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TELECOMS.COM INTELLIGENCE ANNUAL INDUSTRY SURVEY 2017

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HEAVY READING

About Heavy Reading
Heavy Reading, the research division of L**ight Reading** and **Telecoms.com**, offers deep analysis of emerging telecom trends to network operators, technology suppliers and investors. Its product portfolio includes in-depth reports that address critical next-generation technology and service issues, market trackers that focus on the telecom industry's most critical technology sectors, exclusive worldwide surveys of network operator decision-makers that identify future purchasing and deployment plans, and a rich array of custom and consulting services that give clients the market intelligence needed to compete successfully in the global telecom industry. The Heavy Reading analyst team features 20 analysts with embedded expertise in in a wide range of topics covered in this year's Annual Industry Survey.

EDITORIAL

Scott Bicheno

Scott Bicheno
Editorial Director

CHANGE IS THE ONLY CONSTANT

In attempting to tackle the massive task of tracking the telecoms industry we need to first try to define exactly what that entails. Previously we may have restricted ourselves to operators, networks, BSS/OSS and devices, but as we move towards the 5G era so many more factors have been introduced into the business of telecoms.

So much water seems to have passed under the bridge since the last Telecoms.com Intelligence Annual Industry Survey that it almost feels like we're writing about a different sector. Among our main sections this year are security, ultra-broadband, video and IoT, which illustrates the many different considerations that go into today's networks and what they might be used for. The testing and measurement, NFV and SDN sections provide a reminder of just how complicated they have become.

The Telecoms.com audience is comprised entirely of people with a professional interest in this industry and the hundreds of respondents to this year's survey offer a unique insight into expectations, plans, attitudes and concerns.

The Operator Landscape section is designed to provide a snapshot of what operators are thinking. For example by far the biggest potential threat perceived by our respondents was 'increased pressure to lower prices and profit margins'. It also asks them which phenomena they consider to be overhyped, and the clear leaders in this respect are AI and IoT.

Moving onto UBB, the majority of respondents think ultra-broadband will improve network performance and reliability, while almost half think the high cost of deployment is an issue. With IoT a large number of respondents are still struggling to see the business case for it, but reckon the smart home is the most likely to emerge.

Our virtualization sections reveal NFV is expected to be most important for reducing operating expenses but cost and complexity are once again viewed as barriers. And even greater proportion of respondents think SDN will reduce operating expenses, but point to legacy integration challenges as the greatest impediment.

The vast majority of respondents think video will be viewed as either essential or useful for telecom service providers in five years' time. Nearly every company seems to have experienced some increase in internet-based security threats over the past year, while the most common use of testing and measurement is to improve network security.

Once more the Telecoms.com Annual Industry Survey has delivered an excellent set of insights into the most pressing concerns of our industry today and into the future. We would like to thank everyone who responded and hope you find the results as insightful as we do.

“

THE TELECOMS INDUSTRY HAS BEEN **EVOLVING WITH MONUMENTAL PACE IN RECENT YEARS;** LEST WE FORGET THE SMARTPHONE AS WE KNOW IT IS STILL LESS THAN 10 YEARS OLD. WITH THAT IN MIND, IT'S A TRICKY TASK TRYING TO PREDICT EXACTLY WHERE TELECOMS WILL BE 10 YEARS FROM NOW.

1,500 Survey Participants Worldwide

36.3% Europe

23.9% North America

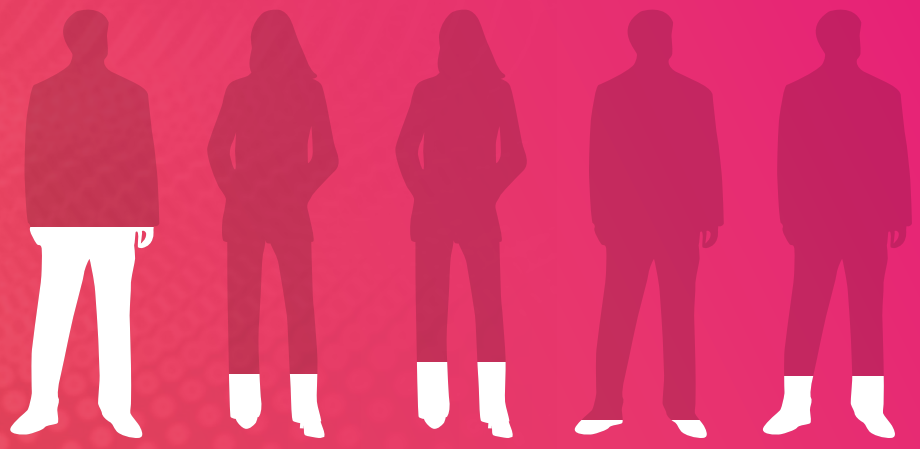
18.6% Asia/Pacific

8.3% Africa

6.8% Middle East

6.2% South America

Breakout by Organization Type



Service Provider **49.1%**

Analyst/ Consultant **14.8%**

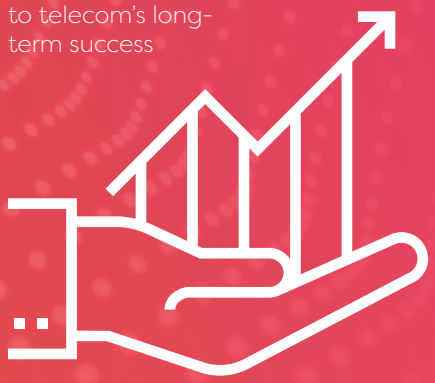
Software/ Systems Integration Vendor **17.7%**

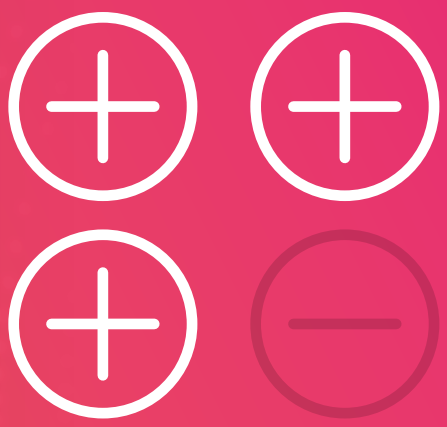
Government/ Regulatory **4.1%**

Other **14.3%**

55.5%
say IoT is a priority investment area for their company in 2018

61.7%
say emerging technologies & services are critical to telecom's long-term success





76.8%
feel positive about the telecom industry's prospects for 2018

Top 3 Threats to Long-Term Success

Increased pressure to lower prices and profit margins

Competition from Webscale giants

Inability to adopt an agile service model

6.7%
of CSPs say NFV is not important at all to their company's five-year plan

53.9%
of CSPs say their company will increase spending on SDN in 2018

OPERATOR LANDSCAPE

The telecoms industry underpins the entire global economy, a reality that is both exhilarating and frightening for industry participants. Emerging technology and service trends like the Internet of Things (IoT), artificial intelligence, and 5G networks hold the promise of vast opportunity for communications service providers, but there are many questions to be answered before that opportunity can be realized.

The 1,500 survey participants to this year's Telecoms.com Intelligence Annual Industry Survey are bullish about the industry's prospects for 2018. And most of them think their company is in a good position to succeed despite the looming challenges that face the telecoms sector at large.

KEY TAKEAWAYS

- Telecoms professionals are decidedly upbeat about the industry's performance: Nearly 60% of all respondents said the sector's performance in 2017 has been excellent or good, and more than 75% expect 2018 to be a good year as well.
- The two biggest potential threats to the long-term business success of their company are increased pressure to lower prices and profit margins (cited as the top threat by 26.2% of all survey respondents) and competition from Webscale giants (picked as the Number 1 threat by 17.7%).
- IoT – the Internet of Things – was named as both the top investment priority area for 2018 and the most overhyped emerging technology today, a result that suggests the telecoms sector is a bit conflicted about IoT's importance and potential.

DAMN THE TORPEDOES

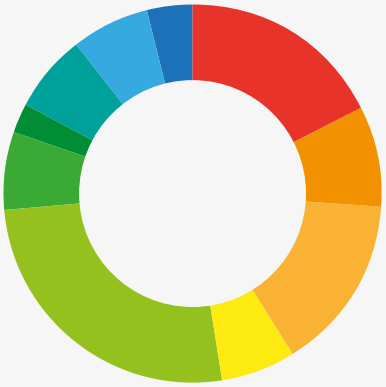
Welcome to the Telecoms.com Intelligence Annual Industry Survey, in which our unique audience of telecoms industry professionals share their opinions on the key issues and trends affecting the sector. We begin with questions designed to provide an overview of telecoms opinion before drilling down deeper into specific subject areas. We hope you will agree that our findings provide great insight into the attitudes and expectations of telecoms professionals and hope you find them useful in shaping your own.

The waters in which the telecoms industry has been sailing for the past decade are far from tranquil, and there's little to suggest that any noticeable calm will set in for the foreseeable future. In most markets, competitive environments continue to undergo wrenching changes driven by new players and technology innovations that are making even networks built at the start of this century seem increasingly obsolete. Rapid, almost uncontrollable change, new business pressures, and more exacting demands from customers – it all adds up to seriously roiling waters.

And yet most of the industry professionals who participated in our latest Telecoms.com Intelligence Annual Industry Survey seem decidedly unfazed by the real and potential market disruptions facing the global telecoms sector. Nearly 60% of the 1,500 telecoms professionals who responded to our survey – conducted in October 2017 -- characterized the telecoms sector's performance in 2017 as being excellent or good, and an even higher percentage – 76.8%, to be exact – said they were positive about the prospects for 2018.

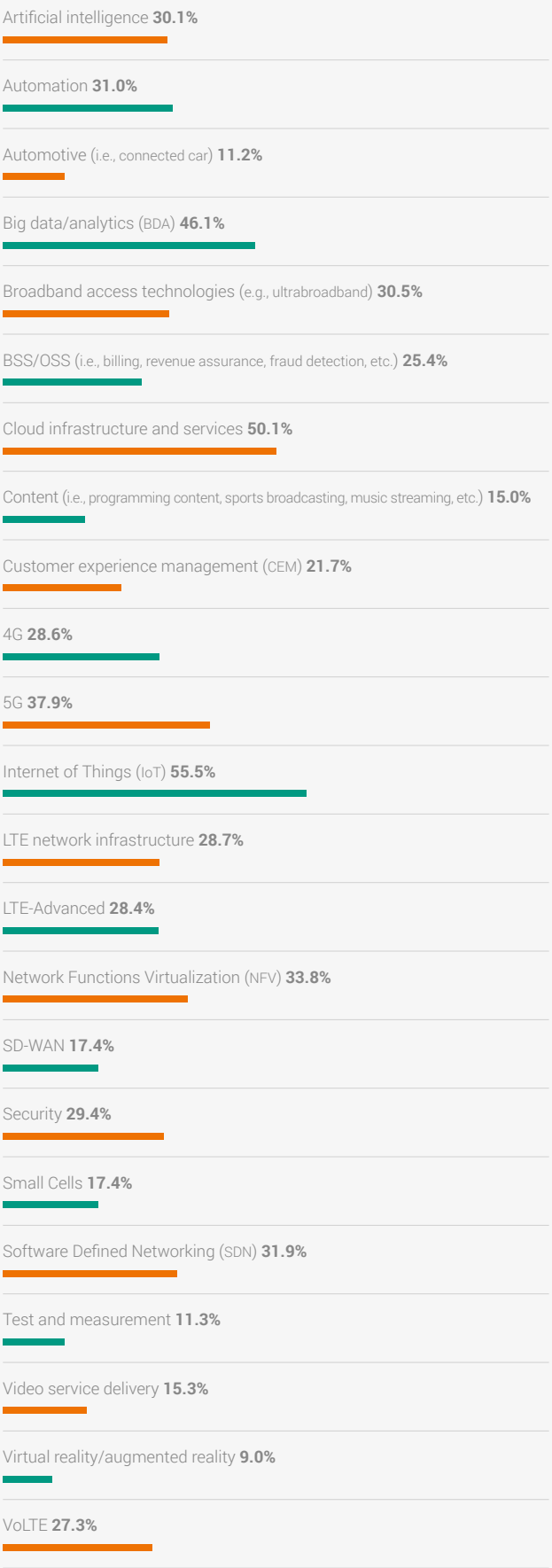
Pessimists in our respondent base were few and far between. Only 6.5% said the telecom sector's performance this year has been below average or poor, and only 5.5% have a negative outlook for 2018. Interestingly, some respondents are a little less optimistic about their own company's performance. While half of all our survey takers said their company has been outperforming the industry as a whole in 2017, nearly 15% characterized their company as an underperformer this year. >

Which of the following is the greatest potential threat to your company's long-term business success?



- Competition from Webscale giants (Google, Amazon, Microsoft, etc.) 17.7%
- Failure to address network complexity issues 8.6%
- Inability to adopt agile service model 15.0%
- Inability to lower capital and operating expenses 6.3%
- Increased pressure to lower prices and profit margins 26.2%
- Lack of demand from the enterprise sector 6.5%
- Lack of demand from the consumer sector 2.6%
- Lack of new products and services 6.8%
- Regulatory restraints 6.6%
- Other 3.7%

Which of the following are likely to be priority investment areas for your company in 2018?



It may be that those who work in the telecoms business are simply used to the fact that they work in a sector that is constantly changing. More than half of this year's survey respondents said they've been working in telecoms for 15 years or more, with nearly a third putting their length of service at 20 years or more. That level of experience gives our survey results a strong element of perspective.

When asked to identify the single greatest potential threat to their company's long-term business success, respondents focused on two main problems: increased pressure to lower prices and profit margins (cited by 26.2% of all respondents as the biggest threat they face), and competition from Webscale giants like Google, Amazon, and Microsoft (named the top threat by 17.7%). The third most serious threat to long-term success, according to respondents, is the inability to adopt an agile service model – cited by 15% of survey takers as the biggest threat to their company's long-term success. Respondents were far less concerned about problems related to lowering capital and operating expenses – only 6.3% pointed to capex/opex as the top problem their company faces.

We asked respondents to identify where they see growth opportunities for the telecoms sector, and which areas are most likely to be designated as priority investments for their company in 2018. In terms of market segments, the majority of respondents – 53.7% -- said the enterprise sector holds the greatest opportunity for revenue growth. Just under 35% said the consumer market is the juiciest growth target for their company, while 11.6% said the government/public sector has the most promise.

In terms of priority investments for 2018, two areas were identified by the majority of survey respondents: Internet of Things (IoT, named as a priority area by 55.5% of all respondents) and cloud infrastructure and services (chosen by just over 50% of survey takers). Other leading priority areas include big data/analytics (46.1%), 5G technology (37.9%), and network functions virtualizaton (NFV, 33.8%). Fewer than 30% of respondents chose security as a priority investment area – a somewhat surprising number given the growing threat levels facing the telecoms sector.

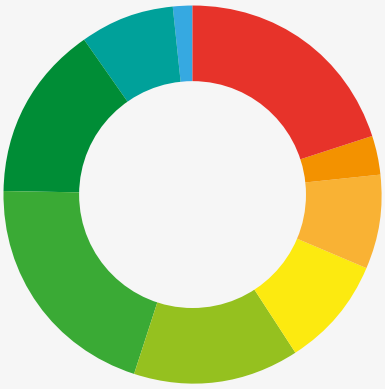
While IoT topped the list of priority investment areas for 2018, survey takers apparently aren't completely sold on its benefits, at least in the near term. Just over 20% of all respondents picked IoT as the most overhyped emerging technology today, with artificial intelligence (AI) running a very close second. By contrast, virtualization – as represented by NFV and software-defined networking (SDN) – was named as the most overhyped emerging area by less than 10% of our survey takers.

Overall, however, survey respondents see important value in emerging technologies and services. More than 60% of our survey takers said emerging technologies and services are critical to the long-term success of the telecoms industry, and that companies that do not embrace them will go out of business. Another 28.4% said emerging technologies and services represent a good opportunity, but not one that will necessarily make or break a company. Only 10% called the potential of emerging technologies and services either marginal or negative for telecoms.

Based on responses to our survey, telecoms industry professionals are decidedly optimistic about 2018, and they see the new technologies and services on the horizon as being more of an opportunity than a threat to the industry's long-term prospects.

In the following sections of this report, we take a closer look at seven key areas of interest for the telecoms sector: ultrabroadband access, video services, security, IoT, NFV, SDN, and test and measurement. In those sections, we focus on the responses from the 700 service providers participating in the survey project.

What is the most overhyped emerging technology today?



Artificial intelligence	20.1%
Automation	3.3%
Automotive (connected car)	8.1%
Big data/analytics	9.4%
5G	14.1%
Internet of Things (IoT)	20.3%
Virtual reality/augmented reality	15.0%
Virtualization (NFV and SDN)	8.3%
Other	1.4%

"OVER 60% OF SURVEY RESPONDENTS SEE IMPORTANT VALUE IN EMERGING TECHNOLOGIES AND SERVICES."

ULTRA BROADBAND

The combination of higher-speed broadband connectivity and new applications and business models for telecom operators promises tremendous change in fixed broadband networks over the next five years. Ultra broadband (UBB) – defined as networks providing downstream data rates of 100 Mbit/s or more over any type of fixed network connection (copper/fiber/coax) – is set to play a key role in operators' broadband plans, as they seek to boost broadband revenues, compete with other providers (including OTTs), and offer new services to customers. This section of our survey covers operators' views and strategies on UBB, including trends and deployments.

KEY TAKEAWAYS

- Most network operators believe that UBB is important to their future success, and most also think they are in at least a good position to achieve leadership and success.
- Despite UBB's importance, operators will be hesitant to significantly boost their capex budgets to deploy UBB, and the high costs of deployment are cited as the biggest barrier to moving forward.
- Nearly two-thirds of operator respondents expect to achieve full UBB deployment by the end of 2020, and 22% said their company will reach that goal by the end of 2018.

HUAWEI

BROADBAND GETS THE ULTRA TREATMENT

Operators around the world know how important high-speed broadband is to their customers and to the global economy. Their challenge now is to deliver those services without wreaking havoc on their spending budgets.

Network operators overwhelmingly view ultra broadband (UBB) – defined as fixed-line service delivering at least 100 Mbit/s to subscribers -- as important, if not critical, to their overall strategies over the next five years. 36% of the 700 network operator respondents participating in our survey identified UBB as critical, while an additional 47% identified UBB as important. Only 5% dismissed UBB as being of no importance to their company.

Network operators as a whole believe they are in a good position regarding UBB currently, but there is clearly work to be done moving forward. While 21% of survey respondents believe they are currently leaders in UBB deployments, the largest percentage of the survey group (at 40%) reported that they are in a good position, but they have work to do to achieve leadership. Additionally, 21% said that, although UBB is important to them, they are falling behind their competitors in deployment.

With UBB set as a strong priority, it is not surprising that spending on UBB is set to increase. However, that spending increase will be relatively modest. 55% of survey respondents expect an increase in UBB spending in 2018, only about 26% expect that increase to be greater than 10%. For 40% of the survey group, UBB spending is expected to be flat compared to 2017.

There are many potential benefits to operators in deploying UBB, but a couple of key benefits were singled out by survey respondents as being most important to their company. At the top of the list were improving network performance and reliability (selected by 53% of respondents) and delivering new advanced applications and services (such as 5G, 4K video, smart home, etc., selected by 50%). Forming a strong second tier of potential benefits were allowing for greater network and service agility (41%), preparing for the coming 5G era (39%), and increasing broadband ARPU (average revenue per user, 38%). >

What are the most important benefits to your company regarding UBB?

- Improve network performance/reliability 52.8%
- Reduce operating expenses 28.1%
- Allow for greater network/service agility 40.7%
- Increase broadband average revenue per user (ARPU) 38.2%
- Deliver new advanced applications/services (i.e., 5G, 4K video, smart home, etc.) 49.7%
- Expand services into new markets or industries (i.e., enterprise, B2B, etc.) 30.9%
- Prepare us for the coming 5G era 38.5%
- Enable us to match or exceed our competitors' broadband offerings 27.8%
- Ensure our ability to survive in our market 23.0%

Naturally, there are some significant barriers preventing operators from achieving their UBB deployment goals, and we asked operators to identify the key barriers in the survey. Topping the list of problems, by a wide margin, was the high cost of UBB deployment, which was selected by 48% of survey respondents. Following high costs, two other barriers form a second tier of challenges. Lack of clear business case/ROI (selected by 30% of respondents) is closely associated with high deployment costs, as high costs eliminate service profitability and thus erode the business case. The need to develop and implement business models for new services (selected by 30%) was cited as the third-biggest barrier to attaining deployment goals.

While the UBB barriers are clear, business goals around broadband overall are quite mixed. When we asked respondents to identify the single greatest priority for broadband over the next five years, no single goal rose to the top. Five goals each received double-digit response rates, including extending broadband coverage to increase national penetration (selected by 19% of respondents), developing new business models and new services to increase broadband revenue (18%), increasing mobile broadband speeds for next-gen broadband services (16%), integrating broadband services across fixed and mobile networks and devices (11%), and boosting broadband speeds to UBB rates and above (11%). Of the eight potential business goal choices we offered in the survey, reducing network capex and opex came in dead last, with only 7.3% of service provider respondents choosing that as their company's top UBB priority.

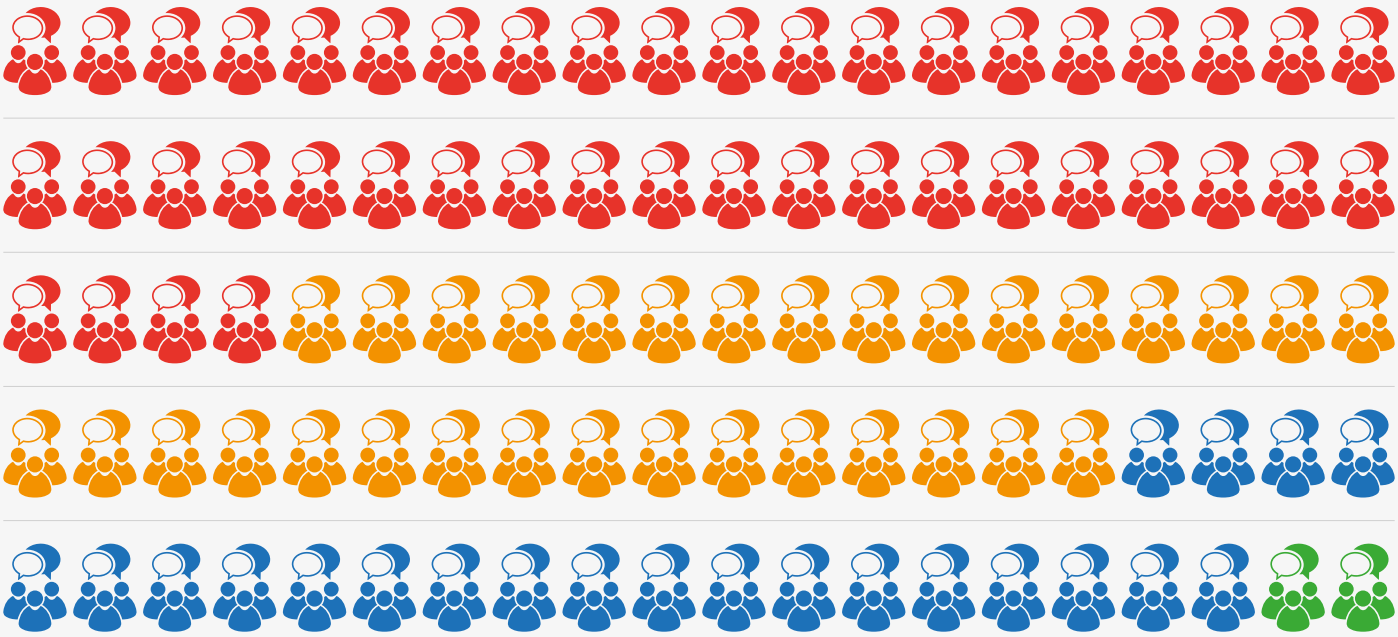
Full UBB deployment is on the horizon – and not too far on the horizon – for most operators. In our survey, 22% of respondents reported they expect to achieve full UBB deployment to all customers by the end of 2018, while an additional 36% said they expect to reach full deployment in the 2019-2020 timeframe – meaning that the majority of operators represented in our survey (58%) would have full UBB deployment by the end of 2020. For a large minority – 28% of respondents – full UBB deployment is beyond the 2020 horizon. And for 15% of the group, full deployment is not expected at all. We expect operators in many developing nations fall into these latter two groups as their priorities are increasing coverage of basic broadband within their countries and often extending their broadband coverage with cellular technologies.

Ultrabroadband is expected to have at least a moderate impact on the business performance of network operators over the next five years. In our survey, 23% of respondents said that UBB will have a major impact on their business and an additional 53% reported that UBB will have a moderate impact. Only 8% of network operator survey respondents said that UBB will have no impact on business performance.

To get an understanding of how operators expect UBB to play out versus industry expectations, we asked respondents what they thought the telecom industry's perception of UBB will be five years from now. The response was somewhat optimistic: In the survey, 44% said that they expect UBB to prove essential

What do you think the telecom industry's perception of UBB will be five years from now?

- UBB was essential to the success of telecom service providers **43.5%**
- UBB was useful for telecom service providers, but it fell short of delivering on its initial promise **32.3%**
- UBB provided some benefit to telecom service providers, but not enough to justify the cost and effort of deployment **21.9%**
- UBB was a complete waste of time for telecom service providers **2.3%**



HUAWEI

It's not surprising to see survey takers consider high cost of UBB deployment the biggest barrier to moving forward. The whole broadband industry is thriving; however, the industry still faces great development challenges. For end users, broadband experience urgently needs improvement as home broadband is increasingly enabled by Wi-Fi networks, and bandwidth-hungry services continue to develop. For operators, the payback period of broadband investment is long, especially in developing countries; as the last mile remains challenging, network operation efficiency is low.

Therefore, it's key for operators to focus on return on investment (ROI) and achieve precise investment, network deployment, and operations to shorten the payback period. For the last mile, operators can use any medium such as optical fiber, copper, and wireless to accelerate broadband while achieving the optimal total cost of ownership (TCO). For the backhaul, operators can take several measures, such as fixed-mobile synergy, infrastructure sharing, and creation of industry alliances, to share benefits and fully collaborate with other industries.

Based on our experience, infrastructure coordination can save 30 percent or more on network buildout; routing FTTH through existing electricity pylons and underground pipes as an example. Also, fixed-mobile synergy can greatly shorten the total payback period to under 3 years, while using the unified outdoor cabinet, rooftop site, single fiber backhauling or microwave backhauling to deploy FTTH networks can cut project time by 70 percent.

By increasing the efficiency of broadband investment and shortening the payback period, operators can achieve sustainable development and provide better broadband experience to customers.

> "IT'S CLEAR FROM NETWORK OPERATOR RESPONSES TO OUR SURVEY THAT HIGH-SPEED BROADBAND IS WIDELY VIEWED AS A **CRITICAL SERVICE**"

to the success of telecom service providers, the largest of any options presented to them. Still not everyone is completely optimistic. Nearly one third (32%) expect that UBB will prove useful for telecom, but fall short of the initial promise, and close to 22% said they expect UBB to provide some benefit, but not enough to justify the cost and effort of deployment.

Lastly, looking further into the future, we asked operators when they expect to achieve wide-scale deployment of Gigabit broadband services, with "wide-scale" defined as at least 50% of the customer base. Here, the timelines are a bit further than UBB plans, but not too much further. 32% of respondents to achieve wide-scale Gigabit broadband in the 2018-2019 timeframe while an additional 31% expect to reach widescale Gigabit broadband in 2020-2021. Only 14% of the survey group reported that Gigabit broadband is not a priority.

It's clear from network operator responses to our survey that high-speed broadband is widely viewed as a critical service – a conclusion that isn't particularly surprising. But reading between the lines in the responses, it's far less clear exactly what benefits operators hope to achieve by delivering those services, and whether, in the long run, the benefits will outweigh the cost of high-speed broadband delivery.

What are the most difficult issues for your company regarding UBB deployment?

The need to develop and implement business models for new services	29.8%
Lack of investment in/internal commitment to UBB	22.8%
No clear business case/lack of ROI	30.1%
Lack of customer demand for UBB	18.8%
Lack of government support for national broadband	18.5%
Lack of confidence in product/vendor solutions for UBB	8.2%
High costs of deployment	47.5%
Overwhelming competition in our market	12.4%
Regulatory challenges/uncertainty	20.8%
Network planning	21.1%
Network deployment	20.8%
Service provisioning	16.6%
Operations & maintenance	16.9%

INTERNET OF THINGS

Service providers have been providing cellular-based telematics and machine-to-machine (M2M) connectivity since the 1990s, but the emerging Internet of Things (IoT) era presents a wide array of new challenges. The mobile IoT space is a potentially huge opportunity for service providers if they can adapt to the technical and business requirements of the industries that will drive the first significant wave of IoT adoption. In this part of the survey, we explored how service providers are viewing the IoT opportunity, where they are focusing, and how they are positioning to address the market.

KEY TAKEAWAYS

- More than 80% of service provider respondents believe that IoT will be important or critical to their business, and only 5% consider it unimportant.
- Two-thirds of service providers anticipate that their company's spending on IoT will increase in 2018, with 32% saying it will grow by more than 10%.
- The single largest concern about IoT, at almost 38%, is the inability to create a clear business case. Not surprisingly, this was closely followed by uncertainty over the benefit of IoT to the business, with lack of investment in and internal commitment to IoT both at 36%.

AS THE WORLD AUTOMATES

The move to automation and autonomous systems is gaining momentum, setting the stage for potentially massive changes in the way the world works and communicates. The internet of things will be at the heart of the next automation revolution.

The ability to connect and deploy billions of sensors to monitor and control everything from cars and homes to oil rigs, industrial plants, and hospitals, is the digital future that will rest heavily on IoT systems. IoT clearly represents a huge opportunity for telecoms service providers to help drive global economic development for the next two decades. But it's an opportunity that carries more than a modicum of risk.

To gauge the telecoms industry's frame of mind on IoT, we asked respondents how important IoT services would be to their company's overall strategy over the next five years. More than 80% of the 355 service providers participating in our survey believe that IoT will be important or critical to their company. Only 5% dismissed IoT as being unimportant. This indicates an increasing awareness of IoT's potential, and is consistent with the rising level of activity by the GSMA's Mobile IoT initiative in driving an ecosystem to support the deployment of LTE-M and NB-IoT systems. It's also further supported by the continued emphasis of IoT as a key use case for 5G. Those that don't yet consider it critical may still be struggling with the mind shift necessary to embrace the different network and business models required to serve the market.

To determine the degree to which interest in IoT is translating into action, we asked how spending on IoT evaluation and deployment would change in 2018. 67% of all service provider respondents anticipating that spending will increase, with 32% saying their company's spending on IoT will grow by 10% or more. So IoT looks to be a positive opportunity for ecosystem suppliers, and seems to support the acceleration of LTE-M and NB-IoT trials and expanded deployments.

Regarding the potential benefits that IoT can deliver to their company, 62% of service provider respondents point to IoT's ability to expand their service portfolio, and almost 57% see IoT as generating new revenue sources. Clearly, there's an element of concern about competitors beating them to the punch, with nearly half of respondents saying their deployment of IoT will help match or exceed competitors' offerings. At the same time, nearly 44% think that IoT will help shape their future growth, with another 36% saying IoT will ensure their company's survival.

As noted in the Operator Landscape section of this report, survey respondents have a high level of uncertainty about IoT. Despite the general optimism, there are still challenges in the way of achieving success. The single largest concern voiced by service providers, at almost 38%, was the inability to create a clear business case for IoT. Not surprisingly, this was closely followed by uncertainty over the benefit of IoT to the business, with lack of investment in and internal commitment to IoT both at 36%. Respondents expressed least concern about lack of confidence in vendor solutions (19%). Looking at the overall picture, vendors may need to focus more on sharing knowledge about business models and practicalities of implementation than on touting the technical prowess of their solutions.

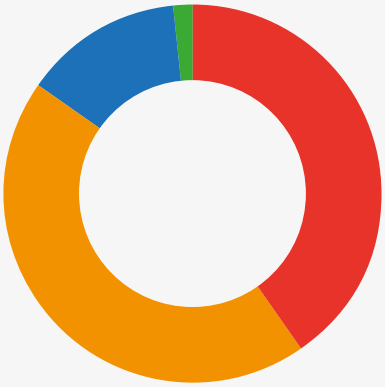
Concerns aside, a significant number of operators are already rolling out IoT services, according to the results from our survey. 40% of our service provider respondents say they either already have IoT services for customers (32%), or will have by the end of 2017 (8%). Nearly 42% more said they will have services by 2020. Of this group, 19% will offer services by 2018, and 22% in 2019 to 2020. This will mean that almost 60% of service providers will have IoT services by the end of 2018. Nearly 11% don't think they will be able to offer services until after 2020. Only 8% have no plans to offer IoT. >

Which markets hold the greatest potential for IoT success? When asked this question, nearly 60% of service provider respondents picked the smart home and smart building opportunity, followed by industrial and enterprise (53%), utilities (also 53%), and healthcare (51%). Smart cities (48%) consumer IoT (45%), logistics and asset tracking (44%), and connected car (43%) also are seen to have potential by survey takers.

One of the big questions for service providers and IoT is related to the types of services delivered. Will they focus on connectivity, or will they move up the stack? The two offerings that were effectively tied (at 46%) were connectivity services to end customers and IoT platform services. End-to-end services (39%) was the next most likely service, together with connectivity service to IoT MVNOs (31%). Only 22% said they would have no services to offer. Since most of the offerings are not mutually exclusive, and respondents had the option to select as many as applied, it's reasonable to assume that most operators will be offering a combination of these services as they explore market development.

We have seen that there is intent to invest in 2018 - but what IoT areas are the service providers looking to invest in over the next five years? Given the focus on NB-IoT and LTE-M, it should be no surprise that 56% of service providers are prioritizing IoT access network infrastructure. This potentially reflects the implementation of 5G V2X capability over the next five years. The second priority area is security (54%), which is high on everyone's agenda given the high visibility hacks that have occurred over the last year. The third choice, IoT platform (50%), is also fundamental to delivering IoT services: these top three are the essential components, and the next two are the glue that pull the offerings together. IoT visibility and analytics platforms (38%) allow operators to monetize basic and incremental services and separate core network infrastructure for IoT (37%), to agilely and cost effectively deliver them.

What do you think the telecom industry's perception of IoT will be five years from now?



- IoT was essential to the success of telecom service providers **40.5%**
- IoT was useful for telecom service providers, but it fell short of delivering on its initial promise **44.4%**
- IoT provided some benefit to telecom service providers, but not enough to justify the cost and effort of deployment **13.5%**
- IoT was a complete waste of time for telecom service providers **1.7%**

What are the biggest barriers to success for your company regarding IoT?

- Uncertainty about the overall benefit of IoT to our business **35.7%**
- Lack of investment in/internal commitment to IoT **35.7%**
- No clear business case for IoT **37.6%**
- Increase operating expenses **27.3%**
- Network/service agility **23.3%**
- Lack of confidence in product/vendor solutions for IoT **18.5%**
- High cost of deployment **25.0%**
- Impact on network performance/reliability **14.0%**
- New entrant competition in IoT market **20.5%**
- No clear deployment roadmap for IoT within our company **25.3%**
- No clear industry roadmap for IoT (i.e., lack of standards) **22.5%**

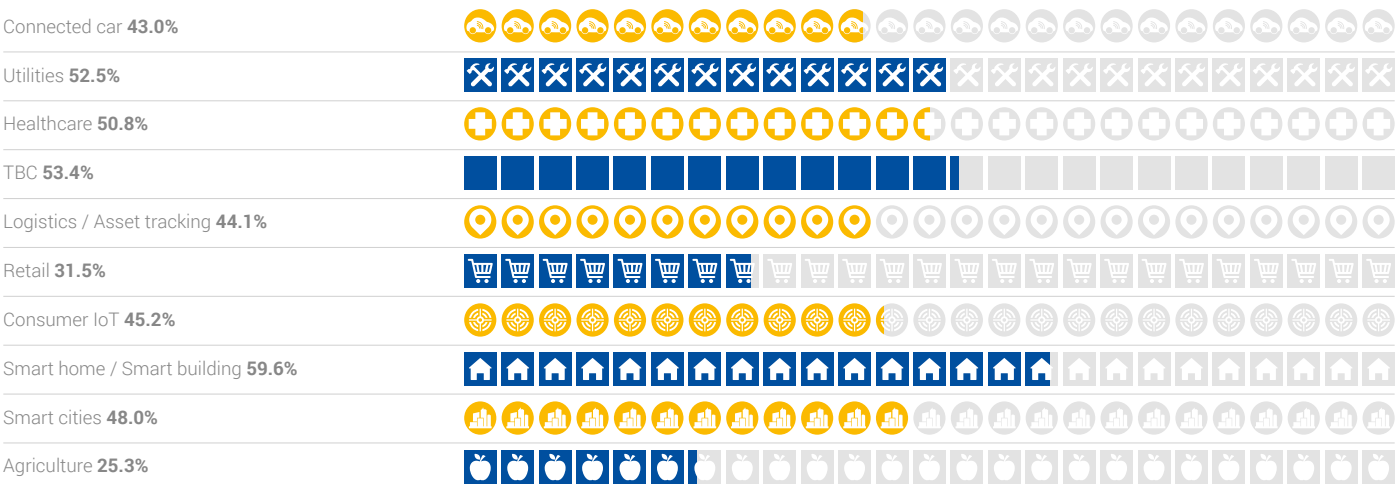
Regarding IoT's impact on telecoms over the next five years, only 7% of service provider respondents believe IoT won't be a factor in their business performance. A full 25% say IoT will have a major impact on their company's business performance, and nearly 50% more say IoT will have a moderate impact.

Finally, we asked survey takers what they think the telecom industry's perception of IoT will be in five years. Less than 2% believe that IoT will be considered a waste of time. About 44% anticipate that IoT will be seen as useful to service providers but that it will fall short of delivering on its initial promise. This compares to the optimistic 41% who believe IoT will prove out to be essential to service providers' success.

In summary, there appears to be significant forward motion for IoT, with positive intent from an investment perspective next year, as well as over the next five years. The favored target markets are less consumer and more industrial / enterprise, and the solutions are evolving beyond connectivity to platform-based end-to-end solutions. Service providers are still struggling with the business case for IoT, and this is reflected in barriers to deployment. It's also muting the enthusiasm when looking at IoT over the five-year period, from a company and industry perspective. The probability is that, as investments are made and deployments of mobile IoT expand, the experience gained with IoT will continue to reinforce this positive forward motion. And if those internal drivers aren't enough, the external demand for service automation will push the IoT agenda.

> IN SUMMARY, THERE APPEARS TO **SIGNIFICANT FORWARD MOTION** FOR IOT, WITH POSITIVE INTENT FROM AN INVESTMENT PERSPECTIVE NEXT YEAR, AS WELL AS OVER THE NEXT FIVE YEARS."

Which IoT markets will be important for your company?



Today, almost everything is becoming connected—cars, home appliances, factory machines, utilities, and office equipment, to mention just a few. As this survey confirms, IoT is rapidly increasing in importance for Communications Service Providers (CSPs). Inevitably, it is also becoming an integral part of life for consumers and businesses.

It is against this backdrop that CSPs must be acutely aware of the grave risk that is lurking in the less glamorous backstage of IoT—Infrastructure and Service Security. Because IoT devices are generally cheap, low-resource units, they are typically not secured. This fundamental weakness makes them easy targets for hacker and malware attacks.

Apart from creating huge disruptions for CSPs and their customers, such attacks also place their reputations in great jeopardy. Consequently, it is imperative for CSPs to stamp out the threats from IoT-connected devices worldwide. However, in parallel to the requirement for increased investment, there is a significant opportunity for new revenue streams in the form of value-added IoT security services for Enterprises.

Allot is the leading global provider of innovative network intelligence and security solutions for Service Providers worldwide. Our solutions are deployed globally on premise or over-the-cloud by some of the world's leading Service Providers enabling network and application analytics, traffic control and shaping, and network-based security solutions.

Allot IoT Defense enables Service Providers to secure IoT deployments at the network layer, addressing:

- **Infrastructure Protection:** Safeguarding the IoT network infrastructures that provide connectivity for IoT and IT systems
- **Service Protection:** Ensuring service continuity of IoT devices, and protecting them from malicious attacks

More information at **www.allot.com**

NETWORK FUNCTIONS VIRTUALIZATION

The telecoms industry has been grappling with NFV for several years now, and the struggle to gain the upper hand on the technology movement is far from over. Some of the early enthusiasm for virtualization has given way to a sense of mounting frustration as the pace of progress has been slower than initially expected. This part of the survey addresses service provider attitudes and expectations regarding NFV, a technology that ultimately will reshape the telecoms sector no matter how difficult it is to deploy.

KEY TAKEAWAYS

- While NFV deployment is still moving ahead and many service providers still see real benefits associated with virtualization, a broad mix of business and technical challenges are taking their toll and effectively slowing down pace and scope of commercial implementations.
- A majority of service provider survey respondents now say that over the next five years NFV will have only a modest impact on business success.
- Less than 10% of service providers participating in our survey say that their company is meeting their deployment schedule for NFV.

STUCK IN A VIRTUAL RUT

The telecoms sector is no stranger to the hype cycles generated by new technologies. In the case of NFV – network functions virtualization – the peaks and valleys of hype and disillusion have been especially drastic, and seemingly unending.

It's certainly not the norm for new telecoms technologies to steal the spotlight for extended periods of time. The normal gestation for innovative technologies is six months in the hype-cycle phase, followed by 12 months to achieve market acceptance or rejection. But it's been four years since NFV first emerged as a game-changing technology for telecoms, and in many ways it's still stuck in the hype machine. NFV emotion and commitment levels have experienced peaks and valleys based on trial experience, vendor overtures, and the undeniable angst associated with trying to undo decades of telecom legacy deployments without disrupting the delicate balance of shareholder expectations.

As we enter Year 5 of the NFV era, service providers are still struggling to make sense of NFV. Results of our survey suggest that a level of ambivalence has set in for a technology that is supposed to be instrumental in the digital transformation of the telecoms industry.

Despite the ups and downs, NFV still ranks fairly high on the strategic technology imperative curve, according to our survey results. Just over 77% of all service provider survey respondents say NFV is either critical (35%) or important (42%) to the execution of their five-year strategy. It's fair to say that NFV at least conceptually is still relevant to telecoms – although almost a quarter of service provider respondents classified NFV as being either marginal or not important at all.

One of the understated nuances of NFV is that it's not simply disruptive on a technical scale, but it's also forcing service providers to reassess their future. As the cloud becomes pervasive, service providers need to retool intellectually to create teams of skilled cloud field forces. But becoming a paragon of all things cloud doesn't happen overnight. Virtualization is essential to cloud, and for network operators, NFV is essential to virtualization.

What are the most important benefits to your company regarding NFV?

- Improve network performance/reliability 55.6%
- Expand our service portfolio 40.7%
- Reduce operating expenses 61.8%
- Allow for greater network/service agility 55.9%
- Enable us to match or exceed our competitors' offerings 26.4%
- Provide a clear direction for future growth 30.9%
- Ensure our ability to survive in our market 24.4%
- Deliver new revenue sources 25.8%

This sentiment showed through when we asked the respondents to assess their overall NFV readiness. Not surprisingly, only 19% considered themselves as NFV deployment leaders, while the largest group (38%) recognized they need to step up their games to achieve cloud NFV leadership status. Significantly, 29% also admitted that they are falling behind their service provider competitors in NFV deployment.

The impact of this latter group cannot be ignored since they represent almost a third of respondents, which can ultimately sway whether NFV achieves it potential commercially or lags in the 60%-70% deployment range. This also means that this group will at some point need to play capex catchup to make up lost ground. >

What do you think the telecom industry's perception of NFV will be five years from now?

- NFV was essential to the success of telecom service providers..... **36.2%**
- NFV was useful for telecom service providers, but it fell short of delivering on its initial promise..... **42.4%**
- NFV provided some benefit to telecom service providers, but not enough to justify the cost and effort of deployment..... **18.8%**
- NFV was a complete waste of time for telecom service providers..... **2.5%**

What are the biggest barriers to success for your company regarding NFV?

- Uncertainty about the overall benefit of NFV to our business..... **31.2%**
- Lack of investment in/internal commitment to NFV..... **32.9%**
- No clear business case for NFV..... **31.5%**
- Lack of confidence in product/vendor solutions for NFV..... **26.1%**
- High cost of deployment..... **38.5%**
- Complexity of NFV operations (e.g., on-boarding)..... **34.3%**
- Assuring NFV service quality..... **25.8%**
- No clear deployment roadmap for NFV within our company..... **18.0%**
- No clear industry roadmap for NFV (i.e., lack of standards)..... **16.9%**

And yet, in response to another survey question, 31% of respondents said they aren't forecasting any increased spending on NFV in 2018. But the other groups are – with nearly 27% saying their company will increase NFV spending by 10% or more in 2018 and another 33% projecting increases of less than 10%. If these expectations hold, there's a good chance that we will see a "virtualization gap" in the telecoms sector.

Another positive in the trend data is that service providers still view NFV as delivering value on several distinct levels. While service agility was the dominant attribute early on in trial and deployment cycles, perceived benefits of NFV have shifted a little, with a greater focus on reducing operating expenses (62%), than the venerable service agility attribute, which still retains a strong second place standing at 57%.

While the points above reinforce that most service providers are still focusing on NFV and moving ahead, the other group see themselves as either falling further behind or maintaining status quo mode. There are of course good reasons for this, including the existence of a broad range of barriers that must be addressed. Of these, the biggest perceived barrier to NFV is the high cost of deployment – cited by 39% of respondents as a big barrier to NFV success.

Other barriers most often cited by service provider respondents are the complexity of NFV operations (34%), a lack of investment commitment (33%), lack of clear business case (32%), and overall uncertainty of the business benefits (31%)

The takeaway from such a broad range of challenges is that NFV implementation is inherently complex. However, while this is largely the case, almost-half of our service provider respondents (49%) in a positive turn categorize themselves as managing a somewhat difficult implementation cycle, and another 9% said they are finding NFV an easy nut to crack. At other ends of the spectrum, 18% classify the journey as much more difficult or extremely difficult (6%), while close to 20% said they haven't begun NFV implementations at all.

Still, even for many of respondents, the implementation complexity curve will likely scale since only a very small percentage of service providers have implemented fully orchestrated solutions (3% with zero-touch automation and 10% with dynamic failover and autoscaling). In contrast, in order to minimize the impact of implementation complexity and onboarding, 20% of the service providers are utilizing manually deployed, non-orchestrated VNFs or even simply standalone network functions on common x86 compute nodes (24%).

While these latter approaches can certainly simplify the implementation process, they also will not satisfy the noted above cost savings or operational expense reduction requirements. Furthermore, these approaches often demand a vendor cost premium given the strict implementation parameters.

Realizing the promise of network virtualization will take years
NFV deployments are continuing to move forward; however, as this Telecoms.com Report makes clear, the ultimate goal of fully transitioning to cloud-native, virtualized networks is years away. Providers can't afford to wait years to experience the promised benefits of virtualization including faster service launches, lower costs, and a better customer experience. While cloud-native network deployments aren't imminent, providers can apply cloud-native principles to their service assurance approach to yield immediate benefits in today's physical and early-stage virtual networks.

Cloud-native service assurance delivers benefits in today's networks
Cloud-native service assurance relies on a stateless, microservices architecture and open interfaces to provide radically improved automation of service testing and operational assurance in production networks. By leveraging white boxes and small form factor compute resources, cloud-native service assurance can be deployed in today's networks, even if NFV infrastructure isn't widely deployed. The ability to significantly automate testing and assurance workflows in today's networks results in benefits such as accelerated service launches, reduced operational costs, and higher-quality, on-demand services.

Learn more about VisionWorks & cloud-native service assurance
VisionWorks is part of Spirent's Lifecycle Service Assurance Suite for automating testing and assurance in physical, virtual and hybrid networks. VisionWorks features a cloud-native architecture that allows independent, open modules to be rapidly combined and integrated to deliver solutions such as Customer Experience Assurance, Mobility Service Assurance and Transport Service Assurance. To learn more about VisionWorks and the benefits of cloud-native service assurance, please visit: *www.spirent.com/Solutions/Service-Assurance*

From the outset, one of the benefits identified with implementing NFV was that it would usher in an age of software-driven innovation. This could be accomplished by adopting an open-source model that would empower third-party software developers to integrate software quickly using an open-source software fabric as the common template. Moreover, open source also has the potential to reduce opex and capex since it provides service providers greater vendor choice.

Still given as noted above, many NFV deployments have been limited in orchestration capabilities and still more reliant on specific vendors, open-source adoption has yet to achieve mainstream status. While a little more than half of our service provider respondents (51%) still cling to the promise of open source as the preferred approach, they do not see it as a critical factor for attaining overall success in the cloud. Only 21% believe that open source is critical, while another 29% downgrade the impact to either marginal (19%) or not important at all (10%).

Implementation complexity and other business factors are leading network operators to move at a conservative pace in NFV deployment. But the danger with the go-slow approach is that this pace may thwart efforts to achieve the digital transformation gains necessary to remain competitive in a global economy that is moving inexorably to a cloud-based environment.

Looking even five years ahead, many survey respondents (41%) have effectively decoupled business performance from NFV. This group predicts only a moderate impact from NFV deployment on their business, while another 22% forecast only minor business performance impacts or no impact at all (13%). This leaves only about a quarter of service providers (25%) as assessing NFV as having a major impact on their company's future business performance.

Finally, more 60% of our service provider respondents expect NFV to have a modest or even no impact on the telecoms industry within this five-year window, A little more than a third of service providers (36%) believe that when five-year debriefs are performed they will assess NFV as having been essential to the telecoms industry's success.

Overall, results from this part of our survey strongly suggest that a certain level of fatigue has set in regarding NFV. But it's also clear that at least some operators are firmly committed to virtualization as part of their overall digital transformation. ●

SOFTWARE-DEFINED NETWORKING

Roughly six years into its existence as a carrier-grade trend, SDN – software-defined networking -- has made solid progress. But there is still much work to be done. Cloud service providers threaten operator revenues from all sides, while also straining their networks with increasing traffic volumes. At the same time, operators must drastically reduce their capex and opex to scale and remain viable. SDN is so critical because it promises to address these operator challenges in the new cloud era. This survey covers operators' views and strategies regarding SDN, including trends and deployments.

KEY TAKEAWAYS

- The largest group of operators report that they have deployed SDN in small pockets or are in advanced stages of proof of concept (PoC). What's needed now is for those operators in advanced PoCs/limited deployments to roll out those projects widely across their networks.
- The four key benefits of SDN implementation, based on survey results, are reducing operating expenses via simplified processes and automation, improving network performance/reliability, allowing for greater network/service agility, and reducing capital expenses.
- Operators remain optimistic about the future of SDN, but are perhaps a bit less enthusiastic than a couple of years ago, now that the realities of legacy integration and employee skillsets are sinking in.

ECI

THE ELASTIC NETWORK

IT'S GO TIME

SDN – whether combined with NFV or deployed separately – brings automation and programmability to telecoms networks at a time when those features are desperately needed. But the pace of SDN deployment has been fairly slow so far.

When faced with even inevitable change, the telecoms sector usually takes its time in moving on from its legacy technologies and processes. But at some point, network operators need to pick up the pace and leave the past behind. With SDN, the time to move faster is at hand.

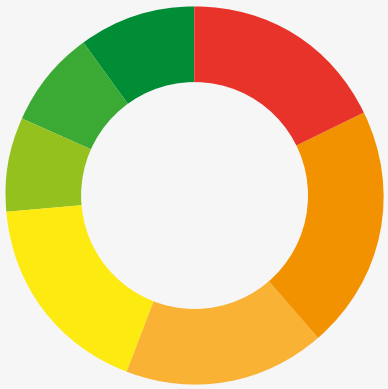
Not surprisingly, given years of industry focus, network operators overwhelmingly view SDN as a significant part of their five-year plan. In our survey, just over 75% of the 700 service provider respondents said SDN was critical or important to their company's overall strategy over the next five years.

But given the fact that SDN has been around for most of this decade, progress made in SDN deployment is less than impressive. Less than half of service provider respondents said their company has gotten beyond the lab-test phase of SDN deployment, and only 13.8% said they are rolling out SDN across their entire network. Nearly 40% of respondents said they haven't even made it to the lab stage yet, with close to 9% saying their company has no interest in SDN.

Automation will critical to operator success and profitability over the next decade and beyond, but SDN-based automation is in an early phase. At 31%, a set of early adopters expect to fully automate the first discrete parts of their networks via SDN by the end of 2018, but less than 8% expect to reach that goal by the end of this year. An additional 30% of operators expect to achieve SDN automation of some parts of their networks in the 2019-2020 timeframe. This means that by the end of 2020, nearly two-thirds of operators would have some SDN-based automation running throughout their networks – a fairly ambitious goal, given the current state of deployment.

Consistent with several other telecom trends, operators want to migrate to SDN-based networking, but they don't expect to spend much more to achieve their goals. In our survey, the largest group – 39% of respondents – said that they expect 2018 spending on SDN to remain about the same as their 2017 spend. An additional 34% expect their SDN spend to increase modestly (less than 10%). Some operators, however, do expect a spending bump, with 20% forecasting a spending increase of 10% or more on SDN in the coming year. >

What are the most important benefits your company is looking to achieve through the implementation of SDN?



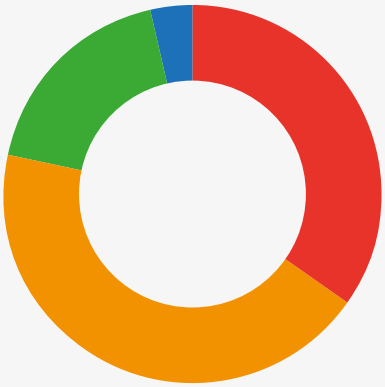
- Improve network performance/reliability 51.4%
- Reduce operating expenses 60.1%
- Reduce capital expenses 48.9%
- Allow for greater network/service agility internally and/or for customers 51.1%
- Increase supplier diversity/reduce vendor lock-in 23.6%
- Enable us to match or exceed our competitors' offerings 23.6%
- Quickly deliver new revenue sources – shorten time to market for new services 28.4%

Operators have clear goals in mind for SDN. In our survey, four key benefits of SDN implementation rose to the top: Reducing operating expenses via simplified processes and automation (selected by 60% of respondents), improving network performance/reliability (selected by 51%), allowing for greater network/service agility internally and/or for end customers (selected by 51%), and reducing capital expenses via better optimization of network resources (selected by 49%). All other benefits are secondary to these four, based on our survey results.

Barriers to SDN implementation are also clear and have much to do with legacy integration and internal skillsets. The top barrier identified by service provider respondents is legacy network integration challenges (selected by 47% of respondents), followed by limited employee skillsets needed to implement SDN (selected by 39%). In third was OSS/BSS integration challenges (selected by 37%), which is closely related to legacy network integration – as legacy OSS/BSS manages the legacy network. Somewhat encouragingly, lack of a clear business case for SDN ranked a fairly distant fourth on the list, indicating that operators understand the value of SDN, if they can only upgrade their systems and find or train the right people to take advantage of the new capabilities that SDN will bring.

Based on our survey responses, the top network segments for SDN deployment over the next three years are: mobile core, intra-data center, long haul/core networks, and metro and aggregation networks. Access networks ranked at the bottom of the list – including mobile RAN, mobile backhaul, and fixed access. While access networks in general hold tremendous potential for benefits of automation and programmability, they also come with significant added complexity – due to the numbers of end nodes that could expand to millions. Deployment of SDN in the access network SDN is a strong long-term goal for operators (both fixed and mobile), but it may not feasible in the next three years due to this complexity.

What do you think the telecom industry's perception of SDN will be five years from now?t



- SDN was essential to the success of telecom service providers..... **34.8%**
- SDN was useful for telecom service providers, but it fell short of delivering on its initial promise..... **43.8%**
- SDN provided some benefit to telecom service providers, but not enough to justify the cost and effort of deployment..... **18.0%**
- SDN was a complete waste of time for telecom service providers.....**3.4%**

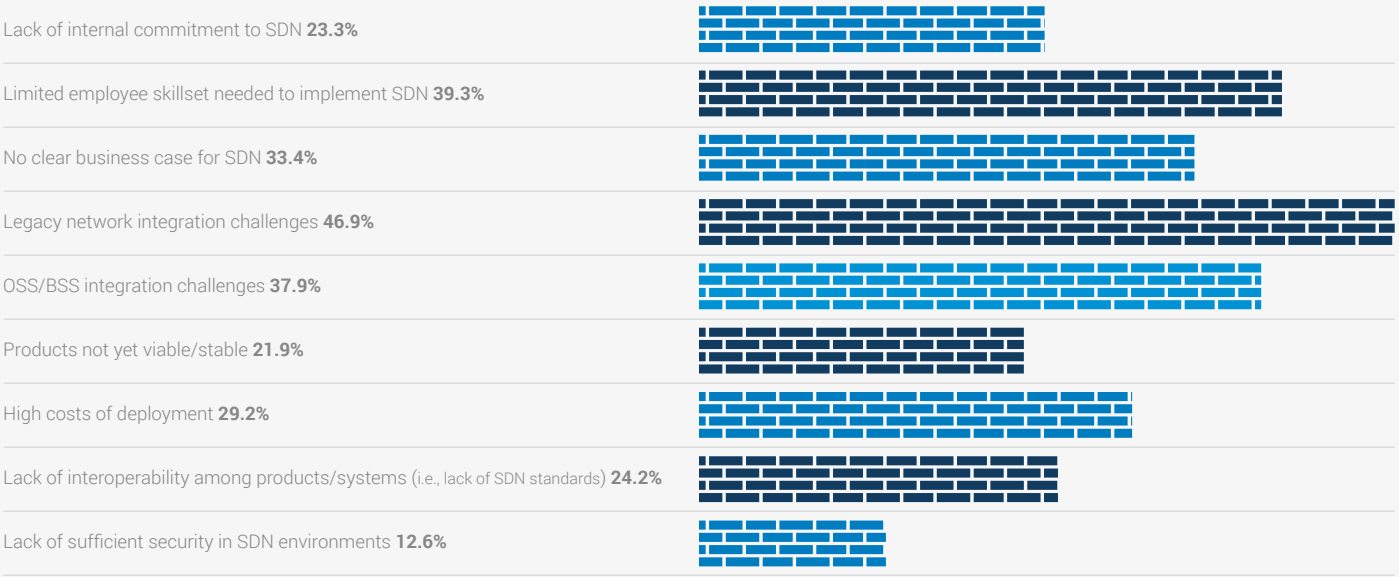
The relationship between SDN and NFV is important to understand, and it's a relationship that has morphed over time. Although SDN emerged as a telecoms solution before NFV, the two have been viewed as tightly coupled in implementation and timelines. That's starting to change, based on responses to our survey. Only 23% of service provider respondents said they view SDN and NFV as completely interlinked and inseparable – down significantly from past surveys, in which roughly 50% viewed the two technologies as completely interdependent. In our survey, the largest group (at 35% of respondents) said that SDN and NFV are partially linked but that SDN is proceeding more quickly. Another 24% said that the technologies are partially linked, with NFV proceeding more quickly.

Looking out over the next five years, network operators expect the business impact of SDN to be moderate. In our survey 47% of respondents said they expect a moderate impact on business performance, with SDN helping them to achieve their business goals but not determining whether, in the end, they succeed or fail. Still, for nearly one quarter of operators (21% of operators surveyed), SDN will have a major impact, with business performance relying heavily on SDN.

Lastly, to get an understanding of how operators expect SDN to play out versus industry expectations we asked survey takers what they think the telecom industry's perception of SDN will be five years from now. Responses show optimism, but perhaps a bit less optimism then a couple of years ago – now that the realities of deployment are better known. In the survey, 35% of service providers said that they expect SDN to prove essential to the success of telecom service providers. But a greater percentage – 44% of respondents – expect that while SDN will prove useful, it will ultimately fall short of delivering on its initial promise, and 3% believe that SDN will prove to be a waste of time for service providers.

Comparing results from this part of survey with NFV results, service providers appear to be more confident in reaping benefits from SDN than from other aspects of virtualization.

What has limited or impeded your company's implementation of SDN?



"COMPARING RESULTS FROM THIS PART OF SURVEY WITH NFV RESULTS, SERVICE PROVIDERS APPEAR TO BE **MORE CONFIDENT** IN REAPING BENEFITS FROM SDN THAN FROM OTHER ASPECTS OF VIRTUALIZATION."

ECI THE ELASTIC NETWORK

Today communication service providers are looking forward to addressing a variety of new markets, such as 5G, IoT, and smart cities. Each holds much potential, but also poses challenges for the current network infrastructure. Technologies such as SDN and NFV are inevitable, and promise to help CSPs realize great new revenue streams by making networking more efficient, autonomous and cost effective.

The survey results align with the trends we all see, i.e. initial adoption or trials across the industry, albeit at a slightly slower pace than expected. They also indicate that hope of gradually rolling out SDN and NFV across networks worldwide is becoming a reality. Legacy integration, standardization and people skillsets will remain obstacles in the coming years, so there is reason to believe that it will take some time before SDN goes 'mainstream'.

Benefits of SDN, in the form of OpEx and CapEx reduction, will as a result also take time, and we expect service providers to look for 'quicker wins' in terms of ROI. The task of vendors is to lower the barrier of entry for these new technologies by delivering solutions which offer smooth migration and easy introduction.

Service providers should look for solutions which provide immediate benefits, even as they exist in tandem with legacy network equipment and associated operational procedures. Finally the pairing of both SDN and NFV under one strong service orchestrator can simplify service delivery, speed time to market and drive new revenue streams.

VIDEO

Most operators are finding that video is responsible for the majority of their network traffic. In fact, for the typical operator it accounts for more than two-thirds of the traffic load today. Few operators challenge predictions that it will account for more than 80% of traffic within five years. Operators need to better understand video's growth, the impact of video on their networks, and they need to build their networks accordingly -- or get flooded by an application they aren't capable of supporting or monetizing.

KEY TAKEAWAYS

- Despite video's massive presence, only one in every three service provider respondents said video is critical to their company's overall strategy.
- Competition from OTT services such as Netflix and Amazon is now the most-cited challenge for video services, exceeding the perceived challenges of accessing content at viable prices and expanding network capacity to support high-quality video delivery.
- Productive video services -- using video for training, collaboration, and other purposes beyond entertainment and consumer applications -- are seen as an opportunity by two-thirds of operators in this survey.

HUAWEI

LIGHTS. CAMERA. ACTION?

Video now accounts for most of the traffic that traverses telecoms networks worldwide. That has major ramifications for network operators – whether or not they want to face that fact.

Service providers generally refer to themselves as communications service providers or telecommunications providers, a mindset and terminology that has come down from the industry's beginnings in telegraph and voice services. However, when four out of every five bits travelling over these networks is video – as is expected to happen sometime around the end of this decade – perhaps they would be better suited looking at themselves as video delivery networks or as video service providers. How an organization sees itself affects the way it strategizes and prioritizes for the future.

Based on our survey results, most service providers aren't thinking video-first as they plan their business and network future. Just over a third of the 700 service provider respondents to our survey feel video services are critical to their company's overall strategy, with nearly 25% saying video services are marginal or not at all important to their overall strategy over the next five years. That is staggering, given that video consumption is growing at a rapid pace, with higher bandwidth services such as 4K UHD and virtual reality coming around the corner, OTT video usage exploding and social media increasingly being focused on video – to the extent that Facebook CEO Mark Zuckerberg said Facebook would be "mostly video" in coming years.

The low priority given to video services is further reflected in the operators' current status on video services. While 21% of service provider respondents rate their existing video services highly, nearly 40% said they are falling behind or just don't rate video highly as part of their business. That's concerning; With the amount of time spent viewing video growing steadily, and video traffic using up the vast majority of their network, the failure to see video as important is perplexing.

Nor are operators looking to invest heavily in video services, according to our survey. While one in every five respondents said their company plans to increase spending in video services by 10% or more in 2018, the others are not planning considerable video investment. In fact, about 42% of respondents said their company will either keep video spending flat in 2018 or even decrease that spending. >

What are the biggest barriers to success for your company in the video service market?

- Access to content at viable prices 39.0%
- Bandwidth requirements for high-quality video services 40.7%
- Visualizing video experience for easy management to guarantee user satisfaction 19.9%
- Identifying and catering to evolving user behaviors for video consumption 25.0%
- Competition from OTT providers such as Netflix and Amazon, with global scale and multibillion-dollar content development budgets 42.7%
- Development of video services from social networks such as Facebook and Snapchat 18.8%
- Exploding number of video providers and services 22.8%
- No clearly defined pricing and revenue models 21.1%
- Undefined revenue potential from non-subscription sources, such as white-labeling, content delivery and targeted advertising 12.9%
- No clear industry roadmap for advanced video services (i.e., lack of standards for virtual reality, HDR etc.) 16.3%

Of course, investing in video services isn't exactly equivalent to investing in infrastructure to support the delivery of video traffic. But that points to another potential disconnect: If operators are going to make their networks robust enough to handle growing volumes of video, why wouldn't they be more interested in offering services that would make use of those network resources?

It's not like operators don't see the potential value of video services. Despite the relatively low priority most operators appear to be giving video, survey respondents weren't shy about identifying potential benefits of offering video services. When we asked survey takers to identify the most important benefits of offering video services, eight of the nine options we included were selected by more than a quarter of service provider participants.

Unsurprisingly, generating new revenue ranked first when operators were asked about the benefits of offering video services. With network capacity constantly under pressure, the cost of upgrades must be funded by some corresponding new revenue, and operators are looking for ways to make video at least pay for itself. Another often-cited benefit of video is the ability to anchor the multiplay bundle. This cuts churn and helps add value to the operator's broadband product.

As many smaller service providers who launched an IPTV service can testify, getting access to content at prices that allow for a profitable pay-TV service is a huge challenge. So it's not surprising that 39% identified access to content at viable prices as a major barrier to offering video services. But even higher on the list of barriers are competition from OTT providers like Netflix and Amazon (cited by nearly 43% of service provider respondents) and bandwidth requirements for high-quality video services (41%).

Relatively few service provider respondents think their company's video services are up to the competitive challenge today – only about 18% characterized their video offering as comprehensive and among the best in the world. Another 25% hope to see a world-class product in place by the end of 2018. That leaves the majority in the laggard category, with nearly 20% saying their company has no intention to deliver a world-class video product.

Given the success of OTT services in recent years, operators see a robust video on demand (VoD) library with high-value content as being the most important attribute of a successful video service. And with younger consumers increasingly demanding access beyond the TV screen, it has become essential to offer high-quality video services across various devices. Operators recognize this, but 38.5% also recognize that consumers are still spending hours every day viewing live TV on their TV sets. Thus, having a linear TV service is still essential.

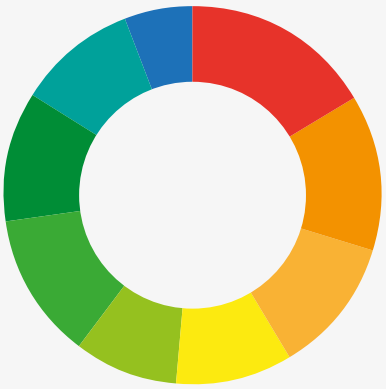
While video services tend to be associated primarily with entertainment, there is a greater use of "productive video," i.e., the use of video within commercial enterprises and governmental and educational organizations. Survey respondents were quite optimistic about the opportunity in this segment, with nearly two-thirds seeing it as a very important or somewhat important opportunity for them. Even among the warier respondents, less than 2% dismissed the opportunity outright.

About half of service provider respondents think video services will have a moderate impact on their company's business performance over the next five years, and another quarter think it will have a minor or zero impact on the business. This is again a surprising mindset among respondents, given that 80% of network capacity will be used for delivering video, and video will be increasingly important even in areas such as consumer and enterprise communications, surveillance, training and many others.

The last question about video services that we put to survey takers shows just how conflicted service providers are about video. When we asked respondents what the telecoms industry's perception of video service will be five years from now, just over 40% of service providers said video will be seen as essential to the success of telecoms service providers, and another 40% said video services will prove to be useful, even if they fall short of delivering on initial promise.

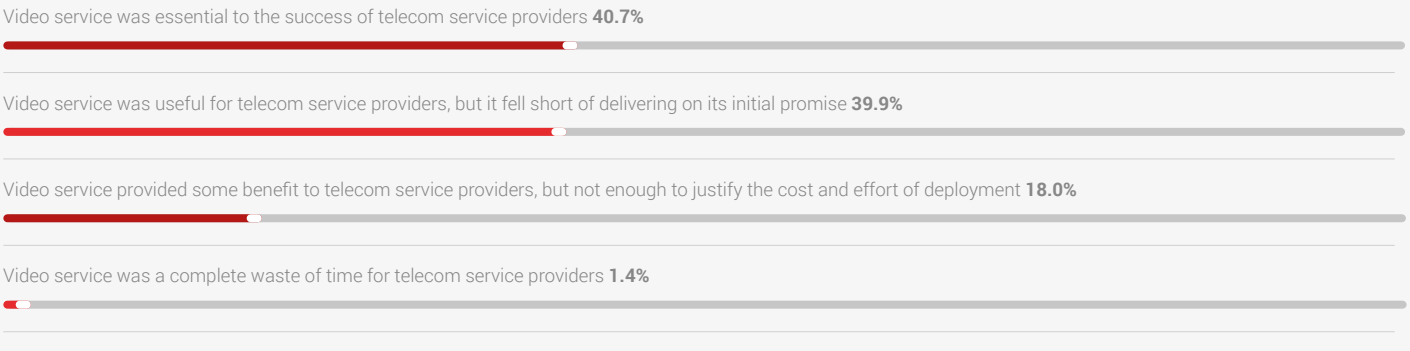
So 80% of service provider respondents see value in video services, but only about one-third view video as being critical to their overall strategy. It may be time for a serious review of priorities.

What are the most important benefits of offering video service for your company?



- Deliver new revenue 48.9%
- Anchor the multi-play bundle 39.6%
- Target new segments (i.e., enterprise communications) 34.3%
- Add value to our cloud strategy 29.5%
- Generate revenue from video growth; it is already more than two-thirds of network traffic 27.0%
- Reduce churn and improve customer satisfaction 36.2%
- It's a competitive requirement in today's market 33.7%
- Avoid losing revenue to OTT providers 29.8%
- Create a platform for targeted advertising revenue opportunities 17.1%

What do you think the telecom industry's perception of video service will be five years from now?



> OTT VIDEO USAGE IS EXPLODING AND SOCIAL MEDIA INCREASINGLY BEING FOCUSED ON VIDEO -- TO THE EXTENT THAT **FACEBOOK CEO MARK ZUCKERBERG SAID** FACEBOOK WOULD BE "MOSTLY VIDEO" IN COMING YEARS."

HUAWEI

It has being widely recognized that video plays a much more crucial role for operators' business growth especially when we are now in the eve of 5G, though the survey results look not so exciting. The video opportunity for operators is significant. It was estimated that in 2016, the global top 50 telco video groups generated USD 85.8 billion in video revenue, up by 12.6% from USD 76.2 billion in 2015, with 11 generating more than USD1 billion. These telco video groups contributed to more than 250 million video subscriptions.

Video can serve as a primary tool for driving extensive telco business growth across all operators' products and services, which is why it should be treated as a core service. In essence, it reflects a change in priorities, away from commodified Telco services towards having a TV or video offering as a core. This often includes leveraging video's marketability and appeal to sell broadband, mobile, and telephony – in various bundle. In addition, with video as a core service, it can be expanded to a broader target market via broadcast or OTT distribution, often motivated by the possibility of attracting new subscribers to the bundled Telco offerings.

Video as a core service means using TV (traditional pay TV), online video, or user generated content (UGC), as a primary tool for driving extensive telco business growth. Operators can leverage video's marketability to sell bundles featuring broadband, mobile and/or fixed, as well as expand video services to a broader target market via online distribution. The latter supports ongoing cross-selling and upselling, facilitated by creating as many customer relationships as possible. In the triple-play context, video has become a core service for many operators. Also we see that lots of operators have managed to sell video into their mobile customer bases.

SECURITY

There's no question that network operators not only see security as a core responsibility but also are committed to investing in resources to make their networks and services more secure. The questions now facing service providers involve bolstering their security arsenals to meet the needs of emerging technologies and services like IoT, and deciding whether to expand into a potentially lucrative but challenging market: offering security as a service to enterprise customers. This section of our survey covers what may be the most daunting aspect of delivering network services: keeping those services secure.

KEY TAKEAWAYS

- Almost 70% of service provider respondents see security as a vital component of their five-year strategies, and nearly 80% expect their company to increase spending on security in 2018.
- Almost half of service provider respondents (49%) are either only somewhat confident or not confident at all in their company's ability to effectively manage IoT security requirements.
- Among Internet-based threats, ransomware and malware attacks are showing the highest growth rates, with 20% of respondents reporting attacks growing by more than 30% in the past year.

THE PRICE OF VIGILANCE

Network operators know they are on the hook to deliver safe and secure services, and they are willing to make the investment to meet that mandate. But not all of them are confident that they are ready to protect emerging services like IoT.

Judging from the results of our survey, there's no need to provide network operators with a wakeup call about security. Of the 700 server provider respondents, nearly 95% labeled security as being either critical (69%) or important (25%) to their company's overall technology and business strategies over the next five years. Of the seven focus areas covered in our survey, security is the clear leader in perceived importance to telecoms operators.

And those operators are committed to spending to keep their networks safe. Nearly 80% of respondents said their company will boost spending on security in 2018, with nearly half of that group saying spending will ramp up by 10% or more in the coming year. Less than 4% of service provider respondents forecast a spending decline for security next year.

The focus on security appears to be paying off to some extent. The greatest share of service provider respondents (33% to 42%) say their company has seen only medium growth (10% to 30%) in Internet-based attacks over the past year. Moreover, the second largest range of respondents (27% to 34%) perceive only slight growth in these attack types (less than 10%).

When asked about specific types of attacks, operator respondents pointed to ransomware and malware as the highest-growth areas, with about 20% of respondents reporting each type of attack growing by 30% or more over the past year.

This same trend of medium and slight growth also applies to network-based attacks. For example, the medium growth range (10% to 30%) range was 29% to 32% for various threats, while the slight growth range (less than 10%) was the number one range, garnering 33% to 35% of respondents.

Of these network-based attack types, DNS amplification and DNS tunneling tended to be most reported types of attacks based on growth, but the growth in botnet-based network attacks also is growing.

One of the challenges often cited as injecting complexity for coping with cyberattacks is the requirement to manage a growing number of vendor-specific solutions that may not support seamless interworking and supervision. This, as the story goes, makes it more expensive to scale and roll out new capabilities.

Most of our service provider respondents -- 62% -- said their company is working with a manageable number of security vendors. The others are seeing some trouble signs, with 26% saying the number of security vendors they are dealing with is growing and becoming less manageable, while 12% say the problem is already acute and needs to be addressed.

One area where there is less variance between research findings and anecdotal proof points pertains to the security impacts of the Internet of Things (IoT). The logic of the circumstantial view is that the massive number of IoT devices has the potential to exponentially amplify the number of potential intrusion points, while research tends to link the software programmability of these endpoints as serious concerns.

A majority of service provider respondents perceive IoT security as an area of major concern, and only about one-third of the group said it is very confident in its company's ability to meet the IoT challenge. Another 35% said they are only somewhat confident in their ability to deploy what will be necessary to secure IoT networks. Even more disconcerting is the 14% of respondents who are not confident their company will be able to implement adequate security measures for IoT. Given the importance placed on IoT by survey respondents in other sections of this survey, the overall lack of complete confidence in IoT security points to a potential problem for operators and their customers. >

In the telecoms sector, technology challenges often result in new consulting and professional/managed service opportunities. Security services definitely fall into this category, since there is little disagreement that security skillsets are difficult to find and cultivate. Consequently, the overwhelming majority of network operator respondents to our survey – 89.3% -- see delivery of security services to enterprise customers as being important, and more than 82% say their company plans to offer such services to enterprise customers.

Based on our survey results, carrier readiness to offer such services is a mixed bag at this point. At the top end are the 22% of service provider respondents who believe their company is among the leaders in the delivery of security services. In the middle is the largest group (47%) of respondents who assess themselves as being in a generally good position, with some work required to vault themselves into the leadership club. Another 21% of respondents said delivery of security services is important, but that their company is falling behind the competition in delivering such services.

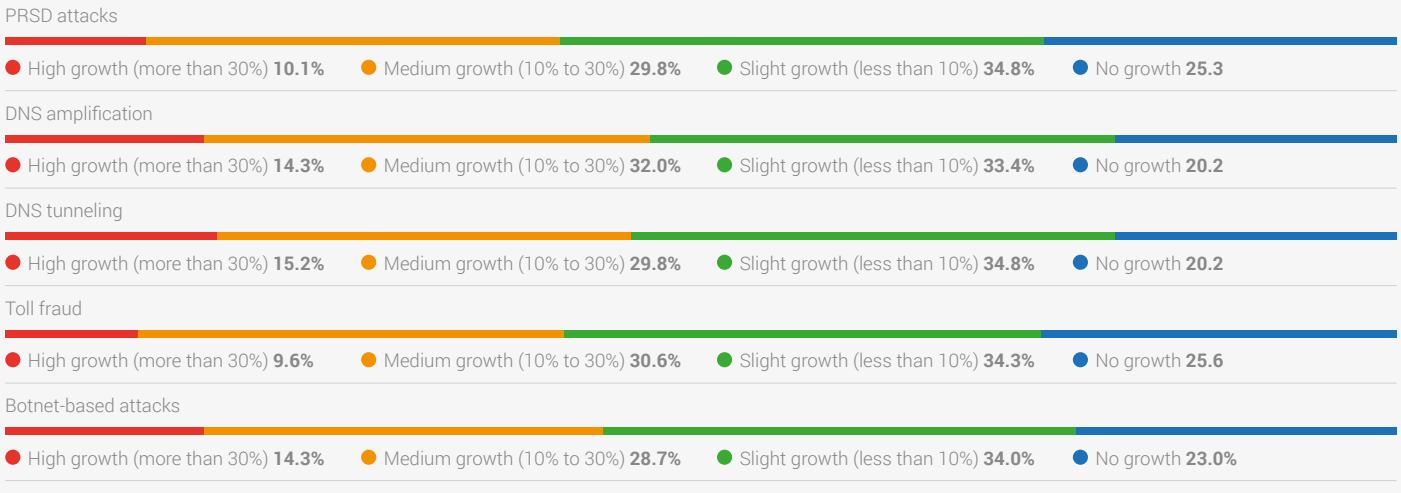
The push to secure networks is happening both on the service provider and enterprise front. As we have touched upon many enterprises are not well equipped to manage security-related challenges without assistance from third parties. While generally, smaller enterprises tend to be less optimally well positioned to go it alone in a security sense, the rapid and fluid changes in the threat landscape present formidable challenges for an enterprise of any size. Consequently, service providers are not ruling out any markets. 37% of service provider respondents said their company is selling security services to enterprises of all size.

However, it's important to note that the size of the enterprise often shapes the types of security services they require. For example, an enterprise with a more Internet-centric business model is more vulnerable to Internet-based attacks than others.

Accordingly, service providers must tailor security service delivery to optimally reflect the needs of the customer segments they are focusing on. While there is no definitively

How much growth has your company seen in the following types of Internet-based attacks over the past year?

How much growth has your company seen in the following types of network-based attacks over the past year?



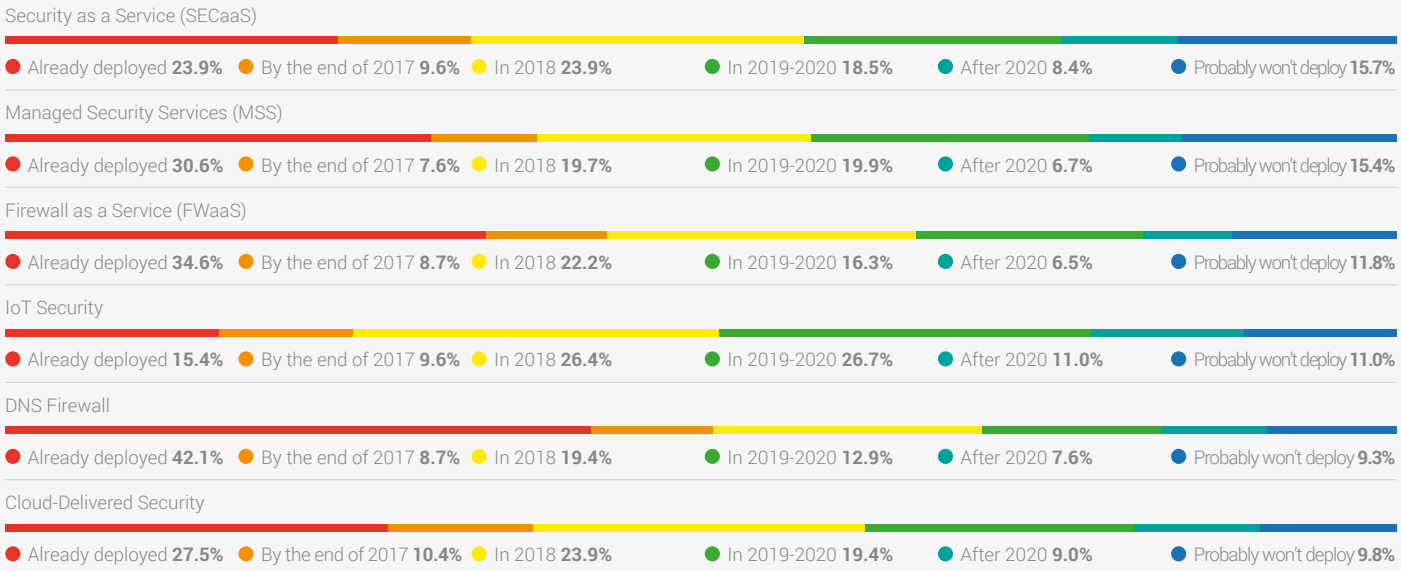
correct answer, service providers when asked about the types of security services their customers are most interested in gravitated towards Internet-based threats (42%), while another group singled out network-based attacks (25%). However, second-place metrics from the respondents captured that 33% of their customers are equally interested in protection from both Internet and network-based threats.

Given this range of security requirements, the security services that services providers deploy to protect themselves as well as their customers can also differ. To better understand the transition, we asked service providers which services they already have deployed or plan to deploy.

Again, while there is no definitive list, some common ground does exist. For example, the service that has been already been deployed to the greatest extent is DNS firewall (42%), followed by firewall as service (FWaaS) at 35%.

The leading inputs reflect the undeniable impact of the transition to cloud-based models. Of these, cloud-delivered security, security as a service, and IoT security were ranked equally at 10%. Looking to 2018, the trends are similar even though the deployment percentages ramp-up. Leading the way in 2018 is a focus on IoT security (26%), with cloud-delivered security and security as a service both ranked at 24%.

When does your company expect to deploy the following types of security services?



TEST AND MEASUREMENT

The days of guaranteed "five nines" reliability may be over, but network operators are still expected to make sure their customers have constant access to network resources and services. Test and measurement products and services have long served as important tools for service providers to keep their networks up and running. But in the rush to deliver new and more dynamic services, operators may be cutting some corners in test and measurement. This section of our survey covers network operator attitudes toward test and measurement, as well as plans for future deployment of test and measurement solutions.

KEY TAKEAWAYS

- About 58% of service provider respondents say their company either isn't utilizing test and measurement enough, it's not a priority, or it's not used at all.
- The majority of spending on test and measurement for 2018 will either stay the same or account for less than a 10% increase in spending.
- Almost 60% of service providers admit that price is the biggest factor when choosing a test and measurement vendor.

VIAVI

THE BIG SQUEEZE

Telecoms service providers are having to make some hard choices in the face of growing price pressures and shrinking profit margins. Cutting back on test and measurement initiatives is an option that is fraught with peril.

Network operators continue to struggle with what is now an all-too-familiar situation: Price pressure from increased competition continues to mount, resulting in thinning profit margins. But shareholders aren't lowering their expectations for overall business performance. Cutting corners to pare down spending is the most expedient way to deal with immediate issues.

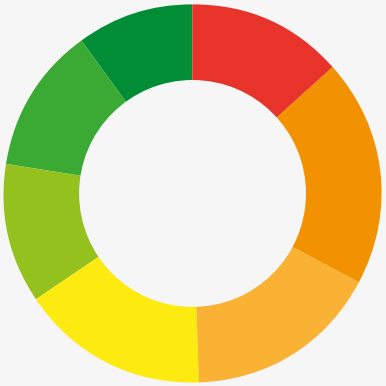
It's no secret that short-term fixes can have long-term effects that are less than pleasant. That's a reality that service providers will have to consider as they weigh decisions to pull back on spending in areas like test and measurement.

If keeping networks and services secure is the top priority for telecoms service providers, then making sure that those networks and services are fit for purpose should be a close second in importance. Yet results from our survey indicate that many network operators are not giving full attention to testing. Nearly 60% of the 700 service provider respondents participating in our survey said their company is either using test and measurement sporadically, or not at all.

It's not that network operators don't see value in testing – More than 90% of respondents said their company uses test and measurement tools. But survey results suggest that service providers don't have a clear test and measurement strategy, and they aren't confident that vendors understand and can meet their needs. They find test and measurement costly, and they don't see a clear bottom-line value for implementing the solutions.

Nearly half of our service provider respondents -- 47% -- said their company works with a number of different test and measurement vendors to find best-of-breed solutions. Another 27% have a relationship with one vendor, and about 15% develop their own solutions.

What are the most important benefits to your company regarding test & measurement?



- Allow for greater network/service agility 44.4%
- Improve the performance/reliability of networks or services 63.5%
- Manage faults and events in network/services 54.5%
- Manage QoS/QoE/Customer experience 52.5%
- Meet compliance/SLA requirements 39.0%
- Network/service traffic management 40.7%
- Reduce operating expenses 32.6%

Only 41% of respondents said their company actively incorporates test and measurement at every stage when developing, upgrading or transforming networks. The rest, however, paint a dismal picture of network preparedness. More than 45% said their company uses test and measurement sporadically and should use them more. Another 5% said that while test and measurement is important, it isn't used. And 8% said that such solutions aren't a priority at all.

The forecast for test and measurement spending isn't particularly rosy, according to our survey results. Almost half of network operator respondents said spending on test and measurement will either remain flat or decrease in 2018. Less than 15% of respondents said they expect their company to boost test and measurement spending by 10% or more next year. >

While changes in spending don't necessarily reflect commitment to pursue test and measurement, it's hard to reconcile the conservative spending on test and measurement with the fact that operators are in the midst of major transformation projects.

One reason most service providers won't be increasing spending on test and measurement likely relates to how they view its impact on company performance. About 47% of service provider respondents said that test and measurement will have a moderate impact on their company's performance over the next five years, and more than a third of those respondents said test and measurement will have little or no impact. Only 15% of service providers felt the company's overall business performance would depend heavily on test and measurement.

Not surprisingly, more than 55% of operator respondents identified network security as the most common area for test and measurement at their company. Service providers most commonly utilize test and measurement at their biggest pain points. About 42% said their company is using test and measurement tools for IoT/IIoT, and another 34% are using them for machine-to-machine (M2M) systems. Only about a third of operator respondents said their company is using test and measurement for NFV and virtual network components.

While there is no question that most service providers eagerly anticipate the new business lines and revenue opportunities created from IoT and M2M, they're extremely sensitive to the reality that such technologies open their networks to millions of devices, many of which aren't secure.

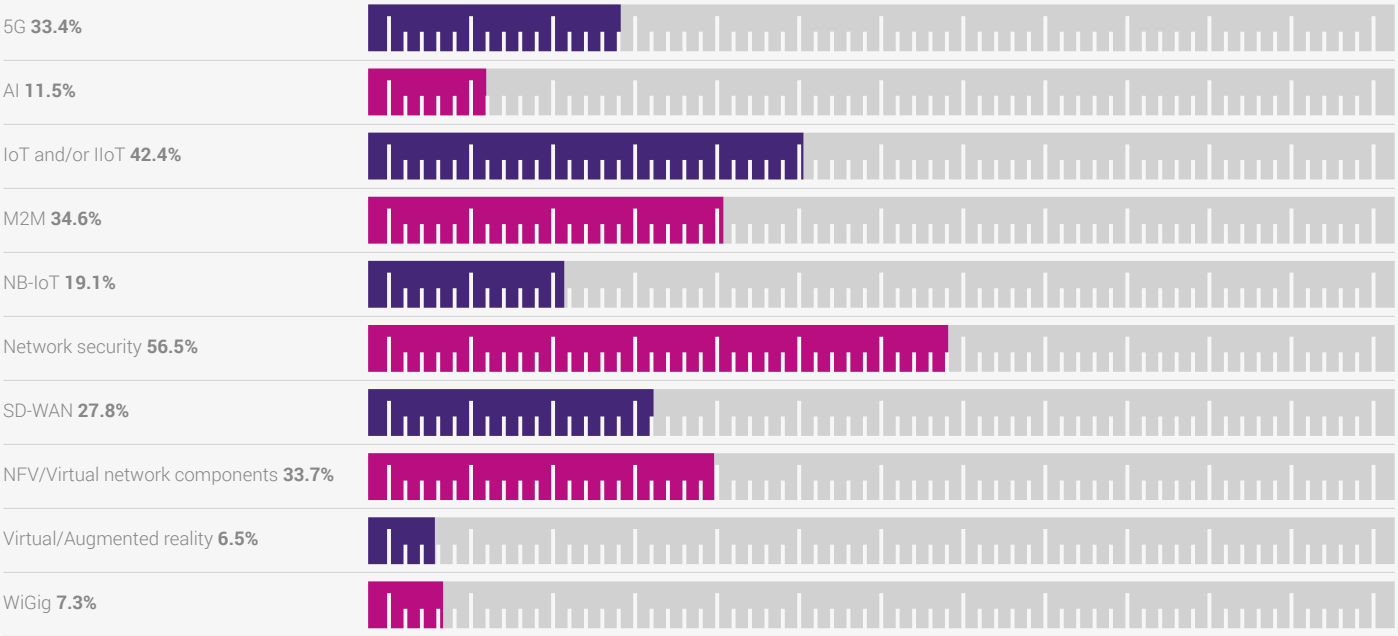
When asked about the most important perceived benefits of test and measurement, more than 63% of service provider respondents said such solutions improve the performance and reliability of their networks and services. Nearly 55% also cited managing faults and events in networks and services, while 52% said managing customer experience was a major benefit. Fewer than one in three identified opex reduction as a main benefit.

Drilling down into the reasons that operators are less engaged with test and measurement than they know they should be, cost is clearly the top issue. When asked to identify the biggest barriers to implementing test and measurement, more than 56% of operator respondents named high cost of deployment as a big problem. The second most cited barrier – increased time to market – was a distant second, cited by less than 40% of respondents.

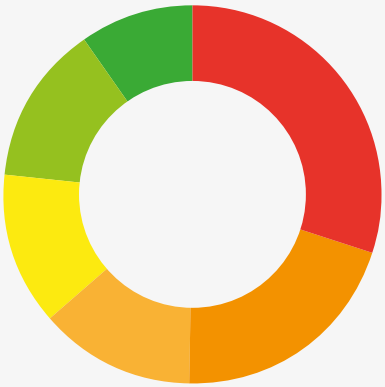
The cost issue also arose when respondents were asked to identify the most important criteria used by their company in choosing a test and measurement vendor. Nearly 60% of service provider respondents named price as an important factor. Price was the only important factor in vendor selection cited by more than half of the network operators participating in our survey.

While respondents didn't give test and measurement vendors the highest marks for meeting their needs, more than two-thirds said vendors are "pretty good" at understanding what operators want and need from

In which of the following areas does your company now use test & measurement?



What are the biggest barriers to implementing test & measurement for your company?



- High cost of deployment 56.2%
- Increased time to market if T&M is deployed 38.2%
- Lack of confidence in product or vendor solutions 24.7%
- Lack of investment in or internal commitment to T&M 24.4%
- No clear business case for T&M 25.6%
- Uncertainty about the overall benefit of T&M to our business 17.7%

test and measurement. Just over 20% gave vendors a failing grade, while 11% said vendor performance was outstanding.

The move to virtualized test and measurement services may be a slow one, based on our survey responses. While 18% of operator respondents said their company already is using virtualized solutions and another 37% said they expect to do so within the next year, the largest group of respondents (45%) said their company either doesn't see virtualized test and measurement as important, or it has no plan to move to virtualized products at all.

Survey results in this section strongly suggest that test and measurement vendors face some challenges in the years ahead. On the positive side, operator respondents see a clear need for robust test and measurement, and most of them would like to see their company get more aggressive with testing. But they also say that spending in this area will be restrained, which puts the onus on vendors to come up with solutions that fit ever tightening budgets. ●

"IT'S NO SECRET THAT SHORT-TERM FIXES CAN HAVE LONG-TERM EFFECTS THAT ARE LESS THAN PLEASANT. **THAT'S A REALITY THAT SERVICE PROVIDERS WILL HAVE TO CONSIDER** AS THEY WEIGH DECISIONS TO PULL BACK ON SPENDING IN AREAS LIKE TEST AND MEASUREMENT."