

2016

2016 ACUTA/ACUHO-1 State Of ResNet Report

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ResNet Trends & Practices Across Higher Education

2016

ACUTA/ACUHO-I

STATE OF RESNET Report



Association for College and
University Technology
Advancement



Association of College and
University Housing Officers -
International

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INTRODUCTION

The Association for College and University Technology Advancement (ACUTA) and Association of Colleges and University Housing Officers-International (ACUHO-I) are pleased to present research findings from the 2016 ACUTA/ACUHO-I State of ResNet Study.

This is the fifth installment of a comprehensive five-year tracking study to measure the pulse of ResNet practices and policies in higher education in order to provide year-over-year analysis and report on the evolution of certain trends. Again this year, the study has broadened its opinion sources among three significant audiences- Higher Education IT Leaders, Housing Officers, and Business Officers.

This research, which includes data from over 360 higher education institutions, is designed to help administrators and business officers address such issues as the unprecedented growth in bandwidth and connectivity demands, budget restrictions, policy considerations, staffing, and support. These insights will make it possible for colleges and universities to better meet the challenges of today while fostering greater collaboration that is needed to meet the challenges of tomorrow.

“Five years ago, we started the State of the ResNet study to map the peaks and valleys of a little-understood area of the higher ed digital landscape. Since then, the ResNet has garnered a seat at the table as institutions chart their strategic paths, leveraging it for growth. We look forward to many more years of watching, learning and studying how ResNet affects competitiveness, retention and student satisfaction.”

- Dee Childs, Chair of the ACUTA Associate Provost and CIO at the University of Alabama - Huntsville.

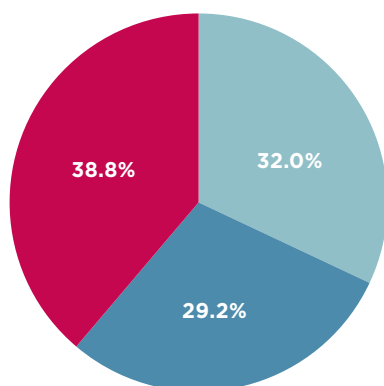


METHODOLOGY

For the fifth year, market research firm Forward Analytics was contracted to perform the ResNet industry research and to report quantitative market intelligence that can benefit higher-education institutions and enhance residential computer networking for college/university students. Forward Analytics worked closely with ACUTA and ACUHO-I representatives to design the 2016 survey and conducted online polling from December 2015 through January 2016. Three unique questionnaires were developed to accommodate the representation of the three audiences. While the surveys have evolved over the years to reflect the changes in technology, the surveys have remained fairly consistent so that data comparisons can be made.

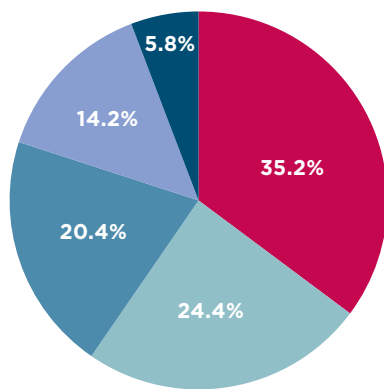
High Participation Rates

A total of 406 surveys were completed, presenting a 59% increase in completion rates since the initial study in 2012. This represents 361 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 +/-4.2% at the 95% confidence interval. With 406 institutional respondents, it can be said that if the survey were repeated 100 times, 95 in 100 times the research finding would vary at most +/- 4.2%. 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*)
- 29.2%** | **Medium** (*5,000 to 15,000 students*)
- 38.8%** | **Large** (*15,000+ students*)



Number of On-campus Students

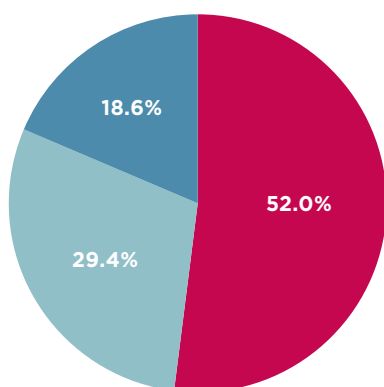
- 35.2%** | **Under 500**
- 24.4%** | **501 to 1,000**
- 20.4%** | **1,001 to 2,000**
- 14.2%** | **2,001 to 5,000**
- 5.8%** | **More than 5,000**

METHODOLOGY

(continued)

More than one-third of the respondents have between 1,001 – 5,000 on-campus students (beds), and nearly 6% of the respondents have 5,000+ on-campus students. For colleges and universities, having students live on campus provides a number of benefits, in revenue, classroom performance, and student retention.

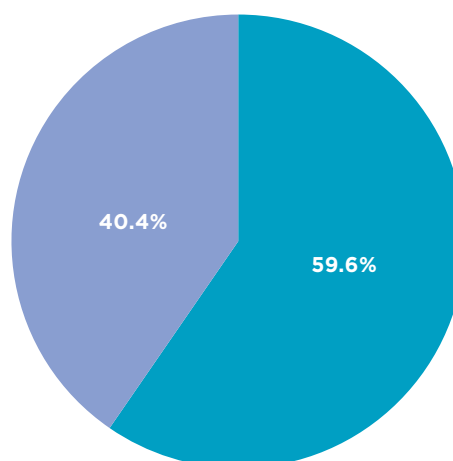
Job Responsibility



52.0% | IT
29.4% | Business
18.6% | Housing

Of the 406 total responses, 119 respondents indicated their primary job was related to business and 76 to housing, while 211 respondents primarily handled IT.

Public vs. Private



59.6% | Public
40.4% | Private

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

EXECUTIVE SUMMARY

When our State of ResNet Report first launched in 2011, universities and colleges were grappling with the beginnings of the BYOD (bring your own device) phenomena. At that time, teaching and online resources were undergoing a digital evolution, if not revolution, and schools had begun to engage ever more students through apps, online learning, gamification, streaming content, and social media. Today, higher education institutions have become comfortable with the idea of BYOD, and are fleshing out their roadmaps for rapid and sustainable growth in the Digital Age.

The 2016 State of ResNet Report explores the current state of the ResNet – internet, cable television/video services, phone services, and support available to residents living in on-campus residence halls. The report documents the perspectives of IT, Business and Housing officers, and details how universities and colleges are responding to the diverse and ever-evolving challenges for ResNet services. The following section highlights summarize the report with regards to the following topics: Bandwidth Management, Wireless Coverage and Capacity, Service and Support, Planning and Measuring, Funding and Technology Costs, and Outsourcing.

Institutions respond to demands for greater bandwidth, but needs continue to inflate

- Nearly two-thirds of universities and colleges dedicate 1 Gbps or more to the ResNet. In 2012, most colleges (54.6%) offered 500 Mbps or less.
- While increasing their bandwidth, universities continue to manage bandwidth consumption by shaping by protocol and blocking activities, such as P2P sharing, music downloading, etc.
- Only 12% of schools cap individual Internet bandwidth usage and one-third give students the option to pay for additional Internet bandwidth.

ResNet wireless coverage has improved dramatically

- Today, 83% of campuses provide a robust wireless connection; almost doubling from 45% in 2013.
- The strength of the wireless connection has increased in all areas of residence halls, as well as academic and common areas.
- Seventy-three percent of Business Officers believe a high performing (coverage and capacity) ResNet is very important in attracting and retaining on-campus students.

EXECUTIVE SUMMARY *(continued)*

- Today, 83% of college campuses provide robust wireless coverage throughout 81-100% of their campus, nearly doubling in the past four years. Residential rooms now receive the most robust coverage offered by 88% of schools – a 29% increase over the last year.

Schools are anticipating what's next

- Nine percent of colleges and universities have transitioned from traditional cable television to IPTV, IP video, etc. Twenty-seven percent of institutions are strongly considering the change.
- For two years in a row, desktops and laptops have taken the top spot over tablets as the largest bandwidth consumers, which could point to the increasing usage of applications that need larger processing power, such as streaming video and online learning.

Schools are trying to provide connectivity support for all kinds of devices, but are not providing enough round-the-clock assistance

- Only 13.6% of schools provide 24/7 support, a 5% increase from 2012.
- The only resource available to students at a majority of schools (76.5%) is access to online resources such as a wiki or online FAQ.
- A growing number of schools offer support via live chat and social media, and the majority of schools continue to provide on-site, walk-in and call center support.
- Ninety percent of schools provide connectivity support for desktops, laptops, tablets, etc., and 86% support smartphones. The majority of schools also provide network connectivity support for recreational devices, such as game boxes (74.7%), iPods (73.1%), handheld game consoles (65.3%), and video systems (63.8%).

Strategic planning improves, but inter-departmental communication and benchmarking still needed

- Since 2011, there has been a 24% increase in schools with ResNet strategic plans, growing from 34% to 58%.

EXECUTIVE SUMMARY *(continued)*

- Nearly one-fourth of Business Officers do not meet with their IT department, 22.7% of Housing Officers do not meet with the IT department, and 18.9% of IT Officers do not meet with the Housing/Residence Life department.
- Approximately 56% of Business and Housing Officers do not have access to benchmark data.
- Housing Officers show an increase in satisfaction for reliability (uptime), performance (speed), and security. However, satisfaction scores went down for service response time and cost.
- Business Officers value quality over cost in regards to an IT and networking system.

Anticipating ResNet/wireless costs to increase, schools are exploring ways to stem rising costs

- Sixty-two percent of all institutions expect the cost of wireless network services to increase over the next two years with half of the institutions expecting an increase in cost of 5% or more – a 10% rise from nearly 39% last year.
- Fewer institutions reported an increase in ResNet funding – from 54% in 2015 to 47% in 2016.
- Eleven percent of institutions anticipate the cost of wireless network services to increase by 15% or more.
- Eighty percent are balancing bandwidth costs through shaping and/or by combining their ResNet services with other campus IT services (an increase of 11% from 69% in 2015).

Outsourcing continues to gain popularity as costs rise

- Presently 44% of schools are outsourcing or considering outsourcing some or all of ResNet services to trim costs, doubling from 22% in 2013.
- More than half of schools are currently outsourcing or considering outsourcing cable television, however, this presents a drop from the previous two years.
- To save on bandwidth and costs, 8.6% of campuses are currently outsourcing IPTV and 26.3% are considering it.

FINDINGS

Bandwidth Management

Key Takeaways:

- Schools are bolstering their residential networks with more bandwidth for two reasons: To meet the BYOE (bring your own everything) demands of the millennial residents and to support increasingly sophisticated educational applications and techniques.
- More than 64% of institutions now offer 1 Gb or more of bandwidth per student – a more than two-fold increase from 25.5% in 2012. Twenty-one percent of campuses offer as much as 7Gb or more to accommodate student needs.
- Eighty percent of colleges that have in-house Internet are implementing bandwidth management practices, such as shaping by protocol, compared with just 11% of those that have outsourced ResNet.
- In the past two years, laptops have emerged as the top bandwidth-consuming device, a departure from the mobile devices of the previous years. In 2016, concerns have tapered for all network-enabled devices and their usage to affect bandwidth consumption.

Snapshot of Bandwidth Management

For students at today's universities and colleges, high-speed network access and reliability have become a baseline expectation. Students increasingly come to college expecting that the network will meet their educational needs as well as provide their entertainment.

And never before has so much rich media content been used to enhance and aid the educational process. As audio, video, and e-learning applications proliferate, the demand for bandwidth resources grows as well. The popularity of recreational peer-to-peer (P2P), social media, and gaming applications further exacerbates the bandwidth management problem on campuses today.

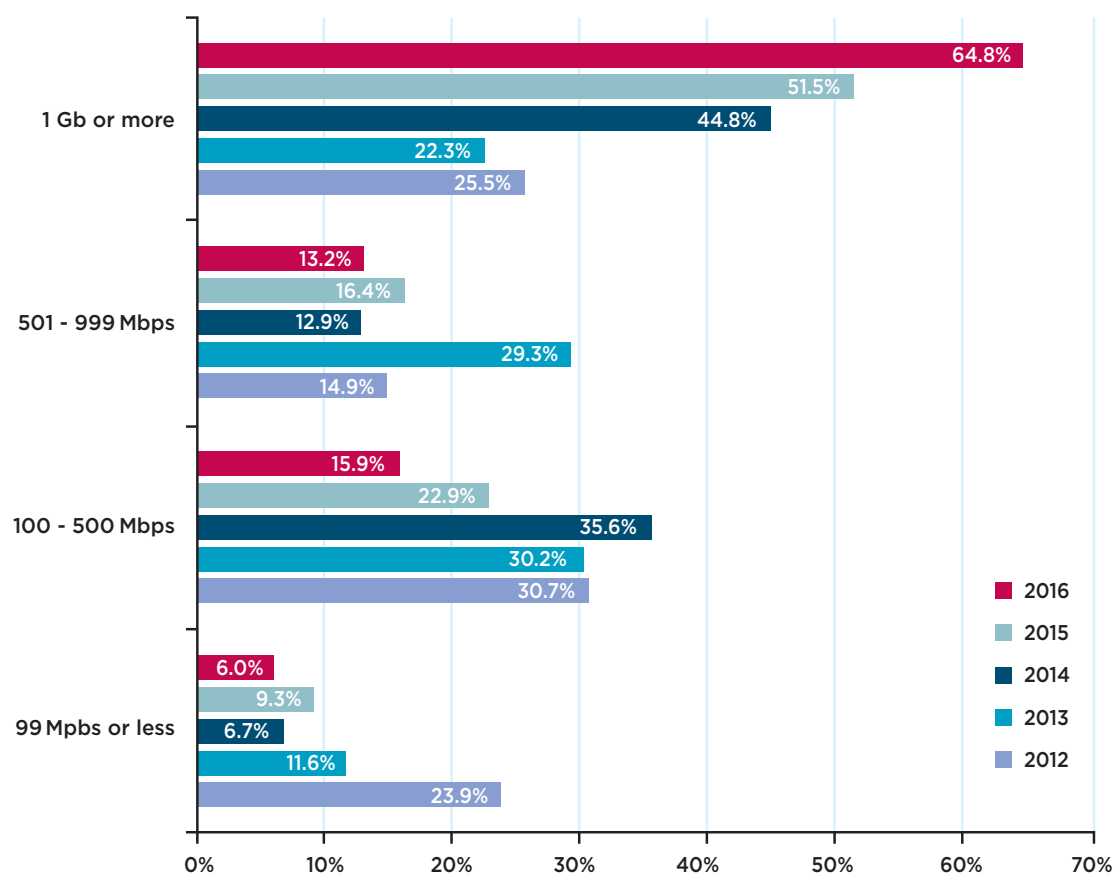
The outlook has not improved, and, similar to last year, 34% of Housing Officers and 15% of IT Officers are concerned about the ability of their provider to meet the future demands of residential networking. Still, universities embrace the BYOE movement and increase the demand for bandwidth by allowing an unlimited number of devices to be connected to the residential network (68% of campuses).

Year-to-year data illustrates a momentous increase in bandwidth dedicated to the ResNet. 2016 shows that 64.8% of institutions now offer 1 Gb or more – a dramatic increase from 25.5% in 2012. Twenty-one percent of campuses offer as much as 7Gb or more.

FINDINGS *(continued)*

In summary, higher education IT and Housing departments are under pressure to contain network operating costs while still delivering a high-quality user experience for students on (and off) campus. Schools are being forced to bolster their residential networks with more bandwidth not only because of BYOE's demands of the millennial college student, but also the increasingly sophisticated educational technology and techniques suited for the digital generation.

Bandwidth Dedicated to ResNet



FINDINGS *(continued)*

Bandwidth Management Practices

Today we can buy more bandwidth for less money than in the past, and this trend will probably continue. Nevertheless, it is often not practical to meet the increased demand for bandwidth by “throwing money at the problem” – which is why a ResNet and bandwidth strategy is an important element in the overall planning of network infrastructure. This year’s data shows that 80% of colleges that have in-house Internet are implementing bandwidth management practices, such as shaping by protocol, compared with just 11% of those that have outsourced ResNet. The most common bandwidth management practice is shaping and limiting bandwidth by protocol or blocking activities such as P2P sharing, music downloading, etc. Only 12% of colleges cap bandwidth.

| Bandwidth Management Practices | | | | |
|--|-------|-------|-------|-------|
| | 2013 | 2014 | 2015 | 2016 |
| Shaping and limiting bandwidth by protocol | 72.4% | 66.7% | 77.3% | 46.2% |
| Blocking activities such as P2P sharing, music downloading, etc. | N/A | 52.0% | 68.1% | 40.1% |
| Capping network-wide throughput available to streaming video | 22.9% | 18.6% | 25.9% | 20.3% |
| Implementation of cache servers | 22.9% | 21.1% | 25.9% | 25.4% |
| Providing minimum guaranteed service levels by user | 12.9% | 15.2% | 20.8% | 10.2% |

Other bandwidth management practices in place on campuses include:

- Bandwidth sharing services
- User-based rate limits
- Bandwidth accounting (residents pay for allocation)

Future Bandwidth Consumers

In previous years of the study, tablets (iPad, Android) were forecasted as the largest bandwidth consumer in the years to come. However, these past two years show a change as desktop and laptop computers take over the top spot and are now gateways to many disruptive applications, which may require even more bandwidth than ever before. Through these devices, students have found a larger canvas for complex games, virtual learning, 3D-modeling software, computer animation, or simply storing photos and videos.

This year’s data shows that concerns have tapered for all network-enabled devices and their usage to affect bandwidth consumption.

FINDINGS *(continued)*

| Largest Bandwidth Consuming Devices | 2013 | 2014 | 2015 | 2016 |
|---|-------|-------|-------|-------|
| Tablets (iPad, Android) | 83.5% | 73.4% | 67.9% | 57.7% |
| Desktop and laptop computers | 75.0% | 69.3% | 76.5% | 58.6% |
| Video systems (DVD/Blu-Ray Players, Apple TV, Roku, Slingbox) | 63.6% | 49.3% | 53.7% | 48.9% |
| Smartphones (iPhone, Blackberry, Android) | 63.2% | 64.2% | 66.8% | 55.2% |
| Game boxes (PS3, Wii, XBOX, XBOX 360, etc.) | 60.7% | 46.7% | 52.2% | 41.9% |
| Smart TVs | 51.7% | 37.2% | 38.8% | 36.6% |
| iPod/iPod Touches | 33.5% | 20.5% | 16.5% | 10.8% |
| e-Book Readers (Kindle, Nook) | 27.8% | 13.0% | 9.4% | 7.4% |
| Wireless Printers | 14.1% | 5.8% | 8.7% | 7.8% |

Students want fast, reliable networking, and they want it 24/7. These demands particularly impact the residential network, where students live and want the “at home” experience. In order to accommodate students, 40% of schools allow campus residents to install personal network devices, like switches or mini-hubs, but slightly less than 20% allow residents to install wired or wireless routers. Fourteen percent of schools permit the installation of services. In contrast, 61% of universities prohibit the installation of network devices in campus residences. These figures have remained similar over the previous four Annual State of ResNet Studies.

FINDINGS *(continued)*

Wireless Coverage and Capacity

Key Takeaways:

- Today, 83% of campuses provide a robust strong wireless connection, almost doubling from 45% in 2013.
- Robust wireless connection has increased in all areas of residence halls – academic and common areas.
- Seventy-three percent of Business Officers believe a high-performing (coverage and capacity) ResNet is very important in attracting and retaining on-campus students.
- In order to “bridge the gap” in wireless coverage, 58% of institutions are considering an array of services to augment residential cellular reception on campus, representing a small increase from the past two years.
- Nine percent of colleges and universities have transitioned from traditional cable television to IPTV, IP video, etc. Twenty-seven percent of institutions are strongly considering the change.

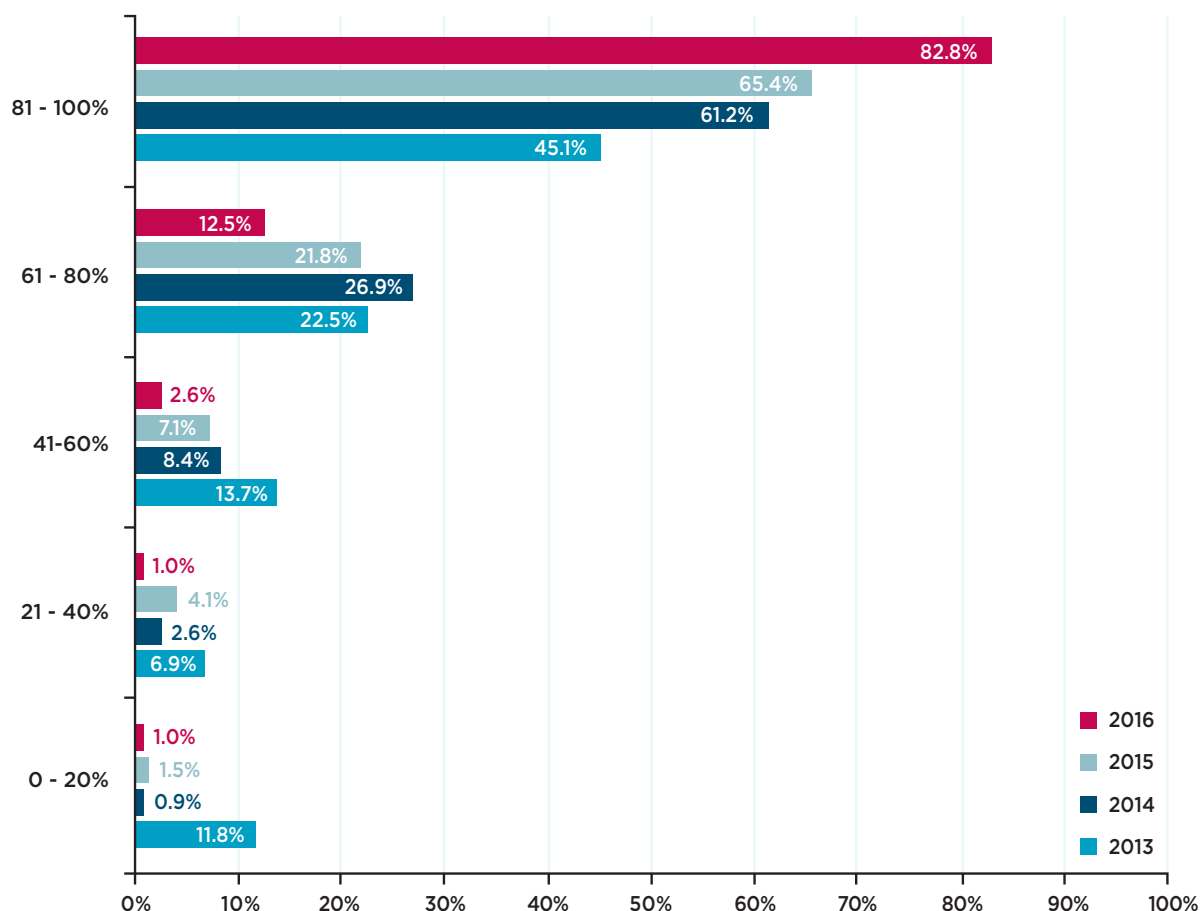
Snapshot of Current Wireless Coverage

Colleges and universities are facing increasing demands on their wireless networks as students increasingly expect instant access to myriad applications, from online classes to streaming video to gaming and music apps.

In an effort to better meet the needs of these millennials, more institutions than ever have stepped up efforts to provide reliable and comprehensive wireless coverage. Today, 83% of college campuses provide robust wireless coverage throughout 81-100% of their campus. This figure has nearly doubled in the past four years.

FINDINGS *(continued)*

Percentage of Campus with Strong Wireless Connection



2016 data presents a weighty increase in the percentage of schools offering robust wireless coverage in both academic and residential areas. Similar to last year, 58% of Business Officers support expansive Wi-Fi access or coverage for the entire campus rather than limit coverage to the extent of available funds only for the most densely-populated areas. Seventy-three percent of Business Officers believe a high-performing (coverage and capacity) ResNet is very important in attracting and retaining on-campus students.

FINDINGS *(continued)*

| Percentage of Campuses offering Robust Wireless Coverage in 81-100% of Residential Areas | | | |
|--|-------|-------|-------|
| | 2014 | 2015 | 2016 |
| Academic spaces in residences, including classrooms and study areas | 73.0% | 71.4% | 86.1% |
| Residential Computer Labs | 73.0% | 72.1% | 81.0% |
| Administrative areas (front desks, area offices, residential staff offices, etc.) | 71.2% | 66.9% | 82.9% |
| Common areas and community spaces | 69.9% | 66.1% | 80.2% |
| Dining facilities | 69.3% | 66.9% | 81.4% |
| Residential rooms, suites, or apartments | 59.0% | 58.7% | 87.8% |
| Outside areas adjacent to residential spaces (courtyards, parks, breezeways, etc.) | 19.6% | 12.1% | 19.3% |

Cellular Reception

In order to “bridge the gap” in wireless coverage, 58% of institutions are considering an array of services to augment residential cellular reception on campus, a small increase from the previous two years. To handle coverage and capacity problems, 37% of institutions plan to deploy in-building DAS, 18.2% outdoor DAS, and 27.6% outdoor cellular sites/towers.

Fifty-six percent of institutions have no plans for cellular augmentation because the cellular reception on the campus is perceived as satisfactory. A significant number of institutions believe that cellular augmentation is too expensive (44%), or there is a perception that the carrier is responsible for providing satisfactory cellular coverage (42%).

Wired Ethernet Ports

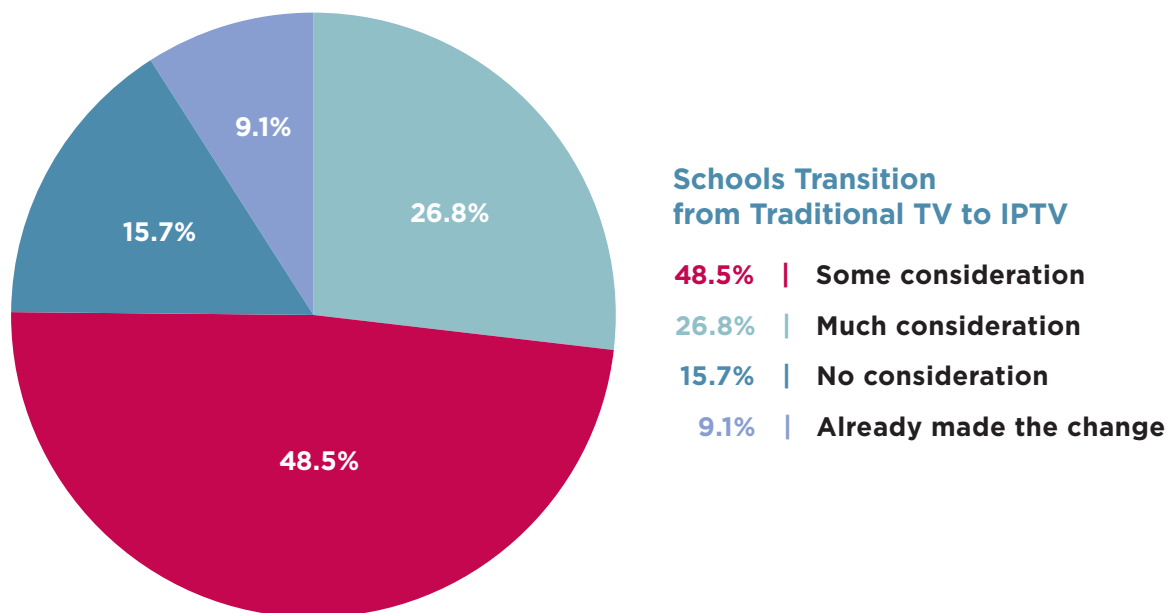
Despite the increase in wireless coverage on college campuses, only 18.5% of institutions will remove existing wired Ethernet access ports in residential buildings. Another 23.0% are unsure if they will remove Ethernet access ports. These figures are only slightly higher than the previous two years. This number has tripled since 2012, when a mere 5.2% of institutions had plans for removal.

FINDINGS *(continued)*

The majority of institutions include wired Ethernet access ports in new residential construction. Most offer one port per student (59.3%), whereas 14.1% provide one port per residence and/or 7.5% provide ports upon request. Ten percent of institutions chose not to include Ethernet ports in residential construction completed over the past three years.

IPTV on the Rise

The proliferation of devices means today's students seek instant access to information and entertainment. As a result, schools are responding to this need by adopting/considering IPTV. Nine percent of schools have transitioned from traditional cable television to IPTV. Three out of four schools are giving it much consideration (26.8%) or some consideration (48.5%).



FINDINGS *(continued)*

ResNet Service and Support

Key Takeaways:

- The past year shows that university housing departments have increased their role in ResNet services, both in manpower and time allocation.
- Today, 68% of colleges offer unlimited device connectivity; most have increased bandwidth and provide technical support for a wide array of devices. However, less than one in five schools (14%) provides 24/7 support.
- More schools are providing support via live chat and social media; the majority of schools continue to provide on-site, walk-in and call center support.
- Eight percent of institutions are outsourcing help desk services, while another 12.3% are strongly considering it.

Snapshot of Support Services

Historically, Central IT (Networking, Security, etc.) takes responsibility for maintaining the physical infrastructure and providing end-user support for ResNet. About one in five schools utilizes Student Affairs to provide support. Housing and Residence Life continues to play a significant role in monitoring the ResNet as a key component of on-campus residential life, with nearly half of housing departments surveyed currently tasked with measuring student satisfaction with ResNet services.

The past year shows that university housing departments have increased their role in ResNet services, both in manpower and time allocation. Still, the majority (82%) of surveyed Housing Officers said ResNet makes up less than 20% of their daily responsibilities. And slightly more than half indicated that there is no full-time staff working within their housing/residence-life IT department.

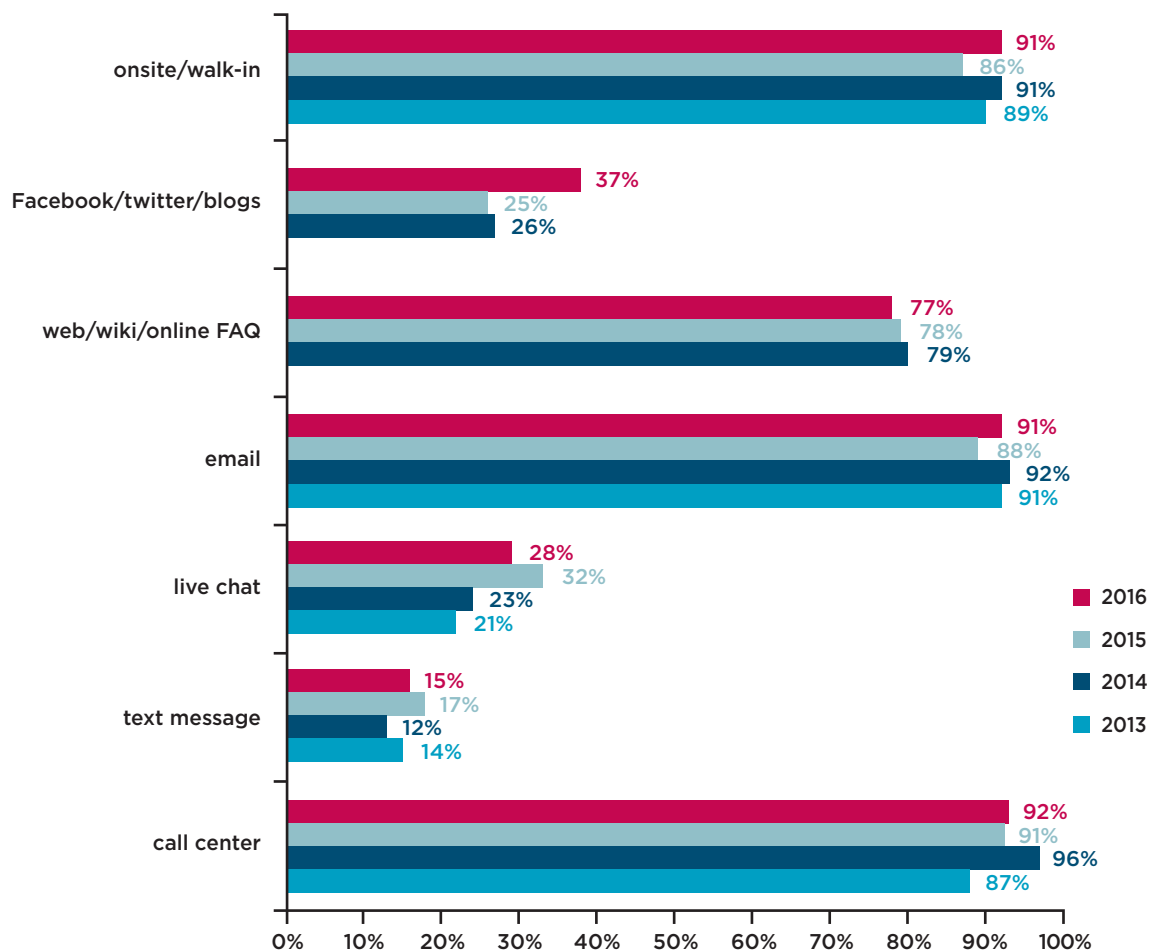
Options for Support

To accommodate the upsurge in devices on campus and to allow for the increased use in video, audio, and big-data applications, schools are providing significantly more bandwidth for each user. Universities further embrace digital learning by providing support for a variety of devices and applications.

While mobile devices allow for virtual communications, on-site/walk-in network support is still offered by 91% of universities. Old-school communication (phone and email) prevails, but increasingly more schools offer network support through social media and live chat.

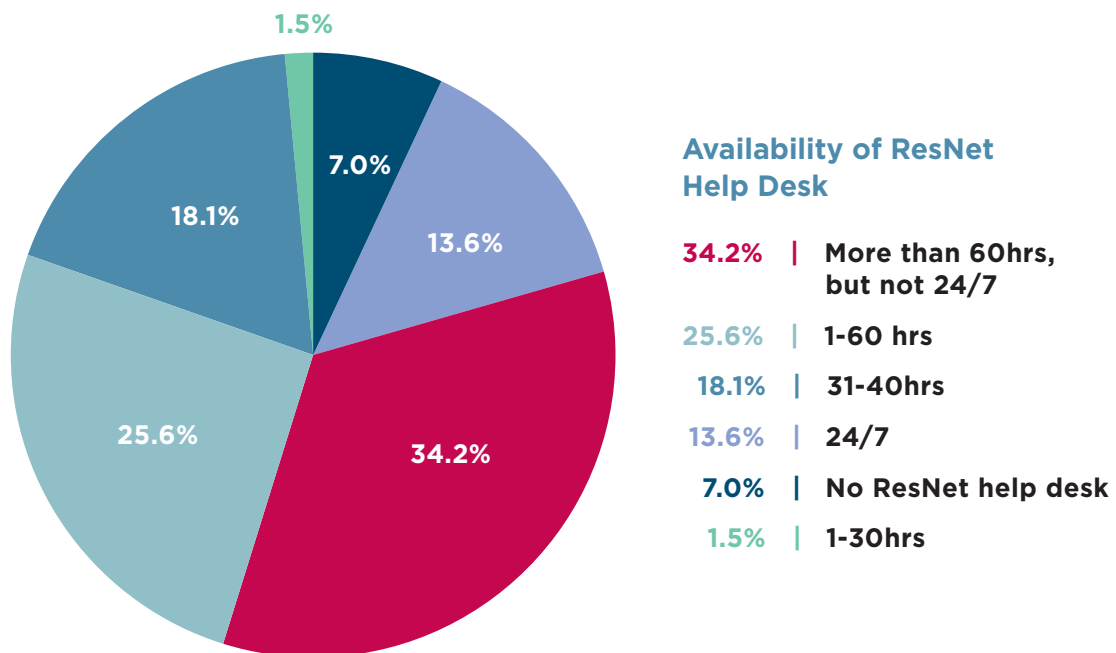
FINDINGS *(continued)*

Network Support Options



As technology extends beyond a personal communication tool to a platform for educational instruction and learning, there will likely be increased expectations for help desk services. So far, there has been little change in the availability of ResNet help-desk services. Presently, 73.4% of schools offer more than just 9-to-5 help desk support, but still, only 13.6% provide 24/7 support. To help leverage these evolving demands, 8% of institutions are outsourcing help desk services while another 12.3% are strongly considering it.

FINDINGS *(continued)*



FINDINGS *(continued)*

Planning and Measurement

Key Takeaways:

- Over the past three years, there has been a 24% increase in the number of institutions with a ResNet strategic plan, jumping from 34% to 58%. But only 20% update their plan annually.
- Although more than two-thirds of Housing and Business Officers would like benchmarking information, 56% do not have access to such information.
- Business Officers value quality over cost in regards to an IT and networking system.
- While security is a top IT priority, one-fifth of schools have no Information Security and Internal Audits (ISO) team.

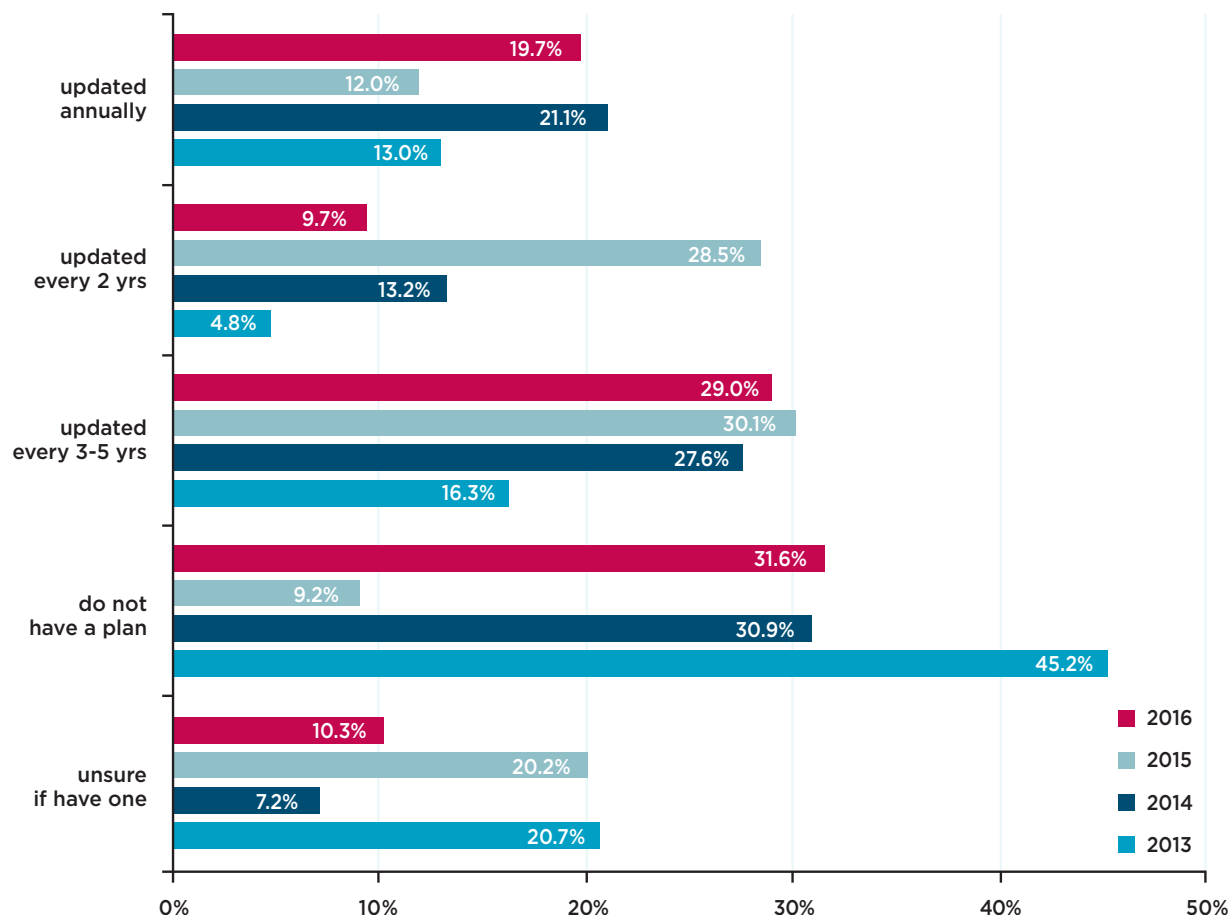
With today's college students relying on technology more than ever, the IT network becomes one of the most important features of the campus environment. In fact, colleges are finding that a high-speed Wi-Fi network is critical to attracting and retaining students. Five years of research shows increasing awareness and need for strategic planning to provide effective ResNet services.

Presently, 58% of surveyed colleges have strategic plans in place for the ResNet compared to 34% in 2013. Such a plan may include an approach for management and maintenance, staffing and support, as well as cost and performance information for wireless internet (Wi-Fi), Internet bandwidth, cable TV, IPTV, VoIP, and related services.

To leverage the ever-evolving devices and applications, 20% of schools update their strategic plan annually, while 38.4% update it every 2-5 years. In contrast, 2016 survey data reports 31.6% of institutions do not have a strategic plan for ResNet, and 10.3% of institutions are unsure whether they have a plan and/or how often it's updated.

FINDINGS *(continued)*

Strategic Plan for ResNet



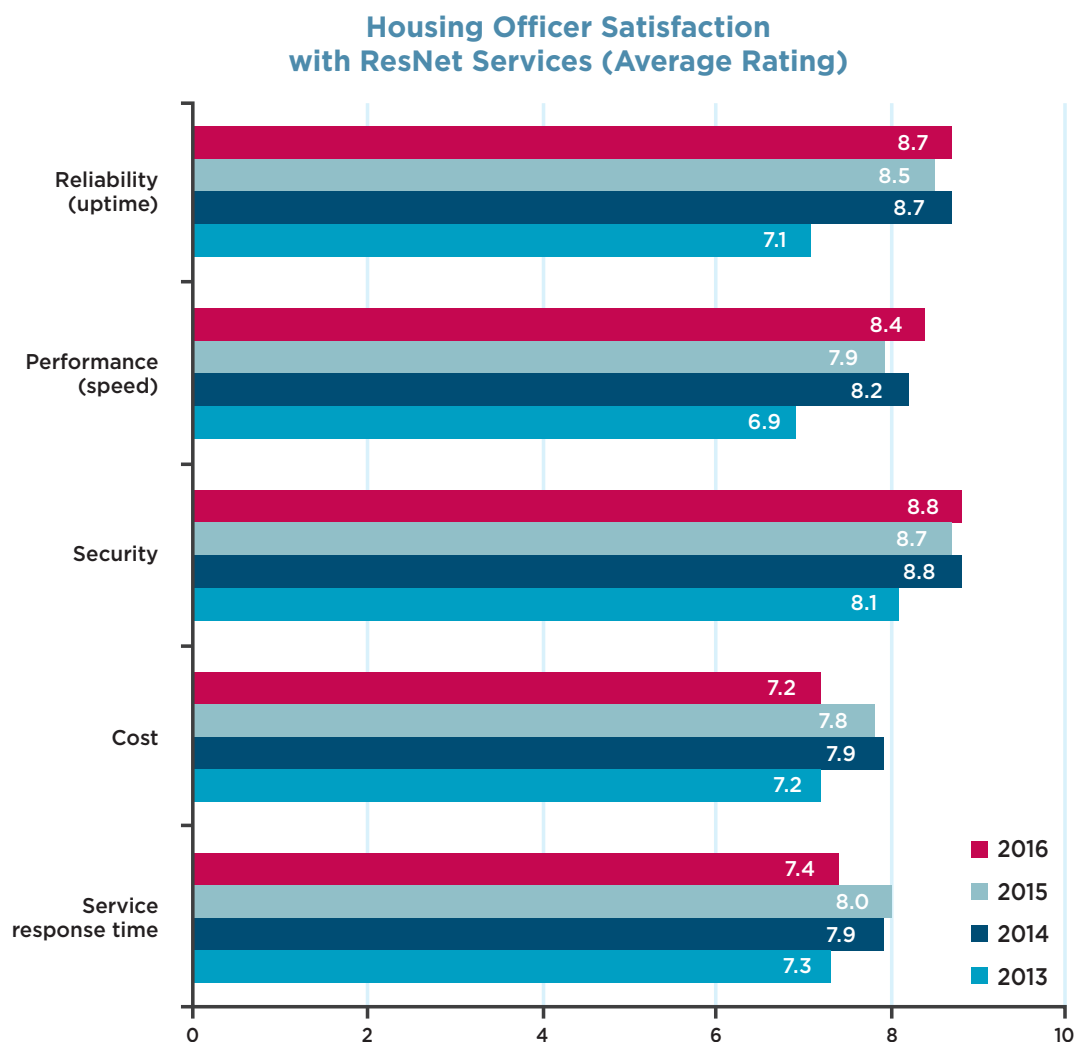
Communication

In order to work toward a common strategic goal, key players will benefit from communicating with their counterparts regarding the quality and performance of ResNet services. However, data shows that communication is lacking between responsible departments. Nearly one-fourth of Business Officers do not meet with their IT department, 22.7% of Housing Officers do not meet with the IT department, and 18.9% of IT Officers do not meet with the Housing/Residence Life department.

FINDINGS *(continued)*

Level of Satisfaction with ResNet Services

The role of the Housing Officer is to ensure student satisfaction with all aspects of on-campus housing, including ResNet services. They are the “voice” of residents. Housing Officers are reportedly satisfied with the overall performance of the ResNet services available to their on-campus residents. In the survey, they were asked to measure the performance of ResNet services on a scale of 1 to 10, where 1=poor and 10=excellent. The following chart provides the average rating. 2016 shows an increase in satisfaction for reliability (uptime), performance (speed), and security. However, satisfaction scores went down for service response time and cost.



FINDINGS *(continued)*

Diagnostics

Measurements and reports are critical to quickly diagnosing and resolving ResNet problems and ensuring user satisfaction. Furthermore, measuring costs with quality of service can be a critical component of evolving strategies for disruptive technologies.

Although 70.8% of Housing and Business Officers would like to benchmark ResNet services, 55.7% do not have access to such information. When Business Officers were asked to rank various factors in terms of relative importance with respect to IT telecommunications, and networking services, the survey found that reliability (uptime), security, and performance (speed) were valued over cost. The following table illustrates the ranking factors and weighted scores (which is the sum of all weighted rank counts). Rankings are the same as last year's survey results.

| Drivers of IT Telecommunications and Networking Services Ranked by Importance - Business Officers | | |
|--|------|----------------|
| | Rank | Weighted Score |
| Reliability (uptime) | 1 | 589 |
| Security | 2 | 520 |
| Performance (speed) | 3 | 501 |
| Operating Cost Predictability | 4 | 438 |
| Capital Cost Predictability | 5 | 348 |

Only 30% of Business Officers have the diagnostic information they need regarding the above factors. Moreover, it's the factor of most importance where Business Officers have the least information. Although the chart above shows that Business Officers value information regarding security breaches, more than half say they do not have access to—but would like—this data.

This lack of information 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. Fifty percent have a team of between 1 and 4 staff members. And 20% of institutions have a team of between 5 and 9 staff members, while 10.8% have 8 or more.

The following 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 service volume and support, headcount, speed and performance, and reliability.

FINDINGS *(continued)*

Diagnostic Needs of Housing and Business Officers



FINDINGS *(continued)*

Funding and Technology Costs

Key Takeaways:

- An increasing number of respondents expect wireless costs to increase and by larger and larger percentages.
- Fewer institutions reported an increase in ResNet funding – from 54% in 2015 to 47% in 2016.
- Slightly more than one-third of institutions do not levy a technology fee.
- Eleven percent of institutions anticipate an increase of wireless networks services at 15% or more.
- Eighty percent are balancing bandwidth costs through shaping and/or by combining their ResNet services with other campus IT services (an increase of 11% from 69% in 2015).

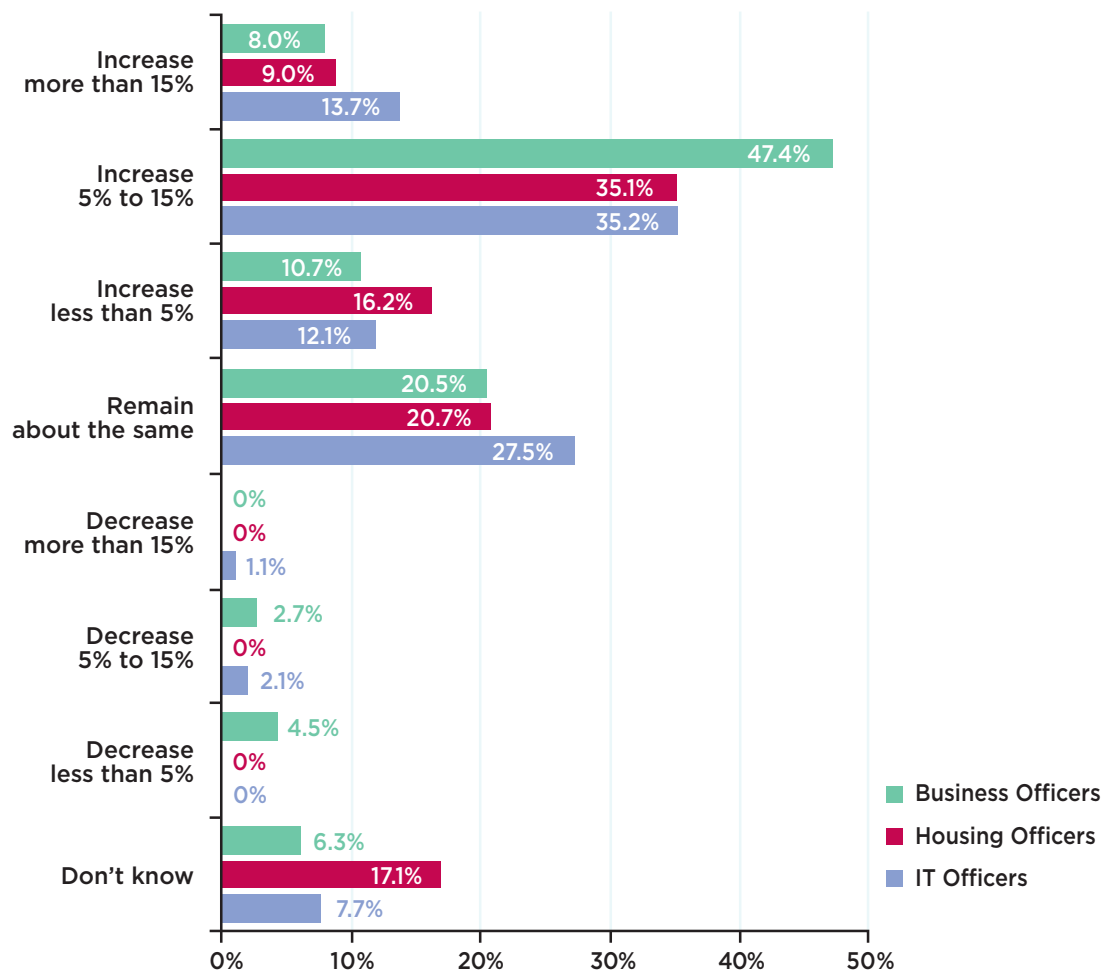
Colleges and universities continue to face an uphill battle with wireless costs and funding. Sixty-two percent of all institutions expect the cost of wireless network services to increase over the next two years with half of institutions expecting an increase in cost of 5% or more – an intense rise from nearly 39% last year. Eleven percent of institutions anticipate an increase of wireless networks services at 15% or more.

A deeper analysis of these findings shows that business officers have a more dispiriting expectation of the future costs of wireless (see chart below), with 66% expecting wireless costs to increase. But technology officers see the increase to be more drastic. Nearly 14% of technology officers expect a 15% or more increase in cost in wireless network.

On the positive side, 47% of institutions saw an increase in ResNet funding. However, this number dropped from 54% in 2015. In contrast, 7% of institutions expect a decline in funding. Twenty-one percent of Business Officers and 31.3% of Housing Officers do not know how the total cost of ResNet has changed over the past two years.

FINDINGS *(continued)*

Cost Expectations for Wireless Network



FINDINGS *(continued)*

Who Pays for ResNet Costs & How are Costs Recovered

Annual budgets for ResNet closely reflect the size of the institution. More institutions (44.2%) have an annual budget of less than \$750,000; one-third have a budget between \$750,000 and \$2.5 million and 22.5% over \$2.5 million.

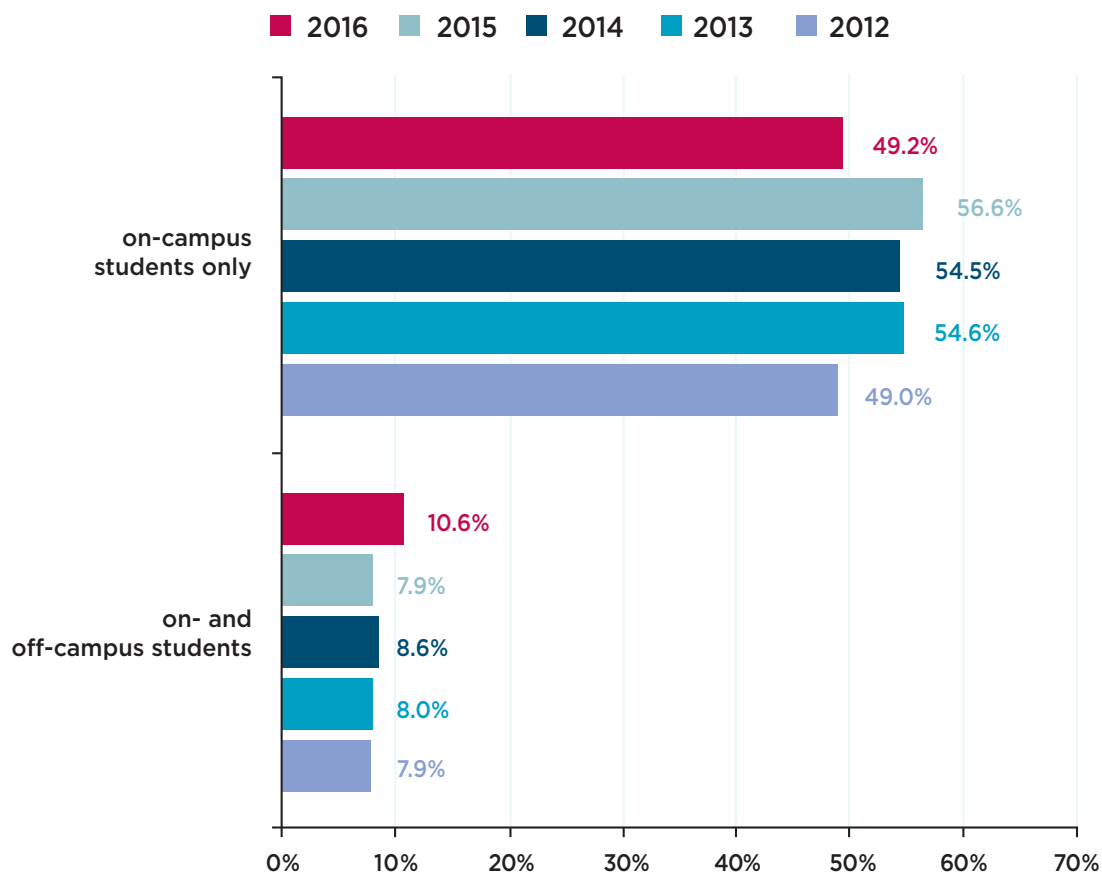
Funding models follow tightly with the size and type of university. Small, predominantly private institutions fund centrally, and medium to large, predominantly public institutions use a fee/recharge system. This year's data presents an increase in the number of institutions using mixed-resources (55.3% vs. 47.9% in 2015) as opposed to relying solely on central university funds.

| Funding Models for Campus Telecommunications and Network Services | | | | |
|--|-------|-------|-------|-------|
| | 2016 | 2015 | 2014 | 2013 |
| Completely fund the network as a core university service from central university funds. | 41.5% | 47.4% | 49.3% | 30.8% |
| Partially fund with student fees and partially through central university funds. | 33.3% | 28.6% | 23.7% | 35.9% |
| Jointly fund the network through central university, student fees and departments. | 17.1% | 15.1% | 13.8% | 15.0% |
| Partially fund by departmental assistance (colleges and schools) and partially fund by central university funds. | 4.9% | 4.2% | 9.9% | 12.8% |

Some technology costs are recovered through a general technology fee. And this year presents a small shift in the way universities levy the technology fee. There is an increase in the number of universities that levy a general technology fee to both on- and off-campus residents (10.6%), while now 49.2% charge on-campus fees only. An increasing number of institutions forego a general technology fee all together - from 28.5% in 2015 to 35.2% in 2016.

FINDINGS *(continued)*

How Institutions Levy General Technology Fee



Nine percent of schools have increased or added new student/user fees to address the rising costs of ResNet, and 29.9% are considering it. More schools have addressed the cost of ResNet by combining network services with other campus IT services (47.8%) and/or through shaping bandwidth (41.6%). Another 29.2% are considering these actions.

FINDINGS *(continued)*

Outsourcing

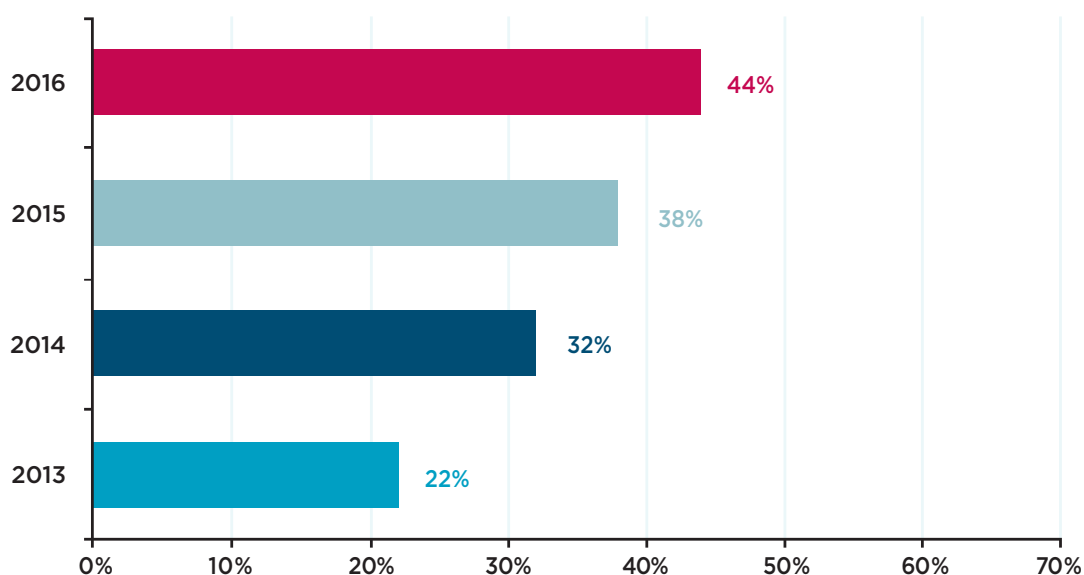
Key Takeaways:

- The number of schools outsourcing or considering outsourcing continues to increase year over year and has doubled from 22% in 2013 to 44% of schools.
- Outsourcing IPTV may be the way of the future as 8.6% of universities are currently outsourcing and another 26.3% are considering an outside entity to provide these services.

Higher education institutions have always been on the cutting edge of technology seeking to provide faculty and students with the most powerful and efficient access to information. In today's environment, the explosive increase in mobile devices and their associated high-bandwidth applications have put universities in the crosshairs of managing infrastructure, technology, lifestyle, and costs.

Since 2013, the number of institutions outsourcing or considering outsourcing some or all ResNet services has doubled from 22% to 44%. While cost-savings seems to be a predominant reason for outsourcing ResNet services, many institutions outsource as a way to improve service quality, keep up with the changing technology, improve student satisfaction, and spare resources and time.

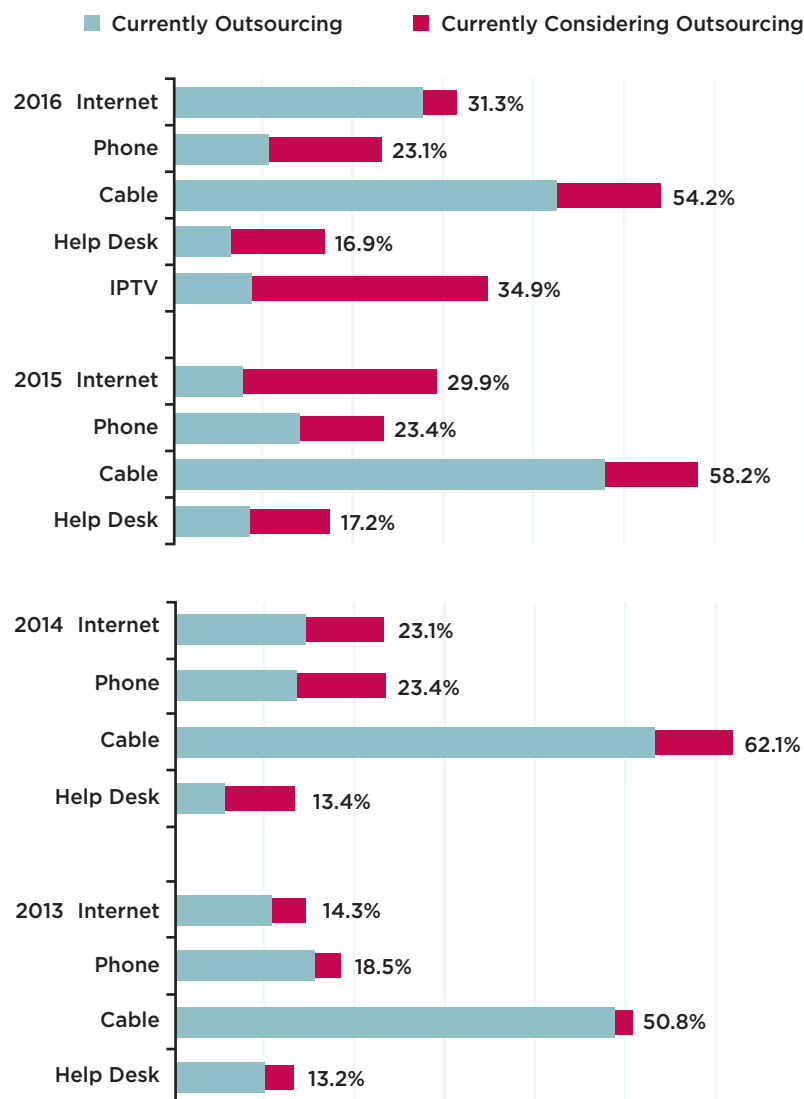
Percentage of Institutions Outsourcing or Considering Outsourcing to Trim Costs



FINDINGS *(continued)*

The following chart illustrates that more institutions outsource cable TV compared to other ResNet services. However, while this year shows a small decrease in the percentage of schools outsourcing cable, 8.6% of are currently outsourcing IPTV and 26.3% are considering it.

Percentage of Institutions Outsourcing ResNet Services





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