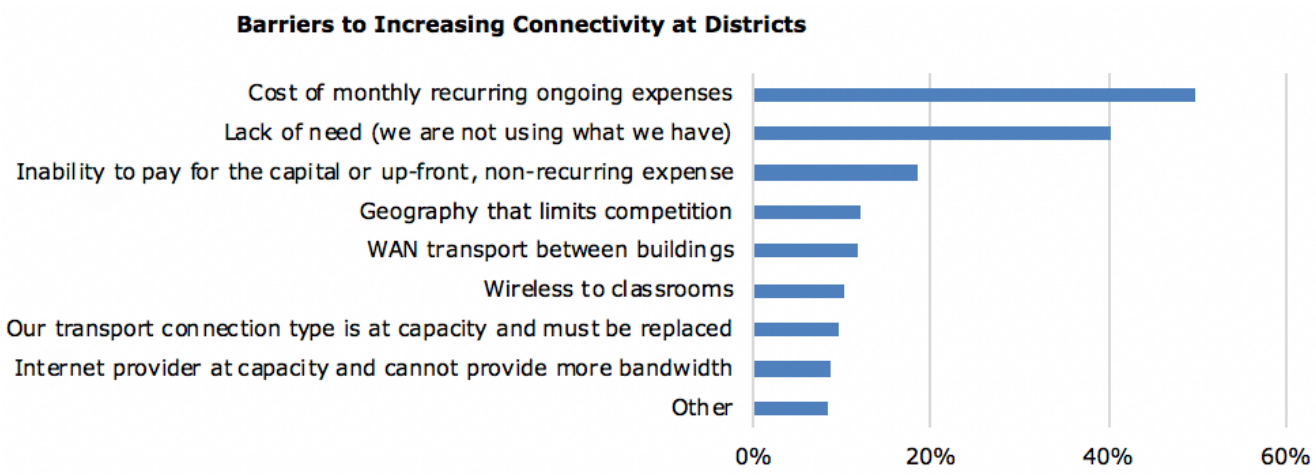
When asked about component upgrades needed to meet the FCC's short and long-term broadband goals, a significant percentage of respondents indicated they don't currently need any upgrades. This finding represents a marked increase over the prior year and the first time any component had a majority response for "no upgrade" needed. Gateway Routers and DMZ Switching (both with 51%) are the components least needing an upgrade, followed by Content Filtering (49%), Firewall (46%), and Internet Infrastructure Components (41%). By comparison, in 2017, DMZ Switching was the most up-to-date component, with just a third (35%) of respondents indicating no upgrades were needed. These component improvements coincide with the overall increases made in percentages of districts meeting the FCC's short- and long-term goals.

Table: Internet Infrastructure/Firewall Upgrade Requirements

Upgrade required for specific components to meet FCC broadband goals	Yes, we need upgrades for both short-term and long-term	Only long-term upgrades are needed, not short-term	No upgrades are needed for short-term or long-term	Don't know
Internet Infrastructure Components	13%	45%	41%	2%
Firewall	12%	40%	46%	2%
Content Filter	13%	37%	49%	2%
DMZ Switching	7%	30%	51%	12%
Gateway Routers	10%	35%	51%	5%
Not all rows total 100% due to rounding.				

COSTS

Costs of monthly recurring, ongoing expenses continue to top the list of barriers to increased district connectivity. However, this is first survey in which recurring cost has not been cited by a majority of respondents, having decreased steadily from 71% in 2013 to 50% today. Forty percent (40%) of respondents report having more bandwidth than they currently use. This reflects an increase from 33% the prior year and from 28% in 2016, indicating "lack of need" is a growing trend. Less than a fifth of respondents (19%) cite capital expenses as a barrier.



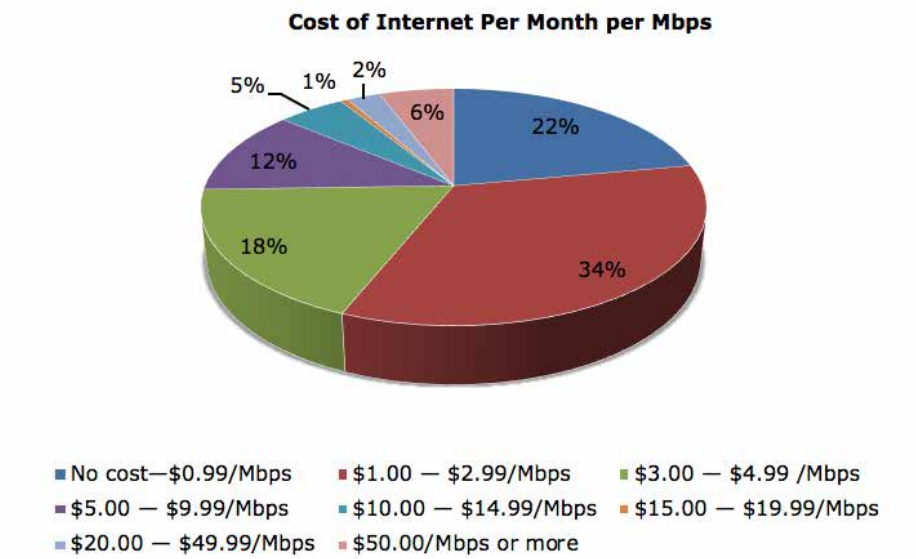
There was marked improvement in percentage of districts paying the least for their Internet connection. Three quarters (75%) of districts report paying less than $5 per Mbps for their Internet as compared to 60% the prior year. The majority of districts are also in the lowest paying bracket for WAN, with 68% paying less than $5 per Mbps. Districts paying the most for their connections—$50 per Mbps or more—had no year-over-year improvement. However, they account for less than a tenth of respondents.

Table: Monthly Costs for Internet and WAN Connections

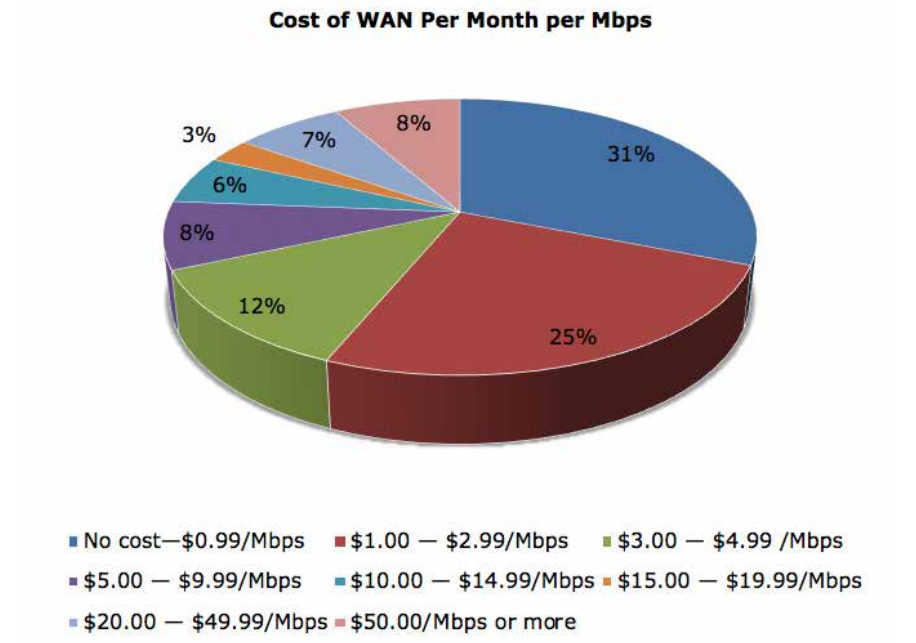
Cost Per Month	Internet Connection					WAN Connection				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
No cost-$4.99/Mbps	27%	36%	46%	60%	75%	46%	52%	64%	65%	68%
$5.00-$49.99/Mbps	40%	45%	37%	34%	20%	31%	30%	24%	30%	23%
$50.00/Mbps or more	32%	19%	16%	6%	6%	22%	18%	13%	5%	8%

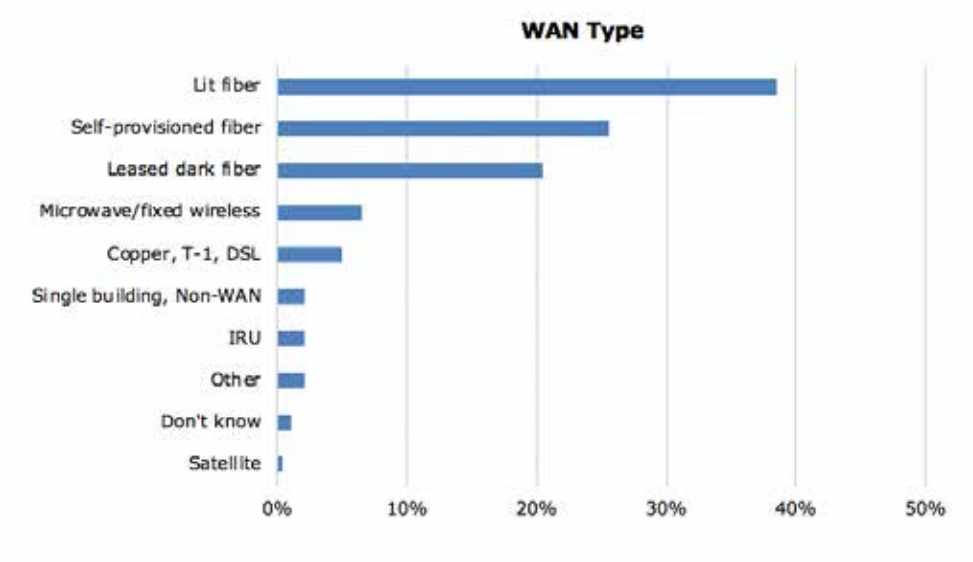
Not all columns total 100% due to rounding.

The connection costs for districts have been decreasing over the last five years – a trend that is expected to continue. To enable better monitoring of cost trends going forward, this year's results have been parsed more finely. When looking at districts paying less than $5/Mbps for Internet—the largest single bracket of all respondents—a third of districts (34%) pay between $1 — $2.99, followed by 22% paying less than $1, and 18% paying between $3 and $4.99. When looking at the fifth (20%) of districts paying $5—$49.99, the vast majority is comprised of those paying less than $10, (accounting for 12% of respondents across all cost ranges).



The top two WAN cost brackets are reversed as compared to Internet costs. Thirty-one percent (31%) of districts pay less than $1, making it the most common rate, followed by the $1-2.99 bracket paid by a quarter (25%) of respondents. The third most popular rate is $3-4.99, with 12%.





WAN TYPES

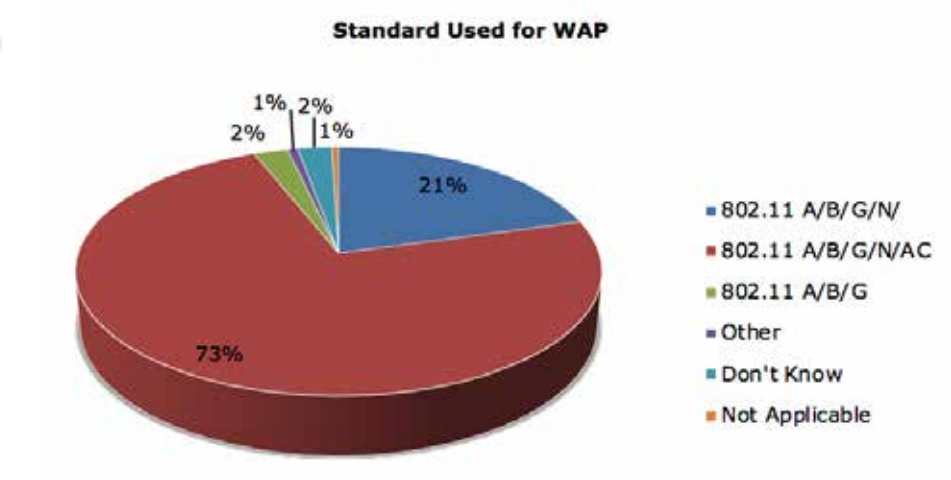
The vast majority (85%) of respondents already use fiber for WAN transport. More than a third (39%) of districts use lit fiber. Self-provisioned fiber—eligible for E-rate funds since 2016—is the second most used solution with 25%. Leased dark fiber completes the top three WAN types, with 20%. A distant fourth is microwave/wireless with 7%.

SPEED

The typical speed between WAP and LAN switch ports remain essentially unchanged year-over-year, with almost three quarters (74%) of respondents reporting a rate of 1 Gbps compared to 73% the prior year. Eleven percent (11%) of respondents report speeds of 100 Mbps. The typical connection between LAN and Core Switches is 10 Gbps. With 45%, 10 Gbps edges out 1 Gbps (44%) for the top speed between LAN and Core Switches for the first time in survey results. Top speed for WAN connections remains at 1 Gbps (37%) followed by 10 Gbps (29%).

The vast majority (79%) of districts are not using caching proxy servers or WAN acceleration. However, when they do, proxy servers are more popular: 12% compared to 1% using WAN acceleration technology. Only 2% of respondents indicate they use both.

The most up-to-date standard—802.11ac (which is three times faster than the previous release, 802.11n)—is used by nearly three-quarters (73%) of all respondents. This is an increase over the prior year's 61% and closely aligns with the year-over-year decrease in the use of the older 802.11n, suggesting 14% of districts implemented upgrades. The oldest standard of 801.11g is still in use but only by a tiny percentage of respondents (2%).



CAPACITY

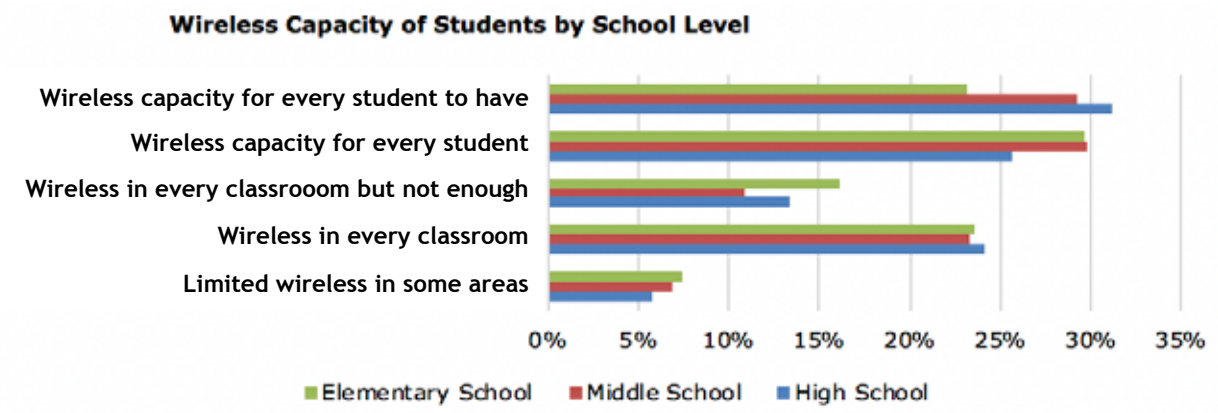
Since the question was first asked in 2014, more student devices, digital content, and online assessments consistently rank as the top drivers for increased bandwidth. The only change has been their relative order. Student devices were ranked third in 2014 and second in 2015, moving to the number one slot in 2016 where they remain in 2018. Digital content ranks second for two consecutive years with online assessments remaining in third place. As districts continue to build capacity for online testing, it is anticipated online assessments will drop-off the list of the top three drivers of bandwidth growth, having fallen from its 2014 debut in the number-one position. "Streaming content" (ranked fourth) or "more devices per student" (ranked fifth) appear poised to replace online assessments in the top three.

Table: Drivers for Internet Bandwidth Growth

Rank	Demand
#1	More students with devices
#2	Digital content
#3	Online assessments
#4	Streaming content
#5	More devices per student
#6	Embedded formative assessment
#7	New learning models (project/problem, game, or design based)
#8	Maker spaces
#9	Parents demanding electronic resources

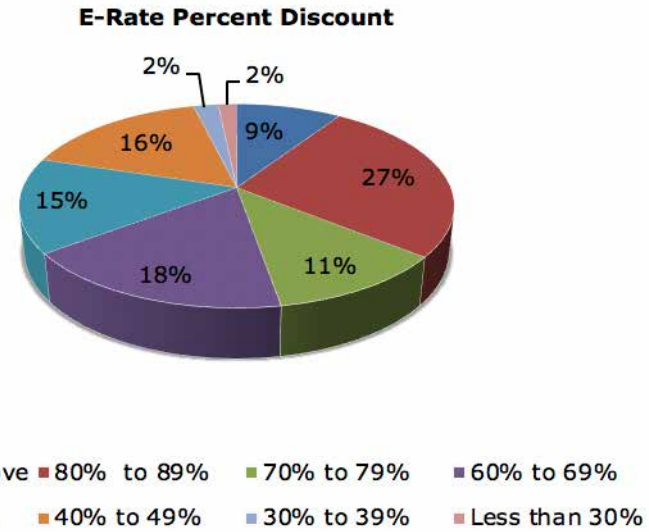
Districts' confidence in the ability of their wireless networks to support one device (or more) per student is increasing. A large majority (69%) of respondents report they are "very confident" as compared to the prior year's 58%. When combining "very confident" with the "somewhat confident" responses, the year-over-year confidence rating increased to 90% from 86% in 2017.

When asked to describe existing wireless connectivity by school level, respondents indicated general parity across all environments. More than a quarter but less than a third provide wireless in every classroom—high schools with 25%, middle schools with 28%, and elementary schools with 30%. Breakdowns are similar for "wireless capacity for every student"—high schools with 26%, middle schools with 29%, and elementary schools with 28%. The one category with a marked difference between school levels is "wireless capacity for every student to have multiple devices." High schools are best able to support students with multiple devices (37%) as compared to elementary schools that have the least capacity (29%). However, elementary schools are also likely to have a student body that least needs this level of support. Middle school capacity for multiple devices per student (34%), not unexpectedly, more closely resembles high schools.

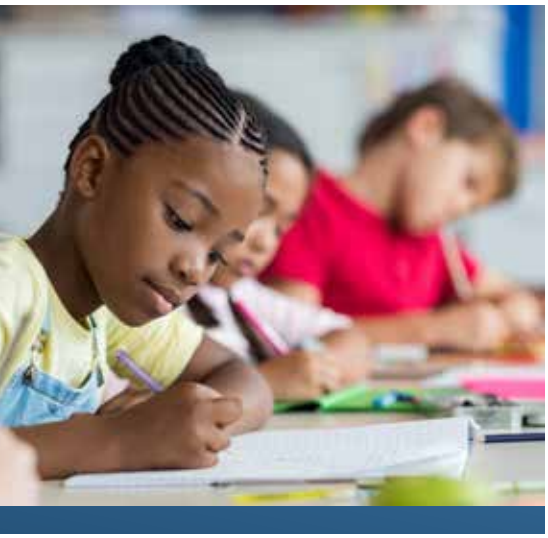


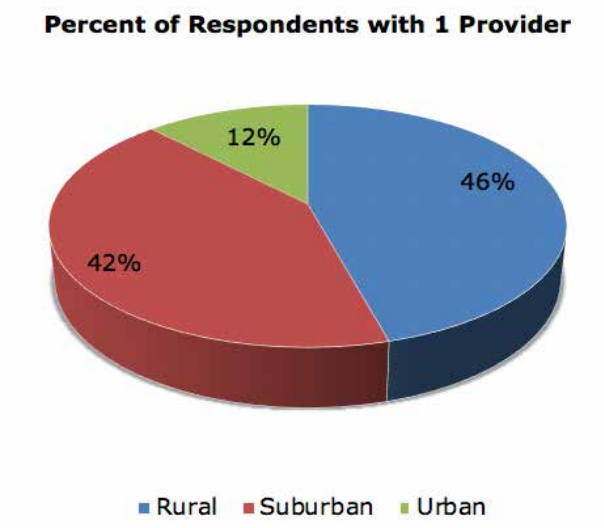
E-RATE

E-rate discounts of 80-90% are the most common, as reported by 27% of respondents. Only 4% receive discounts less than 50%. At the other end of the spectrum, less than a tenth of districts (9%) have an E-rate discount of 90% or above.

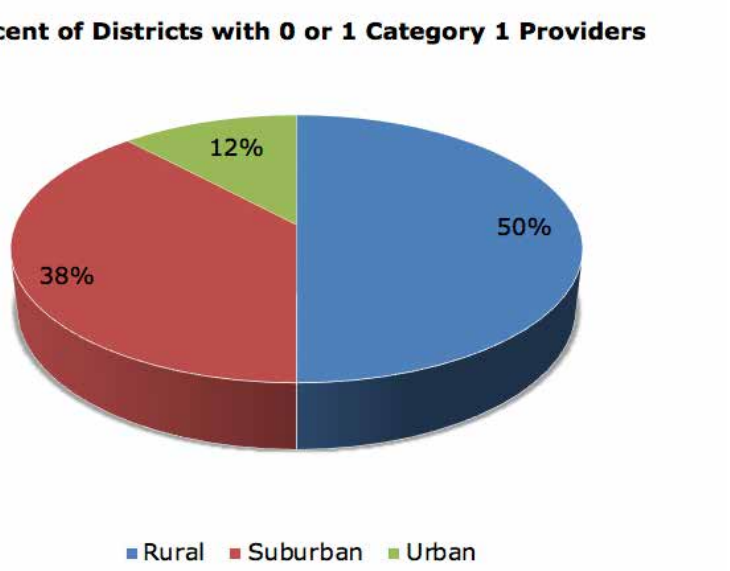


The majority of districts (58%) report using one Internet provider. Urban districts (12%) were least likely to do so, as compared to suburban (42%) and rural (46%) districts. These metropolitan breakdowns suggest a lack of options due to regional ISP monopolies. Regardless of the reason, without multipath Internet all district online activity will cease with an Internet outage. As Cloud-based storage is now the norm for school enterprise systems and curriculum materials, lack of redundant connectivity puts districts at risk.

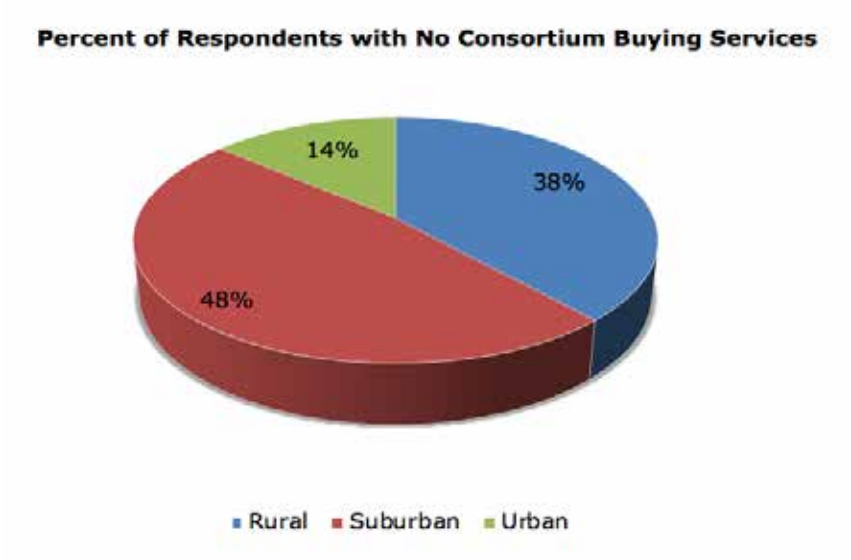




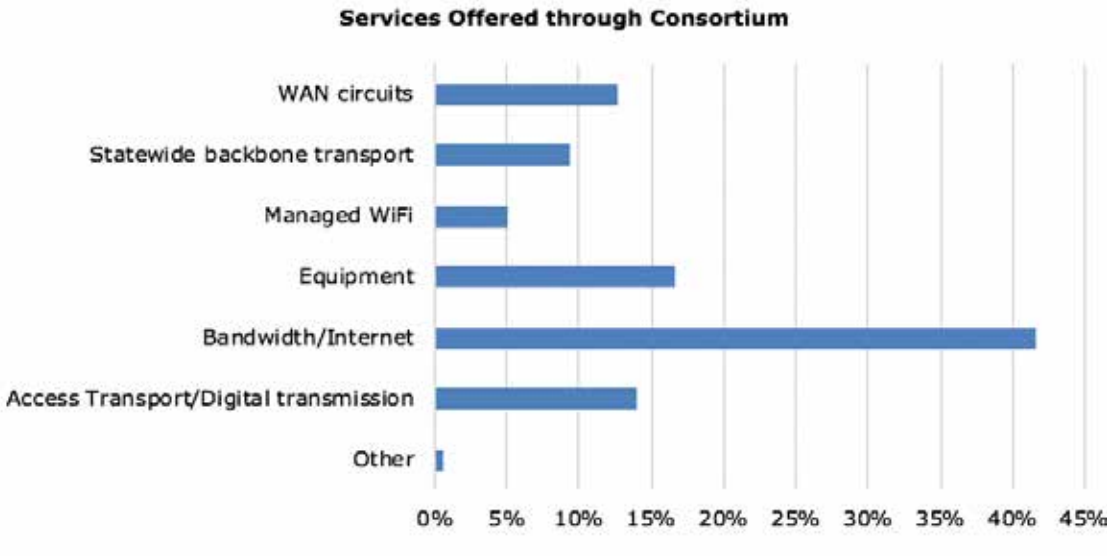
The metropolitan breakdown of districts using one provider roughly aligns with the breakdown of those who have access to only one provider. Of those respondents who had one provider (or no provider) for E-rate category 1 telecom services, 12% are in urban districts, 38% suburban, and 50% rural. Rural districts continue to be most impacted by the lack of options.



Less than a third (27%) of respondents participate in a consortium using E-rate funds. This is a significant drop from 40% the prior year. It is less than half of the 60% using consortia in 2014, the year FCC prioritized consortium E-rate applications. This decline is particularly notable in context of the increase in percentage of districts that have access (87% of districts this year as compared to 75% in 2014.) This decline in consortium E-purchasing suggests districts are not finding a benefit. For 13% of respondents consortium-buying services are not an option. Of those, nearly half (48%) are suburban districts and more than a third (38%) are rural. Urban districts are least affected with 14%.



Of the 27% of districts participating in consortium using E-rate funds, the service most commonly offered by their consortium is bandwidth/Internet purchasing. With 42%, it is by far the most common. With 17%, equipment is a distant second.



DEVICES & EQUITY

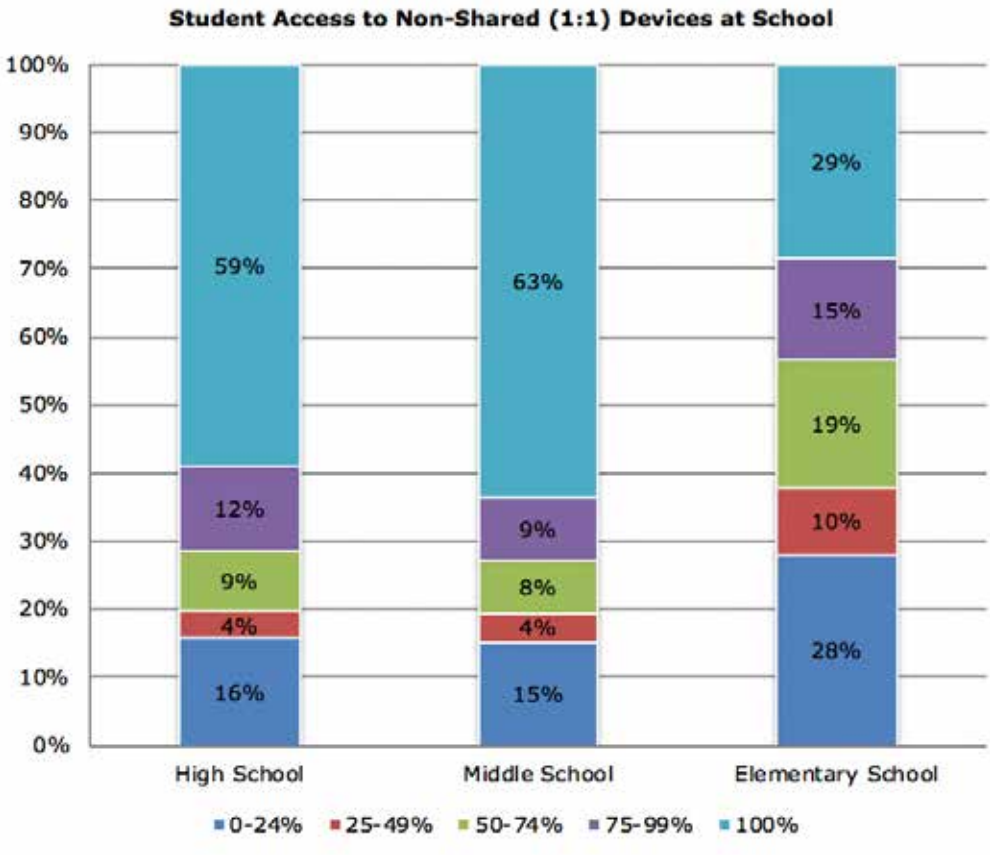
"Device to student" ratios are expected to improve over the next three years. Scenarios where there is less than one device per five students, already at a low 4%, are expected to be even rarer. The ultimate reduction could be a low as 1%. One device per two students is expected to drop from 21% to 3%. 1:1 scenarios are also expected to decrease—49% to 34%—because more devices per student are anticipated. More than a third (38%) of students are projected to have two devices, an increase from 23% today. The percentage of students with three devices is expected to grow to 18% from 2%. Today, no districts report students with more than three devices. In three years, 5% project that will be the case.

Table: Device to Student Ratio

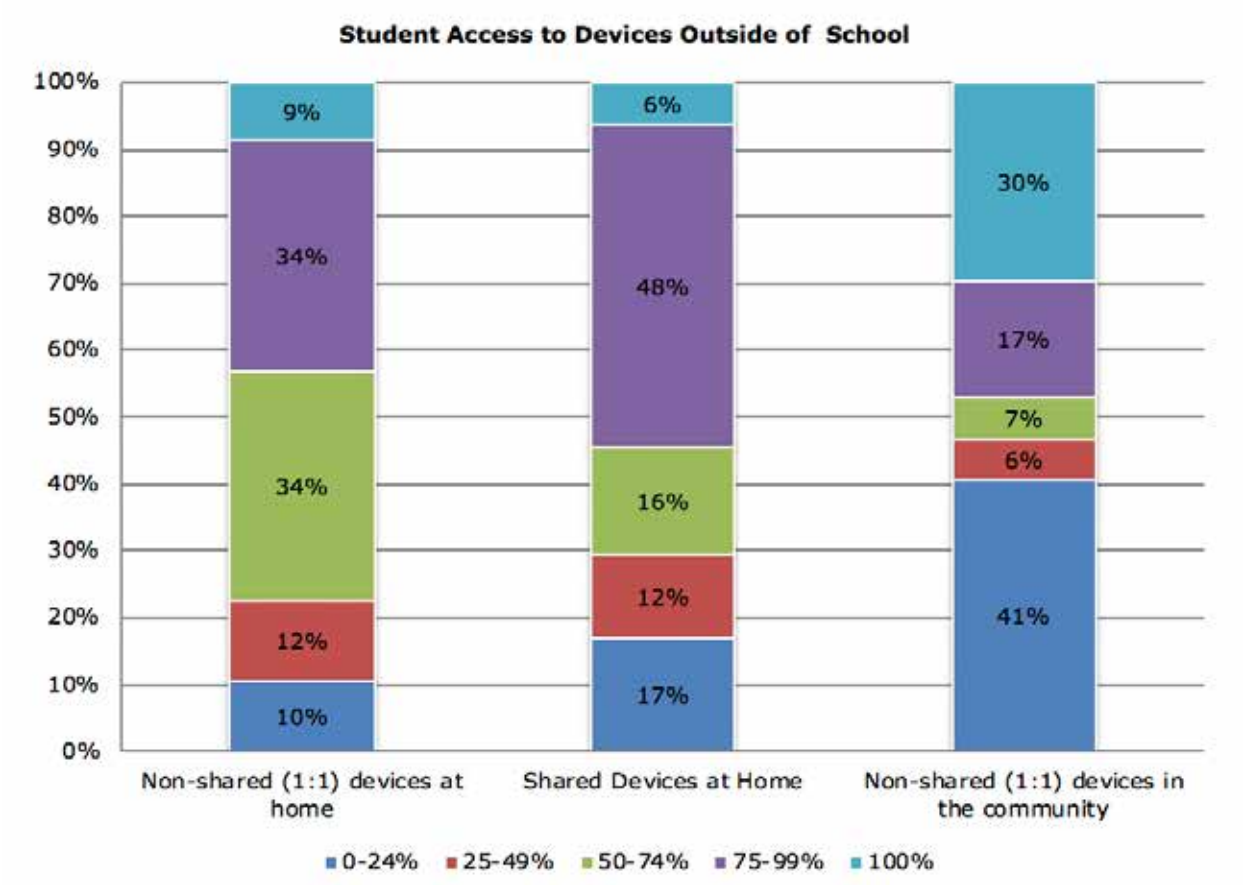
Devices Per Student	Today	In Three Years
Less than one device per five students	4%	1%
One device per two students	21%	3%
One device per student	49%	34%
Two devices per student	23%	38%
Three devices per student	2%	18%
More than three devices per student	0%	5%

Not all columns total 100% due to rounding.

Student 1:1 environments are growing. A majority (59%) of high schools report that 100% of their students have access to non-shared devices, compared to 53% the prior year. An improvement in 1:1 was also achieved in middle schools, with 63% reporting all students have access compared to 56% in 2017. Elementary schools had the smallest increase of the 1:1 scenario—29% this year as compared to 25% the prior year. However, this small growth rate is not unexpected in the lower grades, as 1:1 is generally not considered a necessity—and for many not even desirable—for younger children.



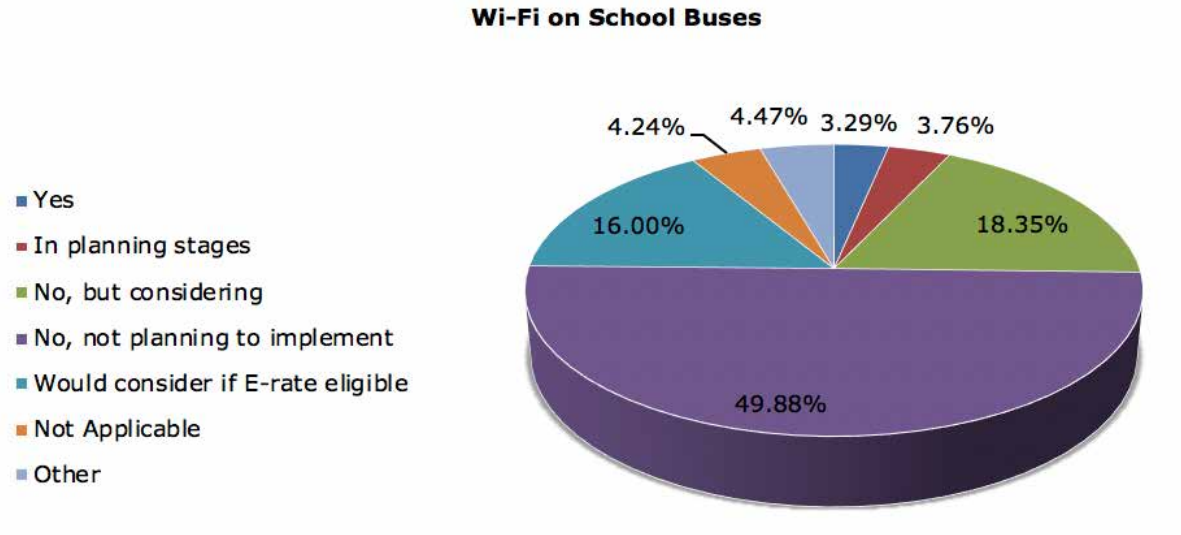
No improvement was made regarding access in students' home environments. Since 2015, 10% or less of districts report that all of their students have access to the Internet through non-shared devices at home. Similar to 2017, 54% of districts report that more than three-quarters of their students have access to shared devices at home. However, some improvement was made in student access to non-shared devices in the community (libraries and community centers). Almost half (47%) of districts estimate more than 75% of students have community access to non-shared devices, compared to 40% the prior year. However, access to non-shared devices outside the home does not create equity. As districts increase their use of digital resources, students that have to travel away from home to complete their homework are at a clear disadvantage compared to those who do not.



In addition to device access, students need Internet access outside of school to complete homework assignments. While a third of districts (35%) do not provide any off-campus support for broadband access for their students, the majority (65%) do. Of the strategies employed, 14% of districts are working with community/business to provide Wi-Fi hotspots, 13% participate in provider-sponsored services, 12% provide loaner hotspots, and 10% deploy district-owned hotspots. "Free or subsidized district sponsored wireless access to the community" is the strategy least used by districts.

Table: Off-Campus Strategies for Increasing Student Broadband Access Outside of School

Strategy	Percentage
Do not provide any off-campus services	35%
Provide free/subsidized home Internet access for low-income families	6%
Provide free/subsidized district-sponsored wireless access to the community	3%
Participate in provider-sponsored services	13%
Work with community/business to provide Wi-Fi hotspots for students	14%
Deploy district-owned hotspots for students	10%
Provide loaner hotspots	12%
Not Applicable	5%
Other	3%



Supplying Wi-Fi on school buses is one approach to providing Internet access to students outside of school. While a lot of worthy attention has been given to districts that have outfitted their buses with Wi-Fi, the strategy has not been widely adopted. Less than 7% of respondents report providing, or planning to provide, Wi-Fi on school buses. Half of all respondents have no plans to implement a bus Wi-Fi program. Thirty-four percent (34%) of districts not currently engaged with school bus Wi-Fi are considering it; or would consider it if the program was E-Rate eligible.

INTEROPERABILITY

The overwhelming majority of districts feel improved interoperability will help them address a myriad of challenges. Nearly all (97%) "agree or completely agree" that more seamless data exchange between systems will help with state and federal reporting as well as enable them to build better district-level dashboards. Improved ability to access digital content was also rated highly by 95% of respondents. With 77%, "making staff decisions" is the area identified as least likely to be helped by greater interoperability. It is unknown whether that relatively low ranking is because the type of data needed for staffing considerations is not currently being captured in systems or because schools rely more heavily on personal interviews for those decisions.

Table: Areas Helped by Improved Data Interoperability

District Challenge	Agree/Completely Agree
Making state and federal reporting more efficient	97%
Building better district-level dashboards	97%
Accessing digital content	95%
Scheduling/rostering	94%
Tracking student technology use	94%
Better understanding the student learning experience	91%
Tracking teacher technology use	90%
Saving money	89%
Conducting research/evaluation	88%
Holding vendors accountable	84%
Making staffing decisions	77%

Half of districts cite interoperability as a major consideration when making purchasing decisions. One of the likely reasons this is so important to districts is the hidden cost of integrating systems that lack interoperability. With nearly half (49%) of respondents citing "budget constraints" as either extremely or very challenging, it ranks as the top barrier facing districts to improve data interoperability. Almost as many respondents (46%) rated the lack of common technical standards as very challenging or extremely challenging. With 23%, it is the factor most rated as extremely challenging. Rated as extremely or very challenging by more than a third of respondents is lack of staff expertise (37%), an issue that more heavily impacts districts with greater poverty levels. The average poverty rate of districts that are extremely concerned about staff expertise is 53%. Conversely, the average poverty rate is 39% for the 8% of districts not at all affected by their staff's lack of expertise. This discrepancy suggests lower-income districts have more trouble recruiting qualified candidates than their more affluent counterparts.

Privacy concerns are rated as extremely or very challenging by 36% of all respondents. Poor tagging/categorization of digital content follows with 34%. Less than a third of respondents (30%) cited resistance from vendors as extremely or very challenging. Current efforts such as the vendor pledge created by Project Unicorn, increased vendor involvement in standards bodies such as IMS Global (which in addition to 66 district members, has over 230 members that develop K-12 products) and Ed-Fi (with a growing number of large SIS vendors), as well as industry support from organizations such as the Education Technology Industry Network, a division of the Software & Information Industry Association, suggest "resistance from vendors" may be less of a barrier going forward.

Table: Barriers to Improving Data Interoperability

Barrier	Not at all	A little	Moderately	Very	Extremely
Lack of awareness/ understanding by district leaders	14%	24%	38%	16%	9%
Lack of awareness/ understanding by school leaders	10%	22%	35%	22%	11%
Budget constraints	3%	16%	31%	31%	18%
Lack of staff expertise	8%	21%	34%	26%	11%
Resistance from vendors	17%	25%	28%	19%	11%
Resistance from parents	43%	35%	17%	5%	1%
Resistance from IT staff	53%	32%	11%	3%	1%
Privacy concerns	10%	23%	31%	27%	9%
Lack of widely agreed upon technical standards	6%	19%	29%	23%	23%
Poor tagging/ categorization of digital content	10%	20%	36%	20%	14%

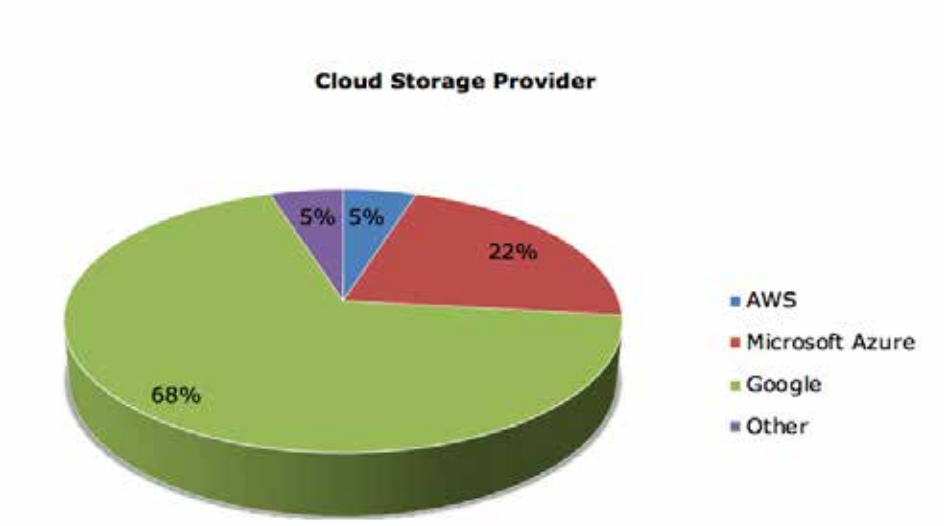
CLOUD

The vast majority of districts (88%) are using Cloud-based software systems (SaaS). When asked about enterprise systems, the learning management system (LMS) is the most likely to be Cloud-based, with only 11% of districts reporting they plan to continue to host locally. The wide adoption of a Cloud-based LMS is likely connected to the wide adoption of Google Classroom. The system least likely to be in the Cloud is a district's financial system (43%). Least likely to be moved to the Cloud are the student information systems (39%) and human resource systems (37%).

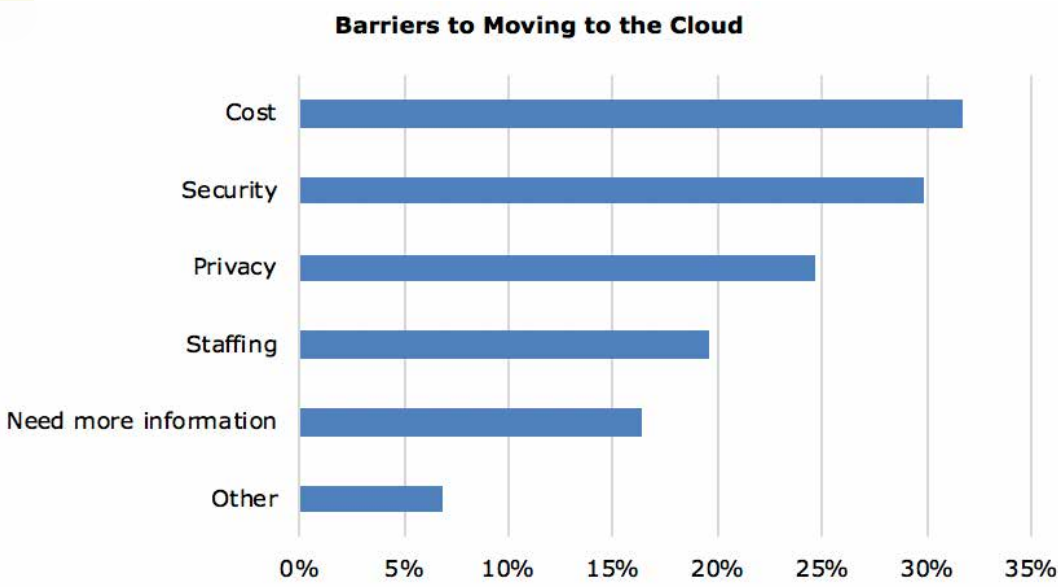
Table: Cloud Migration Plans

Enterprise System	Not Planning to Move	In Planning Stages	Moved to the Cloud	Always in Cloud	Don't Know
Learning Management System	11%	9%	29%	45%	6%
Student Information System	39%	10%	29%	21%	1%
Financial Systems	43%	14%	24%	16%	4%
Human Resources Systems	37%	14%	26%	18%	5%

The overwhelming majority (90%) of districts are using Cloud for storage. When districts select their Cloud storage provider, more than two-thirds (68%) select Google. The widespread adoption of Google Classroom is again the likely suspect for the wide use of Google Cloud Services.

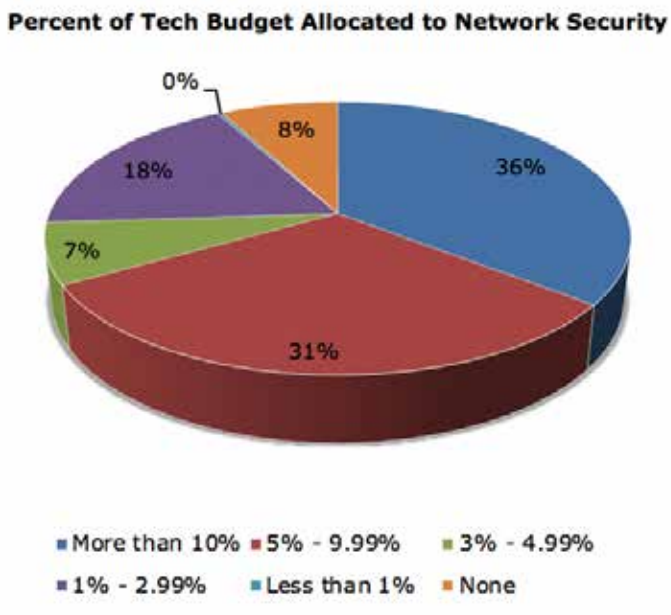


For those districts not in the Cloud, nearly a third (32%) of respondents cite cost as the main barrier. Security (30%) and privacy (25%) follow as the top reasons. A fifth (20%) of districts identify staffing issues and 16% the lack sufficient information.

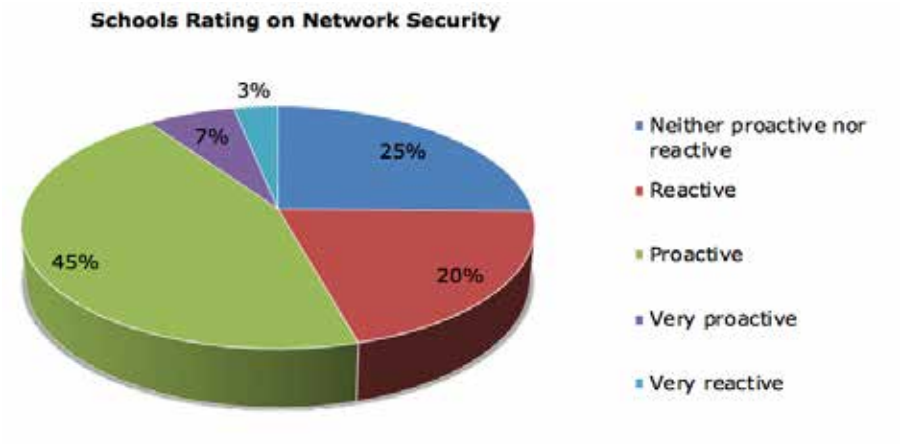


CYBERSECURITY

More than a third of districts (36%) allocate 10% or more of their technology budget to network security. Slightly less than a third (31%) spend 5-9.99%. The remaining third (33%), allocating less than 5% of the their technology budget, is comprised of 18% spending 1-2.99%, 7% spending 3-4.99%, and 8% who don't allocate at all. However, it is not clear whether those who don't allocate a percentage from their technology budgets just fund from other budget categories or don't spend anything at all on network security.



Not surprisingly, a majority of districts (52%) are proactive or very proactive when it comes to maintaining their network's security. However, 23% of respondents report their districts are reactive or very reactive. A quarter (25%) of respondents rate their districts as "neither proactive or reactive." Almost half (49%) of districts purchase cybersecurity insurance.



The good news is that a majority (59%) of districts report cyberattacks occur on an infrequent basis —less than "every month or so." The bad news is that if a district does not have good breach detection (rated a top priority by the majority of respondents) attacks are being underreported.

Of attack types, phishing is by far the security threat that most concerns districts. Forty-seven percent (47%) of respondents rate it a high to medium/high risk. Ransomware is perceived as the second highest security risk, with 23% rating it as high to medium/high risk. As phishing is often the means through which ransomware and other breaches gain access into district networks, that concern is well-placed. According to Verizon's 2018 Data Breach Investigations report, 96% of attacks come through email, and on average 4% of recipients of a phishing email campaign will click on the link[2]. Denial of Service (DoS) attacks are considered the lowest risk by districts. It would require further investigation to determine if this is because districts receive fewer of these types of attacks or because the attack itself brings lower risk to a district. DoS events in K-12 tend to focus on hampering online testing, which does not put district data at risk.

[2] 2018 Data Breach Investigations Report, 11th Edition. Verizon http://www.documentwereld.nl/files/2018/Verizon-DBIR_2018-Main_report.pdf

Table: Network Security Risk Perceptions

Security Threat	Low Risk	Low/Med Risk	Med Risk	Med/High Risk	High Risk
Network Hack	19%	49%	40%	8%	3%
Phishing	4%	18%	34%	33%	14%
Denial of Service	22%	47%	35%	12%	6%
Identity Theft	16%	41%	42%	15%	3%
Ransomware	15%	41%	36%	17%	5%

In addressing data security issues, the majority of districts find it challenging to work with vendors. Breach notification is the most difficult, with 68% that agree or strongly agree that it's a problem. Software and information vendors are not keen to admit their system has been compromised. However, many state laws mandate when vendors need to make notifications in the event of a breach and it seems unlikely that vendors' legal department would permit non-compliance. The large percentage of respondents rating vendors as difficult in this area could be the result of a language problem. Districts may be requesting notification for security incidents that are not considered "breaches" in legal terms, as defined by their respective state laws. Vendors may be pushing back on notification in those instances, as there is no legal requirement that they do so. Vendors could reduce the opportunity for and need to report data breaches by following reasonable security practices. However, according to respondents, it is a challenge to get vendors to commit to these practices. Sixty-five percent (65%) of respondents agree or strongly agree that it is a challenge to get vendors to commit to "best practice data retention and deletion policies", IT support (57%), encryption of data in transit (55%), and encryption of stored data (54%). These high rates of dissatisfaction appear to reflect a disconnect between district expectations and a vendor's perspective of sustainable practices.

Table: District Difficulty in Working with Vendors on Cybersecurity

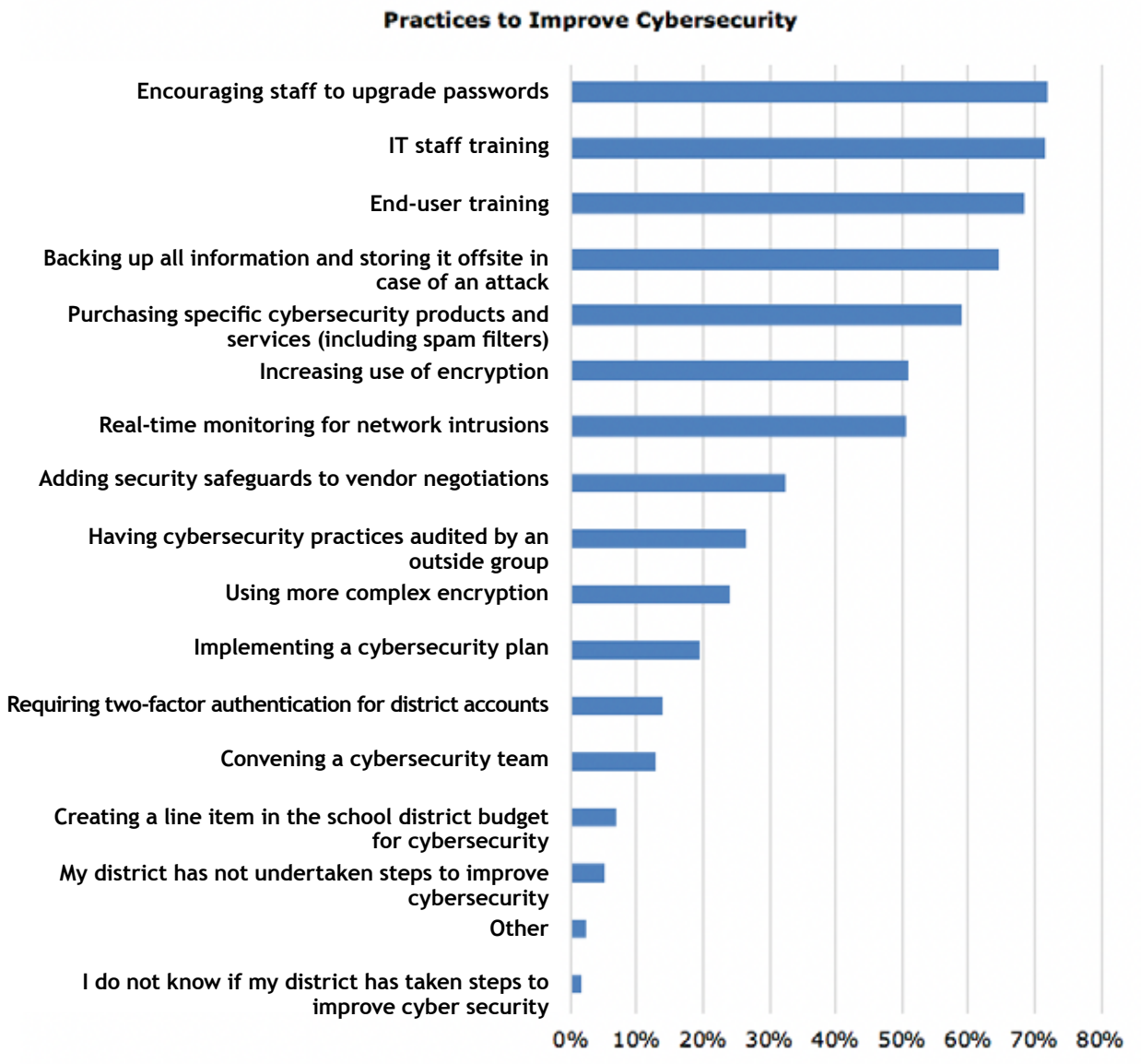
Cybersecurity Commitment	Strongly Agree	Agree	Disagree	Strongly Disagree
Encryption of data in transit	12%	44%	37%	7%
Encryption of stored data	10%	44%	39%	7%
Best practice data retention and deletion policies	11%	54%	30%	4%
IT support	9%	48%	37%	6%
Breach notification	19%	49%	29%	3%

Few respondents (11% or less) consider any of the cybersecurity services on the survey a low priority. A majority (52%) of districts rate breach detection (the counterpart to vendor breach notification) as their highest cybersecurity service priority. This is not surprising as many districts, either by local policy or state law, are required to alert parents of any data breaches. Almost half (49%) of respondents consider security vulnerability assessment a high priority. Mitigation services are rated a high priority by 43%.

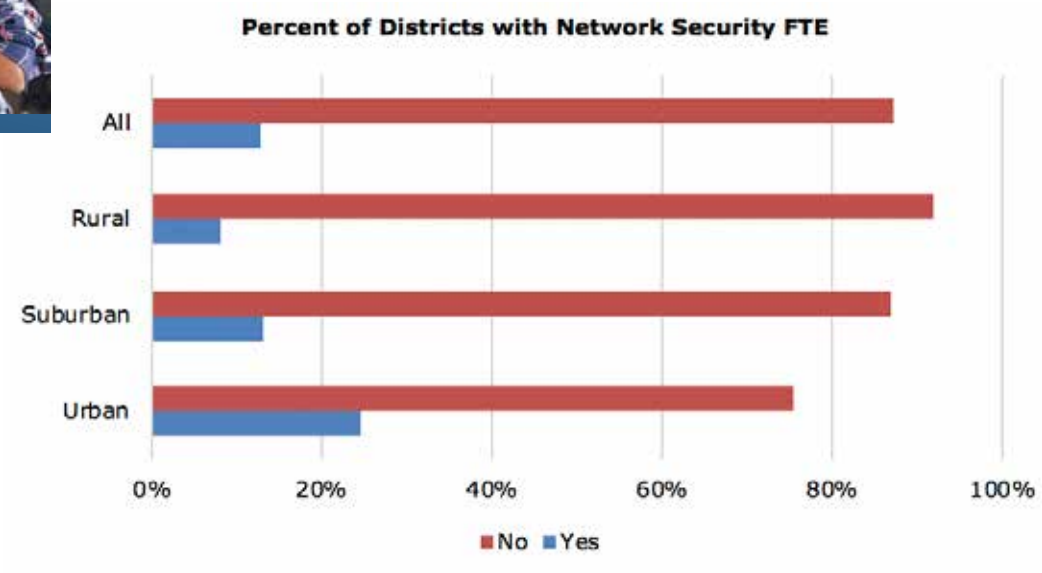
Table: Priority of Cybersecurity Services

Cybersecurity Service	Low Priority	Med Priority	High Priority
Breach Detection	9%	40%	52%
Mitigation Services	11%	46%	43%
Security vulnerability assessment	10%	41%	49%

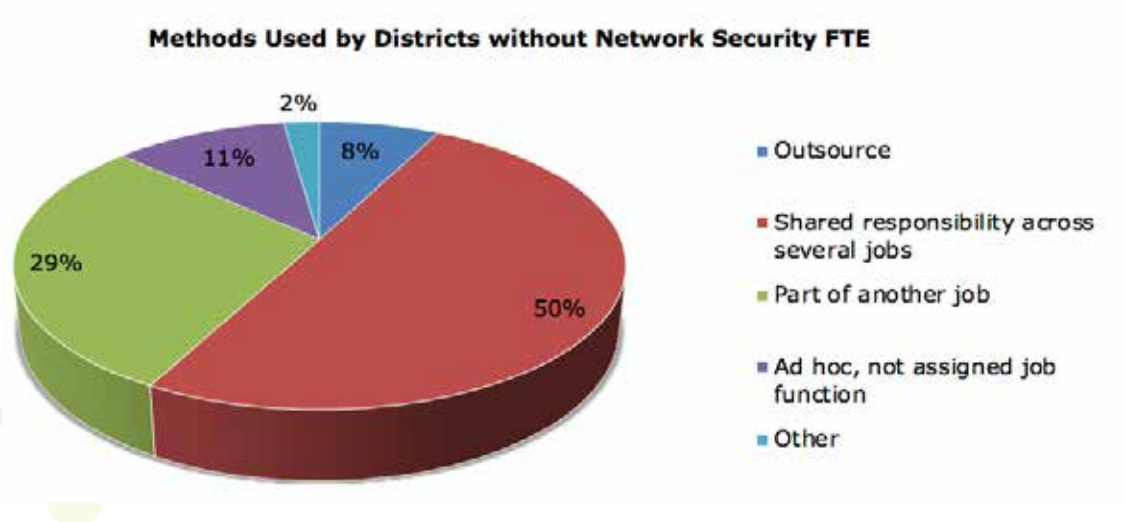
Districts have adopted a number practices to improve cybersecurity. The top three most frequently employed are "encouraging staff to upgrade passwords" and "IT staff training," each with 72%, and "end-user training" with 68%. As humans are often the cause of a security breach, these top practices play critical roles in helping to keep networks safe. In addition, a majority of districts are implementing the following practices: off-site back-up (64%), cybersecurity products and services (59%), increased use of encryption (51%), and real-time monitoring for network intrusions (51%). Only 5% of districts report their districts have not made any attempts to improve cybersecurity.



Despite the plethora of cybersecurity initiatives and practices that need to be managed, only 12% of districts have a dedicated network security person. Rural districts are the least likely to support a full-time employee (FTE), with only 8% reporting a person in this role. With 25%, urban districts have the highest percentage network FTEs. Suburban districts are closest to the national average, with 13%.

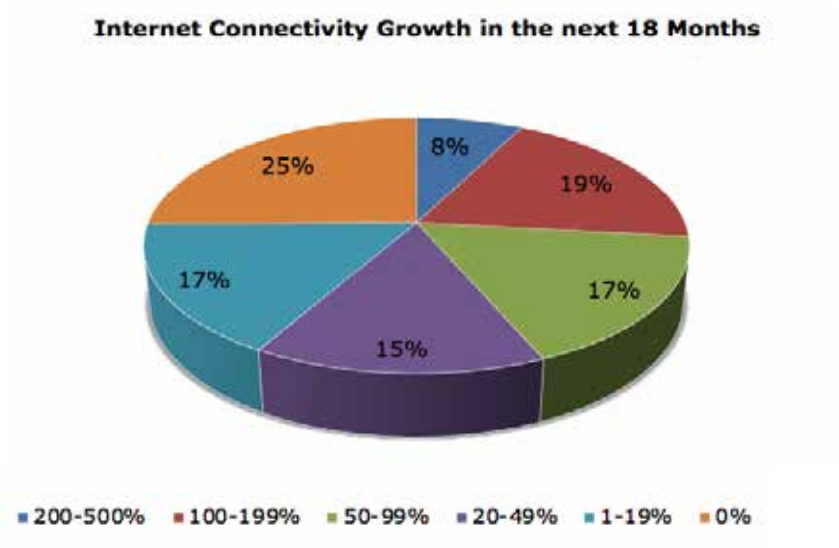


Half (50%) of districts without dedicated full-time staff manage network security oversight by distributing shared responsibility across several jobs. More than a quarter (29%) incorporate responsibilities as part of another job, while 11% manage on an ad hoc basis (not assigned to a specific job function), and less than a tenth of districts (8%) outsource the function.



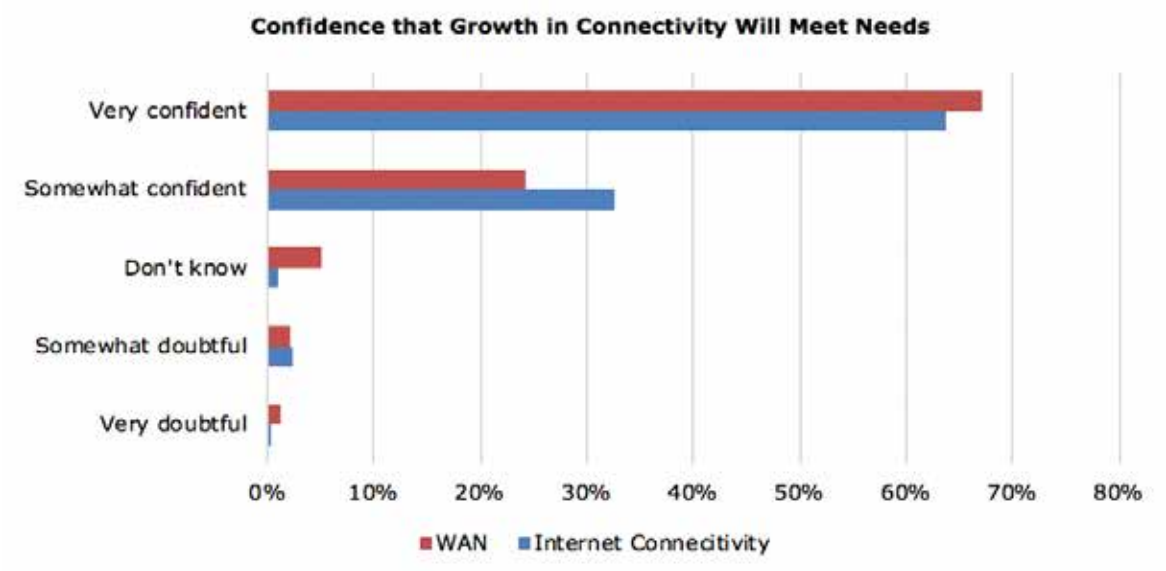
PLANNING

Only 8% of districts anticipate growing their Internet connectivity by 200% or more over the next 18 months. Nearly a fifth (19%) are planning growth rates between 100-199% and 17% are planning growth of 50-99%. A majority (56%) expects an increase of less than 50%—including a quarter (25%) that do not expect any growth.



Overall, WAN growth is expected to be less than Internet growth in the next 18 months. While rates are the same (8%) for growth greater than 200% and for districts expecting growth between 1-19% growth (17%), the vast majority (73%) are not expecting any growth in their WAN as compared to 25% for Internet.

When asked about their confidence in projected growth to meet projected needs, almost all respondents (97%) expressed confidence about their ability to meet their district's Internet demand, with an overwhelming majority (91%) expressing confidence concerning their WAN. These percentages indicate districts are more confident than the prior year, when response rates for "very or somewhat confident" for Internet and WAN were 83% and 88% respectively.

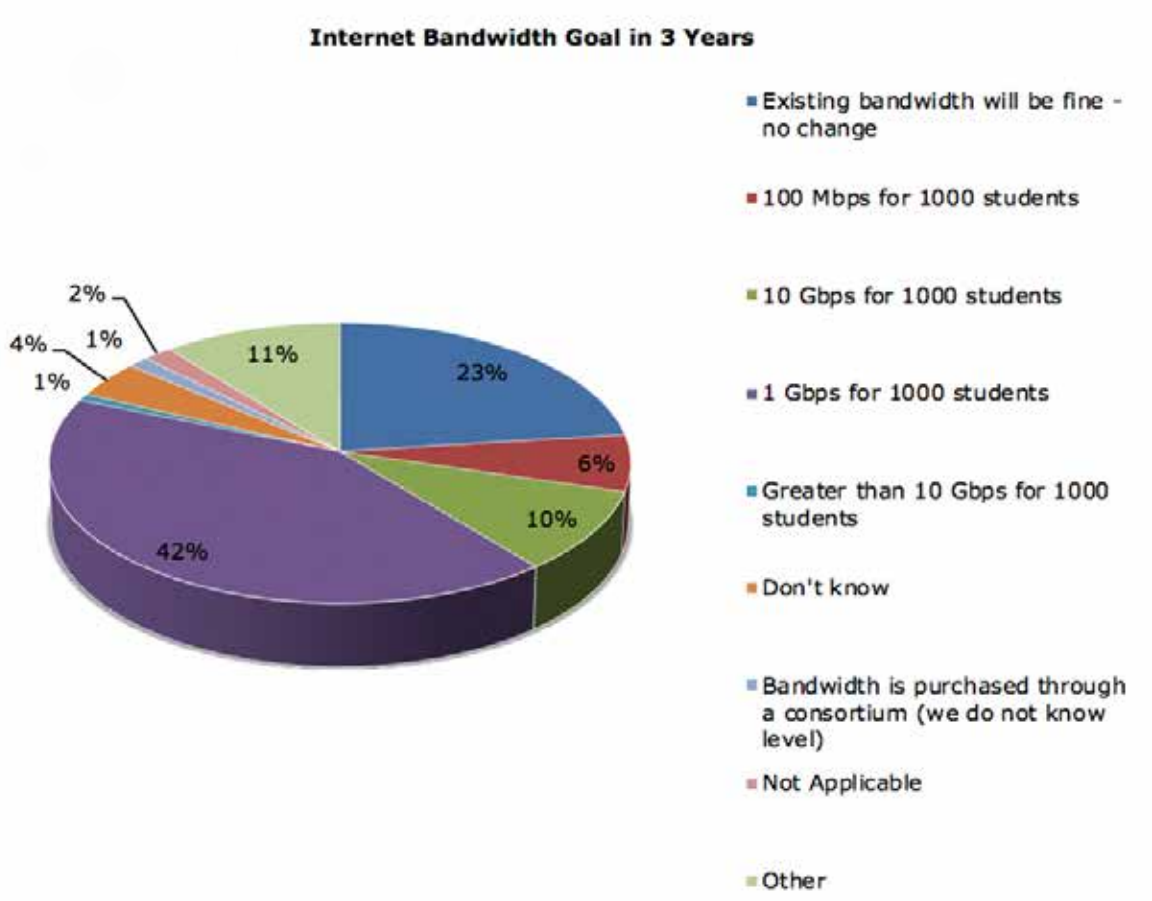


When making edtech purchasing decisions, sustainability is the most important factor to respondents, with 75% reporting it matters "a lot." "Upfront costs" was the next most heavily rated factor with 62%, followed by accessibility (59%), scalability (55%), and interoperability (50%). Less than half of respondents found that these factors did not matter a lot: cybersecurity (49%), vendor's level of technical support (41%), and existing bandwidth (30%). Considering the importance of and district accountability for cybersecurity, it is somewhat surprising that more districts do not weigh it more heavily. The relatively low importance of Internet bandwidth can be attributed to districts' confidence that bandwidth will grow to meet needs.

Table: Purchasing Decision Considerations

Consideration	A Lot	Some	A Little	Not At All	Don't Know
Sustainability	75%	20%	3%	2%	1%
Upfront cost	62%	32%	3%	1%	2%
Accessibility for students	59%	26%	11%	4%	1%
Scalability	55%	32%	9%	2%	1%
Interoperability	50%	35%	11%	2%	2%
Cybersecurity	49%	37%	10%	4%	0%
Vendor's level of technical support	41%	41%	14%	4%	0%
Existing internet bandwidth	30%	30%	24%	16%	1%

There are still districts (6%) working towards achieving the FCC short-term goal (100 Mbps per 1,000 students), with the plan of achieving it in three years. In the same time frame, 42% of districts will be working towards achieve the FCC long-term goal (1 Gbps per 1,000 students). Looking to exceed the long-term goal are 10% of districts planning on 10 Gbps per 1,000 students and 1% planning on more than 10 Gbps. Almost a quarter (23%) of respondents expect that their current bandwidth will be sufficient in three years. While at the same time, 42% will still be working towards achieving the FCC's long-term goal—2 years after the 2019 target year for achieving them.



CONCLUSION

It is taking districts longer than the timeframe outlined in the E-Rate Modernization Order to achieve the short and long-term goals. However, E-Rate has enabled schools to achieve a level of connectivity that would otherwise be out-of-reach. Digital eco-systems have also benefited from decreasing connectivity fees, better WAN transport options, more scalable Wi-Fi, and the emergence of Cloud solutions. While these improvements have reduced certain burdens, other factors such as off-campus equity, interoperability, and network security are gaining predominance. A district's struggle to improve its network infrastructure—and the teaching and learning it supports—requires diligent, ongoing effort.

ABOUT THE SURVEY PARTNERS

CoSN is the premier professional association for school system technology leaders and represents over ten million students nationwide. The mission of CoSN is to empower educational leaders to leverage technology to realize engaging learning environments. Visit cosn.org or call 866-267-0874 to find out more about CoSN's focus areas, annual conference and events, advocacy and policy, membership, and the CETL™ certification exam.

AASA, The School Superintendents Association, founded in 1865, is the professional organization for more than 13,000 educational leaders in the United States and throughout the world. AASA advocates for equitable access for all students to the highest quality public education and supports school system leaders.

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Forecast5 Analytics provides interactive data analytics solutions to schools, covering a spectrum of organizational performance areas. The Forecast5 platform includes cloud-based business intelligence software, an analytics platform that connects a district's disparate student datasets into one system, a financial forecasting engine, interactive data visualizations, and a Google Maps-based tool for geospatial projects. More than 1,500 school districts across the country are using Forecast5 tools to maximize their data insights.

About Survey Report Author

Paula Maylahn is an education industry consultant with over thirty years' experience across the K-20 spectrum. She currently serves as the project director for CoSN's interoperability initiatives and serves on CoSN's Standards and Interoperability Committee. Paula is a contributing author on two books, "The Experts' Guide to the K-12 Market" and "The Experts' Guide to the Postsecondary Market", and authored the publication, "Interoperability: Definitions, Expectations, and Implications." Paula chairs the education council of the United Design Guild where she also serves as a member of the board. She is a council member of the Women's Education Project, former board member of the Education Division of the Software & Information Industry Association, and a former executive council member of the PreK-12 Learning Group of the Association of American Publishers.

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