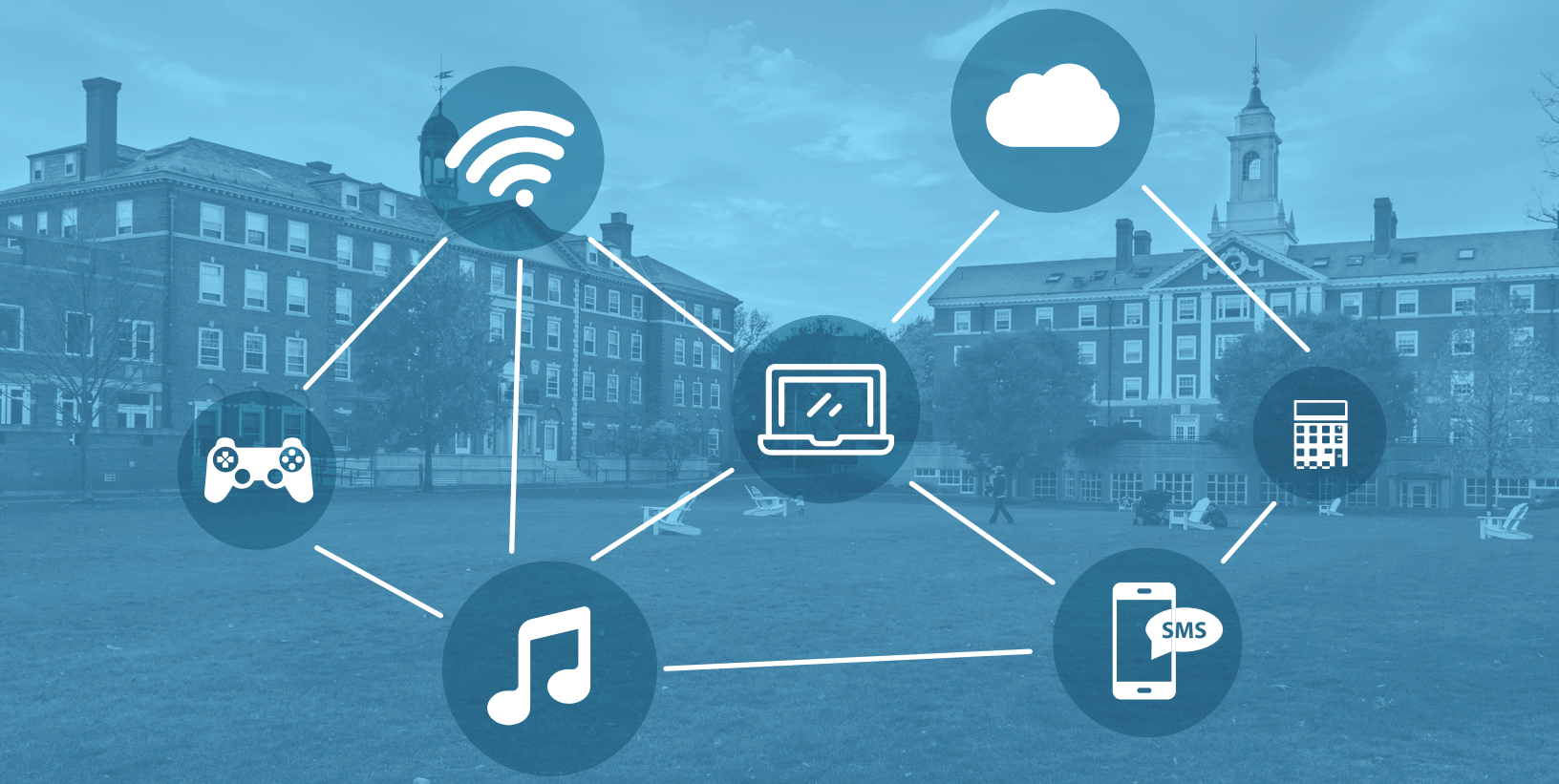
ACUHO-I

STATE OF RESNET

2018 Report

ResNet Trends & Practices Across Higher Education



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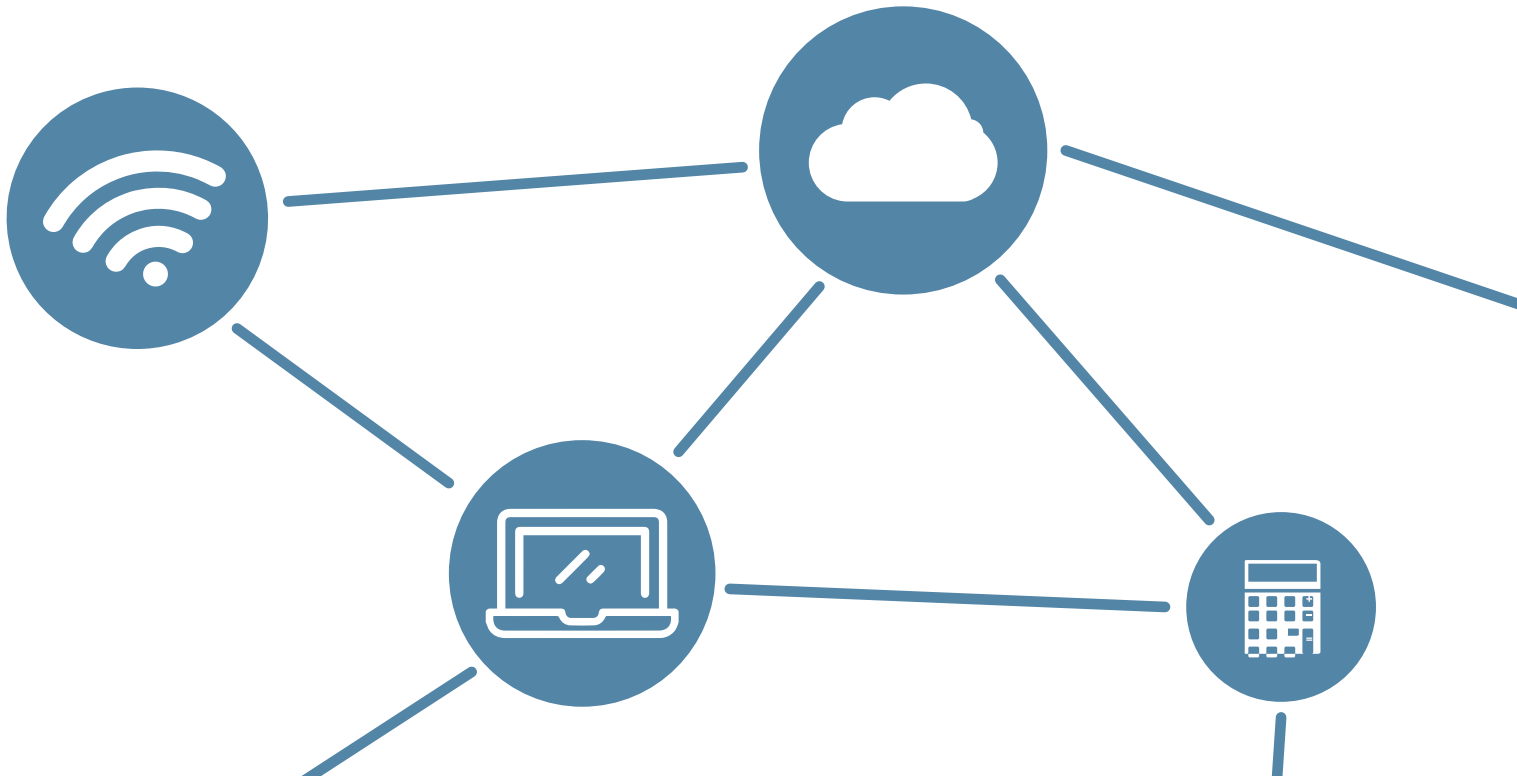


1. Introduction

The Association of College and University Housing Officers-International (ACUHO-I) is pleased to present research findings from the 2018 ACUHO-I State of ResNet Study.

In its seventh year, the Residential Networking (ResNet) study continues to examine the current state of Residential Networking (ResNet) – trends, practices, and the development of standards among U.S. and International higher education institutions. The 2018 research findings, gathered from 435 respondents representing 312 higher education institutions, provide visibility into the best practices and challenges of delivering a strong residential networking infrastructure, including student connectivity needs, wireless demands, bandwidth and metering, device support policies, and budgets.

A year-over-year analysis shows the evolution of technology on college campuses and its impact on ResNet. This report recognizes the innovative teaching and learning opportunities that cutting-edge technologies and devices support. By gleaning meaningful information and insights from three significant stakeholder groups – higher-education IT leaders, housing officers, and business officers – the study helps us understand the strong collaboration required to manage technology, infrastructure, lifestyle, and costs on college campuses today.

"As we survey today's higher education landscape, we are struck by how Wi-Fi and connectivity has rapidly emerged as the lynchpin for student engagement, satisfaction, and success. More universities are responding to a new generation of students prioritizing robust and ubiquitous Wi-Fi and connectivity as an important criterion for their college decision," said Mary DeNiro, CEO and executive director, ACUHO-I. "Our seventh annual ResNet study shows more schools going all out to make this a reality. It's our hope that this study provides administrators insight into how best to meet connectivity challenges as we continue to innovate and grow."

– **Mary M. DeNiro**, CEO and Executive Director, ACUHO-I

2. Methodology

For the seventh year, market research firm Forward Analytics was contracted to perform ResNet industry research and to report quantitative market intelligence that can benefit higher education institutions and enhance the residential network for university and college students.

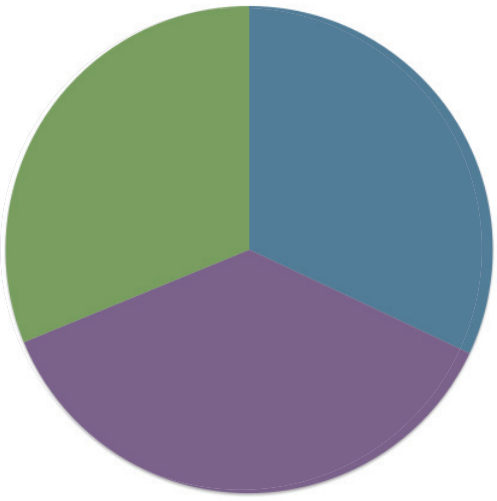
This study is based on an online survey targeted at higher education IT, business, and housing officers. Forward Analytics worked closely with ACUHO-I representatives to design the 2018 survey and conducted online polling in January 2018 through March 2018. Three different questionnaires were developed to accommodate the three distinct audiences. While the surveys have evolved over the years to reflect the technological evolution, as well as developments in higher education, the surveys have remained reasonably consistent to allow for data comparisons.

High Participation Rates

A total of 435 surveys were completed, presenting a 70.6% increase in completion rates since the initial study in 2012. These results represent 312 universities or colleges (some institutions had multiple respondents), with a sample (total) population of 1,700 U.S. higher education institutions, the response rate represents a statistical significance of +/-4.0% at the 95% confidence interval. With 435 institutional respondents, it can be said that if the survey were repeated 100 times, 95 in 100 times the research findings would vary at most +/- 4.0%. This level of sampling is deemed significant for supporting business decisions and strategic planning.

Size of Institution

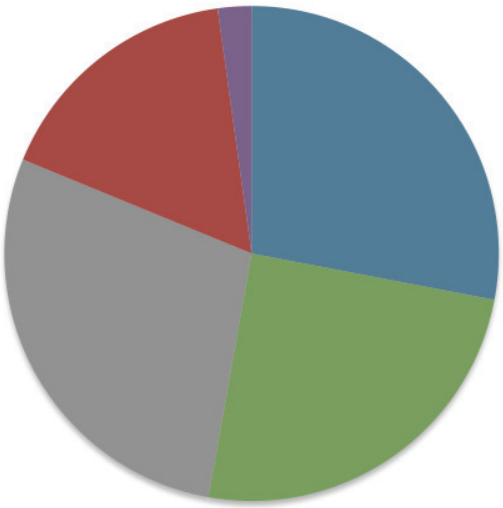
32.0% | **Small (fewer than 5,000 students)**
36.8% | **Medium (5,000 to 15,000 students)**
31.2% | **Large (15,000+ students)**

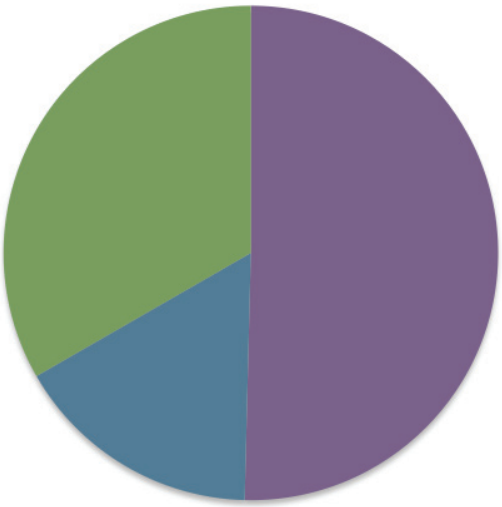


Number of On-Campus Students

The concept of the residential college, where guided learning occurs mainly within the residence facility, continues to grow in popularity, as well as influence. Universities are using residence halls to foster a stronger sense of community on campus. This year measures 45% of the respondents having between 1,001– 5,000 on-campus students (an increase from last year at 37.4%).

28.0% | **Under 500**
24.8% | **501 to 1,000**
28.4% | **1,001 to 2,000**
16.6% | **2,001 to 5,000**
2.2% | **More than 5,000**





Job Responsibility

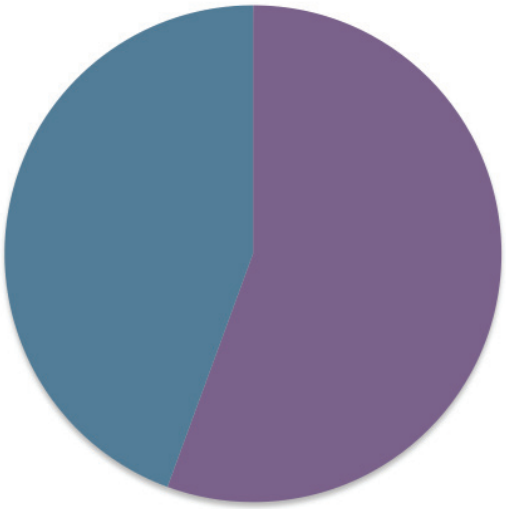
Of the 435 total responses, 71 respondents indicated their primary job was related to business and 136 to housing, while 228 respondents primarily handled IT.

50.4% | **IT**
16.3% | **Business**
33.3% | **Housing**

Governance

Among the institutions represented in the survey, slightly more than half were public universities or colleges.

55.6% | **Public**
44.4% | **Private**



3. Executive Summary

Technology has changed how today's students live and learn. Higher education institutions are increasingly embracing technology and using it to improve all aspects of the educational process, communications and operations. Consequently, the scale of residential networking and infrastructure has increased dramatically. To stay competitive, schools understand the need to continuously evolve and grow to take fuller advantage of technology's relentless advances and new dynamics.

Ubiquitous and robust Wi-Fi is a "must have" for colleges to attract and retain on-campus students and to keep them engaged. Student demand has escalated for technology resources that can be used anywhere, anytime, and on all the devices they bring to campus. Schools are racing to keep up with the need for more significant bandwidth and seamless connectivity. As a result, many are stretching their budgets to expand Wi-Fi coverage and build sophisticated residential networks to meet student's ever-growing expectations.

The following study explores the current state of ResNet – Wi-Fi, internet, cable television, internet protocol television (IPTV), phone services and support available to residents living in on-campus residence halls. The ACUHO-I 2018 State of ResNet Report looks at the current state of ResNet from the perspectives of IT, business, and housing officers and details how universities and colleges are planning and/or reacting to the diverse and ever-evolving demands and implementation of ResNet services. The report delves into the following topics: Bandwidth Management, Wireless Coverage and Capacity, Service and Support, Planning and Measuring, Funding and Technology Costs, and the growing trend of Outsourcing.

Schools Accommodate Mobile Technology with More Wireless Coverage

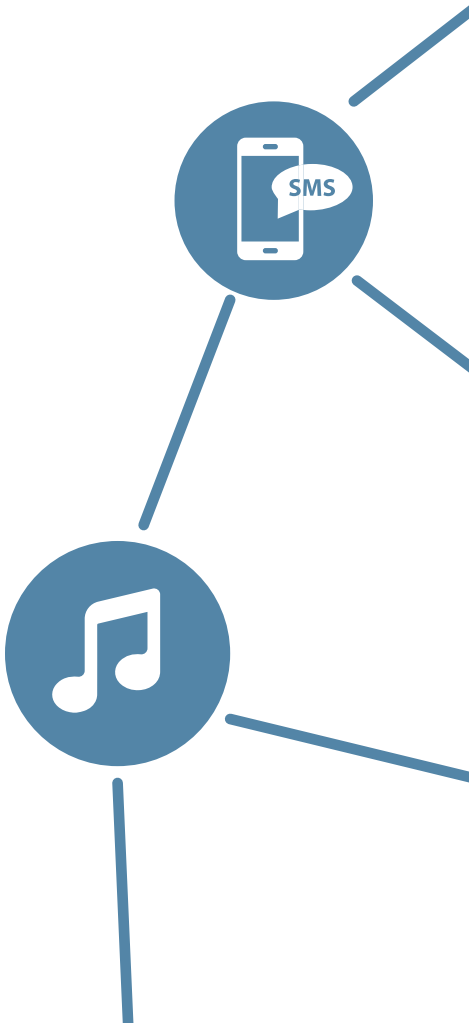
- For the first time, smartphones top the list for the largest bandwidth-consuming device with an 11% jump over the past year.
- Presently, 63.6% of colleges and universities offer comprehensive wireless coverage throughout 80% or more of the whole campus – a 7.6% rise from last year.
- Schools providing robust wireless coverage of 81-100% in on-campus student areas increased from 76.7% in 2017 to 80.3% this year.
- Schools add more outdoor wireless coverage to residential areas.
- 56% of business officers support expansive Wi-Fi access or coverage for the entire campus.

The Majority of Schools Address Network Bandwidth Demands

- Desktops and laptops are ranked #2 in bandwidth-consuming devices as they support rich video, audio, and rich media applications.
- Smart TVs jump 11% to #3 as bandwidth-consuming devices. TV and video consumption (Netflix) and web-based rich content are the largest bandwidth-consuming applications.
- To support bandwidth demand, 72% of schools now offer 1 GB or more of bandwidth dedicated to ResNet – a near three-fold increase since the start of the study in 2012.
- Almost one-third of campuses provide as much as 7 GB or more to accommodate student needs.
- 82% of schools include Ethernet in new construction for faster bandwidth.
- Only 11% of schools cap bandwidth, though there is an increase in the number of institutions that control excessive bandwidth consumption. An increasing number of schools optimize bandwidth through shaping and limiting bandwidth by protocol or blocking activities such as p2p sharing, music downloading, etc.
- Schools that outsource ResNet and Internet are less likely to require bandwidth management.

High Performing Wi-Fi for Competitive Advantage

- Administrators in housing, IT and business agree that a high-performing ResNet is very important in attracting and retaining on-campus students.
- 74% of business officers say reliable Wi-Fi is essential to driving their institution's mission.
- 69% of schools include Wi-Fi connectivity as part of their institution's strategic plan.
- 59% of schools monitor and measure student satisfaction with ResNet services.
- This year shows a 15% increase in the number of schools that cite student satisfaction and retention as their reason for outsourcing ResNet.



Growing Concerns for Wi-Fi Management and Budgeting

- Over half of all institutions expect the cost of wireless network services to increase over the next two years with a rise in schools expecting an increase of 15% or more.
- Two in three schools say the cost of network hardware or software accounts for the change in ResNet costs.
- 76% of business officers experience growing concerns about Wi-Fi management and budgeting.

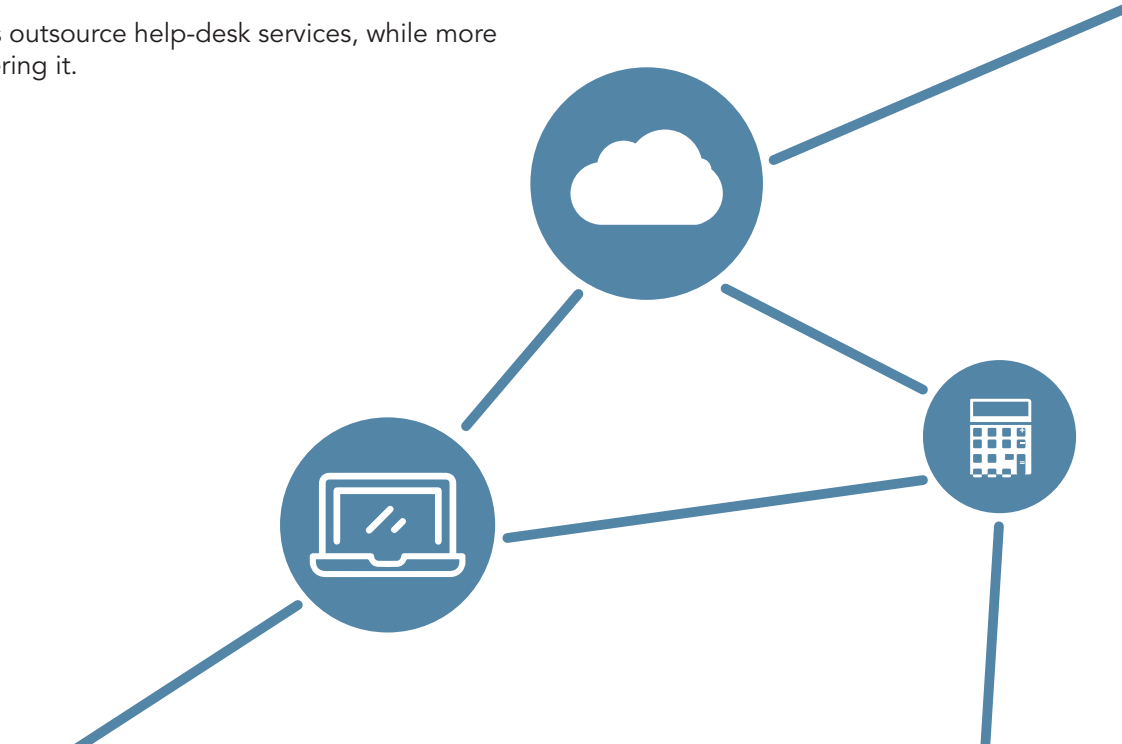
- 65% of technology officers worry that capital funding for network infrastructure will impact the way they manage the network.
- One in four schools that outsource ResNet do so to reduce costs.

ResNet Planning and Collaboration Among Administrators is Lacking

- Only 17% of schools update their strategic plans for ResNet annually. In the past five years, there has been a decrease in the number of institutions with a strategic plan, falling from 62% to 52%. Twenty-eight percent of schools do not have such a plan.
- Forty percent of business officers and 49% of housing officers meet annually or not at all with their IT department. Whereas, 51% of IT officers say they meet with housing officers annually or not at all.
- Stakeholders are troubled by the lack of reliable benchmarks or comparative data on which to base decisions about ResNet services. Sixty-eight percent of administrators would like benchmarking data, but only 21% have such information; 26% are unsure of available data.

Support Services Fail to Keep Up with the Evolution of Technologies

- 73% of schools allow an unlimited number of devices to connect to the residential network.
- Few schools support all technology on campus. Regardless of the influx of wearable devices on campus, schools are disinclined to assist with these tools.
- Only 17% of schools offer 24/7 live help desk support. Twelve percent of schools offer no help-desk support at all.
- While fewer schools presently provide on-site, walk-in support, live support is more often provided through call centers and email.
- Four percent of institutions outsource help-desk services, while more (5.5%) are strongly considering it.

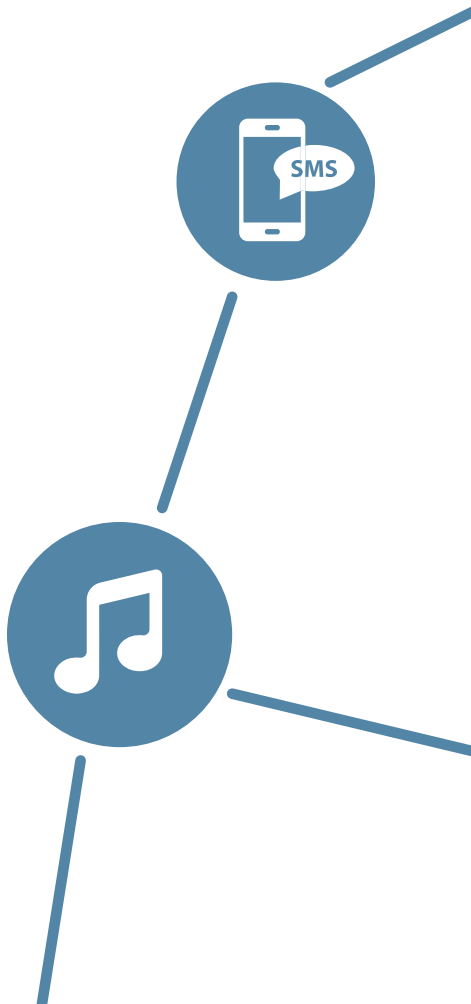


4. Findings

a. Bandwidth Management

Key Takeaways:

- Smartphones have swiftly become more engaging and this year rise to the top as the largest bandwidth-consuming device. Because of their mobility and increased sophistication, traffic load has increased, and the type of traffic on mobile devices is changing rapidly too. Schools continue struggling to keep up with demand as more students use their phones to upload and download digital coursework, as well as check social media and watch videos online.
- As a result of increased mobile internet usage, schools will likely need to increase their bandwidth to meet growing student demands. The research shows a massive increase since the start of the study in 2012 when 25.5% of schools offered 1 GB or more bandwidth. Presently, 72% of schools offer 1 GB or more, while 31% provide 7 GB or more to accommodate the student demands.
- Yet, more schools are shaping and limiting bandwidth by protocol or blocking activities such as p2p sharing, music downloading, etc. Data shows that schools that outsource Resnet are less likely to require bandwidth management practices vs. schools that in-house their network.



Snapshot of Bandwidth Management

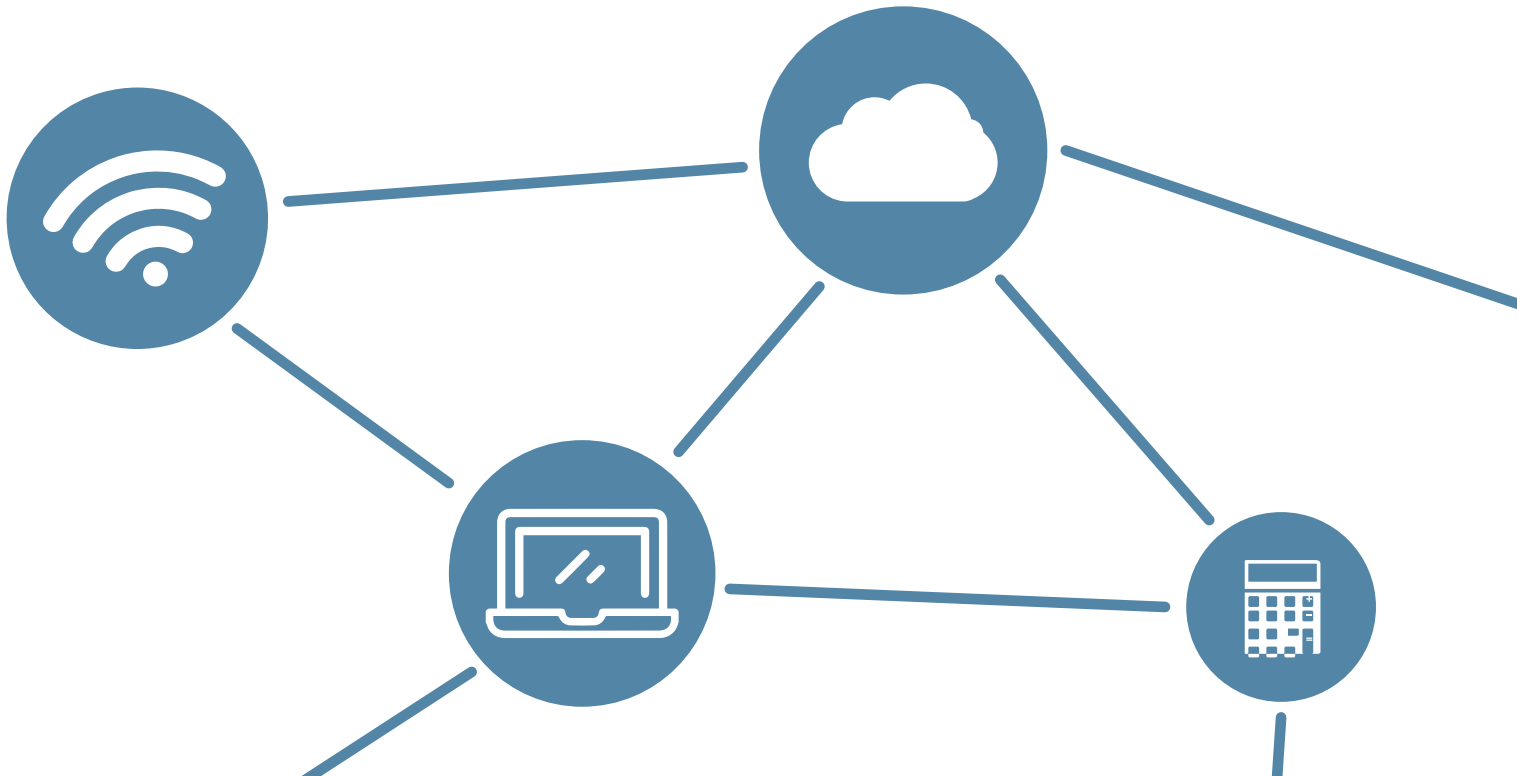
Today, more universities are recognizing that better access to technology can result in a more valuable college experience. Whether universities are creating new technological breakthroughs at their innovation and research centers or using it in classrooms, colleges must capitalize on technology's strengths. Today's higher education institutions are grappling with the best ways to adapt to the boom of BYOD, the rise of mobile tech, and the complexities of the Internet of Things (IoT). The Internet of Things, or IoT, is the network of physical devices embedded with electronics, software, sensors and connectivity which enables these things to connect and exchange data for more direct integration of the digital and physical world.

Presently, 73% of colleges and universities allow an unlimited number of devices to connect to the residential network (an increase from 68% in 2016). The expanded variety of connected tools that students and faculty want to use on campus certainly puts a drain on the network. Further, the capacity in which today's students use devices drastically increases the consumption of bandwidth. Student

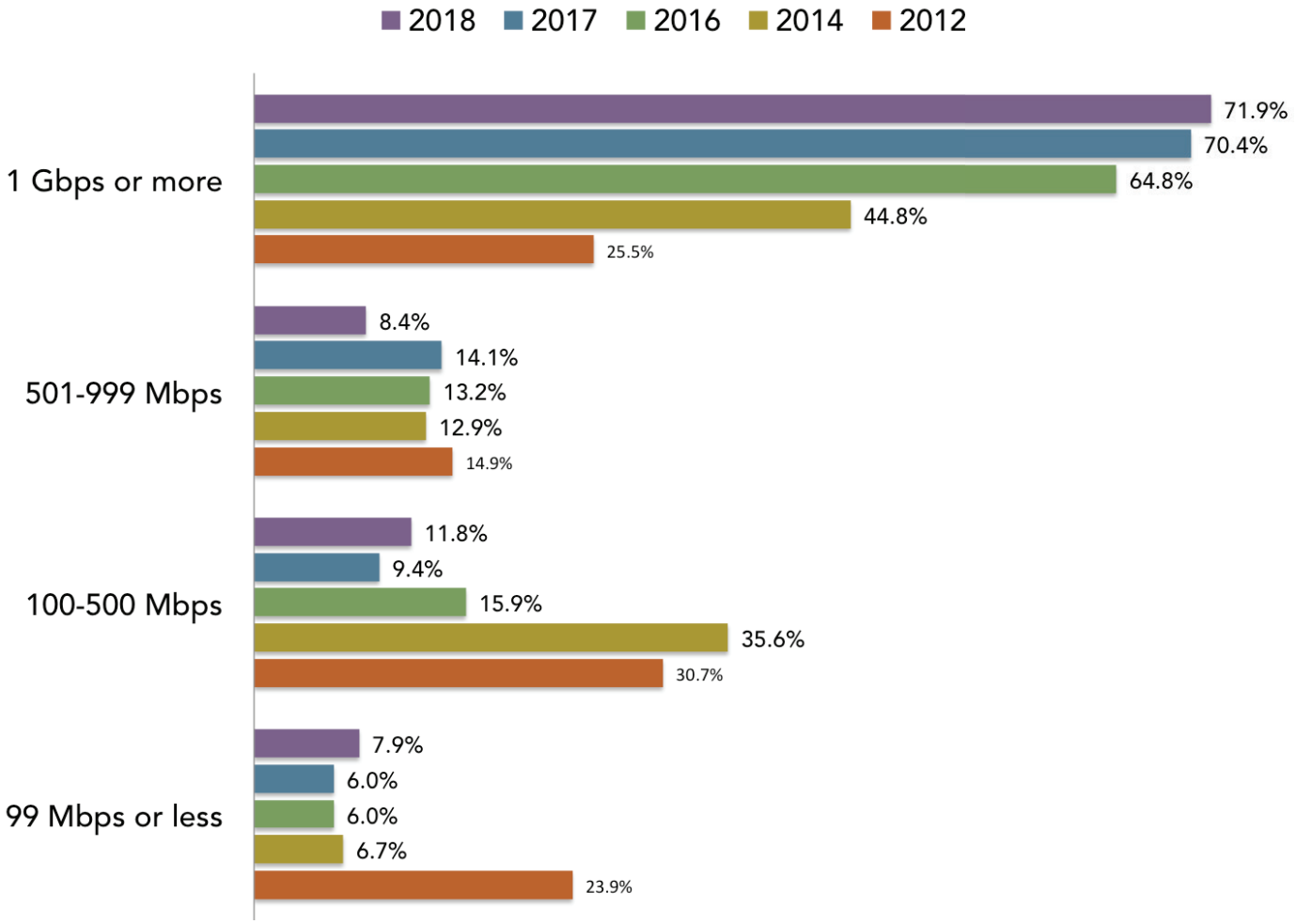
entertainment (TV streaming, social media) has long been a drain on the network infrastructure, but the swift integration of technology in teaching/learning brings new and bigger challenges to bandwidth management. For example, technology adds to the pedagogy with massive online open courses (MOOC), immersive learning, and recording, managing and delivering educational videos.

It is difficult to talk about a quality student experience without considering the digital experience that an institution offers. To be competitive, higher education institutions have been increasing bandwidth dedicated to ResNet to meet student demands. In 2012, at the start of the tracking study, only 25.5% of institutions offered 1GB or more dedicated to the ResNet. Today 72% of surveyed universities dedicate 1GB or more to ResNet.

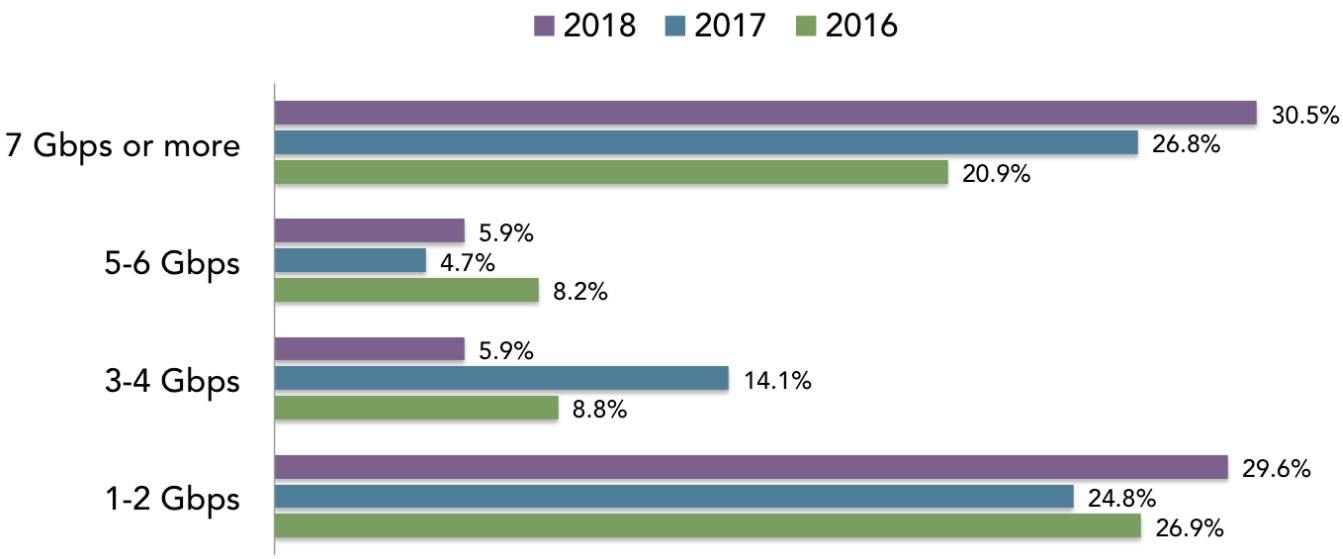
As bandwidth increased, the survey tool changed to take a closer measure of what is offered on campuses. Over the past three years, schools offering 7 Gbps or more bandwidth for the ResNet increased by nearly 10 percent. Today 30.5% of colleges and universities offer 7 Gbps or more.



Bandwidth Dedicated to ResNet



Bandwidth Over 1 Gbps Dedicated to ResNet



Future Bandwidth Consumers

The smartphone lifestyle is rapidly taking over college campuses, leading to dramatic changes in the amount and type of mobile content being downloaded, used and shared by college students. And this year's research proves that IT officers have growing concerns over students' usage of smartphones and their drain on bandwidth.

This year, smartphones dominate the list as the biggest bandwidth consumer with a big jump of 10.8% over last year. Advances in smartphones and applications technology, as well as the growing size of smartphone displays, has cannibalized the need and use of tablets. Smartphones now surpass desktop and laptop computers and tablets, which for years ranked above. Smart TVs had the most significant increase over the past year of 11.3% and moved up in rank forecasted as the third largest bandwidth-consuming device.

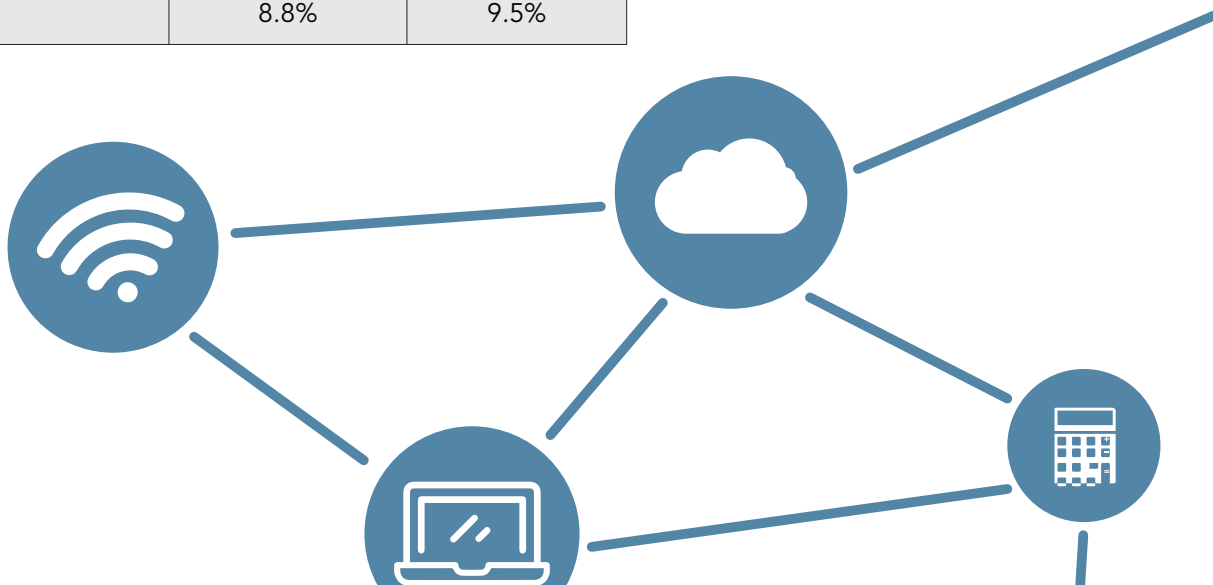
Most IoT devices use very little bandwidth, but the sheer volume of connected devices means more bandwidth will be needed. Right now, there is a great deal of uncertainty pertaining to the impact of IoT on bandwidth and campus networking- but expectations are exorbitant. Last year's study presented greater concerns about the bandwidth need of IoT devices. Wearables and remote control vehicles coming in at lower numbers this year may be due to last year's uncertainty around these devices' bandwidth consumption and impact. Schools – having gained a better understanding of usage of new devices over time, and with a heightened focus on smart phones – have tapered perceptions of these devices' bandwidth needs.

Largest Bandwidth-Consuming Devices	2013	2014	2015	2016	2017	2018
Tablets (iPad, Android)	83.5%	73.4%	67.9%	57.7%	54.2%	55.2%
Desktop and laptop computers	75.0%	69.3%	76.5%	58.6%	62.3%	64.6%
Video systems (DVD/Blu-Ray Players, Apple TV, Roku, Slingbox)	63.6%	49.3%	53.7%	48.9%	50.0%	53.6%
Smartphones (iPhone, Android)	63.2%	64.2%	66.8%	55.2%	61.8%	72.6%
Game boxes (PS3, Wii, XBOX, XBOX 360, etc.)	60.7%	46.7%	52.2%	41.9%	48.8%	53.5%
Smart TVs	51.7%	37.2%	38.8%	36.6%	47.6%	58.9%
e-Book Readers (Kindle, Nook)	27.8%	13.0%	9.4%	7.4%	27.3%	3.0%
Wireless Printers	14.1%	5.8%	8.7%	7.8%	28.8%	12.9%
Wearable educational technology (Google Glass, Gear VR, smart watches)	-	-	-	-	29.1%	7.5%
Wearable fitness tracker (FitBit, Nike)	-	-	-	-	27.1%	6.0%
Wearable medical electronic devices	-	-	-	-	27.5%	3.0%
Remote control vehicles/Smart vehicles (Drones, scooters, cars)	-	-	-	-	30.4%	4.6%

As mentioned, the infusion of mobile technologies on college campuses affords a multitude of opportunities for today's students. More sophisticated devices and applications expand the possibilities for how and where students learn and consume information. While institutions have realized the impact of the number of wired and wireless devices students bring to campus, the new concern is the accessible digital content which adds to the networking demand.

Last year's study began comparing device usage and how the consumption of technology by student housing residents contributes to increased bandwidth usage. TV and video consumption (88.1%) remains the biggest threat. Next is web-based rich content (76%). Video gaming has increased by 6.4% and personal video and photos (Flickr) by 6%, while music and audio dropped by 8.7% as a risk to bandwidth consumption by application.

Largest Bandwidth Consumers By Application	2017	2018
TV and video consumption (Netflix)	87.7%	88.1%
Web-based rich content (such as video)	78.2%	76.0%
Music and audio (internet radio, Pandora)	61.3%	52.6%
Video gaming	51.7%	58.1%
Cloud content (Spotify, Apple iCloud, etc.)	51.1%	49.5%
Other social media	35.6%	36.9%
Online learning tools	30.4%	32.9%
Personal video and photos (Flickr)	28.7%	34.7%
Interactive digital textbooks	13.3%	14.1%
e-books	8.8%	9.5%

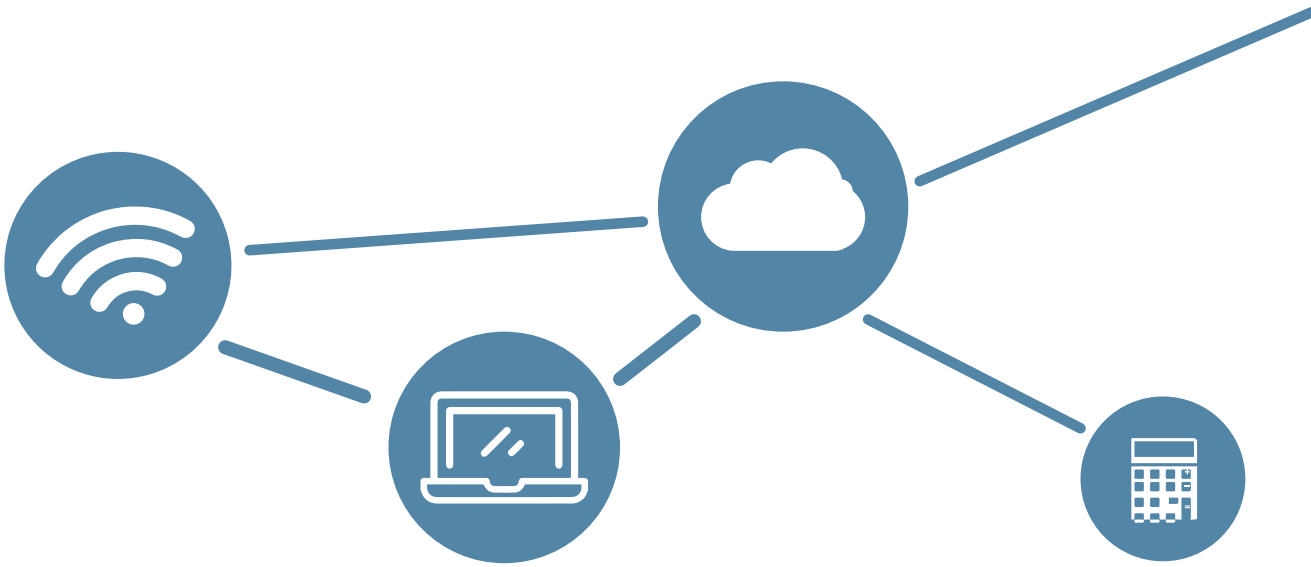


Optimizing Bandwidth

To optimize on-campus network bandwidth, some universities enact policies to block, rate, limit and prioritize applications. Often the objective is to support education and productivity apps over those used for entertainment. While only 11% of colleges cap bandwidth, this year shows an increase in the number of institutions that shape and limit bandwidth by protocol or block activities such as p2p sharing, music downloading, etc. Data shows that colleges that manage ResNet in-house are more likely to control bandwidth (73%) and schools that outsource ResNet and Internet (45.5%) are less likely to require bandwidth management.

Bandwidth Management Practices

	2013	2014	2015	2016	2017	2018
Shaping and limiting bandwidth by protocol	72.4%	66.7%	77.3%	46.2%	30.7%	41.0%
Blocking activities such as p2p sharing, music downloading, etc.	N/A	52.0%	68.1%	40.1%	33.9%	44.4%
Shaping network-wide throughput available to streaming video	22.9%	18.6%	25.9%	20.3%	11.5%	10.7%
Implementation of cache servers	22.9%	21.1%	25.9%	25.4%	24.5%	19.5%
Providing minimum guaranteed service levels by user	12.9%	15.2%	20.8%	10.2%	9.9%	11.7%



b. Wireless Coverage and Capacity

Key Takeaways:

- College campuses offering comprehensive Wi-Fi throughout 81-100% of the whole campus increased from 56% in 2017 to 64% this year. Fifty-six percent of business officers support expansive Wi-Fi access or coverage for the entire campus, while 26.8% back coverage in response to students/parents/faculty/staff demands.
- Wireless coverage of student areas fluctuate from year to year. Schools providing robust wireless coverage of 81-100% in on-campus student areas increased from 76.7% in 2017 to 80.3% this year. But from 2016 to 2017, wireless coverage took a small drop (6.1%). This year, outside areas near the residence halls showed the most significant rise in comprehensive wireless coverage (up 8.6%).
- The vast majority of college administrators realize a high performing (coverage and capacity) ResNet is very important in attracting and retaining on-campus students. Housing officers place the most value on quality ResNet with 96.1% rating it as very important. Ninety-two percent of technology officers and 90% of business officers see it as highly significant to the student experience.
- Forty-five percent of schools are considering cellular augmentation to achieve top cellular reception. And those schools that do not plan for cellular augmentation believe their cellular reception is satisfactory, too expensive, or that augmenting is the carrier's responsibility.

Snapshot of Current Wireless Coverage

Technology is changing the landscape of today's colleges and universities. The classroom of today looks and operates significantly differently to that of even five or 10 years ago. The modern classroom houses various technologies from interactive displays and projectors, tablets, laptops, and smartphones, all seamlessly connected by Wi-Fi and supported by a range of software from cloud-based to apps.

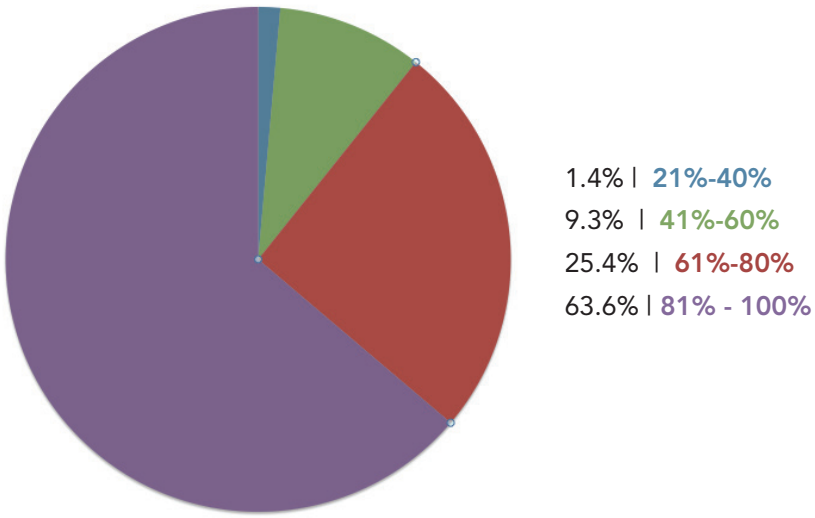
Moreover, the influx of mobile technology is expanding the classroom into "learning spaces." Rapidly changing student habits and modern pedagogy are reshaping physical space and inspiring the design of today's campuses, both living spaces and communal spaces. Some residence halls are experimenting with innovative common areas to stimulate collaboration and socialization for a more enriching learning experience. Open, contemporary spaces

with modular furniture are designed to promote active learning and technology engagement. We can say that mobile computing, ubiquitous Internet connectivity, and distance learning are virtually changing every corner of our lives. Consequently, today's students are demanding "wireless everywhere."

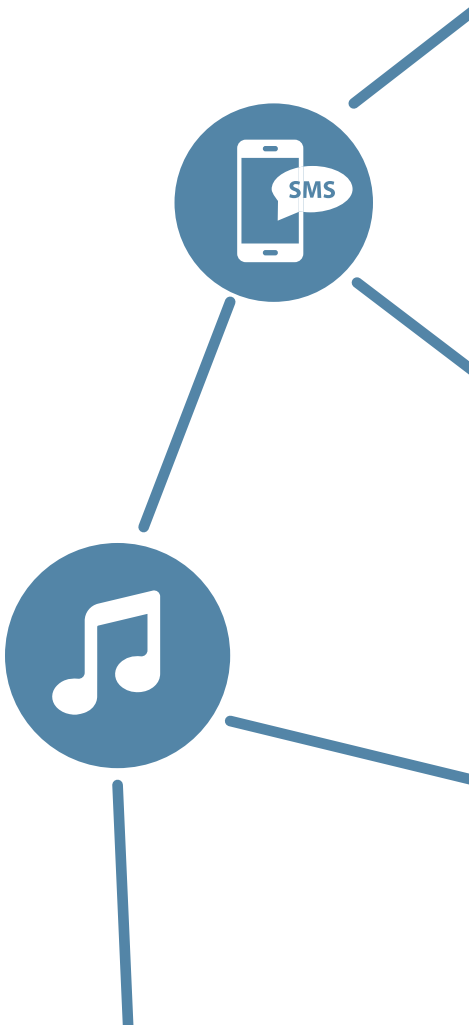
Wi-Fi is also important from a recruitment perspective. A solid IT infrastructure on campus could make a difference in which university students choose. Administrators across the board (93.5% of business, housing and IT officers) realize a high-performing (coverage and capacity) is very important in attracting and retaining on-campus students.

Yet, only 56.3% of business officers support expansive Wi-Fi access or coverage for the entire campus, while 26.8% back coverage in response to students/parents/faculty/staff demands. Today, 63.6% of colleges and universities offer comprehensive wireless coverage throughout 81-100% of the whole campus. This is a 7.6% increase over last year.

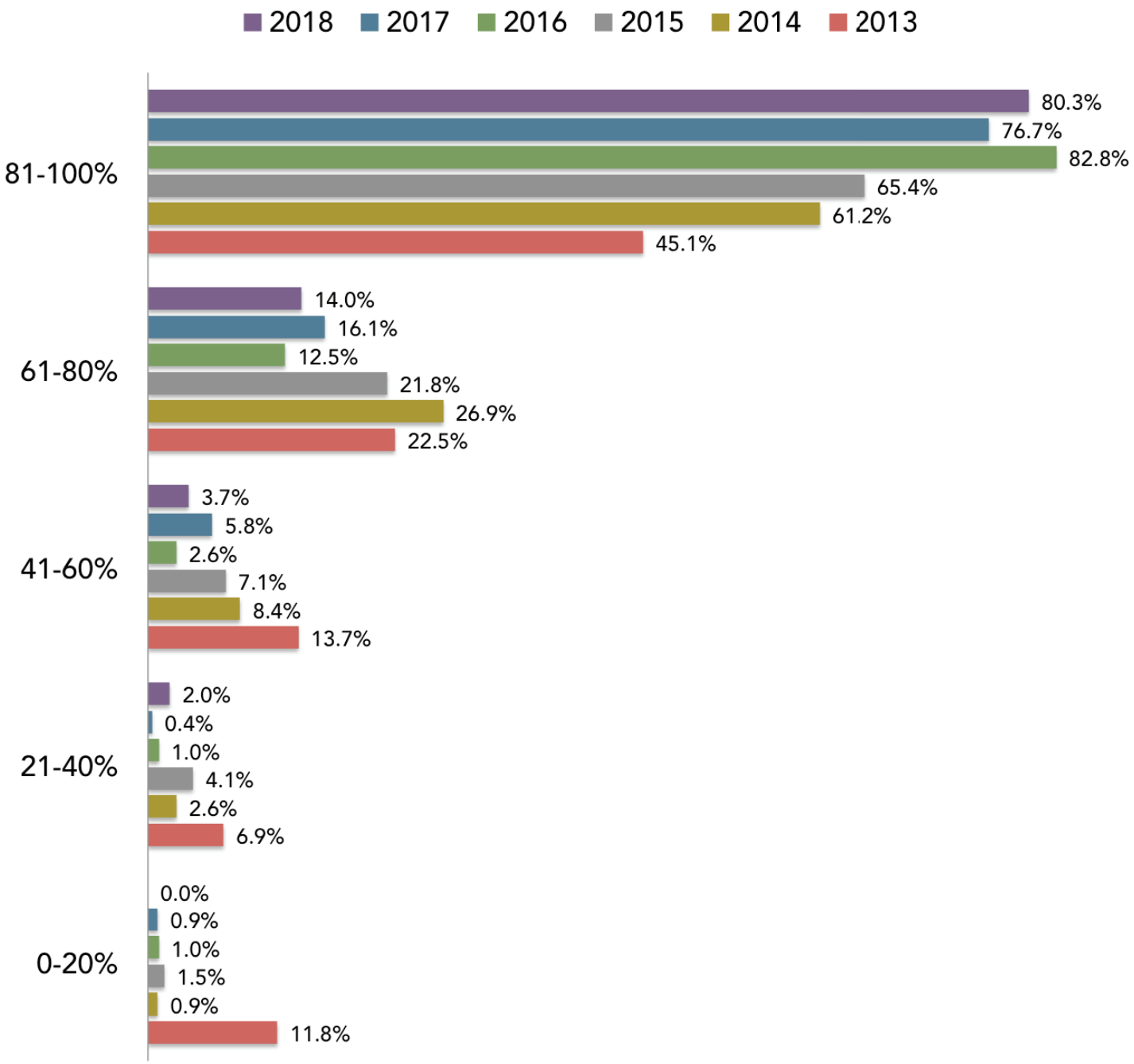
Percentage of Whole Campus with Comprehensive Wireless Coverage



While "wireless everywhere" isn't practical or attainable for all institutions, the majority of schools realize the importance of robust Wi-Fi in dense student areas. Seventy-nine percent of institutions offer strong wireless connection throughout 81-100% of their on-campus student areas. The below chart demonstrates that keeping up with the latest wireless networking standards is a constant challenge. It's a cat-and-mouse game. As institutions upgrade their wireless network, next year's students bring the latest and greatest wireless devices demanding even more bandwidth. Bandwidth requirements can also change as student population increases or physical campus space expands.



Percentage of On-Campus Student Areas with Strong Wireless Connection



2018 survey respondents indicated slightly less coverage throughout all interior residential areas except for rooms and suites which presents a 5.6% coverage increase from last year. Students want Wi-Fi outside and the chart below shows that schools are working hard to accommodate the demand.

Percentage of Campuses offering Robust Wireless Coverage in 81-100% of Residential Areas

	2014	2015	2016	2017	2018
Academic spaces in residences, including classrooms and study areas	73.0%	71.4%	86.1%	87.3%	84.3%
Residential Computer Labs	73.0%	72.1%	81.0%	87.9%	87.8%
Administrative areas (front desks, area offices, residential staff offices, etc.)	71.2%	66.9%	82.9%	85.5%	81.2%
Common areas and community spaces	69.9%	66.1%	80.2%	80.2%	78.2%
Dining facilities	69.3%	66.9%	81.4%	80.8%	79.2%
Residential rooms, suites, or apartments	59.0%	58.7%	87.8%	82.2%	82.6%
Outside areas adjacent to residential spaces (courtyards, parks, breezeways, etc.)	19.6%	12.1%	19.3%	11.9%	20.5%

Cellular Reception

While a campus may be served by "macro-level" cell towers in the area, tower signals can't always provide consistent and seamless service in and around campus. Older buildings, underground space and even new buildings with low-emission glass block cellular reception. Further, the data-intensive needs and often bandwidth-heavy applications in academia put tremendous strain on the local cellular network.

Forty-five percent of schools are considering the many different technologies used to improve cellular service in residence halls. The most common is distributed antenna service (DAS) that has already been deployed by 11.7% of schools along with cellular towers and small cell technology. Others are considering the use of both indoor DAS (22.9%) and outdoor DAS (12.2%). Nearly 20% of schools are considering outdoor cellular sites/towers.

Forty-six percent of institutions that have no plans for cellular augmentation believe the cellular reception on the campus is performing satisfactorily. Another 33.6% believe cellular augmentation is too expensive, and 27.4% of institutions have the perception that the carrier is responsible for providing satisfactory cellular coverage.

Switches and Hubs

To support next generation devices and applications, 36% of schools allow campus residents to install personal network devices, like switches or mini-hubs, and 8.3% allow residents to install

wireless routers. Almost 16% of schools permit the installation of servers. In contrast, 63.9% of universities prohibit the installation of network devices in campus residences, despite their potential value and functionality. When compared to the past six years, 2018 shows less tolerance for personal network devices among colleges and universities.

Wired Ethernet Ports

Regardless of the rise of mobile devices and the consequential increase in Wi-Fi on campuses, only 10 percent of institutions have removed existing wired Ethernet access ports in residential buildings. Another 11% have plans to remove Ethernet in on-campus housing, while 57.5% have no plans to remove the wired connection. While constant over the past year, the switch to wireless has overall growth since 2012 when only 5.2% of institutions had plans for Ethernet removal.

Yet, the majority of institutions include wired Ethernet access ports in new construction. Nearly half (45.8%) offer one port per student, whereas 13.3% provide one port per residence and/or 9.4% provide ports upon request.

Ethernet connectivity can be critical to keep pace with the data-intensive applications, such as gaming and video streaming, in residential halls. And as more schools transition from cable television in favor of IPTV, IP video, etc., the need for Ethernet networking will rise.

IPTV

Currently, 16% of schools have transitioned from traditional cable television in favor of IPTV, IP video, etc. Another 76.4% have given much or some consideration. Only 7.8% of institutions are giving no consideration to the switch.

c. ResNet Service and Support

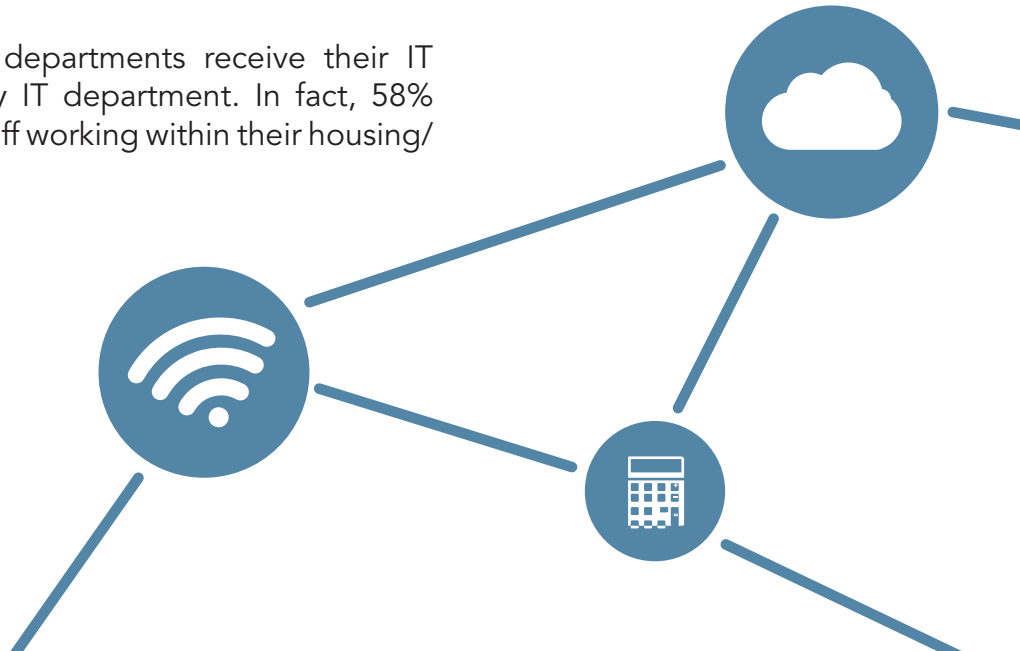
Key Takeaways:

- Colleges and universities embrace technology for enhanced learning and teaching as well as communications. Seventy-three percent of schools allow students to connect an unlimited number of devices and accommodate their use with increased bandwidth in residence halls. But ResNet service and support has stalled.
- Undoubtedly, on-going student satisfaction with ResNet service and support is crucial. Nonetheless, 58% of schools indicated that there is no full-time staff working within their housing/residence life IT department. Additionally, only four percent of institutions are outsourcing help desk services, with another 5.5% strongly considering it.
- Despite the sweeping technological evolution, there has been little advancement and variation in technical support services on campus. Most schools offer traditional on-site/walk-in, phone, and email support for ResNet but few utilize newer methods, like social media or text.
- Presently, only 17% of schools offer 24/7 help desk support. Colleges that outsource ResNet are more likely to provide 24/7 assistance than schools with in-house support.

Snapshot of Support Services

The trend continues that Central IT (Networking, Security, etc.) is primarily responsible for maintaining the physical infrastructure and providing end-user support for residential networks. Twenty percent of schools rely on Student Affairs to manage support for residence hall end-users. Presently, 58.6% of institutions measure student satisfaction with ResNet services, with Housing & Residence Life taking on the task 55% of the time.

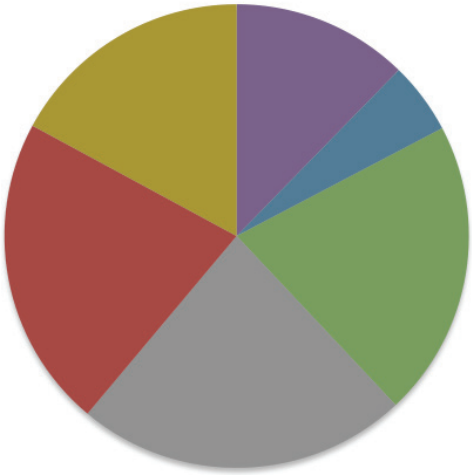
Seventy-three percent of housing departments receive their IT support from the Central University IT department. In fact, 58% indicated that there is no full-time staff working within their housing/residence life IT department.



Options for Support

Today, 73% of colleges offer unlimited device connectivity, an increase from 68% in 2016. Keeping pace with the boom in mobile devices, the rising IoT trend, and user expectations, all heighten the need for a reliable and on-going technical support for students. Further, student lifestyles and study habits make 24/7 troubleshooting essential. Yet, only 17.1% of campuses offer uninterrupted ResNet help desk (live) support. [1] Sixty-six percent of schools provide more than 9-to-5 live help desk support, but not 24/7 assistance. Fifty-nine percent of schools that have outsourced their ResNet provide 24/7 support compared to 8.6% of schools with in-house networks.

Availability of ResNet Help Desk



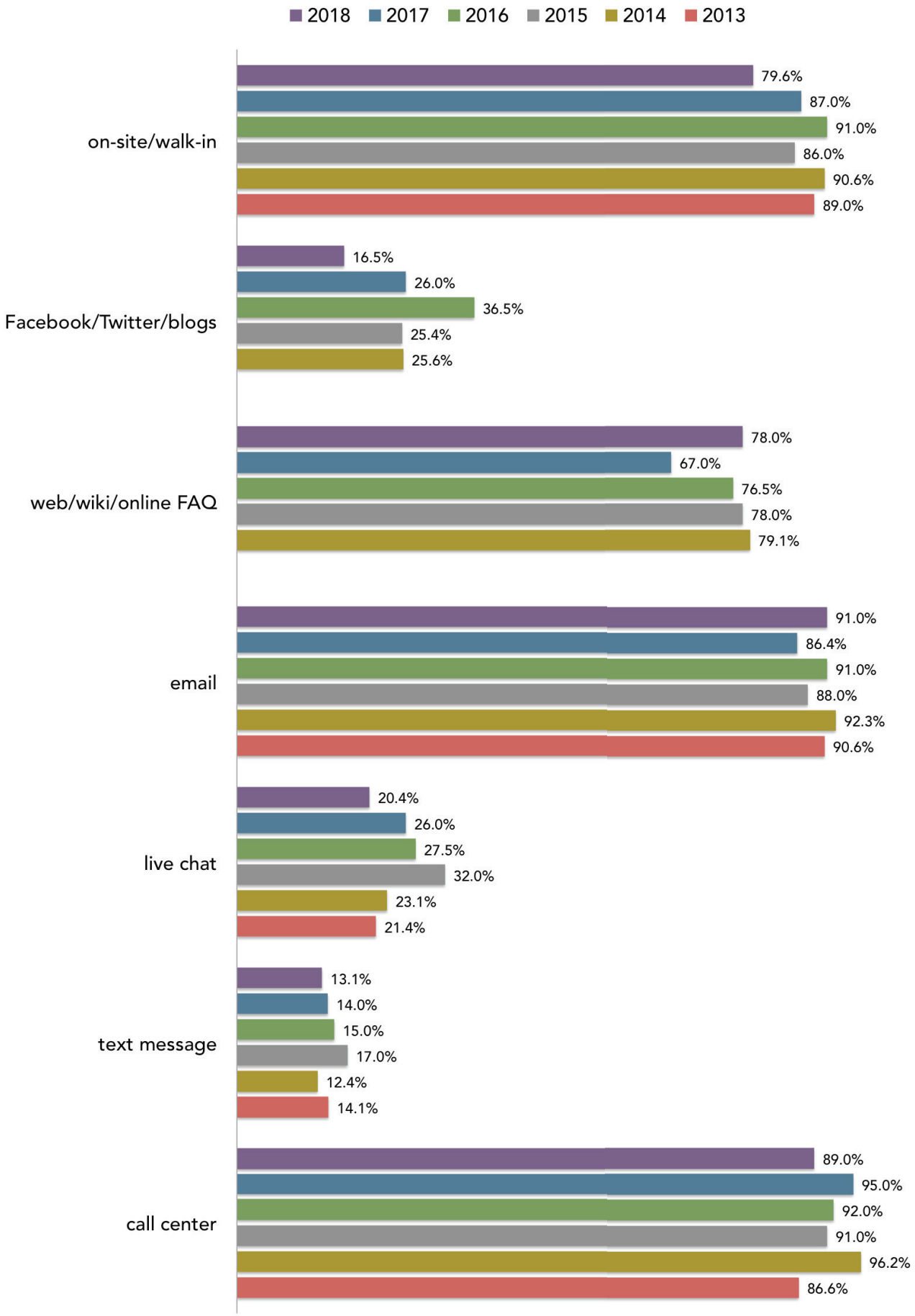
12.3% | No ResNet Help Desk
5.0% | 1-30 hrs
20.7% | 31-40 hrs
23.1% | 41-60 hrs
21.8% | More than 60 hrs but not 24/7
17.1% | 24/7

In recent years, the field of technical support has evolved rapidly to catch up with disruptive technologies. At the same time, technology has led to innovative and fundamental changes in how support services are delivered. But, on-campus networking support is slow to adapt. The majority of universities and colleges stick to low-tech options including phone (90%), email (86%), and on-site support (80%).

Few schools (17%) use popular social-networking platforms for support. And despite the proliferation of mobile devices, only 13% of schools utilize text for troubleshooting. Seemingly, ResNet support services are not keeping up with the technological trends of today's students.

1 * The survey question was revised this year to ask, "How many hours per week is your ResNet help desk (live support) available to residents?" In previous years, the question did not specify "live support." 2018 data shows a slight increase in schools no help desk and under 40 hours of support. This could be an outcome of survey rewording.

Network Support Options



d. Planning and Measurement

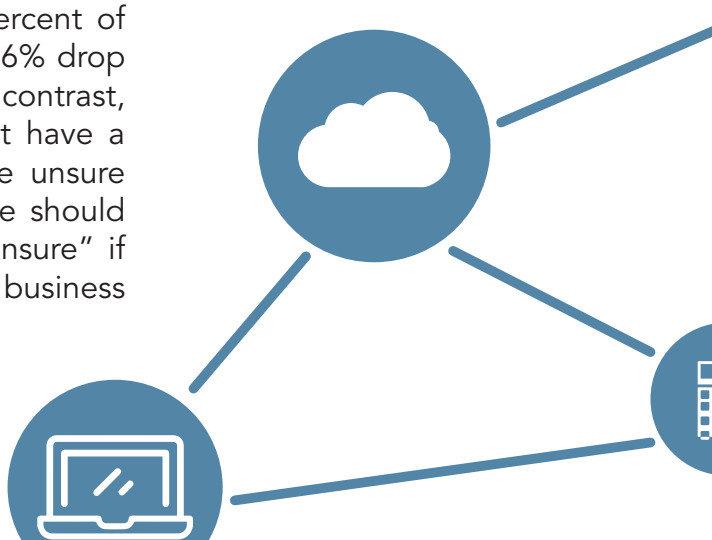
Key Takeaways:

- Today, a high-performing ResNet is seen as an asset on campus and higher education institutions need to recognize the importance of strategic planning. The past five years, however, present a 9% decrease in the number of institutions with a ResNet strategic plan, declining from 61% to 52%. Only 17% of schools update their plan annually, whereas 21% of schools made an annual update in 2014.
- Seventy-four percent of business officers say reliable Wi-Fi is essential to driving their institution's mission. Sixty-nine percent specify that Wi-Fi connectivity is part of their institution's strategic plan.
- More than two-thirds of housing and business officers would like to benchmark their ResNet, but 54% do not have access to such information. Another 25.6% are unsure if such information exists.
- While IT Security is a top priority, one in five schools has no Information Security and Internal Audits (ISO) team. Consequently, over half of the business officers would like more information pertaining to security breach diagnostics.

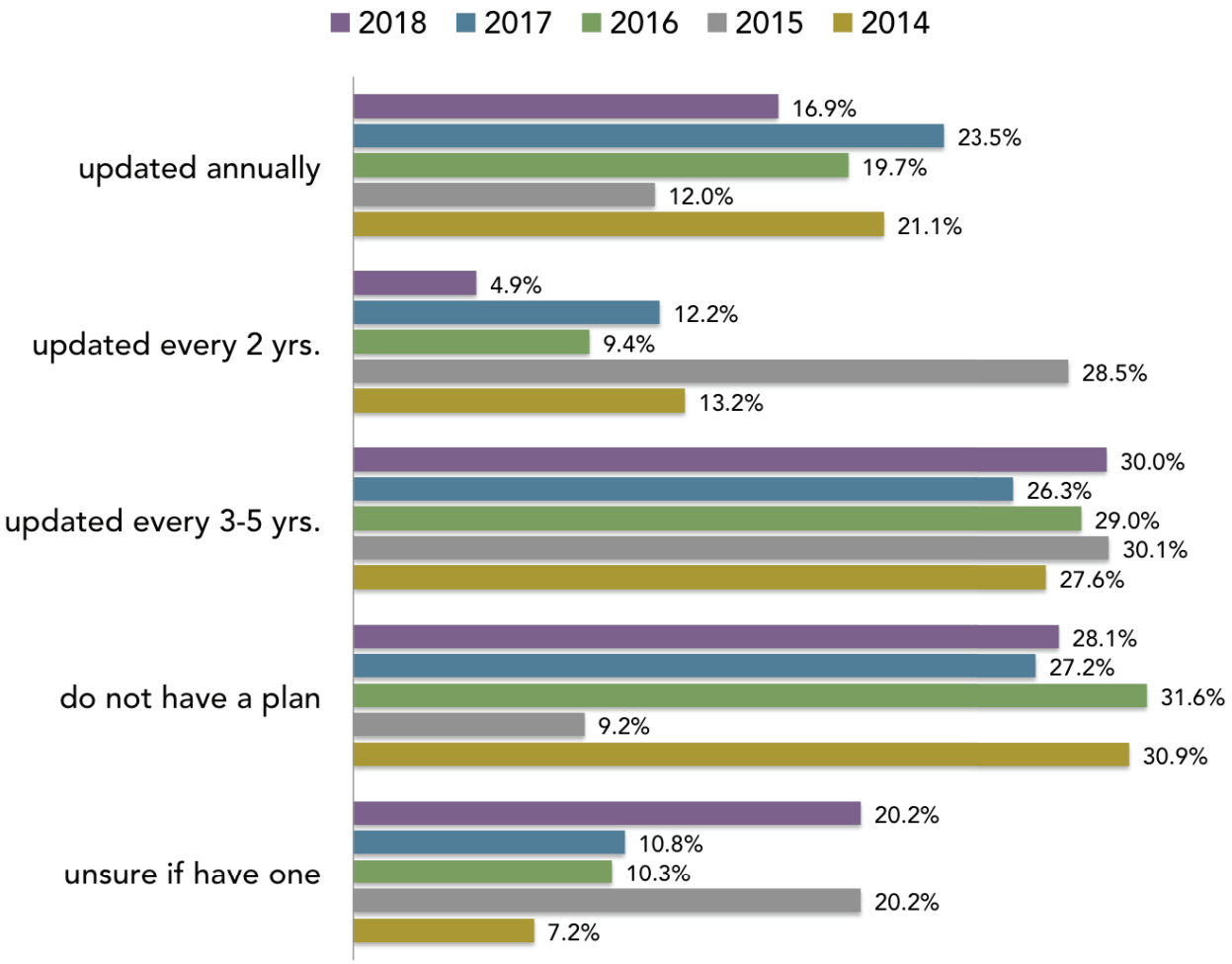
With today's college students relying on technology more than ever, wireless networks have become one of the most essential features of the ideal campus environment. Colleges have quickly learned that reliable Wi-Fi is vital to attracting and retaining on-campus students and keeping students engaged, all of which has an impact on the university as a whole.

In fact, 73.9% of business officers say reliable Wi-Fi is essential to driving their institution's mission. Sixty-nine percent specify that Wi-Fi connectivity is part of their institution's strategic plan.

As student bandwidth consumption continues to increase at ever-faster rates, it's critical that administrators plan for both current and future demand as device use proliferates. Seventeen percent of schools update their ResNet strategic plan annually (a 6.6% drop from last year); while 34.9% update it every 2-5 years. In contrast, 2018 survey data reports a 28.1% of institutions do not have a strategic plan for ResNet, and 20.2% of institutions are unsure whether they have a plan or how often it's updated. We should note that technology officers (24.2%) are more often "unsure" if they have strategic plan for ResNet when compared to business officers (8.7%).



Strategic Plan for ResNet

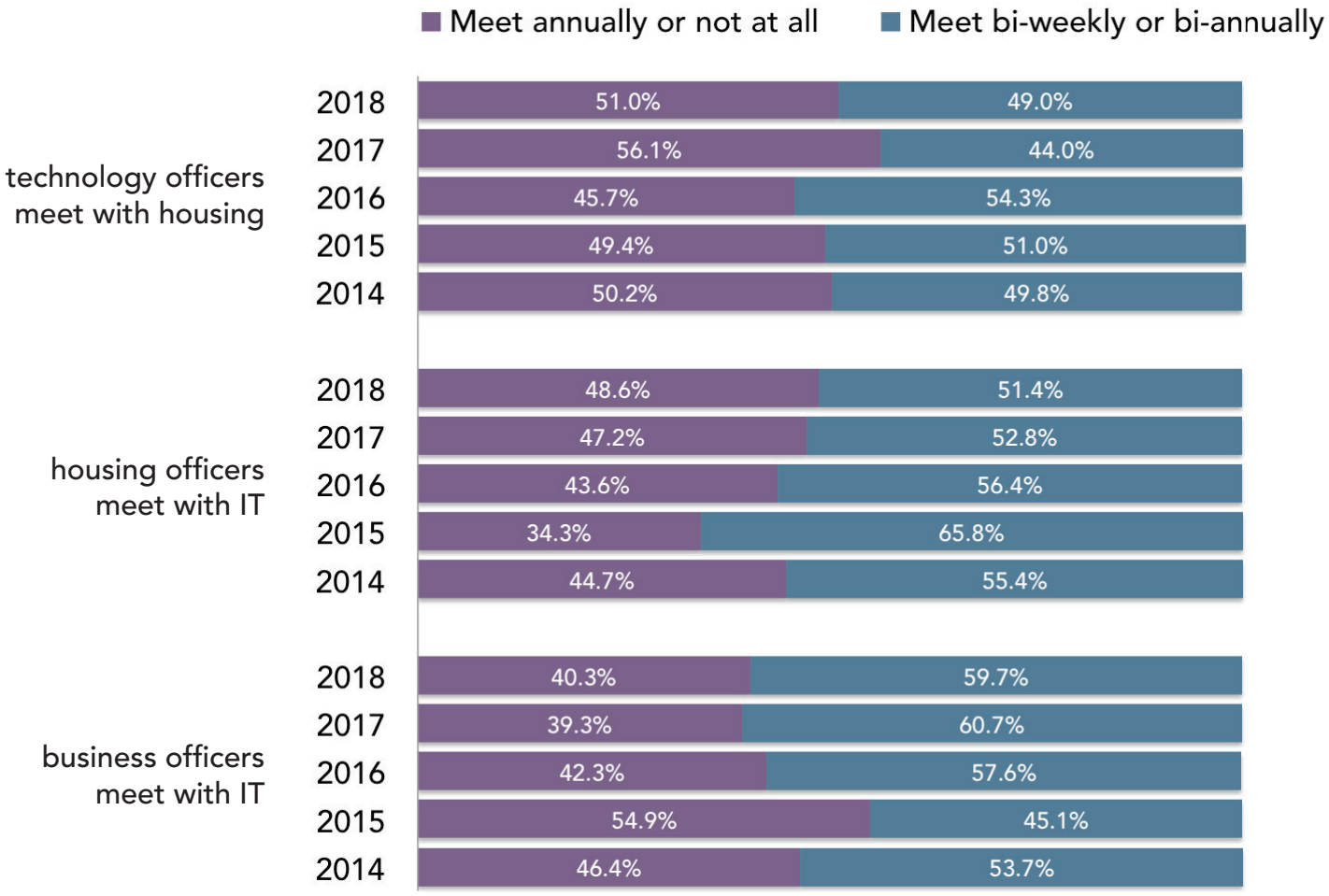


Communication between Departments

The complexity of managing ResNet infrastructure has increased dramatically over the past decade and a half. While ResNets have increased in capability to meet growing student demand, the IT evolution guzzles tremendous resources, including manpower.

ResNet infrastructure, in general, serves to connect various devices so they can interact seamlessly. A modern and reliable ResNet requires substantial planning and communication amongst a diverse group of administrators. Ironically, research shows that some key ResNet stakeholders fail to interact. While data shows a slight six percent increase in bi-weekly to bi-annual meetings between business officers and technology officers, 40 percent of the former group do not meet at all or only meet once a year with their IT department. Moreover, 48.6% of housing officers meet annually or not at all with IT. Whereas, 51% of technology officers say they meet with housing officers only annually or not at all.

Frequency of Communication among Key ResNet Decision Makers



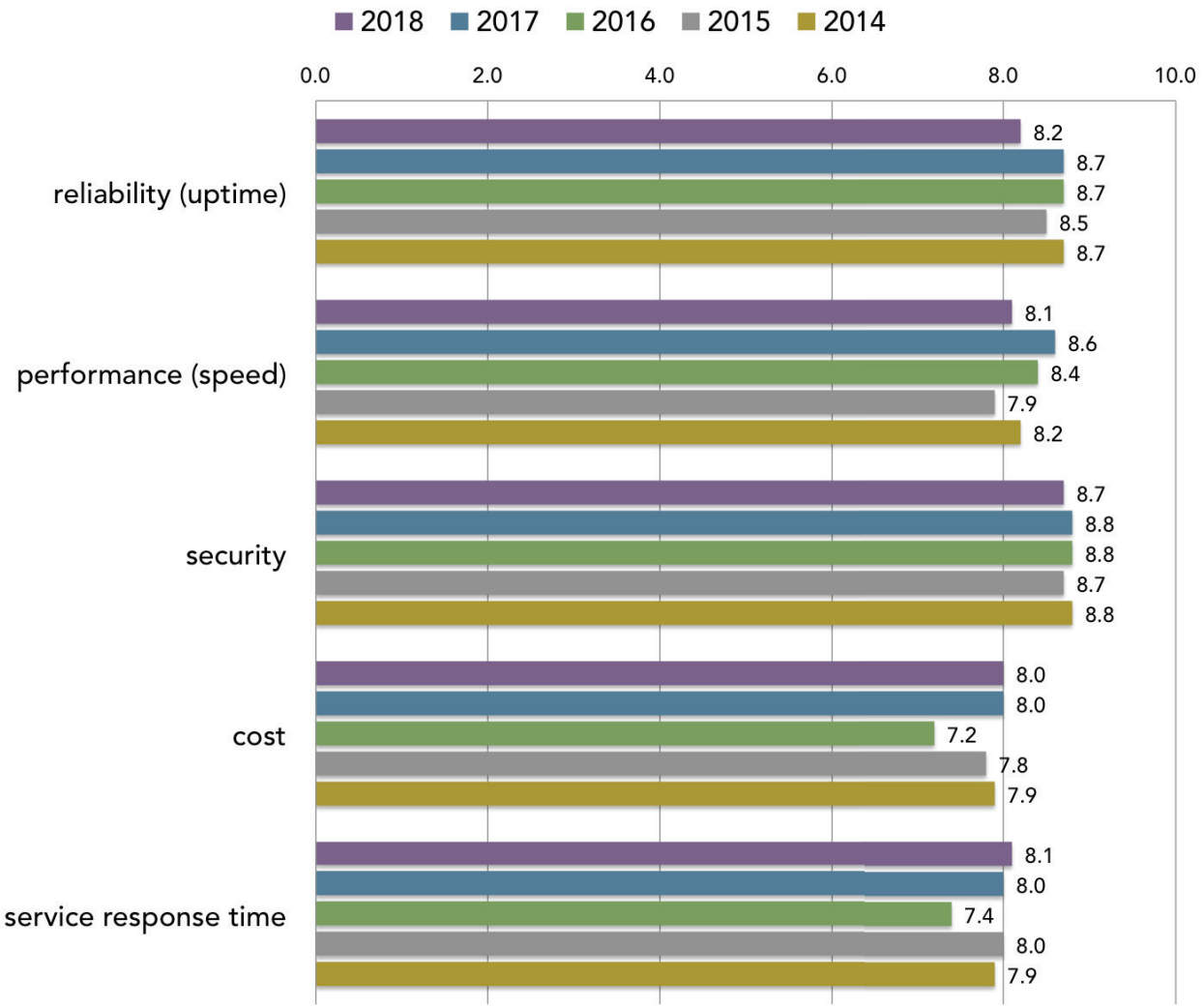
Level of Satisfaction with ResNet Services

Reliable, fast wireless access is a must-have in student housing. Slow internet or down time can affect a student's ability to study or turn in assignments on time, thus low-performing wireless networks can negatively impact both student performance and schools reputation.

Each campus' wireless network design is unique, and it's important to fully understand its makeup, such as the number of connected devices and their use/application, as well as user expectations – student's wants and needs. To assess performance, 58.6% of schools measure student satisfaction with ResNet services. More often, it's the housing department who measures satisfaction (32% of schools), but it's also done by IT (15.7%) or outside entities (5.7%).

Often the voice of the student, housing officers report high satisfaction with the overall performance of the ResNet. Also, regardless of the tug of war with resources and demand, satisfaction has remained relatively consistent over the past five years.

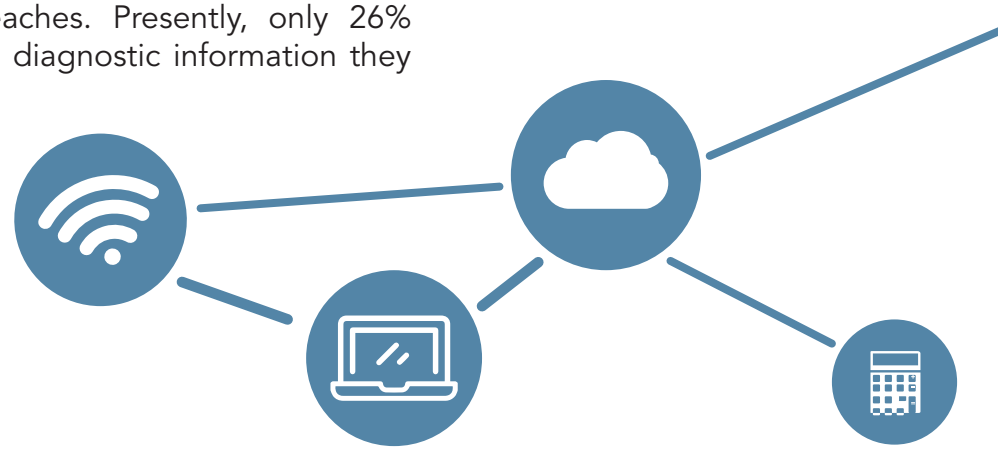
Housing Officer Satisfaction with ResNet Services (Average Rating)



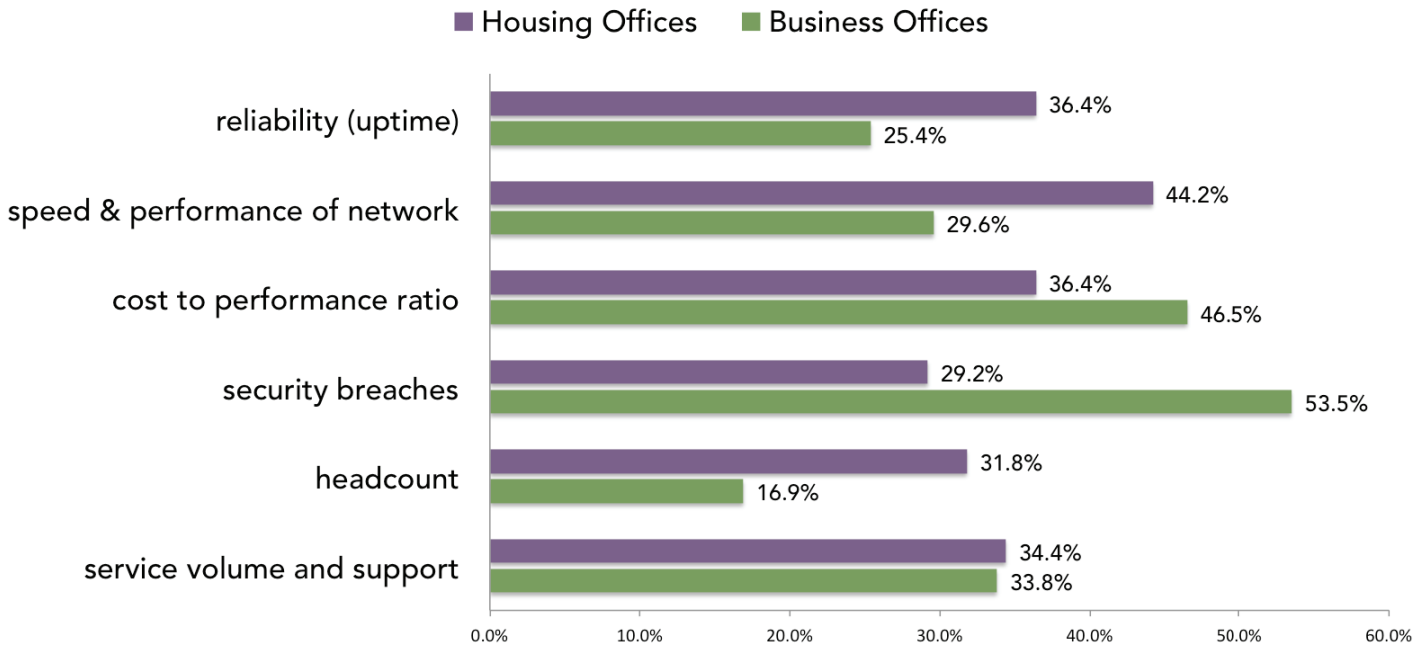
Diagnostics

Measurements and reports can be a critical component of a strategic plan. Knowing ResNet trends helps schools to benchmark against their results as well as other schools. In turn, it's all part of being proactive in an approach to deliver a reliable wireless experience and pre-empt Wi-fi problems. While 67.6% of housing officers and business officers would like to be able to benchmark their ResNet services, 53.5% do not have access to such information. Another 25.6% are unsure if they have available benchmarking data.

The below chart demonstrates the differing diagnostic needs of business officers and housing officers. Housing officers place more value on user satisfaction; with needs for reports and diagnostics pertaining to headcount, speed and performance, and reliability (uptime). Business officers have a stronger need for a cost to performance ratio and security breaches. Presently, only 26% percent of business officers have the diagnostic information they need regarding the below factors.



Diagnostic Needs of Housing and Business Officers



However, when business officers are asked to rank which information is most important, reliability, security, and performance rank higher than costs. The following table lists each factor by importance and provides a score which is the sum of all weighted rank counts. Rankings are the same as the past three years' survey results.

Drivers of IT Telecommunications and Networking Services Ranked by Importance – Business Officers

	Rank	Weighted Score
Reliability (uptime)	1	229
Security	2	213
Performance (speed)	3	202
Operating Cost Predictability	4	186
Capital Cost Predictability	5	171

Security ranks #2 in importance, yet 53.5% of business officers indicate the need for more information on this IT matter. This lack of knowledge may be due, in part, to limited manpower dedicated to security – 20% of universities and colleges do not have an Information Security Office and Internal Audit team. Sixty-four percent have a team of between 1 and 4 staff members and 15.7% of institutions have a team of between 5 and 9 staff members.

e. Funding and Technology Costs

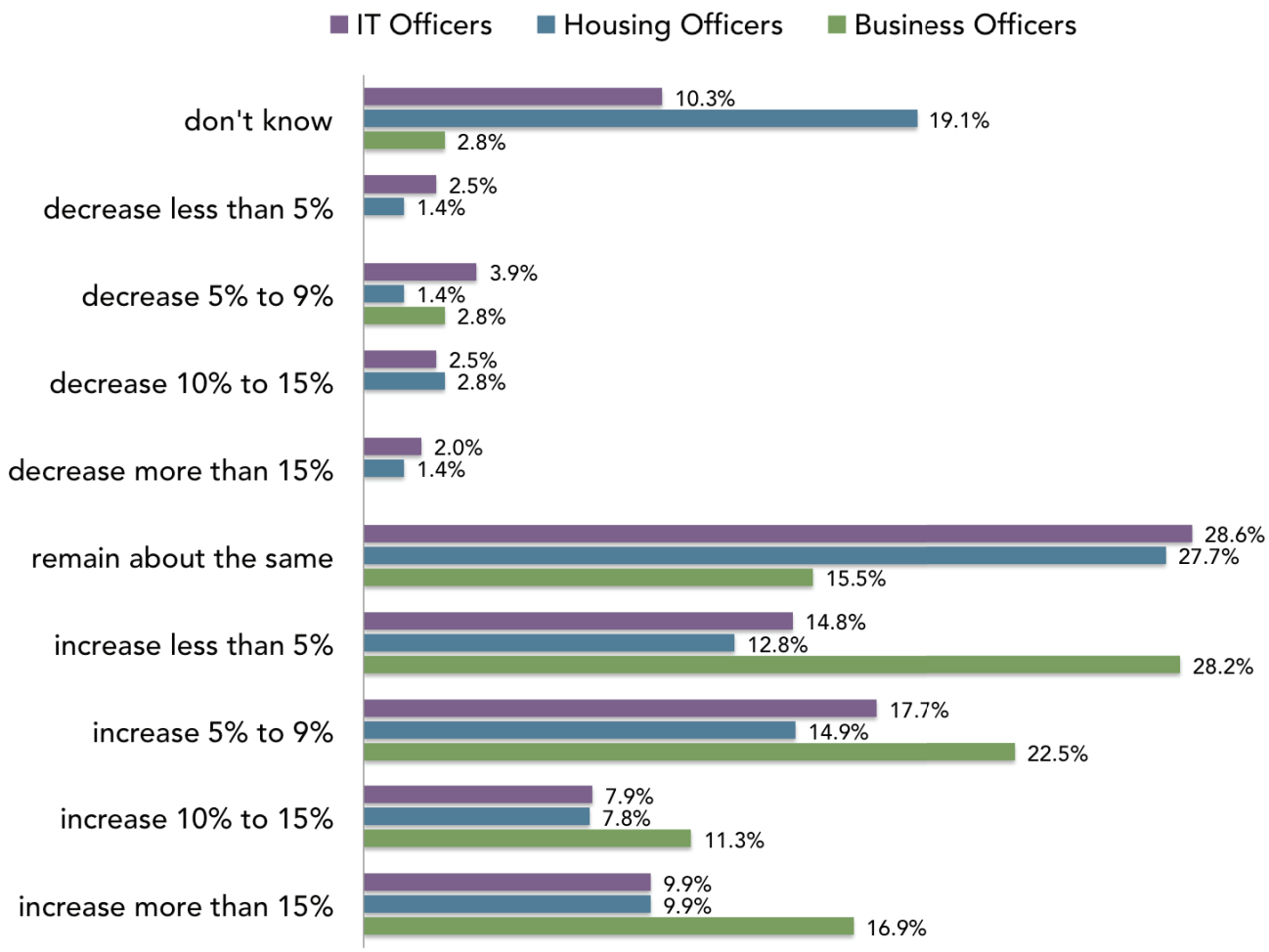
Key takeaways:

- Seventy-six percent of business officers experience growing concerns about Wi-Fi management budgeting (an 8% increase from last year). Sixty-five percent of technology officers worry that capital funding for network infrastructure will impact the way they manage the network.
- Fifty-three percent of all institutions expect the cost of wireless network services to increase over the next two years with 37% expecting an increase in cost of 5% or more.
- While schools are struggling to make ends meet with ResNet costs, 32% have yet to implement a general technology fee. Over half of schools levy a general technology fee to on-campus residents only; 5.5% charge both on- and off-campus students.
- 2018 brings a 27.4% increase in schools with a $750,000 to $2.5 million annual budget for telecommunications and network services. Mid-range budgets have increased, but fewer schools have budgets over $2.5 million.
- The past four years show a steady rise in schools addressing the costs of ResNet by outsourcing some or all network services to managed providers.

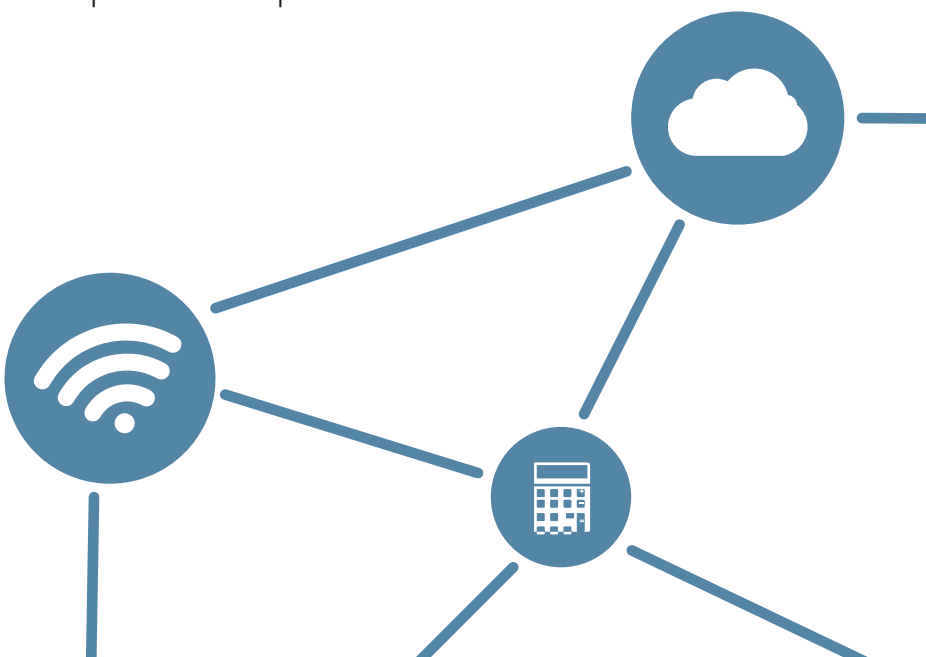
Information technology is bringing profound and inevitable changes to higher education. Administrators see technology as a vital contributor to their schools' success and strategic plan and invest mostly in online learning, upgrading student services and equipment, and building wireless infrastructures to connect the increasing number of personal devices on campus. However, this study found increasing concern that funding will not meet the fast-growing technological demands.

Three out of four business officers convey increased concern for Wi-Fi management and budgeting compared to five years ago. Over half of all institutions expect the cost of wireless network services to grow over the next two years, with 37% expecting a rise in cost of 5% or more. Eleven percent of institutions anticipate an increased cost of wireless networks services at 15% or more.

Cost Expectations for Wireless Network



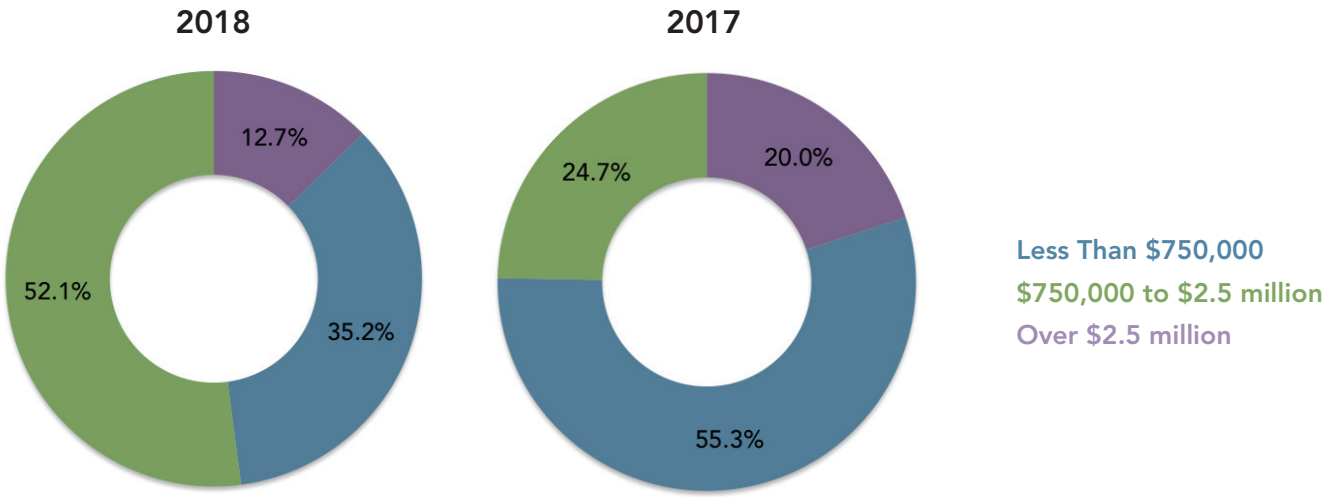
Consequently, 65% of technology officers have concerns that the capital funding for network infrastructure will impact the way they manage the network. Forty-nine percent believe budget and cost predictability may cause a roadblock. Additionally, 27.1% have concerns the lack of funds for network support/help desk will impact their work.



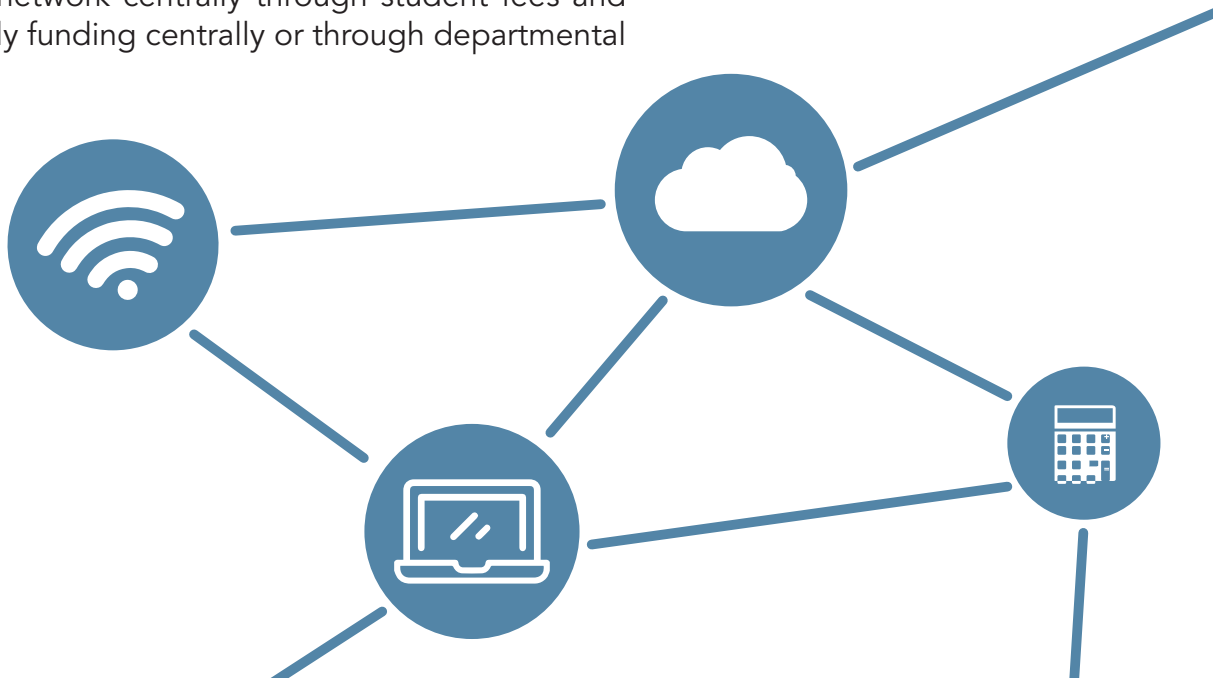
Who Pays for ResNet Costs & How Are Costs Recovered

Annual budgets for ResNet have shifted over the past year. Mid-sized budgets have increased, but fewer schools have budgets over $2.5 million. Thirty-five percent of schools have an annual budget of less than $750,000; slightly more than half have a budget between $750,000 and $2.5 million and 12.7% over $2.5 million. While annual budgets logically reflect the number of students, the size of schools is fairly consistent over the years.

Annual Budget for Telecommunications and Network Services



The past five years track ongoing shifts in the funding models used for university ResNet. Funding models also typically follow the size and type of university. Small, mainly private institutions fund centrally, and medium to large, predominantly public institutions implement a fee system. This year shows an increase in schools jointly funding the IT network centrally through student fees and departments or partially funding centrally or through departmental assistance.

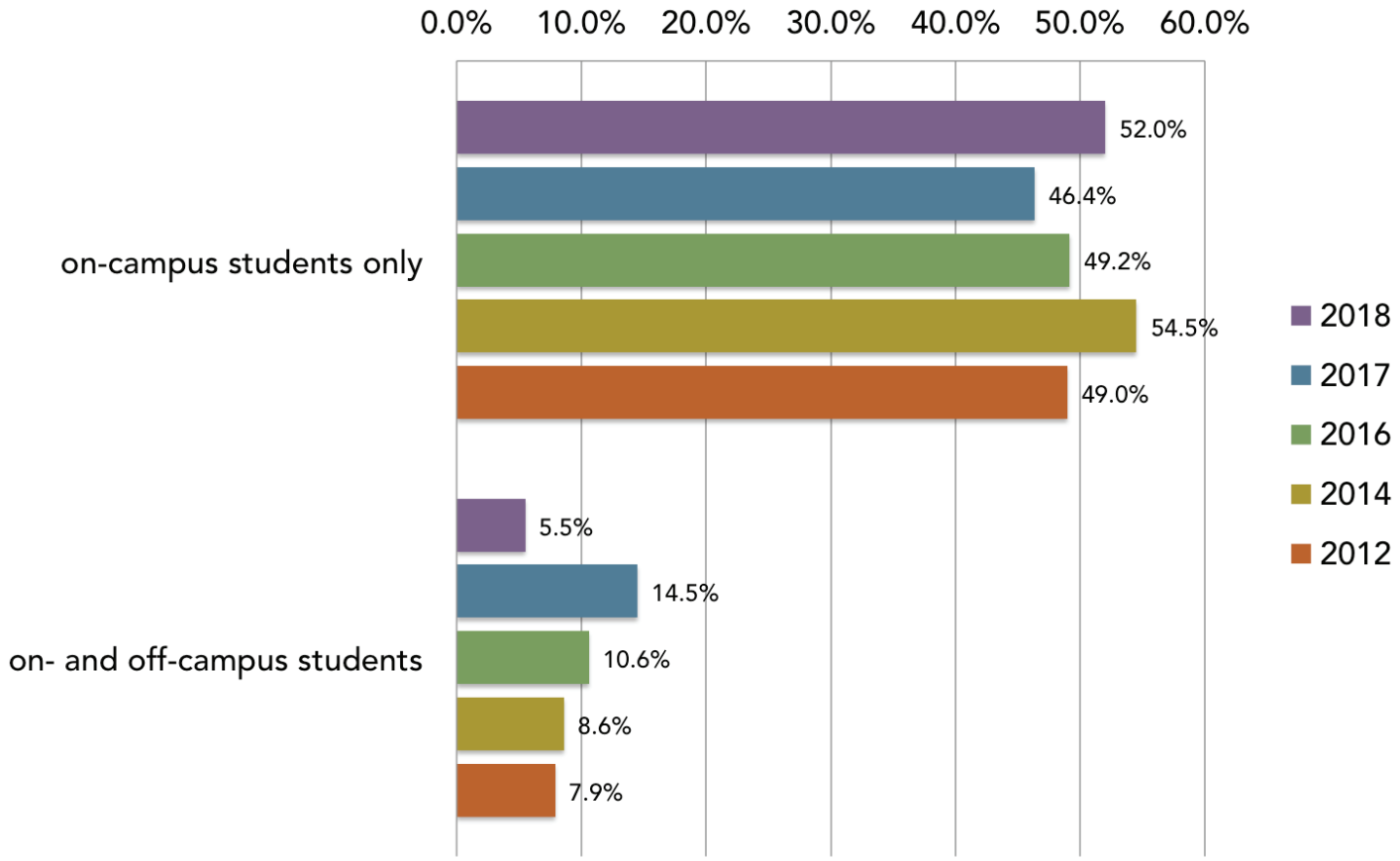


Funding Models for Campus Telecommunications and Network Services

	2018	2017	2016	2015	2014
Completely fund the network as a core university service from central university funds.	36.7%	42.4%	41.5%	47.4%	49.3%
Partially fund with student fees and partially through central university funds.	26.8%	30.6%	33.3%	28.6%	23.7%
Jointly fund the network through central university, student fees and departments.	22.5%	18.8%	17.1%	15.1%	13.8%
Partially fund by departmental assistance (colleges and schools) and partially funded by central university funds.	5.6%	4.7%	4.9%	4.2%	9.9%

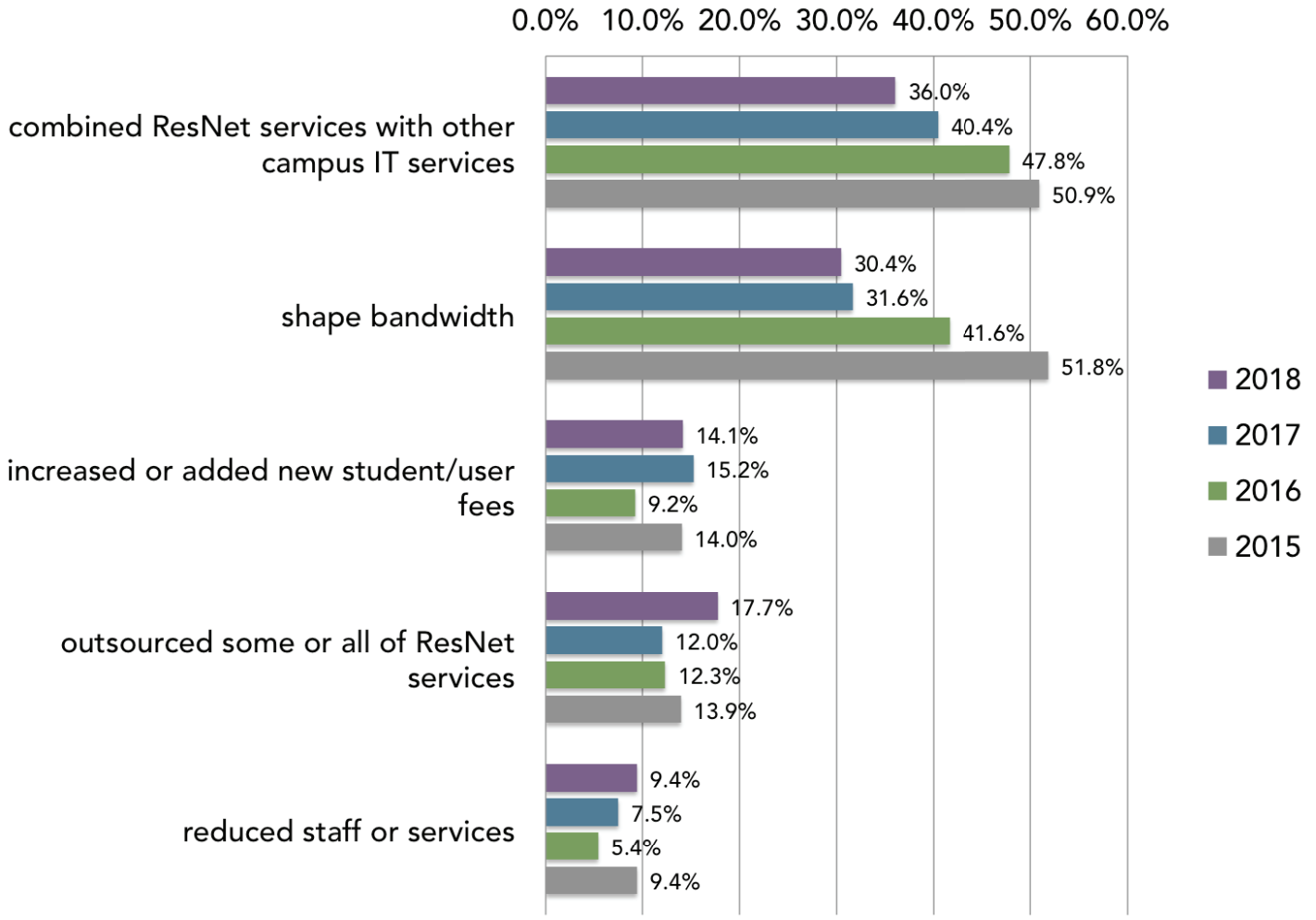
Despite the escalating network costs to meet students' technological demands, 32% of schools do not implement a general technology fee. In contrast, 52% levy a general technology fee to on-campus residents; 5.5% charge both on- and off-campus students.

How Institutions Levy General Technology Fee



More schools address the cost of ResNet by combining network services with other Campus IT services (36.0%) or through shaping bandwidth (30.4%). But the past four years tracks a gradual decrease in these two approaches. Instead, the data shows a rise in schools outsourcing some or all ResNet services to address the costs of ResNet.

How Schools Address ResNet Costs



f. Outsourcing

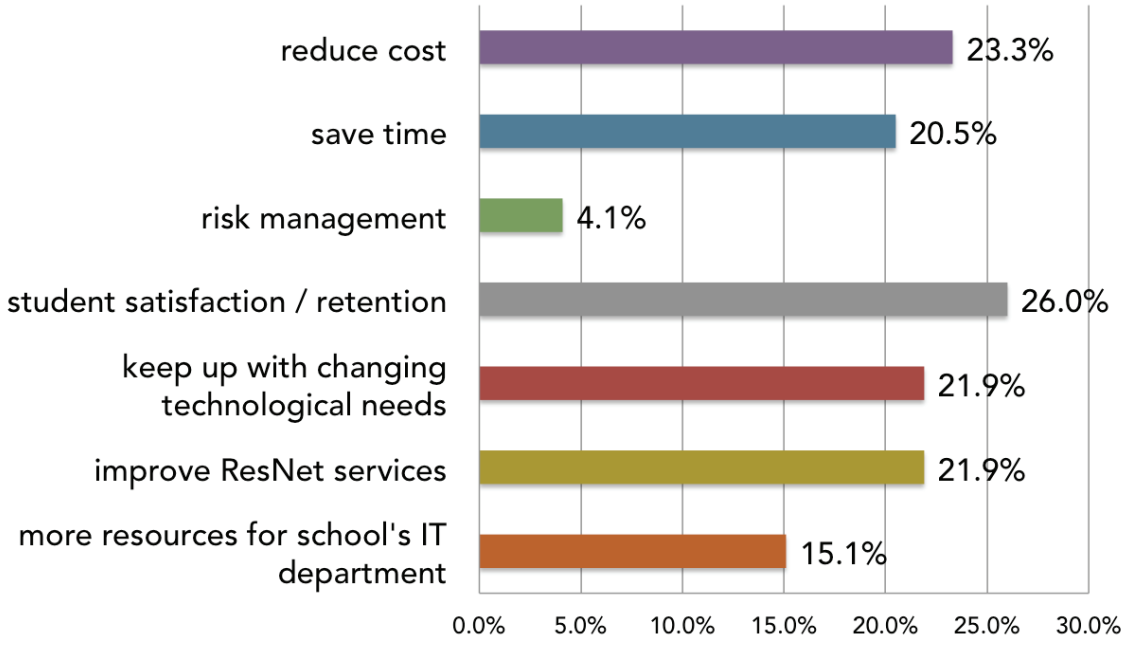
Key takeaways:

- Student satisfaction and retention are the top reasons institutions outsource ResNet. This year shows a 15% increase in the number of schools that cite student satisfaction and retention as their reason for outsourcing ResNet.
- This year, 28 percent of schools are outsourcing or considering outsourcing ResNet, a 9% increase from 2017. Institutions run the gamut, with some outsourcing all their ResNet services, while others outsourcing select ResNet services.
- The number of schools that outsource IPTV (24%) continues to increase. Another 16.4% are considering outsourcing it.
- Fewer schools are offering phone service to residential students, but more schools are offering VoIP or landline phone ports in rooms or hallways.

While the right outsourcing relationship may generate cost savings, it will, more importantly, create positive returns. Those returns include higher levels of student satisfaction, better retention rates, improved ResNet services, and staying on top of changing technological needs.

Student satisfaction has always been a priority for colleges. But the stakes are even higher now that technology is used to evaluate schools (as well as voice student opinions). Competition to recruit students has also increased, making technology an even larger asset. Accordingly, more schools outsource ResNet to achieve student satisfaction and retention, a 15% increase from last year.

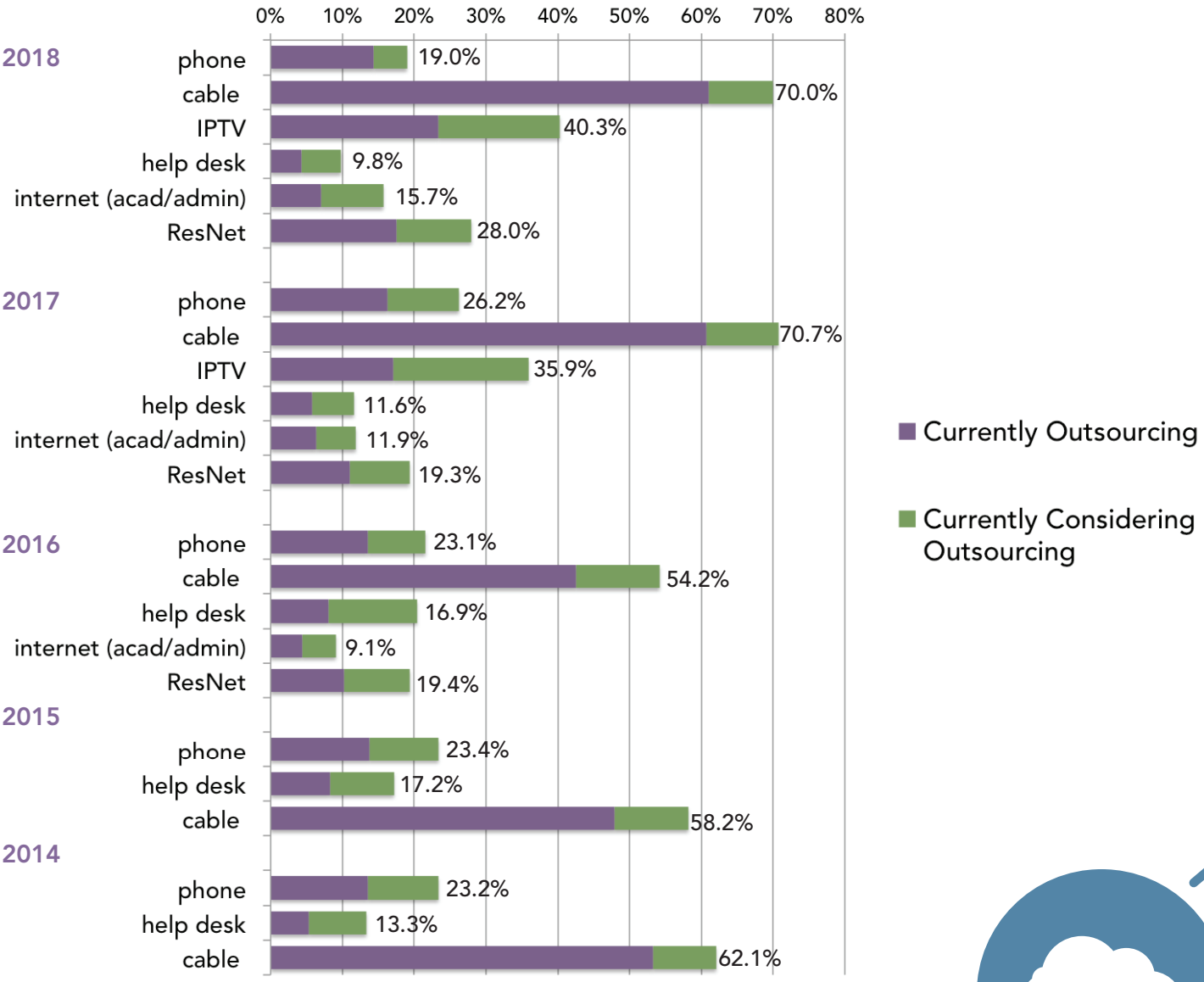
Why do institutions outsource ResNet?



Schools can outsource some or all of their ResNet services. This year, 28 percent of schools are outsourcing or considering outsourcing ResNet, a 9% increase from 2017. Another steady rise has been the number of schools who outsource their internet for their academic, administrative and non-residential parts of campus – rising from 9.1% to 15.7%, in three years.

More institutions outsource cable TV (70%) compared to other ResNet services. However, 7.8% of schools do not offer cable TV to their students. In light of the proliferation and increased sophistication of mobile devices, as well as students' on-demand needs, 15.7% of schools indicated that they have transitioned from cable TV to IPTV, an increase from 9.1% in 2016. And more than three-quarters are considering switching to IPTV. As streaming video content can dominate bandwidth, an increasing number of colleges are outsourcing IPTV for better bandwidth management. Currently, 24% of schools who provide IPTV outsource the service and another 16.4% are considering it, which is the highest it has been since the survey started measuring IPTV outsourcing in 2016.

Percentage of Institutions Ousourcing ResNet Services



Fewer schools currently outsource or are considering outsourcing phone service this year. Additionally, there is a decline in schools offering any phone service to residential students. In 2014, 86.2% of schools provided either in-room landline phone ports, hallway or common area phone ports, or VoIP phone service. Today, only 56.2% of schools offer some type of phone service. Many schools are eliminating phone ports, but data shows more schools are offering VoIP to their students (17.7%) than they did in 2012 (9.9%).

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