

# 2018 Broadband Connectivity Capability Survey Report

Office of Technology  
Virginia Department of Education

## Preface

The Virginia Department of Education (VDOE) and its Department of Data, Research, and Technology is committed to ensuring that the public education system is positioned to provide equitable academic outcomes by supporting scalable, sustainable, secure, and reliable school network infrastructure. We are also committed to assisting school divisions with the leadership, resources, and tools needed for divisions to work with their local governments to expand high-speed broadband access. This will ensure that all students, regardless of where they live, or their family income, will have access to a computing device and high speed Internet. Cybersecurity, student data privacy, and cloud migration will also be a focus for school support and outreach.



# Contents

<b>I. Introduction</b>	<b>5</b>
KLIP Goals:	5
<b>II. Summary of Key Findings</b>	<b>5</b>
Bandwidth and Affordability	5
E-rate	5
Funding Your School Division’s Network Infrastructure	5
Internet Access at Home	5
Information Security	5
Wi-Fi	6
Virginia Schools on Fiber	6
Bandwidth Goal	6
Affordability	6
Average Cost per Megabit per Second (Mbps) for School Internet Access	7
<b>III. 2018-2019 Broadband Connectivity Capability Survey (BCCS)</b>	<b>8</b>
E-rate	8
Funding Your School Division’s Network Infrastructure	10
Internet Access at Home	13
Information Security	15
Wi-Fi	19
<b>IV. Appendices</b>	
<b>Appendix A: CONCLUSION</b>	<b>21</b>
<b>Appendix B: RECOMMENDATIONS</b>	<b>21</b>
E-rate:	21
Funding Your School Division’s	21
Network Infrastructure	21
Internet Access at Home	21
Information Security	21
Wi-Fi	21
<b>Appendix C: 2018-19 Survey Questions</b>	<b>22</b>
<b>Appendix D: Credits</b>	<b>23</b>



## I. Introduction

In 2015, the Virginia Department of Education (VDOE) initiated the K-12 Learning Infrastructure Program (KLIP) in partnership with the Office of the Governor, and the EducationSuperHighway (ESH). The KLIP program supports increased access to affordable, high-speed Internet in every classroom in Virginia's public school system.

### KLIP Goals:

1. Get fiber to the schools that need it;
2. Ensure classrooms have updated and reliable Wi-Fi;
3. Help divisions secure more broadband for their budgets; and
4. Assist schools with the E-rate program to get the discounts they need for Internet access and internal connections.

In the 2016 Virginia Appropriations Act (Item 137.G) the General Assembly directed school divisions to report to the VDOE, by November 1 of each year, the status of broadband connectivity capability of schools in the division.

In response to the General Assembly directive the VDOE collaborated with the K-12 Learning Infrastructure Program Work Group (KLIP WG) to develop the 2018 Broadband Connectivity Capability Survey questions and responses. The EducationSuperHighway (ESH) provided the data on fiber connectivity in schools, bandwidth speed, and bandwidth affordability. The ESH data is collected from the Universal Service Administration Company (USAC) E-rate FCC Form 471.

The data collection was open from October 2018 to December 2018. After extensive follow-up, 128 of 132 divisions (97%) completed the survey. However, not all school divisions responded to all questions. Divisions reported the following information:

- E-rate
- Funding Your School Division's Network Infrastructure
- Internet Access at Home
- Information Security
- Wi-Fi

## II. Summary of Key Findings

### Bandwidth and Affordability

The percentage of schools on fiber increased from 99% in 2017 to 99.5% in 2018. The number of divisions meeting the 100 kbps/student bandwidth goal as set forth by the FCC increased from 92% in 2017 to 99% in 2018. In 2017, only 29% of school divisions met the EducationSuperHighway broadband affordability benchmark, while in 2018, 45% of divisions met it.

### E-rate

One hundred four school divisions of 128 indicated they were Very Likely or Somewhat Likely to use a VDOE driven contract process to purchase E-rate consulting services if the cost of purchasing these services was beneficial to the division. One hundred fifteen of 128 school division technology leaders need greater flexibility to spend Category Two (C2) budgets and want allocation of budgets by school division, not by school building student enrollment numbers as currently regulated.

### Funding Your School Division's Network Infrastructure

Fifty-eight of 128 divisions stated challenges in funding their network infrastructure. The greatest challenges were limited local and state dollars, aging school buildings, decreasing student enrollments, and the staff to support the network.

### Internet Access at Home

There is wide variation across divisions as to the percentage of students that do not have Internet access at home. Only five divisions reported that 81% to 100% of students do not have high-speed Internet at home. There is a need for accurate community mapping capabilities to better understand residential areas without high-speed Internet. There are many variables involved in understanding this construct. School divisions are deploying a number of different strategies to provide opportunities for students and families to access the Internet away from school. Many schools reported that funding is not available to provide Internet access at home. The public library was a top place for Internet access followed by connecting families with low or no cost Internet provider services, and mobile hot spot loaner programs.

### Information Security

More work needs to be done in the area of Information Security. Schools need assistance with third party reviews of network data and security practices, security

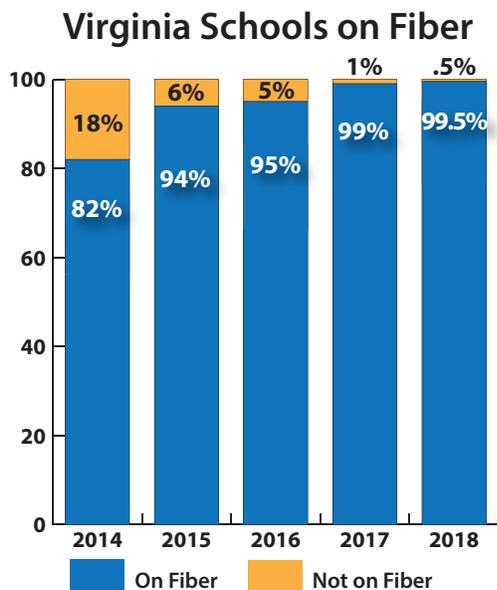
awareness campaigns, and security training for school personnel. Schools overwhelmingly reported a need for VDOE State Information Security Guidelines.

## Wi-Fi

Most divisions have fulfilled their immediate needs or refreshed their infrastructure to the best of their ability given the current restrictions for E-rate C2 funding. However, there are many divisions that indicated more work could be accomplished if E-rate C2 funding was provided on a per-division basis instead of the per-school model used today. Schools need assistance with the initial installation, configuration, and validation of a wireless network to ensure that best practices for radio frequency design, security, and client device use cases are understood and properly implemented. There is also significant interest in the availability of managed Wi-Fi services and the ability to procure trusted resources to assist with Wi-Fi professional services engagements.

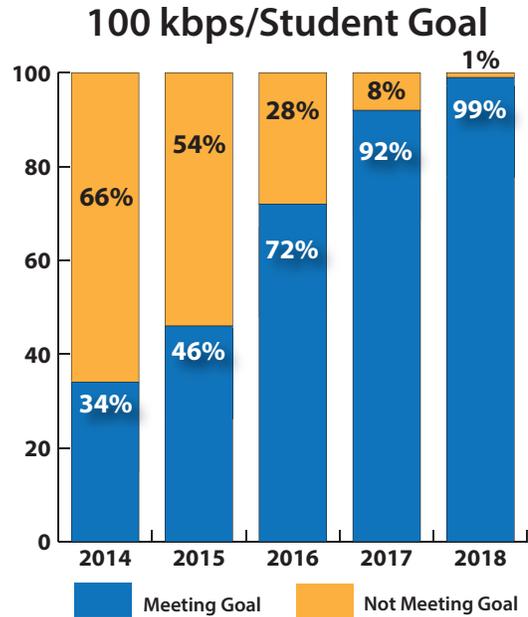
## Virginia Schools on Fiber

The network infrastructure in schools needs to keep pace with the digital learning challenges in K-12 and new opportunities for innovation. Network capabilities are critical to the K-12 mission today. This requires schools to have scalable fiber connections to the Internet. Fiber connections are very important because they allow schools to scale to extremely high bandwidth and this type of bandwidth is becoming increasingly more affordable.



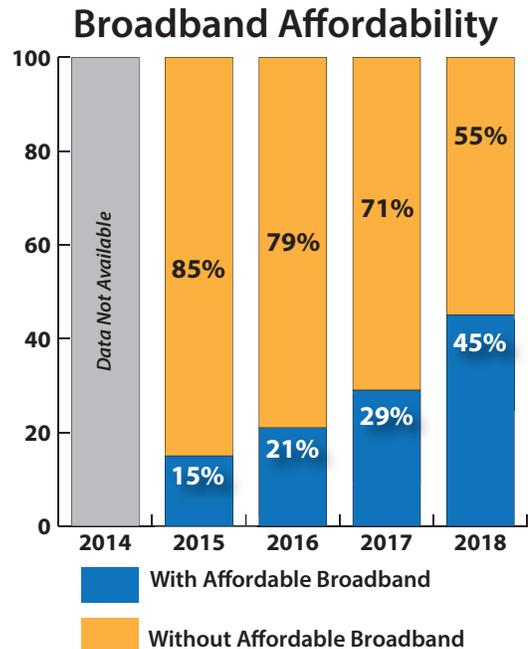
School buildings connected to fiber increased from 82% in 2014 to 99.5% in 2018  
Source: EducationSuperHighway (ESH)

## Bandwidth Goal



Source: EducationSuperHighway

## Affordability



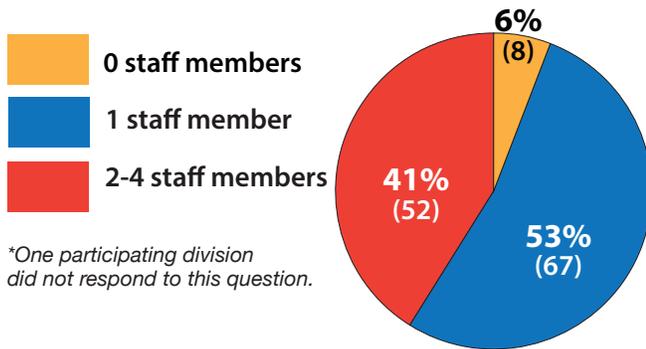
In 2018, 45% of Virginia public school divisions met the ESH benchmark.



# 2018-2019 Broadband Connectivity Capability Survey (BCCS)

## E-rate

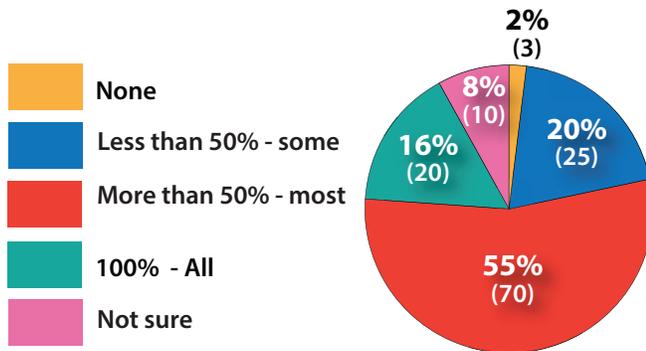
1. How many staff members in your division are trained/have experience in the E-rate program's rules and procedures?



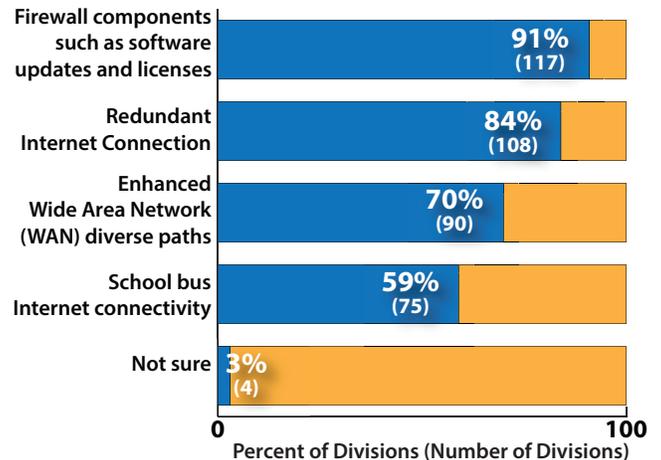
Divisions provided the following rationale for their preference to fund C2 allocations by school division:

- By school division allocation would allow for greater flexibility in determining where to use the funds (e.g. older school buildings have greater C2 needs than newer school buildings);
- Division allocation would allow for school divisions to determine which schools need the most to least funding;
- Documentation of C2 budgets by school is an administrative record keeping burden; and
- Student enrollment alone does not define the needs of a school, school buildings within the division have different needs.

2. What percentage of your eligible E-rate C2 needs were met by C2 funds?

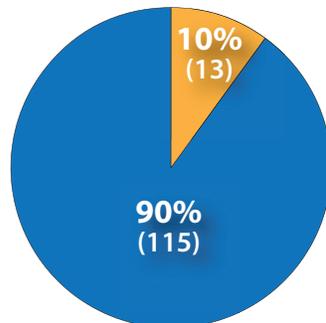


4. Please indicate which of the following services you believe should qualify for E-rate support: (check all that apply)



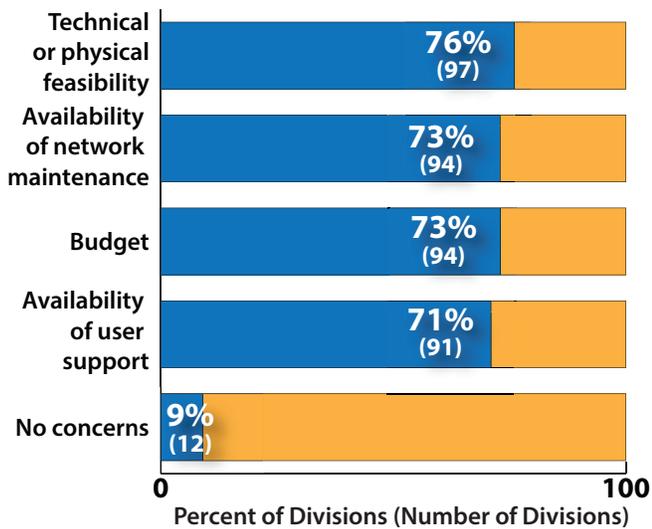
3. How do you think E-rate Category 2 funds should be allocated?

One hundred and fifteen divisions (90%) think E-rate C2 funds should be allocated by division needs. Thirteen divisions (10%) percent of divisions think the funds should be allocated by school as currently regulated.



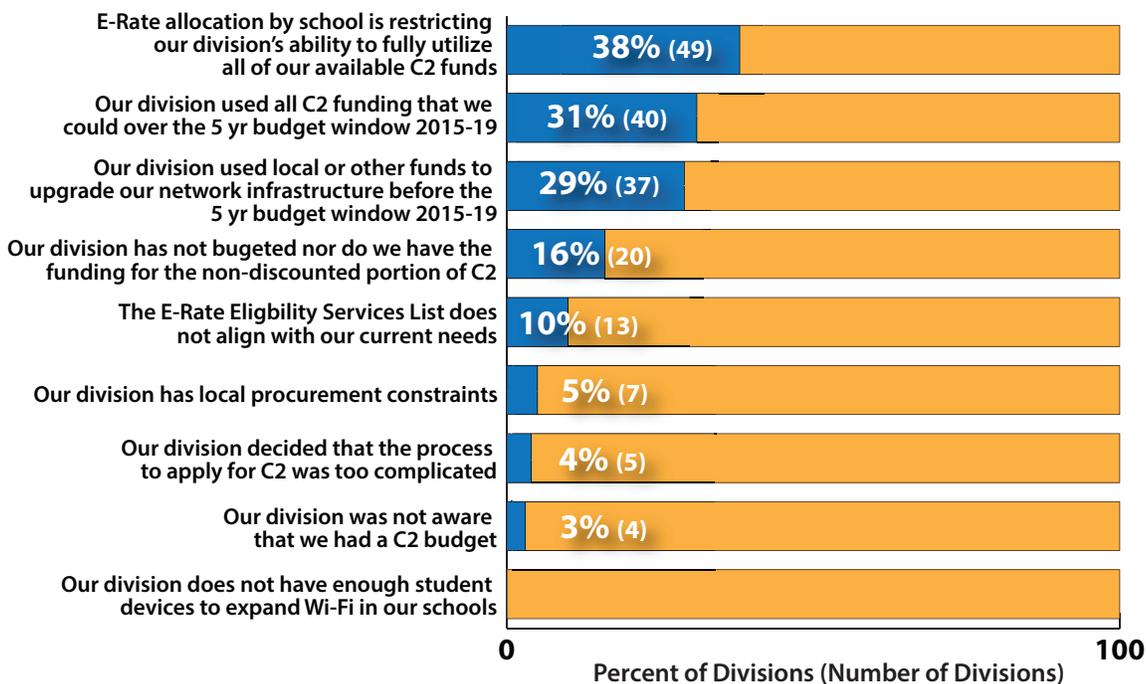
In addition to the top choices, 34 divisions provided responses for additional services that should qualify for E-rate support. The most common responses were devices or services that increased internet access at home (12 divisions), web filtering (five divisions) and Voice Over IP (VOIP) services (five divisions).

5. The Federal Communications Commission (FCC) may consider permitting schools to share Internet access off-campus, connecting students at home via wireless connections that originate from the school's Internet. What are your concerns about this proposal? (check all that apply)



Thirty-four divisions provided other concerns about permitting schools to share internet access off-campus. The most common concerns were web filtering and ensuring appropriate use (nine divisions), staffing to manage the additional workload and support hours (seven divisions), security (six divisions), and limited feasibility due to geography (six divisions).

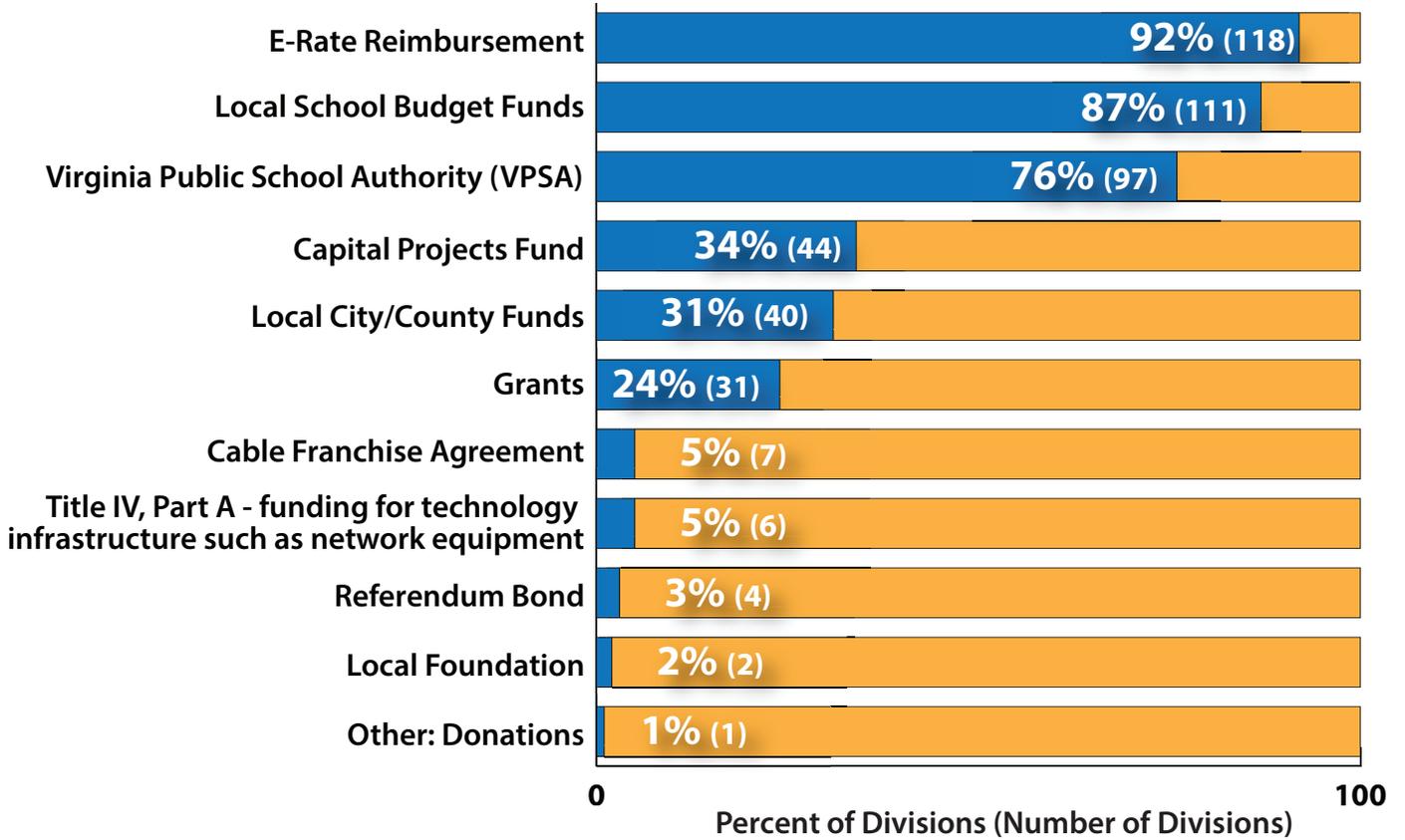
6. If your division has not spent all of its E-rate C2 funds; please identify the reason(s) why (Check all that apply)



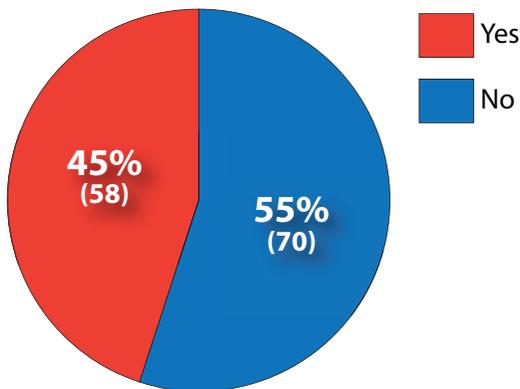
Of the twenty-nine divisions that provided additional responses, thirteen indicated that they would be able to expend all of their E-rate C2 funds by the end of the billing cycle. The next most common responses were extended approval time (four divisions) and inability to match funds (three divisions).

# Funding Your School Division's Network Infrastructure

1. Please identify the funding streams that your division uses to support its network infrastructure (check all that apply).



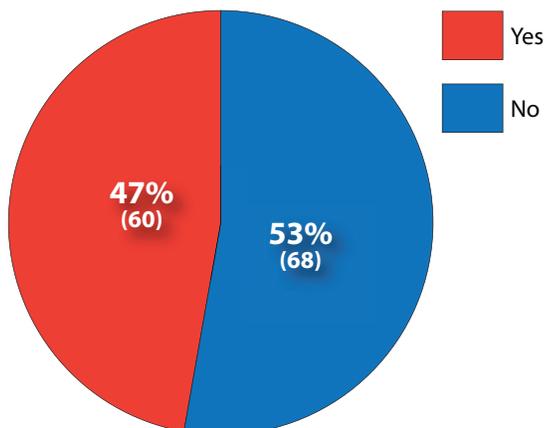
2. Has your division encountered challenges in funding its network infrastructure initiatives?



3. If yes, provide a brief description of up to three of your greatest challenges?

Themes	Quotes
<b>Local and state government dollars are limited</b>	“School budget and local government funding” “Local funding is limited, developing interest for maintenance and improvement of existing systems, procurement and timing for installation upgrades”
<b>Aging facilities</b> <b>Increasing number of devices and applications on the network require continuous upgrades --keeping up is challenging</b>	“Aging facilities” “With the number of devices and applications served on our network, it is a continual challenge to provide adequate funding to ongoing network equipment/bandwidth refresh and upgrade requirements.” “Most funding has been one-shot. Funding for future replacement cycles is always a concern.”
<b>Competing priorities for funding</b>	“Funds being prioritized to other items”
<b>Capital upfront costs and ongoing operational costs are expensive</b>	“Network equipment requires replacement, in general, each 5-7 years to be in alignment with current technologies and the educational reliance on such networked technologies. In environments where much of the equipment requires larger financial investment, replacing equipment for a division our size on such intervals is very cost prohibitive yet the demand remains for such widespread upgrades to occur.”
<b>Decreasing enrollment means less state funding</b>	“Small size of the division and decreasing enrollment”
<b>1:1 initiatives are funded but difficult to maintain and sustain</b>	“1:1 at high school has been funded but it is hard to maintain and keep working.”
<b>Cost of infrastructure, time to implement, and labor (staff)</b>	“Oftentimes we need an upgrade and must wait beyond reasonable time for E-Rate approval.”
<b>Not a focus of school board, they have other priorities</b>	“School board priorities”

4. Has your school division’s technology department worked with local government when planning your network infrastructure projects (e.g. public library, county or city government technology department, public works, transportation, police/sheriff department)?



**5. If Yes, briefly describe how you worked or are currently working with your local government and any challenges you experienced.**

Divisions identified the following main themes regarding their work experiences with local government:

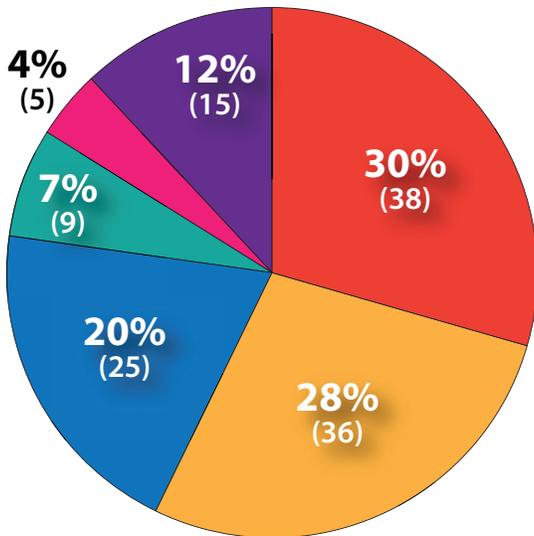
- Collaborative fiber projects that connect schools and county buildings/services
- Library services
- Working with the county on planning for county wide broadband
- Combined RFP for dark fiber to all facilities; provide IP phones at local emergency services
- Formed county /school technology committees
- County and school division share the same network
- Share WAN with county and work together on a private fiber project which will connect all county and school buildings.
- Share Internet access with county government

Divisions identified the following main themes regarding the challenges they experienced working with local government:

- Goals and vision of county do not align
- Different priorities between schools and counties: Who will own? Who will support? Costs.
- Getting the county to understand how "E-rate" could be used to build out fiber projects
- Lack of project management to coordinate needs of all stakeholders
- Funding from county
- Local politics
- Changes in county administration and Board of Supervisors

## Internet Access at Home

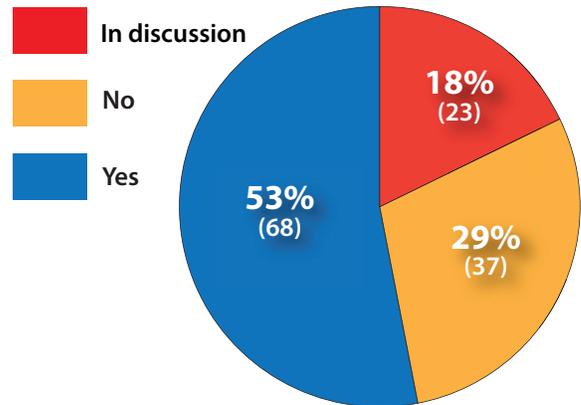
1. Estimate the percentage of your student population that does not have Internet access at home?



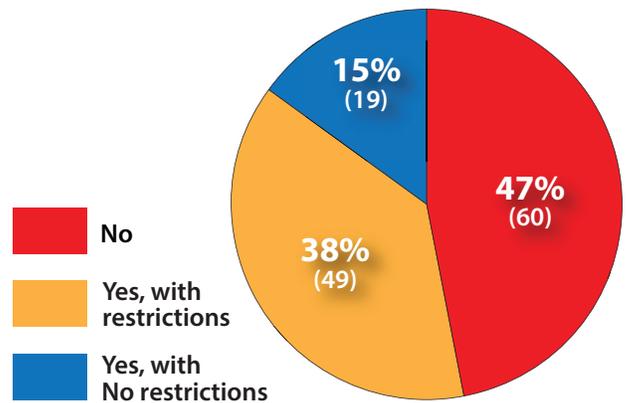
Percentage of students in the school divisions who do not have Internet at home:



2. Have you considered partnering with local government officials to explore ways to provide high-speed Internet access to homes of families in need in your division?



3. Does your division provide after-hours access to school facilities for student use of the Internet?



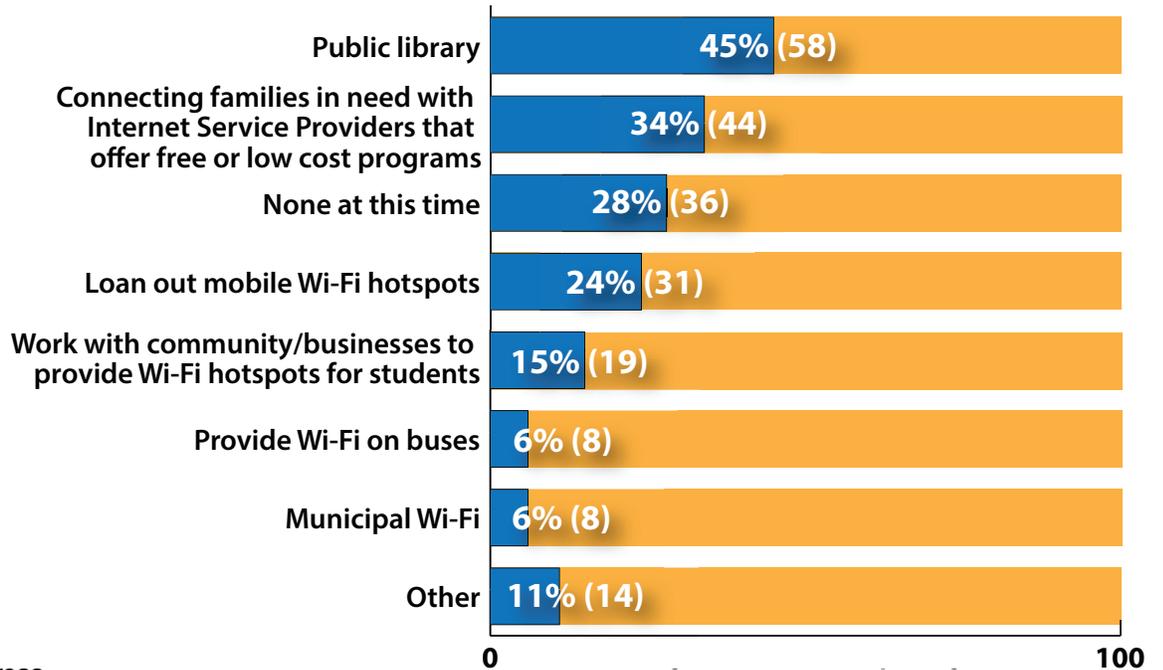
School divisions provided additional comments about their restrictions on after-hours access to the internet. The main restrictions are listed below:

- Limits on hours and campus locations
- Limited parking lot hours
- After school hours in the library or computer labs have restricted hours
- Restricted to night school hours

4. Which, if any, of the following away-from-school Internet access initiatives has your division implemented?

Fourteen divisions provided additional away-from-school internet access initiatives. Five divisions noted working with private companies to increase access, such as Sprint's 1 Million Project or Microsoft's TV whitespace technology. Three divisions also noted that internet access is available in the outdoor spaces of school campuses, including sporting areas.

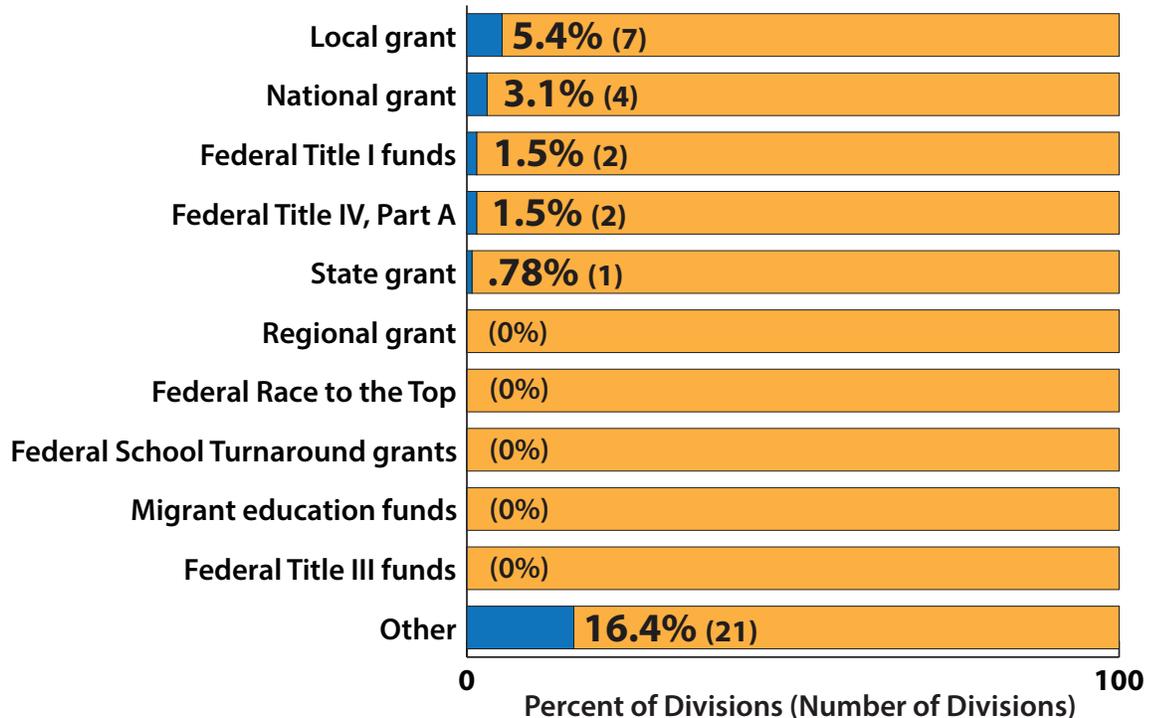
**Away-from-school Internet Access Initiatives Used by School Divisions**



5. If your division does provide away from school Internet access initiatives, identify the funding sources currently being used.

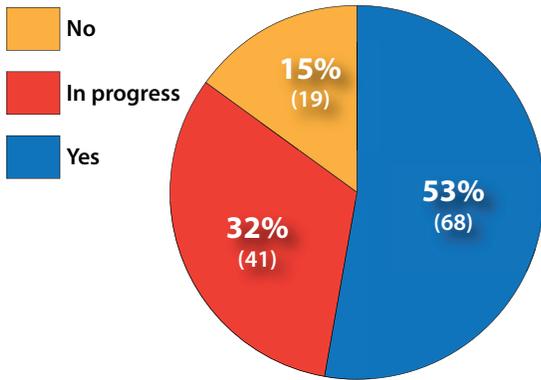
Of the twenty one divisions that identified other funding sources for away-from-school internet access initiatives, most divisions cited local funds and some divisions cited national corporate partnerships (Gear Up grant, Sprint 1 Million, Microsoft and Midatlantic Broadband Corporation).

**Funding Sources Used for Internet Access Away-from-school**

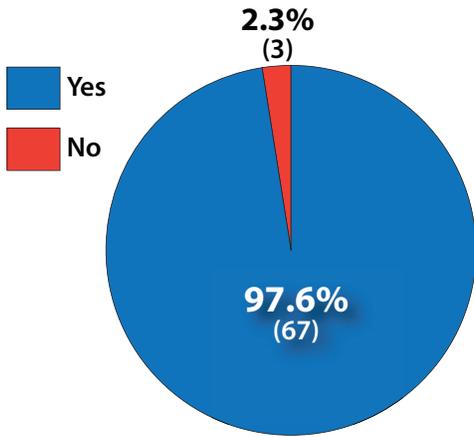


# Information Security

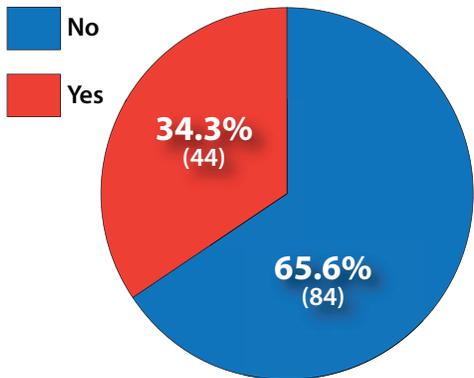
1. Does your division have a network & data security policy?



2. Would your division be interested in the availability of a State information security guideline?



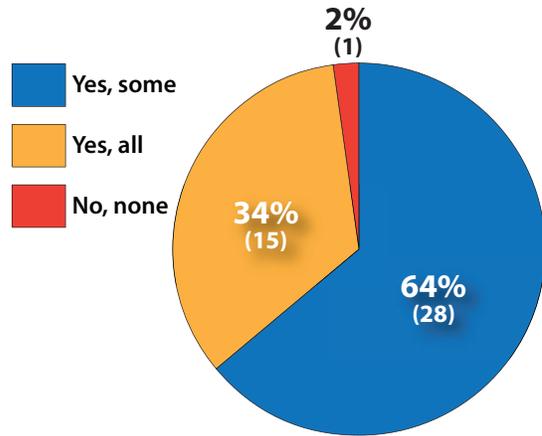
3. Has your division had a 3rd party review of network and data security practices completed in the past 24 months?



4. Were recommendations provided by the 3rd party review?

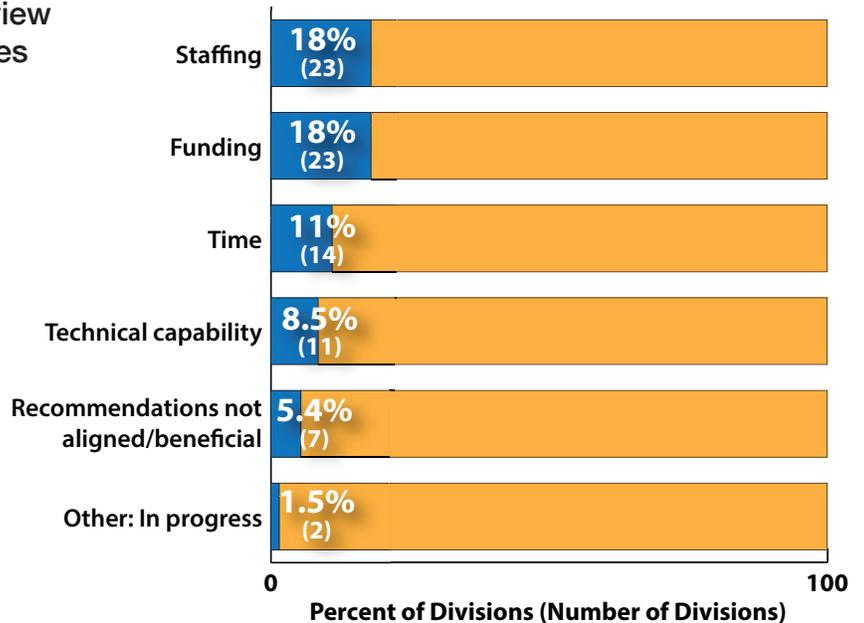
All 44 divisions that indicated they received a 3rd party review of network and data security practices within the last 24 months reported receiving recommendations from the review.

5. If recommendations were provided did your division implement them?

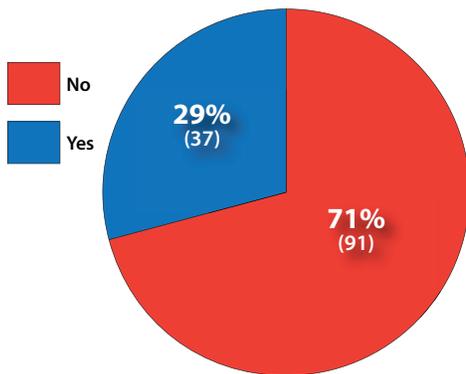


6. Identify which of the following barriers prevented implementation of the recommendations

The 28 divisions indicating that they implemented some or none of the recommendations from their 3rd party review identified the following barriers to implementation:

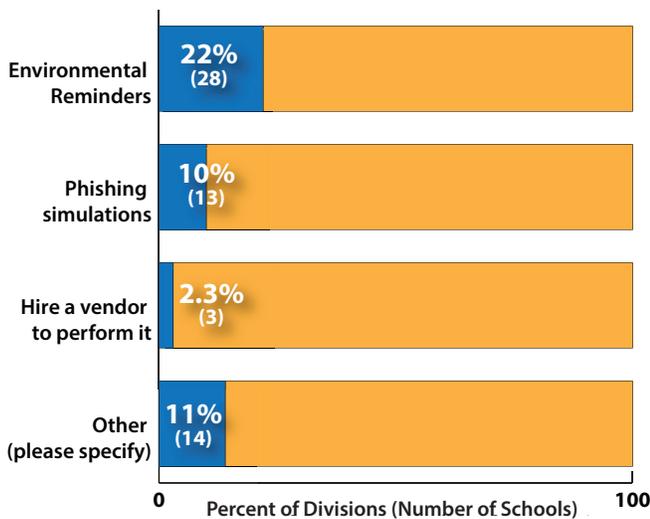


7. Does your division have a yearly documented security awareness campaign?



8. How does your division approach the campaign? (check all that apply)

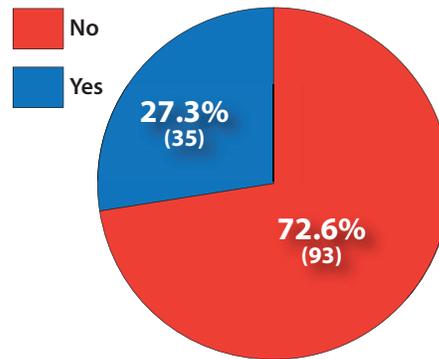
Thirty-seven divisions indicated they had a yearly documented security awareness campaign. Those divisions approached the campaign through the following methods (more than one option could be selected):



Fourteen divisions identified other approaches to security awareness campaigns. The most common response was:

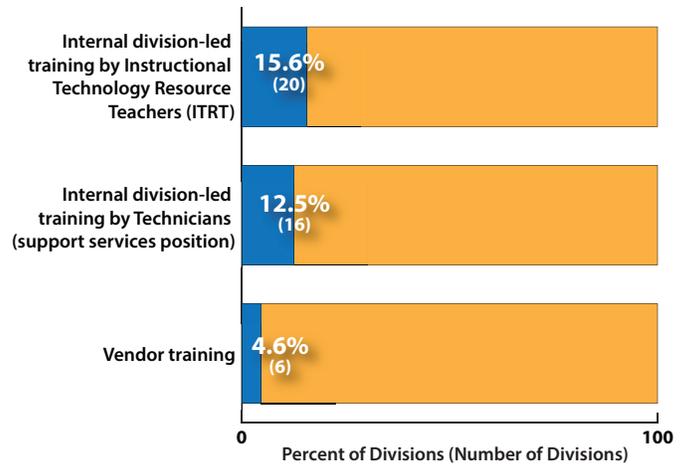
- Online training modules, beginning of year technology online course
- ITRT's review security awareness with teachers
- Professional development for new hires

9. Does your division have a yearly documented information security training?

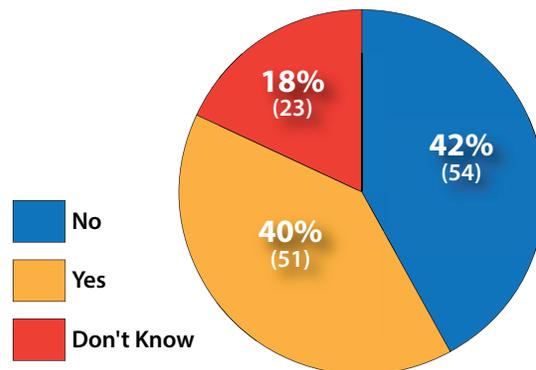


10. Who implements the training? (check all that apply)

The 35 divisions reporting a yearly documented information security training indicated the following as being responsible for implementing the training (more than one option could be selected):



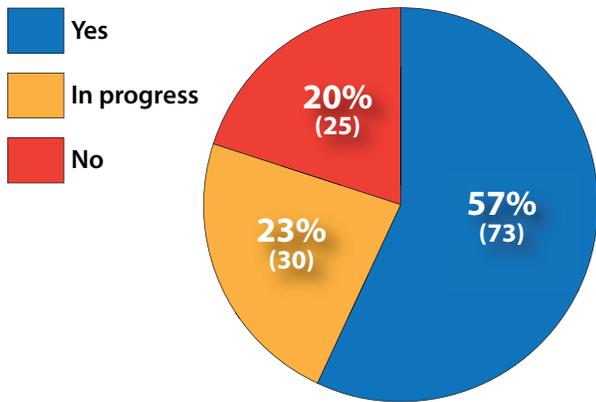
11. Does your division have Cyber Insurance to mitigate the costs associated with a data breach and recovery?



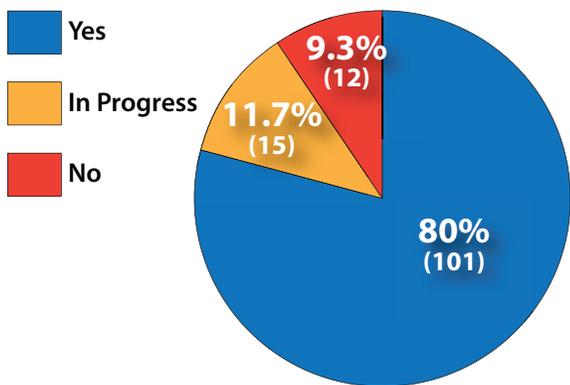
**12. Is the Cyber Insurance included in your division's general liability insurance or was it purchased through a separate policy?**

Fifty-one divisions indicated they have Cyber Insurance to mitigate the costs associated with a data breach and recovery. Among those, 39 divisions (76 percent) indicated that the insurance was included in their general liability policy. Eleven divisions (22 percent) indicated that the insurance was purchased through a separate policy. The others are part of coverage through VACORP or optional add-on.

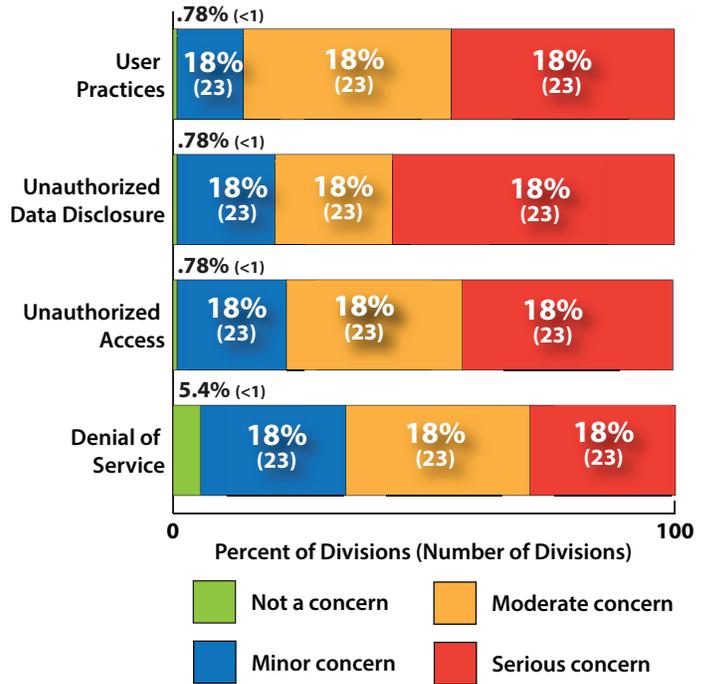
**13. Does your division have documented policies for backing up and restoring critical systems?**



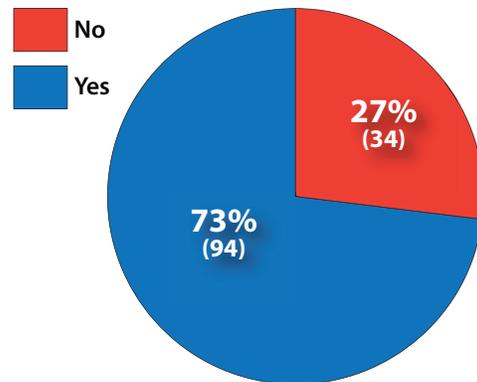
**14. Does your division have a network access policy?**



**15. Rate the extent to which the information security issues listed below are a concern for your division.**



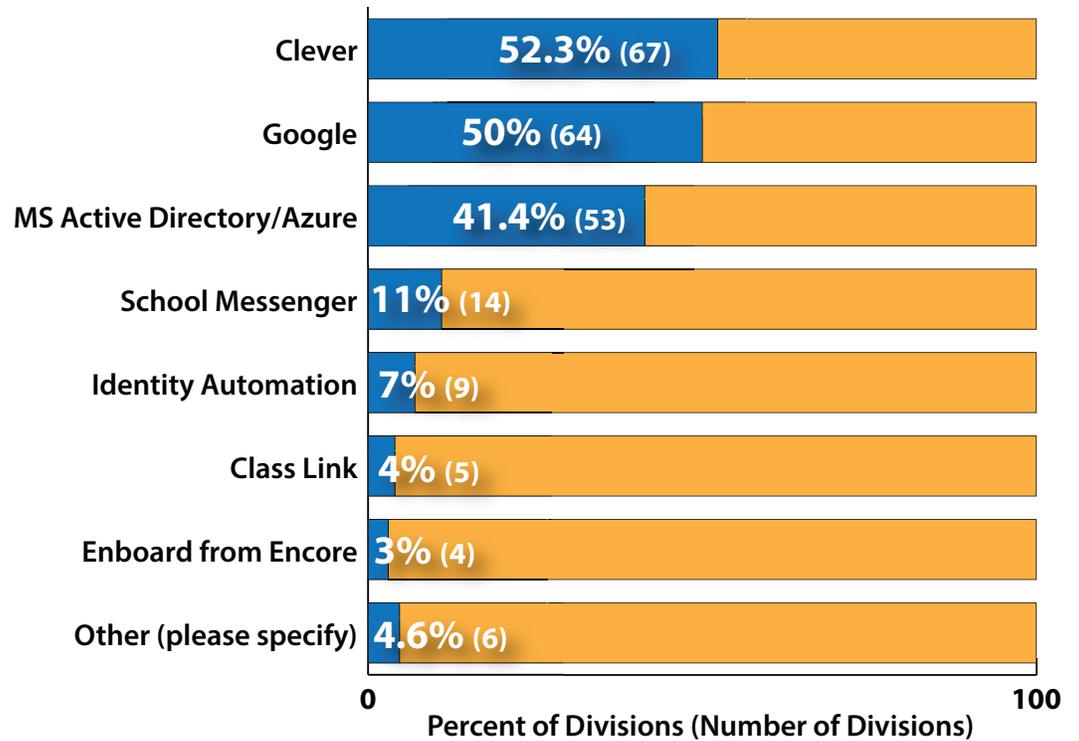
**16. Does your school division have a Single-Sign On (SSO) strategy at the division level that authenticates teachers, administrators, students, parents, and other support personnel against applications?**



### 17. Who are your SSO providers? (check all that apply)

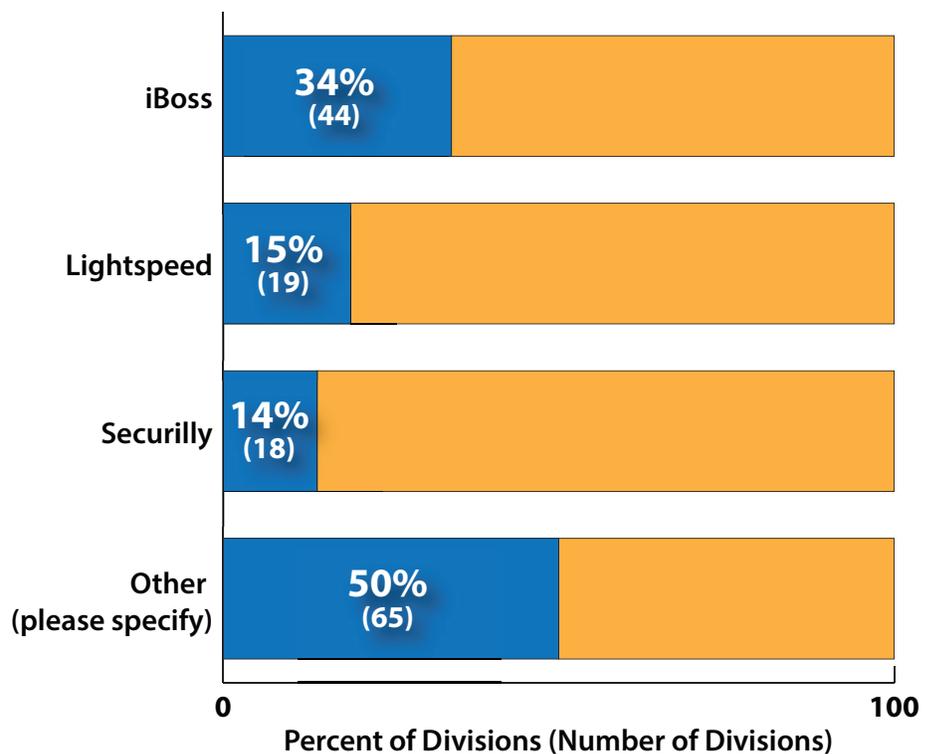
Ninety-four divisions indicated that they do have an SSO strategy at the division level that authenticates teachers, administrators, students, parents and other support personnel against applications. Among those, divisions indicated the following companies as their SSO providers (more than one option could be selected):

- “Other” responses:
- Sonic Wall/Cerdant
  - NetIQ Identity Manager
  - Kimono
  - SSO Easy
  - Aruba Clear Pass and in-house built systems



### 18. What content filtering technology does your school division implement? (Select all that apply)

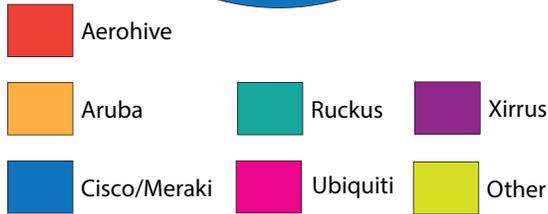
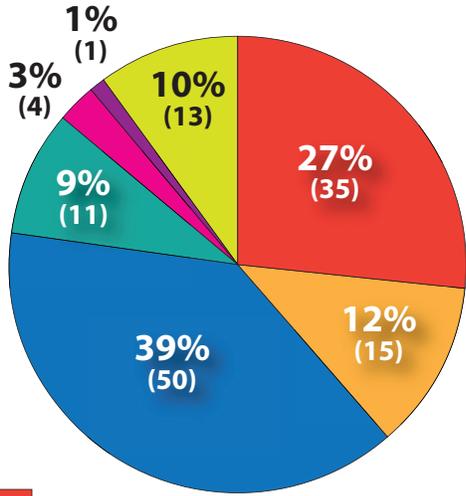
Sixty-five divisions identified additional content filtering technology. The most common responses were Fortinet Fortigate (eight divisions), Palo Alto (seven divisions), Barracuda (six divisions), and Cisco Umbrella (six divisions).



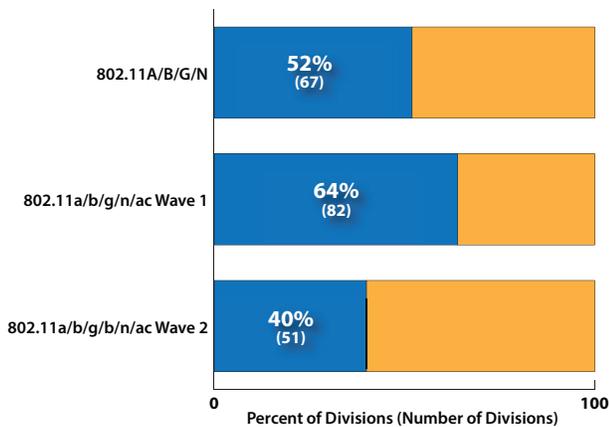
# Wi-Fi

## 1. What is the primary wireless networking gear vendor in your division?

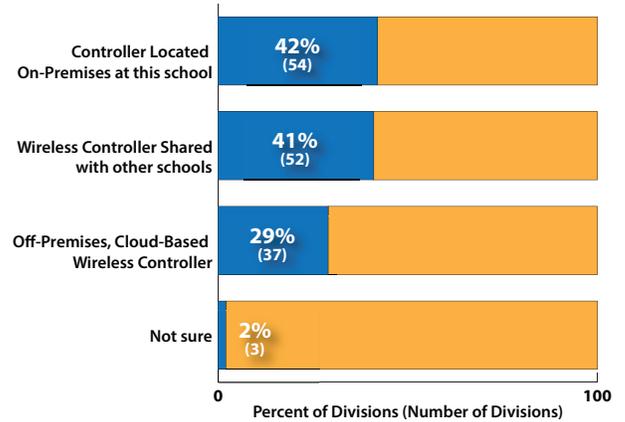
Six of thirteen divisions that provided an additional wireless networking gear vendor identified Extreme Networks as their vendor. Other divisions reported Adtran, Fontinet/Meru and HPE as their primary wireless networking gear vendor.



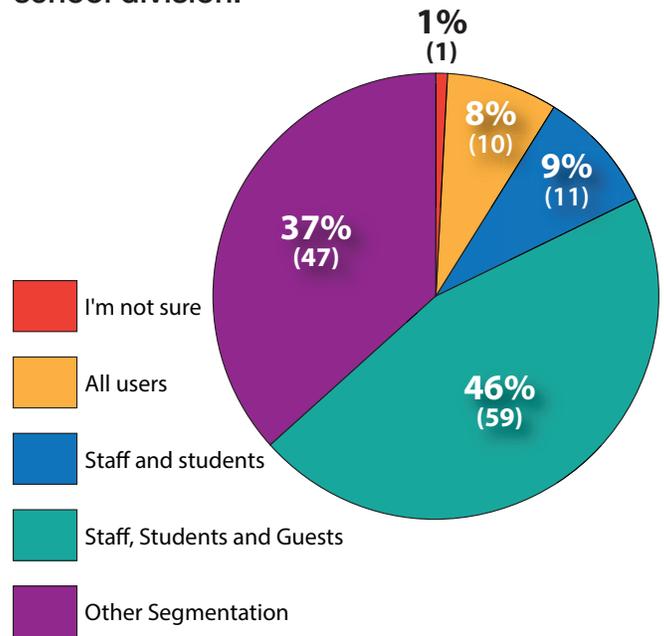
## 2. Which 802.11 standards are supported by the currently installed hardware? (check all that apply)



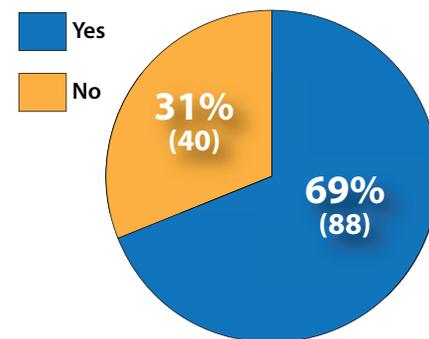
## 3. What controller architecture does your school division implement?



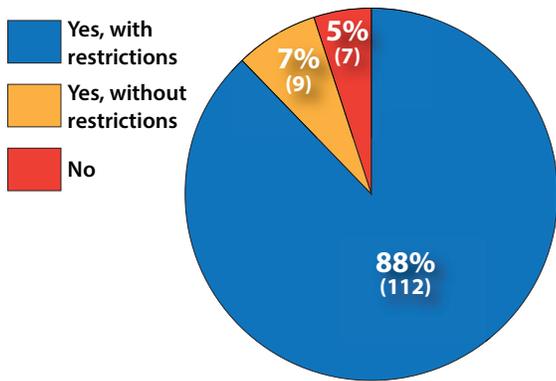
## 4. Total number of SSIDs used within this school division:



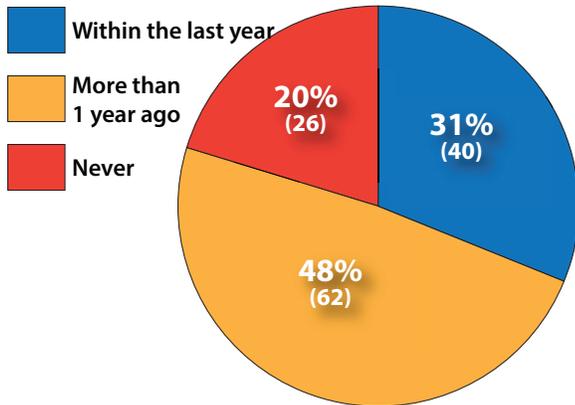
## 5. Does your division allow - Bring Your Own Device (BYOD) ?



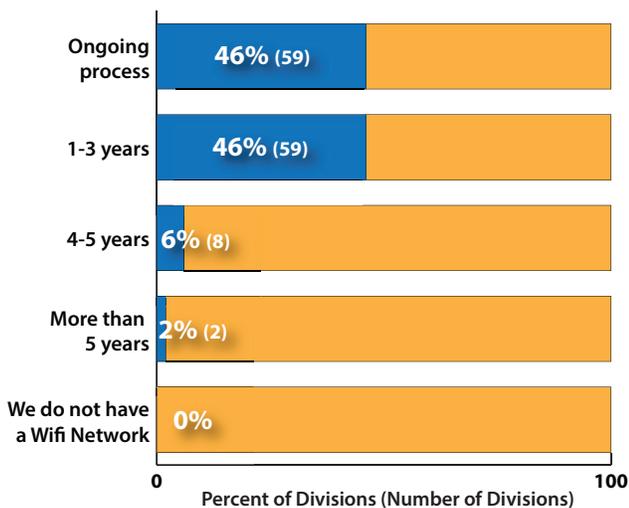
6. Does your division provide guest access to your wireless network?



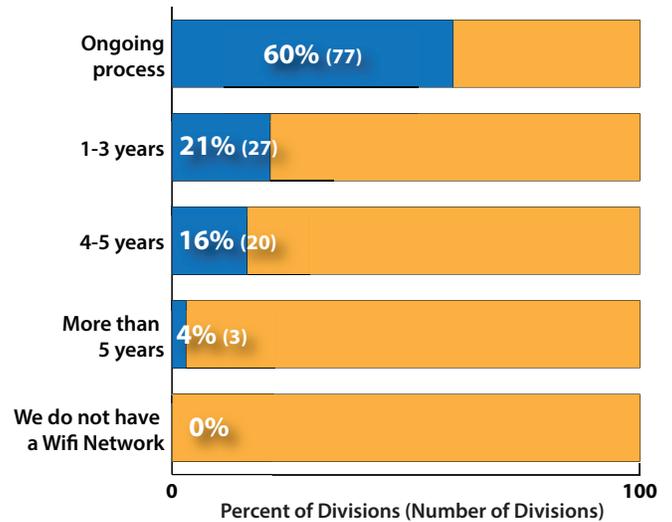
7. When was your last radio frequency heat map completed? (Only select one)



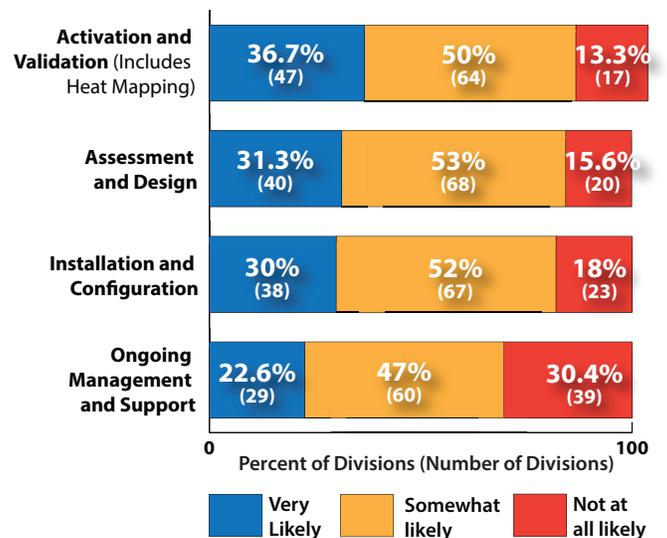
8. When did your division last upgrade its wireless infrastructure?



9. When does your division plan to upgrade its current wireless infrastructure?



10. Given the complexity of managing large-scale, high-density Wireless Local Area Networks (WLAN), VDOE is considering creating a statewide contract vehicle allowing divisions to create new partnerships with service providers who provide E-rate eligible managed services for Wi-Fi. If a contract vehicle for these services was available, how likely would your division be to take advantage of the contract and/or available services such as:



## Appendix A: CONCLUSION

In conclusion, 99.5% of public school buildings are connected to fiber and 99% of school divisions have 100 kbps per student of bandwidth. In 2017, only 29% of Virginia school divisions met the broadband affordability benchmarks as developed by the EducationSuperHighway, but in 2018, 45% of school divisions met these benchmarks. School division technology directors reported that they wanted greater flexibility and decision making in spending E-rate C2 funds. The KLIP Work Group filed comments to the FCC in April 2019 asking for the FCC to consider division level C2 budgets. Ninety percent of divisions think C2 funds should be allocated by division needs, not by school building as is currently regulated by the FCC. More work needs to be done in Virginia to build the capacity of communities to address the Homework Gap. The K-12 education community is in a unique position to build community coalitions to address this gap. Information security issues are a major concern for school technology leaders. The VDOE is in the process of developing State Guidelines for Information Security.

## Appendix B: RECOMMENDATIONS

### E-rate

- Look into developing a VITA State Master Contract to streamline the time it takes to procure E-rate consulting expertise and to obtain cost efficiencies.
- The KLIP WG will submit Comments to the Federal Communications Commission (FCC) and request that the FCC reconsider its decision to limit applicant budgets to a school-specific allocation, and instead allocate the C2 budget on a division-wide basis based on data from this survey.

### Funding Your School Division's Network Infrastructure

- Provide session topics at the Leading Ed Forum and other events such as VSTE Blogs and

webinars that focus on the funding streams that are available for school and community broadband infrastructure projects.

- Because many school divisions report challenges funding their network infrastructure, explore and research the potential cost benefits of cloud computing.
- The General Assembly should commission a study to look into the feasibility of implementing a statewide network. Because 45% of school divisions are experiencing challenges in funding their network infrastructure, the General Assembly should commission a study to look at the feasibility of implementing a statewide network for K-12 and other state entities to drive down costs and allow sharing of resources.

### Internet Access at Home

- The VDOE in partnership with the Virginia Society for Technology in Education (VSTE), and other partner organizations will convene a Digital Equity and Inclusion Summit in July 2019 in Richmond. The Summit will bring together community coalitions of school division leaders, school board chairs, local Boards of Supervisors, local or regional libraries, and county/city administrators. The goal of the Summit is to leverage community partnerships to build capacity for and develop shared digital equity solutions.

### Information Security

- Develop Information Security Guidelines and Standards for school divisions.
- Provide data breach security templates for school division and end user guidance on information security.
- Provide state contract vehicles for information security purchases.
- Disseminate information on how schools can join the Access for All Learning Consortium and the Student Data Privacy Consortium.

### Wi-Fi

- Collaborate with the Virginia Information Technology Agency (VITA) to ensure that VITA state master contracts for E-rate are revised so that Wi-Fi services such as activation and validation (heat mapping), assessment and design, installation and configuration, and ongoing management and support are clearly stated as available services in the contracts.

# Appendix C:

## 2018-19 Survey Questions

### E-rate

1. How many staff members in your division are trained/have experience in the E-rate program's rules and procedures? . . . . . 8
2. What percentage of your eligible E-rate Category 2 needs were met by Category 2 funds? . . . . . 8
3. How do you think E-rate Category 2 funds should be allocated? . . . 8
4. Please indicate which of the following services you believe should qualify for E-rate support: . . . . . 8
5. The Federal Communications Commission (FCC) may consider permitting schools to share Internet access off-campus, connecting students at home via wireless connections that originate from the school's Internet. What are your concerns about this proposal? . . . 9
6. If your division has not spent all of its E-rate Category 2 funds; please identify the reason(s) why . . . . . 9

### Funding Your School Division's Network Infrastructure

1. Please identify the funding streams that your division uses to support its network infrastructure. . . . . 10
2. Has your division encountered challenges in funding its network infrastructure initiatives? . . . . . 10
3. If yes, provide a brief description of up to three of your greatest challenges? . . . . . 10
4. Has your school division's technology department worked with local government when planning your network infrastructure projects (e.g. public library, county or city government technology department, public works, transportation, police/sheriff department)? . . . . . 11
5. If Yes, briefly describe how you worked or are currently working with your local government and any challenges you experienced. . . . . 12

### Internet Access at Home

1. Estimate the percentage of your student population that does not have Internet access at home? . . . . . 13
2. Have you considered partnering with local government officials to explore ways to provide high-speed Internet access to homes of families in need in your division? . . . . . 13
3. Does your division provide after-hours access to school facilities for student use of the Internet? . . . . . 13
4. Which, if any, of the following away-from-school Internet access initiatives has your division implemented? . . . . . 14
5. If your division does provide away from school Internet access initiatives, identify the funding sources currently being used. . . . . 14

### Information Security

1. Does your division have a network & data security policy? . . . . . 15
2. Would your division be interested in the availability of a State information security guideline? . . . . . 15
3. Has your division had a 3rd party review of network and data security practices completed in the past 24 months? . . . . . 15
4. Were recommendations provided by the 3rd party review? . . . . . 15

5. If recommendations were provided did your division implement them? . . . . . 15
6. Identify which of the following barriers prevented implementation of the recommendations. . . . . 15
7. Does your division have a yearly documented security awareness campaign? . . . . . 16
8. How does your division approach the campaign? . . . . . 16
9. Does your division have a yearly documented information security training? . . . . . 16
10. Who implements the training? . . . . . 16
11. Does your division have Cyber Insurance to mitigate the costs associated with a data breach and recovery? . . . . . 16
12. Is the Cyber Insurance included in your division's general liability insurance or was it purchased through a separate policy? . . . . . 17
13. Does your division have documented policies for backing up and restoring critical systems? . . . . . 17
14. Does your division have a network access policy? . . . . . 17
15. Rate the extent to which the information security issues listed below are a concern for your division . . . . . 17
16. Does your school division have a Single-Sign On (SSO) strategy at the division level that authenticates teachers, administrators, students, parents, and other support personnel against applications? . . . . . 17
17. Who are your SSO providers? . . . . . 18
18. What content filtering technology does your school division implement? . . . . . 18

### Wi-Fi

1. What is the primary wireless networking gear vendor in your division? . . . . . 19
2. Which 802.11 standards are supported by the currently installed hardware? . . . . . 19
3. What controller architecture does your school division implement? . . . . . 19
4. Total number of SSIDs used within this school division: . . . . . 19
5. Does your division allow - Bring Your Own Device (BYOD) ? . . . . . 19
6. Does your division provide guest access to your wireless network? . . . . . 20
7. When was your last radio frequency heat map completed? . . . . . 20
8. When did your division last upgrade its wireless infrastructure? . . 20
9. When does your division plan to upgrade its current wireless infrastructure? . . . . . 20
10. Given the complexity of managing large-scale, high-density Wireless Local Area Networks (WLAN), VDOE is considering creating a statewide contract vehicle allowing divisions to create new partnerships with service providers who provide E-rate eligible managed services for Wi-Fi. If a contract vehicle for these services was available, how likely would your division be to take advantage of the contract and/or available services such as: . . . . . 20

## Appendix D: Credits

The Virginia Department of Education wishes to thank the K-12 Learning Infrastructure Work Group in assisting with the questions and responses to this data collection.

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