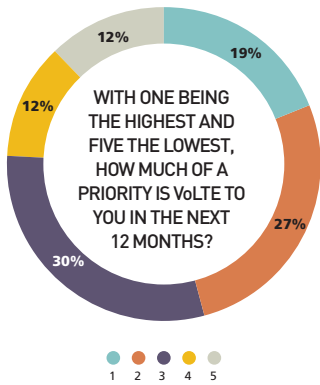


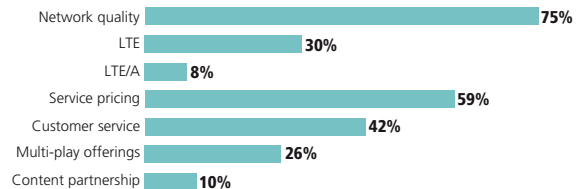
TELECOMS.COM INTELLIGENCE INDUSTRY SURVEY 2015



58%

**SEE OTT
COMPETITIVE
PRESSURE AS
A SIGNIFICANT
CHALLENGE
IN 2015**

WHAT ARE THE PRIMARY MEANS OF COMPETITIVE DIFFERENTIATION AMONG THE MOBILE OPERATORS IN YOUR MARKET?



**152 COUNTRIES
RESPONDED**

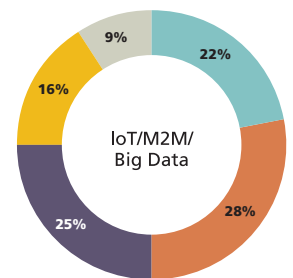
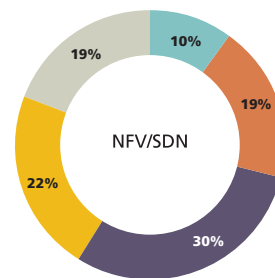
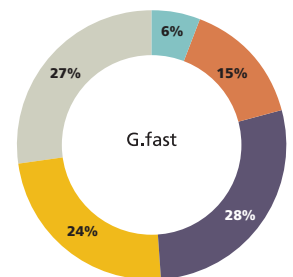
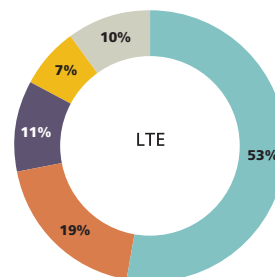
2015 TELECOMS.COM INTELLIGENCE GLOBAL INDUSTRY SURVEY



2066

TOTAL RESPONDENTS

WITH ONE BEING THE HIGHEST AND FIVE THE LOWEST, PLEASE PRIORITISE HOW LIKELY YOU ARE TO INVEST IN THE FOLLOWING TECHNOLOGIES IN 2015.



1 2 3 4 5



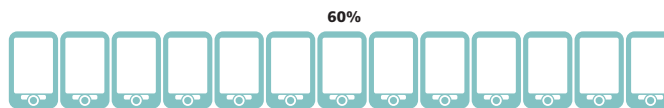
69%

**AGREE THAT NETWORK SHARING
IS A SOLUTION FOR POOR RURAL
COVERAGE**

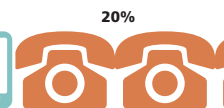


**51% TELECOMS
OPERATOR
RESPONDENTS**

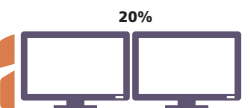
WHICH COMPANY TYPE IS IN THE STRONGEST COMPETITIVE POSITION TO MOVE TOWARDS MULTIPLAY SERVICE OFFERINGS?



Mobile operator



Fixed-line provider



Content/TV provider

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SECURITY

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telecoms
INTELLIGENCE
Getting the industry thinking

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Setting the scene with the top challenges facing operators in 2015, including industry-wide competitive forces, pricing and charging, network sharing, big data, broadband access and emerging network technologies.

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Industry Insights



Here we are at the most exciting time of the telecoms year, when its two most important events coincide: the Telecoms.com Annual Industry Survey and Mobile World Congress. This, of course, is more than a coincidence as we consider unique insight into the plans and opinions of over 2,000 telco industry professionals to be the perfect accompaniment to the biggest annual celebration of all things mobile.

Our comprehensive analysis of the survey data commences on page 3 with an overview of the operator competitive landscape. Over half of the respondents work for an operator, which provides a large sample of highly targeted opinion. Among the areas covered were the competitive pressures they face, with OTTs now prominent alongside the usual operator competition and the cost of infrastructure, and planned areas of investment, among which LTE and cloud technologies were prominent.

Drilling down into more specific segments of the telecoms industry we start with a focus on BSS on page 10. In the rapidly maturing mobile market operators need to be able to adapt quickly to keep up with changing consumer demands, while at the same time keeping their product offerings fresh. The survey revealed a number of insights into respondents' commercial priorities and how they are going about executing them.

LTE is, of course, a key technology for demonstrating value and differentiation to the market, but the survey revealed most respondents still expect the minority of their subscribers to be covered by LTE this year. Another major LTE-related question facing the industry is the move to VoLTE. While it's generally considered inevitable, there is understandable reluctance to do

so prematurely and the survey revealed distinct anxieties about ensuring continuity when they eventually do.

An even more contemporary trend is the collision of networks with enterprise IT via phenomena such as NFV and SDN. With most operators still trying to work out how exactly these technologies will work for them, the survey provides an invaluable insight into their investment plans and the returns they expect to get on that investment.

A direct consequence of convergent trends mentioned previously is an escalation in the type and extent of security threats that must be tackled by telecoms companies. In the security section of the survey respondents indicate the types of threats they are most wary of and the measures they are putting in place to tackle them.

And the convergence isn't limited to the infrastructure side of things; consumers are increasingly looking for a complete communications package, including content. So the content section of the survey has a distinct bias towards multiplay and how best to accommodate the competitive threat posed by so-called OTT players. Meanwhile, with an increasing proportion of all devices becoming connected we conclude with a look at attitudes towards the device sector.

We hope you will agree that the Telecoms.com Annual Industry Survey provides a valuable perspective on the current state of the telecoms sector and where it's headed.

Scott Bicheno

scott.bicheno@informa.com
twitter.com/scottbicheno



OPERATOR LANDSCAPE

The opening section of the Telecoms.com Intelligence Annual Industry Survey 2015 polled operator respondents on the current industry challenges keeping them awake at night. We ranged our questions across today's hottest or most contentious topics; from network sharing, OTT partnerships and convergence, to more technology-focussed subjects like LTE network expansion, network virtualization and broadband access.

The data and subsequent analysis found in this report have been sourced from more than 2,000 respondents from across the industry.

Key takeaways:

- 75% of operators believe network quality and coverage is one of the primary competitive differentiators.
- 72% of operators are prioritising LTE for investment in 2015.
- 75% of operators think video content streaming is one of the most lucrative LTE services.
- 69% agree that network sharing is a solution to poor rural coverage.

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embrace challenge eXperience success

About Amdocs:

For more than 30 years, Amdocs has ensured service providers' success and embraced their biggest challenges. To win in the connected world, service providers rely on Amdocs to simplify the customer experience, harness the data explosion, stay ahead with new services and improve operational efficiency. The global company uniquely combines a market-leading BSS, OSS and network control and optimization product portfolio with value-driven professional services and managed services operations. With revenue of \$3.6 billion in fiscal 2014, Amdocs and its more than 22,000 employees serve customers in over 80 countries.

Amdocs: Embrace Challenge, Experience Success.

For more information, visit Amdocs at www.amdocs.com



Navigating the network

WELCOME TO THE TELECOMS.COM ANNUAL INDUSTRY SURVEY, IN WHICH WE POLL OUR COMPREHENSIVE AUDIENCE OF TELECOMS INDUSTRY PROFESSIONALS TO GAUGE THEIR VIEWS, ATTITUDES AND ASPIRATIONS ON A WIDE VARIETY OF INDUSTRY ISSUES. WE THINK YOU WILL AGREE THIS YEAR'S SURVEY OFFERS SOME PRICELESS INSIGHTS INTO THE WORKINGS OF THE TELECOMS WORLD AND HOPE YOU FIND IT USEFUL IN MAKING YOUR BUSINESS DECISIONS.

Today's telecoms industry is rife with activity of market consolidation, regulatory impositions, technology evolution, competitive pressures and spectrum optimisation challenges. To that extent, gauging audience attitudes towards the main concerns for telcos today is hugely insightful in understanding which direction the industry may shift towards in the coming years. To start the 2015 survey, we began by asking operator respondents to identify the top challenges to their business across the next 12 months.

Respondents were asked to rate the extent of their agreement with a range of challenges, on a scale of one to five, where one represented "highly challenging" and five meant "least challenging". The majority of operator respondents identified inter-operator competitive pressure as the most challenging aspect of business in the next 12 months, with 64% rating it as one or two out of five. Similarly, 60% identified cost of infrastructure investment as a key concern for 2015, potentially due to the continuing rollout and expansion of LTE networks across the majority of global territories. The third biggest concern for operators this year is addressing growing competitive pressure presented by over the top (OTT) service providers, with 59%.

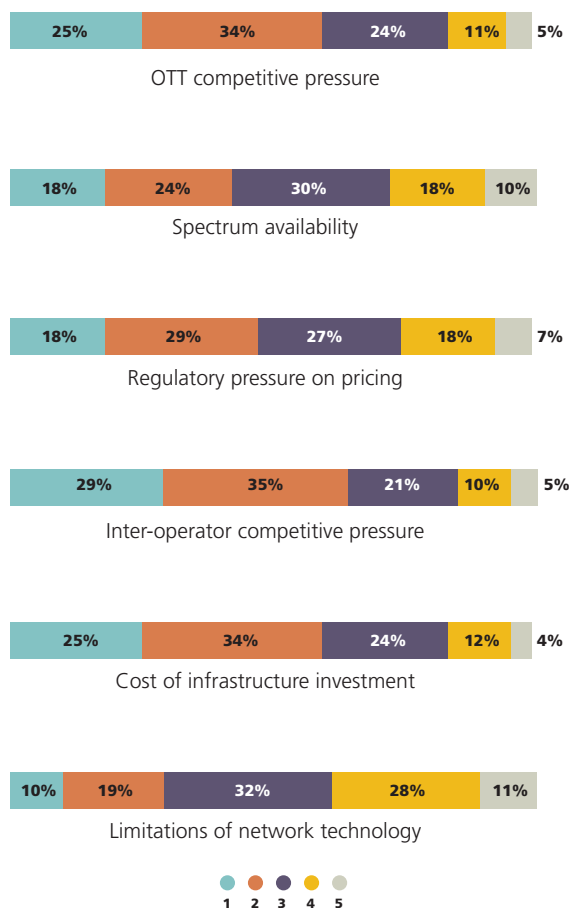
When we look at how operators responded to the same

question in last year, we can see that the landscape has shifted somewhat since 2014's survey was conducted.

In 2014, the top concern for operators was that of regulatory pressure on pricing, probably in consideration of the storm generated by the now former figurehead of the European

Commission's digital agenda, Neelie Kroes. At the time, 59% of respondents agreed it was of primary concern to their business, and perhaps the commencement of the Juncker Commission in late 2014 has temporarily eased concerns for a number of respondents, with 47% agreeing it to be a major

With one being the most and five being the least, how much of a challenge do you consider the following to be in the next 12 months?



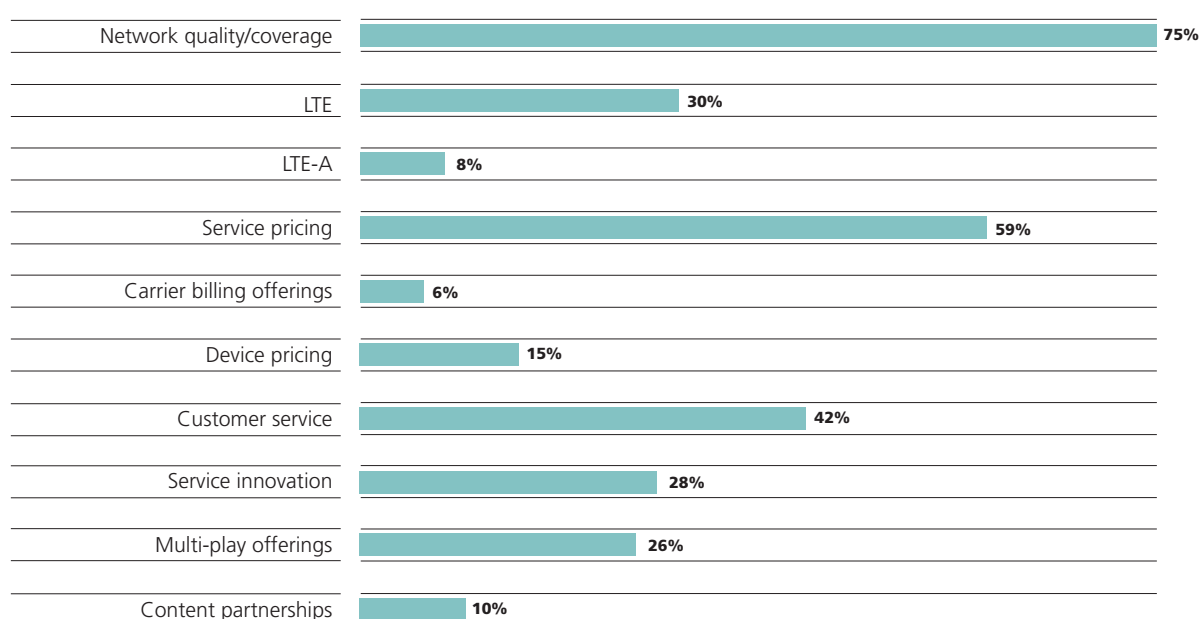


OPERATOR LANDSCAPE

75%

 of operators believe network quality and coverage is one of the primary competitive differentiators

What are the primary means of competitive differentiation among the mobile operators in your market? (select three)



challenge for them this year.

Conversely OTT competitive pressure has climbed from 52% last year to 59% as over the top services for both communications and media/entertainment pervade and encroach on traditional telco revenue streams. Most notably, however, is the aforementioned highlighting of inter-operator competitive pressure, which appears to dominate the challenges faced by operators in 2015. Last year, 45% of respondents ranked it as one of their top challenges, with nearly 20% more respondents identifying this as a cause for concern this time around.

Cost of infrastructure investment has also seen a rise of

13%, which is likely reflected in the roll-out and expansion of LTE networks currently being undertaken across the world.

The level of infrastructure investment could be seen as a key driver for operators as a means of providing differentiation from competitors in domestic markets. We asked operator respondents to identify the three most dominant means of competitive differentiation, and network quality and coverage was the most regularly identified means of stealing a march over competitors. 75% of respondents identified the network as instrumental in gaining ground over competitors, with service pricing coming in

second with 59%. Customer service was selected by 42% of respondents, with LTE, service innovation and multi-play offerings receiving 30%, 28% and 26% of the vote respectively.

However, device pricing, content partnerships, LTE-A and carrier billing offerings appeared to be of least interest to the audience, pulling in 15%, 10%, 8% and 6% of responses respectively.

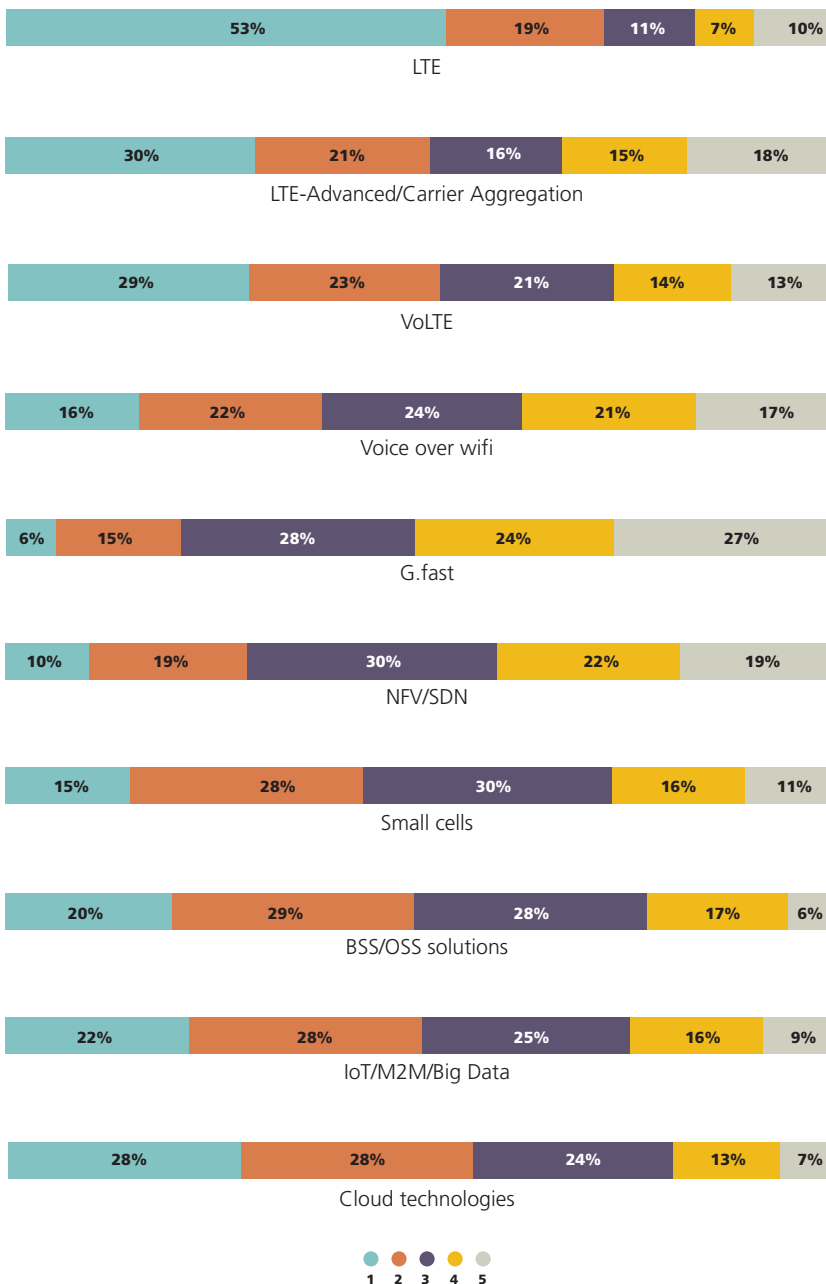
It is interesting to see LTE-Advanced poll reasonably few votes as a competitive differentiator, but this may indicate a lack of both awareness and interest in what the technology is from customers of the respondents. With 4G being the

term of preference for marketing purposes, the technological premise behind LTE-A may be lost on an audience whose primary concern is generally about speed and signal strength – the ends rather than the means, so to speak.

To that end, we asked our operator audience to identify where they are in the process of deploying LTE-A services. 28% of respondents stated LTE-A is already commercially rolled out, with 18% currently undergoing trialling on the service, and an additional 22% of respondents stating that LTE-A is expected to be rolled-out at some point in 2015. Conversely, 16% responded by saying LTE-A is not »

72% of operators are prioritising LTE for investment in 2015

On a scale of one to five (with one being the highest and five being the lowest), please indicate how likely you are to invest in the following technologies in 2015.



planned to be rolled-out at any point, with another 16% indicating that 2016 is a more likely arrival date for the high-speed mobile broadband technology.

Indeed, the responses yielded from the next question we asked substantiated the level of LTE-A activity going on this year. 72% of operator respondents identified LTE as a likely target for investment in 2015. 56% are likely to invest in Cloud technologies, 52% in VoLTE, and 51% in LTE-A or carrier aggregation. Meanwhile, IoT/M2M tech and BSS/OSS solutions were each identified as highly likely for investment by 49% of the respondents. 43% are planning on investing in small cells to boost urban mobile coverage, with 38% looking at investing into voice of wifi technology.

On the subject of small cells, we asked our audience to identify the three biggest advantages of deploying the technology. 70% of respondents, a considerable majority, reckon the biggest advantage is to improve coverage in densely populated, urban areas, with 67% agreeing small cells will also boost capacity. 43% believe small cell deployment will increase network flexibility, with 33% saying added scalability will be afforded to operators managing urban mobile networks.

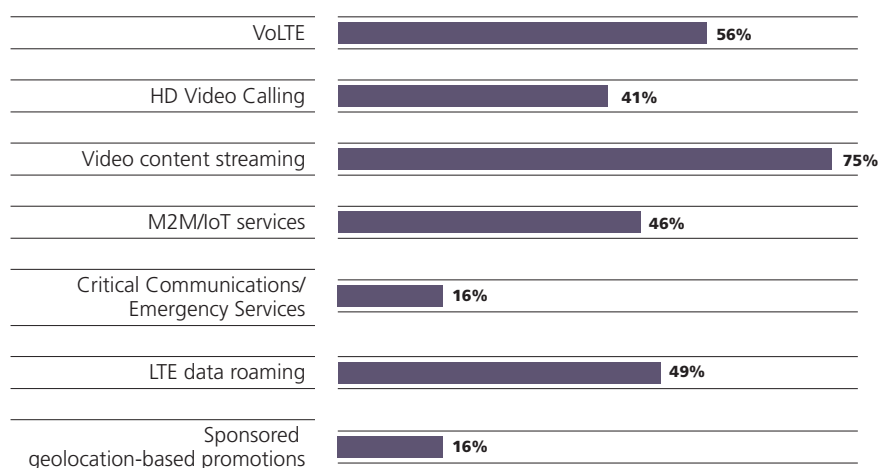
Coming back to areas for investment in 2015, and considering the hype it has received in the past couple of years, only



75%

of operators think video content streaming is one of the most lucrative LTE services

Which of the following do you think are the most lucrative services enabled by LTE? (select three)



29% of respondents are looking to invest in NFV or SDN.

With talk of NFV escalating over the past 12 to 24 months, we decided it was worthy of its own question in this year's operator landscape section of the survey (you will find a dedicated NFV section later on), to gauge how the industry currently views the emerging technology. We asked our audience to state when they intend to roll out virtualised architecture or services into the live network, such as NFV. 28% stated that this will occur in the next 12 months, if not already rolled-out, while 53% will be looking at implementation by 2017. 14% stated that 2020 is the latest they'll have deployed NFV technology by 2020, with just 4% stating no interest in doing so.

Only 21% of respondents are apparently looking to invest in G.fast technology this year, and we asked our respondents to indicate their level of agreement with some statements regarding broadband access and fibre to the home (FTTH). 54% of respondents agreed that FTTH is the only means of achieving truly high-speed broadband access, whereas 50% of respondents believe that copper infrastructure still has untapped potential in urban areas. Meanwhile, 38% of respondents believe that consumers are more likely to select a broadband provider based on download speeds instead of competitive pricing methods.

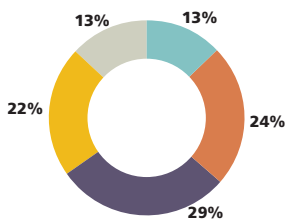
Speaking of pricing, we asked our audience to indicate, on a scale of one to five (one being the highest), how important

they consider certain pricing strategies to be to operators' businesses. It appears that shared data tariffs are being viewed as increasingly important to future revenue generation, with 63% and 54% of our audience indicating the importance of shared data plans for single person/multi-device and shared data plans for multi-person/multi-device respectively.

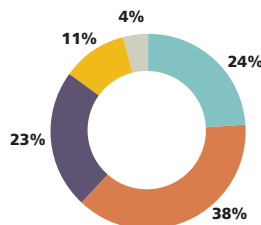
The shared data tariff model has pervaded the US market, with most major operators offering family data and device bundles. That trend began moving over to European, and specifically the UK, markets in 2014, with the major telcos in the UK now adopting plans for families, and the individual with multiple SIM-based devices. This model could be seen as effective means of upselling services »

69% agree that network sharing is a solution for poor rural coverage

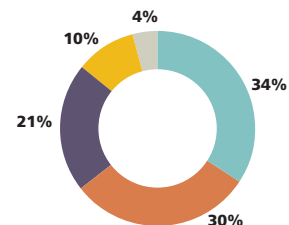
On a scale of one to five (with one being strongly agree and five being strongly disagree), please give your response to the following statements related to network sharing?



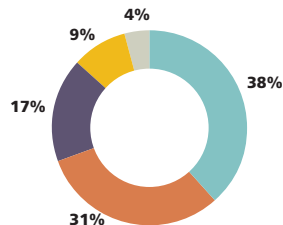
Leads to a less competitive market



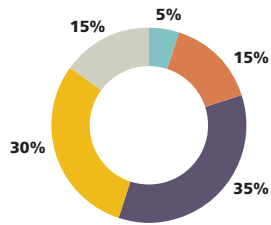
Benefits MVNOs and less well-equipped operators



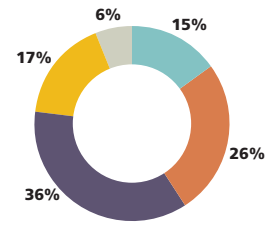
Benefits customers



A solution to coverage issues in rural areas



Leads to higher service prices



Disincentive to infrastructure investment



to entire households, instead of individual users therein. Shared data plans also give operators a means of tackling multi-device usage in a household, effectively transferring restrictions on data usage from a device level to a personal level.

Coming back to the question about pricing strategies, a further 50% of respondents believe that performance-based, on-demand pricing will be an effective pricing strategy for generating new revenue. This can extend to boosting data speeds and capacity for a specific application, event or time period, if a user anticipates high usage for

a set period of time. Taking that one step further, 46% believe application-specific pricing will be of importance to operators. Meanwhile, 35% of respondents actively stated the lack of importance of having data available for tradable usage, such as gifting. It appears there's little appetite for offering data as a tradable commodity.

On the subject of revenue generation, we asked our respondents to identify the three most lucrative services to be enabled by LTE, and the overwhelming majority of our respondents, 75%, identified video content streaming as

the service with most potential to deliver new revenue. 56% believe that voice over LTE (VoLTE) will be the most lucrative service LTE has to offer, 49% said LTE roaming will prove to be a key new revenue stream, and 47% indicated that Internet of Things-based M2M communications will be a big money-maker for operators. Critical and emergency communications are unlikely to be a form of revenue that operators believe will be hugely lucrative, with only 16% of respondents identifying it as a primary revenue source for LTE.

On the subject of VoLTE, 46% of our operator respondents

suggested the emerging voice technology will be a priority for them over the next 12 months. Alongside wifi-enabled calling, it looks like there's a new generation of calling services on the horizon for operators, in a bid to wrestle back customers from OTT communication providers. By sourcing the means to hand calls over between LTE and wifi networks, operators could potentially find themselves with a means to solving dropped calls and the QoS challenges common on traditional voice networks.

In 2014, network sharing again became a contentious issue, with the UK Department



of Culture, Media and Sport (DCMS) going back and forth on operator requirements for nationwide network sharing in Britain. After a three-week consultation period on how new rules should be imposed on the major telcos to ensure better mobile connectivity in rural not-spots, a spot of controversy ensued with the recommendation that operators be obliged to enforce national roaming, a plan which was of course fiercely opposed by the operator community. Upon the conclusion of the consultation period, it appeared the DCMS came to a "landmark agreement" (their words) with the big four telcos in the UK, which skirted around the idea of national roaming, without actually enforcing it in any way.

19%
expect to
implement a
big data strategy
at some point
this year, with
an additional
16% looking to
implement big
data in 2016 or
beyond

We thought it best to get the opinion of the operator community on a few network sharing related points, with respondents asked to share their level of agreement. 65% of respondents agree that it is a solution benefitting customers, with 69% agreeing that it does indeed provide a solution to rural coverage issues specifically. On the other hand, 62% of all operators who respondent believe that it's a policy where only MVNOS and smaller operators stand to gain, and 41% believe that, if anything, national roaming disincentives future investment into network infrastructure. Whether or not national roaming may lead to a more or less competitive market is where opinion is split, with 37% of operators agreeing that competition will decrease, 35% disagreeing and effectively saying competition will increase, and 33% staying neutral on the matter.

To conclude the operator landscape section of this year's survey, we asked our audience about one of the more fashionable trends of 2014: big data. It appears that increased big data adoption has stalled somewhat since last year's survey. In 2014, 46% of respondents had implemented a big data initiative for either internal or external purposes, with an additional 22% looking to implement an initiative at some point in 2014. This year, 47% of respondents currently have a big data initia-

tive in place, a number which is lower than expected considering last year's responses. 19% expect to implement a big data strategy at some point this year, with an additional 16% looking to implement big data in 2016 or beyond.

On the whole there's a great cause for optimism in today's telecoms industry, when we consider some of the monetisation opportunities being served up by the maturation of technologies like LTE. Having looked at the broader operator landscape, it's time we take a deep dive into some specific areas of interest. In the rest of the report you'll find our insight into some of the biggest areas relevant to today's industry, featuring BSS, LTE, NFV, security, content and devices.

It's fair to say that there's a lot of opportunity for the telecoms market in 2015 and beyond, as the technologies we once considered emerging become mature and begin delivering new revenue generation opportunities. Realising the potential capabilities of new, and existing, networking infrastructure is sure to be a key step for telcos looking to embrace the evolving technological and competitive landscape. Hopefully this report will help you more fully understand the emerging trends out there.

We hope you find this year's survey useful as you look towards 2016. ■

SPONSOR COMMENT

By Vincent Rousselet, VP,
Market Insight and Strategy, Amdocs

There is a fresh focus on customer experience among operators around the world. While in the past it was approached from a functional, siloed perspective, mainly from the customer care organisation, today all areas inside an operator, such as network management, marketing, customer care or innovation - are beginning to understand that a multidimensional approach to customer experience is key to building a sustainable, competitive advantage.

Telecoms.com Annual Survey bears out the emergence of this new world of customer experience in a striking manner: competitive pressure is mounting between operators (a top priority for 64% of respondents) and from internet companies (59%). Lower prices and the cost of technology (60%) - both rolling out the new and servicing the old - create a challenging scissor effect, with revenue losing ground to costs. In order to succeed, a common thread has to be woven across the operator: competitive customer experience is that thread.

To be differentiating, customer experience must be holistic. It has to be built into exciting new products and services, and retro-fitted in the legacy portfolio. It needs to incorporate dynamic network configurations to ensure superior quality of experience (QoE). It must be delivered intelligently to the end-customer, with the help of big data analytics. An experience that is personalised and contextualised, on-line and off-line, will be the one that customers actively come back to. Inside the operator's organisation, the network department should be just as concerned about the company's Net Promoter Score as it is about dropped calls.

Here at Amdocs, we're excited that the industry is increasingly recognising the critical role of customer experience in accelerating business value. As we better understand the "what", we can work together on the "how": how to make this multi-dimensional experience a reality.



BSS

Operators are having to combine a widening portfolio of product offerings with an increasingly demanding consumer-base, while simultaneously guaranteeing quality of service in terms of both product delivery and billing efficiency. This section of the survey looks at strides being taken by operators to move towards next generation BSS solutions that can capably handle the stress of the modern day telecoms operator.

Key takeaways:

- 67% believe that bundling offers from content providers such as video and music services, is a serious consideration for new revenue generating services.
- 58% believe that a centralised offer catalogue is helpful for delivering billable services.
- 63% of respondents agree that system integration complexity is a time consuming challenge which can slow down new services being delivered

About Openet:

Openet is the leading independent supplier of real-time BSS (business support systems) to communication service providers. Openet software ensures that more than 600 million mobile telecoms users around the world enjoy the best network and data experience while enabling operators to monetize data use in 'real time'. Since its foundation in 1999, Openet has constantly been at the forefront of telecoms software development and innovation. This is characterized by its open platform, domain experience and engineering expertise. Its success is personified by the many long-term relationships it has fostered with the largest, most progressive and demanding operators across the globe.

For more information, please visit www.openet.com



Relating to the customer

THE RELATIONSHIP BETWEEN COMMUNICATIONS SERVICE PROVIDERS AND THEIR CUSTOMERS HAS NEVER BEEN STRAIGHTFORWARD AS EVERY CUSTOMER HAS UNIQUE NEEDS AND EXPECTS THE CSP TO BE ABLE TO ACCOMMODATE THEM. NOW, WITH EXPONENTIALLY INCREASING DATA CONSUMPTION AND THE NEED TO DELIVER A GREATER RANGE OF PRODUCTS AND SERVICES THAN EVER, CSPS HAVE NEVER BEEN MORE RELIANT ON THE SYSTEMS THAT ENABLE THEM TO INNOVATE, DELIVER AND TRACK THEIR PRODUCTS.

With consumers growing ever more discerning in their mobile contract choices, an important way for operators to retain both business and margin remains BSS (business support systems). Not only is BSS used to help product innovation and ensure revenues are tracked and collected properly, it's also concerned with the management of the customer experience and the customer relationship.

As consumers get more savvy, BSS, which in many ways governs the dynamic between operator and customer, needs to evolve accordingly. It's also a vital component in both reducing churn, via CRM/CEM, and acquiring new subscribers

via product innovation. Almost three quarters of respondents in this part of the survey agreed that reducing churn and increasing ARPU are key competitive tools and that they are being forced to consider more innovative pricing models in order to arrest declining ARPUs.

The first question asked in the BSS-focused part of our survey was also asked in last year's survey. A year ago the BSS application most sought after by respondents was Customer Management, with 43% of them saying they planned to deploy or upgrade their Customer Management capability in the next 12 months. Next came Billing, with

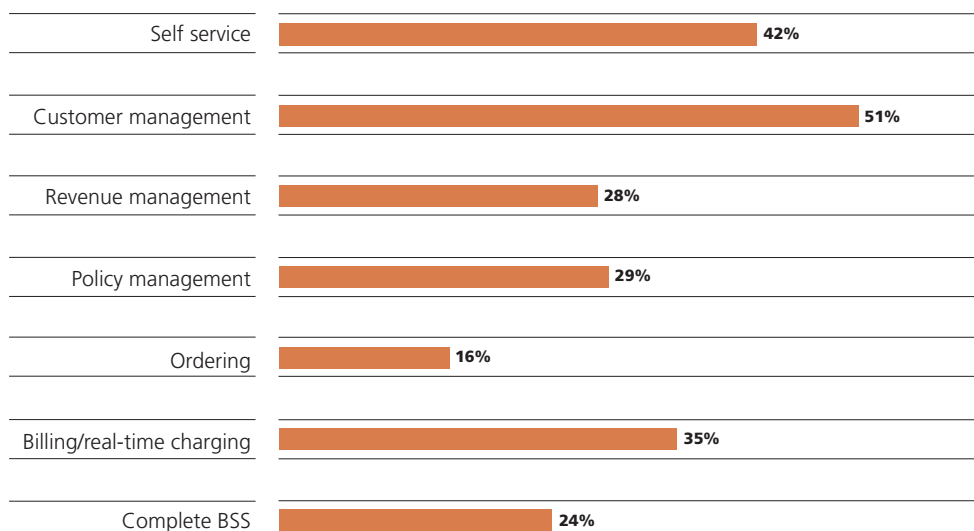
36% and then Self Service, with 30%. 18% of respondents said they expected to invest in a complete BSS suite.

This year Customer Management was once more the most popular category (implying, perhaps, that not everyone who intended to deploy/upgrade last year actually did), but this time more than half of respondents have plans for that branch of BSS this year. Revenue Management and Billing were more or less the same as last year, but the proportion looking to invest in complete BSS solutions jumped to 24%. The biggest change, however, was in the proportion of respondents planning to deploy or upgrade Self Service applications in 2015, which jumped to 42%.

On the whole it appears a significantly greater proportion of respondents are looking to invest in BSS this year than they did last year. While interest in complete BSS has increased, Customer Management and Self Service are clearly the most desired applications, implying operators are looking to introduce both greater sophistication and greater automation into their customer relations. This is consistent with the broader trends towards product innovation combined with lower overheads.

Our next question addressed what those new products might be, specifically how seriously respondents are considering a number of services as potential

Which of the following services are you planning to deploy or upgrade in the next 12 months?



67% believe that bundling offers from content providers such as video and music services, is a serious consideration for new revenue generating services

generators of new revenue.

In the charts below, where one or two indicate the service is being seriously considered, bundle offers from content providers proved the most popular source of potential new revenue, with two thirds of respondents giving it serious consideration. This is consistent with studies on attitudes to OTT partnerships, including last year's Telecoms.com survey.

While so-called OTT players were once considered antagonistic by mobile operators, they are increasingly being viewed from an "if you can't beat 'em join 'em" perspective. Content creation and distribution is not a core competence of operators and past failed experiments have shown subscribers find limited appeal in deriving too many of their mobile services from one supplier. So partnering with trusted OTT brands is increasingly being viewed as the best way for operators to derive at least some revenue from activity that's going to take place over their network regardless.

Of course not all innovation is positive and, while the majority of respondents also think Digital Life services and context-aware offers stand a good chance of generating some extra revenue, only a minority feel the same about novel ways of using data services to generate extra revenues, such as ad sponsorship and time-based data tariffs. On the whole

On a scale of one to five (with one being very seriously and five being not very seriously), how seriously are you considering the following as new revenue generating, billable services?



Bundle offers from content providers (e.g. video and music services)



Time-based data bundles, instead of data-limited



Advertisement-sponsored data services



VoLTE



Personalised, context aware offers (e.g. Geolocation or usage-based offers)



Digital Life/M2M/Connected Home



the impression given is that completely new products offer greater new revenue potential than tweaking existing ones.

Next our survey looked to drill down further into respondents' thoughts on their current BSS provision, by asking them to state the extent to which they agreed with a number of state-

ments. Only two were agreed with by the majority of respondents, with 63% agreeing that: "System integration complexity is a time consuming challenge which can slow down new services being delivered," and 58% concurring that: "A centralised offer catalogue is helpful for delivering billable services."

These responses would seem to highlight two key pain-points; that respondents are looking for solutions that facilitate the delivery of new services, but that this process can also be hindered by the time it takes to properly implement those solutions. The message is clear: it's not enough just to invest »



in technology; it needs to be properly integrated before it becomes materially useful.

Conversely less than 40% of respondents agreed with the other three statements, which concerned how effective respondents think their current BSS solution is in helping them create new products and get them to market, so there's room for improvement there.

Our final set of questions concerned the growing trend of moving to virtualized solutions, specifically virtualized BSS. 28% of respondents said they plan to move to a virtualised BSS and while 43% said they preferred to incrementally upgrade their existing BSS, a significant minority said they want to virtualize.

The responses to our next question implied there may be a fair bit of overlap between the categories covered in the previous one, as nearly two thirds of respondents revealed they either already have or are planning to implement a virtualized BSS solution. Another possible cause of statistical anomaly could be that almost half of respondents indicated this implementation is at least a year away from happening.

Our final question regarding virtualized BSS concerned its perceived benefits. When asked to say what the primary benefit of a virtualized BSS would be, speed of deployment and time to market was the clear top answer, with 38% of respondents, while other benefits such as capex reduction and more differentiated service offerings attracted half the numbers. This

With one being strongly agree and five being strongly disagree, please indicate your agreement with the following statements regarding your existing BSS



My current BSS solution allows us to get new services to market quickly enough



We have an over-reliance on our existing BSS vendor to set up offers and services for us



System integration complexity is a time consuming challenge which can slow down new services being delivered



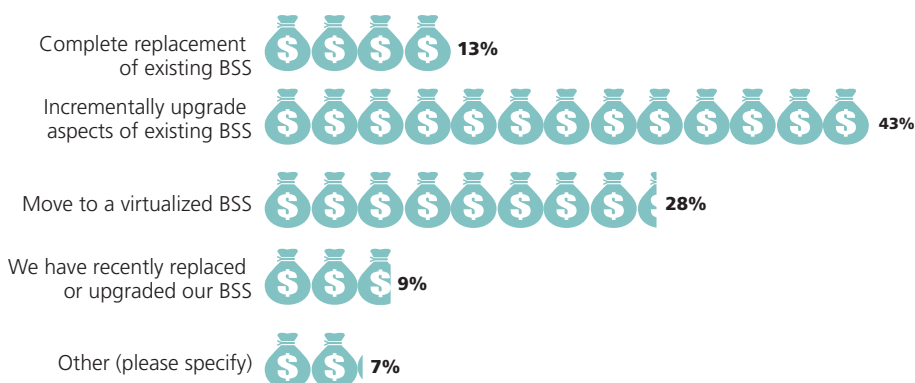
A centralised offer catalogue is helpful for delivering billable services



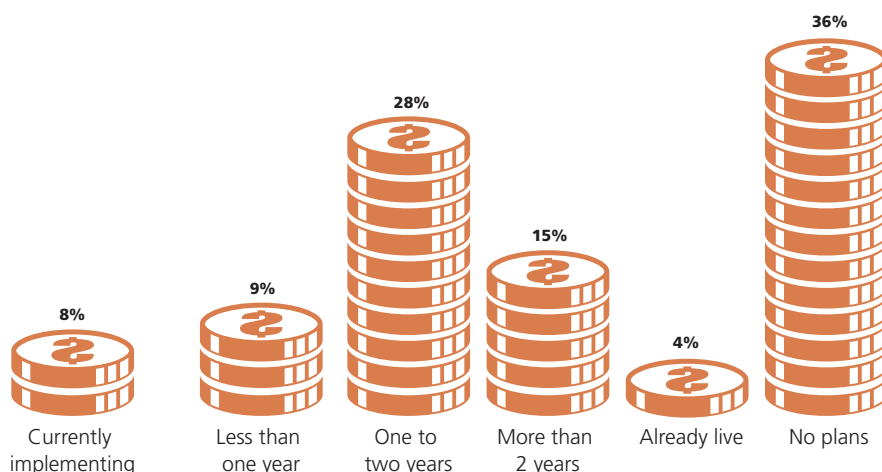
Our existing BSS solution allows us to differentiate our product offerings from our competitors



Which of the following options most accurately reflects your views on upgrading your BSS platform?



When are you planning to implement a virtualized BSS solution?



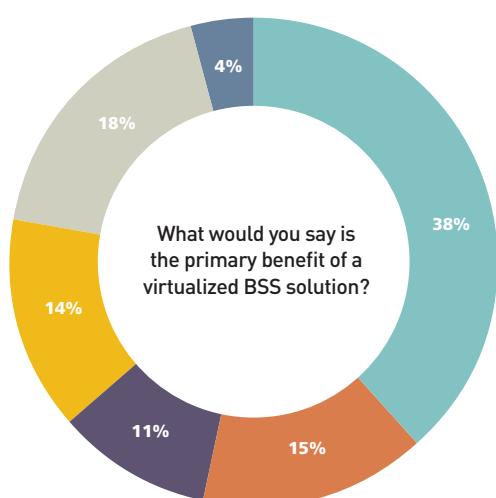
is consistent with a degree of ambiguity towards the benefits of virtualized solutions over and above a growing consensus that it improves speed and agility.

The respondents to the 2015 Telecoms.com annual industry

survey clear view BSS as a vital tool to help them achieve their business objectives. It is considered to provide significant assistance in both reduction of customer churn and, via enhanced product innovation and

delivery, improved ARPU. There is now a widespread acknowledgement that subscribers want real choice in the range of mobile products and services and that many of these fall outside the core competences of operators. These include those typically grouped as "OTT" and respondents are looking for BSS to help them with both the delivery and commercialisation of these.

On the flip side there is clearly some room for improvement on the part of BSS vendors. They must continue to improve the ease with which their solutions interoperate and integrate with their customers' existing infrastructure and must better demonstrate how their solutions can best be used to improve product innovation. It seems that a lot of respondents think that the move to a virtualized BSS may assist with this, and are making that move accordingly, so vendors need to ensure they are well positioned to help their customer fully appreciate the benefits. ■



- Faster service deployment and time to market
- Easier to manage product life cycle
- Differentiated service offerings
- Capex reduction
- Lower software related opex
- Other

SPONSOR COMMENT

Martin Morgan, VP Marketing, Openet

The need to launch new products, harness new revenue streams and deliver a more personalized service direct to the customer's device are the main take-aways from this section of the survey. BSS vendors need to deliver the systems to make this happen - quickly and cost effectively. In order to achieve this, open-ness, interoperability and innovation need to be built in to BSS - the old 'closed shop' days of billing systems are over. BSS are no longer just IT systems for provisioning, charging, billing and managing customers. They must also be used by marketing to enable product innovation and let operators have the flexibility to get more products out the door in a shorter space of time.

The results of this survey show that operators want to innovate and the move to upgrade old BSS stacks is indicative of the changes coming down the line. The large increase in operators looking towards self-service shows the emergence of a much more personalised approach to delivering mobile services. With regards to selling new services to derive new revenues the survey pointed out that partnering with trusted OTT brands is the best way for operators to make money from content and OTT services. Combine this interest in OTT partnering with the increased importance of self-service. The logical result is offering content (and other) services directly to the device using customer self service capabilities - providing a personalised sales and marketing channel.

The survey also highlighted the importance of time to market. The use of centralised offer catalogs in BSS is increasing and many of these now enable operators to set up, test and launch new services in days, as opposed to months.

Operators are becoming more innovative and BSS vendors need to step up to the mark and enable operator innovation with real-time and open systems.



LTE

Live global LTE/4G network deployments climbed past 300 by the end of 2014, so it would be fair to say that LTE infrastructure roll-out has gathered full momentum. The next challenge for operators, however, is in simultaneously expanding the coverage capabilities of LTE networks, while guaranteeing performance and quality of service for a rapidly growing user base. Our respondents, in this section, identified their concerns and motivations for growing their LTE service portfolio.

Key takeaways:

- 86% of operators see data-driven service growth as the main reason for LTE network deployment or expansion.
- 34% believe quality of service with legacy networks is the biggest VoLTE challenge.
- 85% of respondents indicated that data throughput speeds are an important consideration when evaluating LTE network performance.

ascom

About Ascom:

Ascom Network Testing offers the TEMS™ Portfolio, the world's most widely used network testing, monitoring and optimization platform. Ascom Network Testing is a division of Ascom, a global solutions provider with comprehensive technological know-how in mission-critical wireless communication. The company focuses on the Wireless Solutions (an international market leader for high-value, customer-specific on-site communication solutions and workflow optimization) and Network Testing (a global market leader in testing, monitoring, post processing, and performance optimization for mobile networks) divisions. The Ascom Group is headquartered in Switzerland, has subsidiaries in 17 countries, business activities in more than 130 countries, and employs around 1,600 people worldwide. Ascom registered shares (ASCN) are listed on the SIX Swiss Exchange in Zurich.



Performance anxiety

IN JANUARY, THE GLOBAL MOBILE SUPPLIERS ASSOCIATION PUBLISHED FIGURES DETAILING THE GROWTH IN LTE NETWORK DEPLOYMENTS THROUGHOUT 2014. ACCORDING TO THE REPORT, 360 GLOBAL OPERATORS HAVE NOW COMMERCIALY LAUNCHED LTE NETWORKS, ACROSS 124 COUNTRIES.

That represented an annual increase of over 25%, and indicates the rate at which LTE is still growing for a number of service providers across the world. Rolling out the network infrastructure is only the beginning; one of the key challenges across the sector is achieving both coverage and penetration.

While 4G services have been available for years, LTE is still in relative infancy. According to

Ovum's World Cellular Information Service, penetration of LTE service uptake in the UK sits at 23% of the population, or 14.9 million users. With 80.8 million subscriptions in the UK, there could still be some way to go before LTE could be considered to have reached maturity.

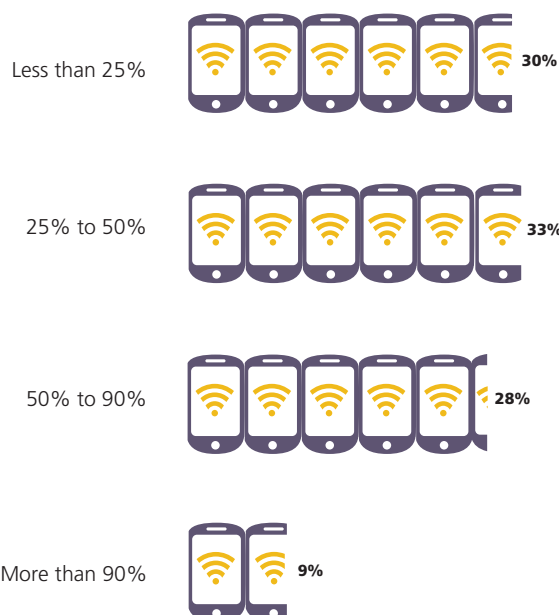
In this year's survey, we asked respondents what percentage of existing 3G subscribers they think LTE will cover by the end of 2015.

30% of respondents believe less than 25% of existing 3G customers will be covered by LTE, 33% of respondents stated 25-50%, 28% believed 50-90% will be covered, with only 9% believing that more than 90% of 3G subscribers will be covered by the end of the year.

Our respondents were asked to identify the two primary motivating factors for deploying, or expanding upon, an LTE network. 86% stated that meeting growing consumer demands for data-driven services is the main reason for investing more into LTE development. This appeared to be the overriding thought from most respondents, with 44% highlighting LTE's ability to ease the introduction of new, media rich services. This seems to suggest a growing emphasis on content and media delivery for consumers. Following on from the rather data-centric viewpoints, 41% of respondents stated that migrating towards a ubiquitous network technology is a priority, and 29% of respondents believe that voice over LTE (VoLTE) and enhanced call quality is a big motivator.

Incidentally, VoLTE is one of the biggest priorities for respondents in 2015, with 45% stating they intend to invest and implement in the calling technology this year. Only LTE network expansion

What percentage of your existing 3G subscribers do you think will be covered by LTE by the end of 2015?

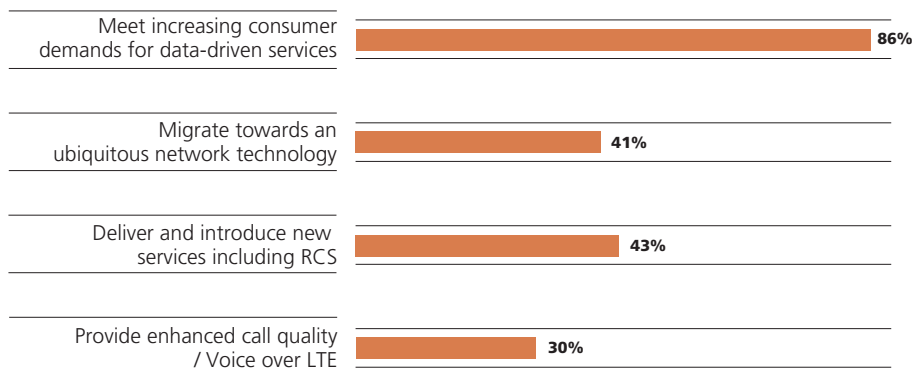




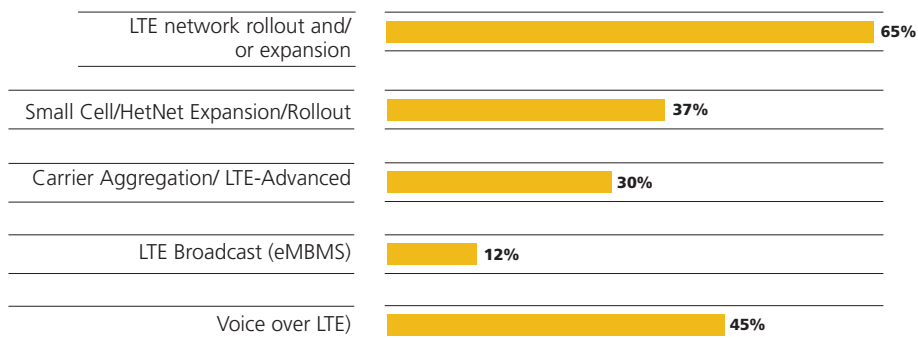
86%

of operators see data-driven service growth as the main reason for LTE network deployment or expansion

What do you consider to be the main motivating factors for deploying or expanding an LTE network?
(Please select two)



Which of the following are you looking to implement in 2015?
(Please select all that apply)



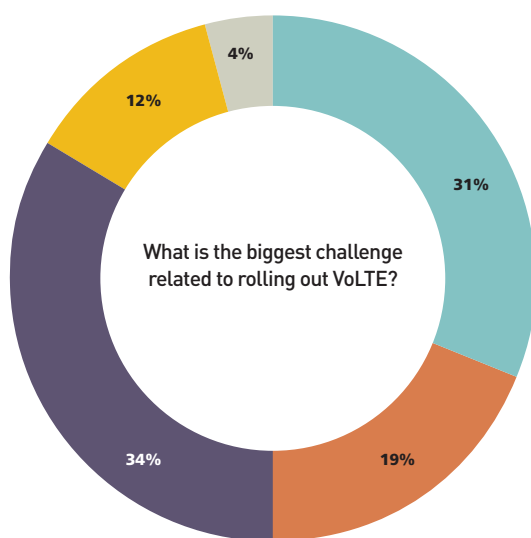
ranked higher as a priority for our respondents, with 65%. In 2014, VoLTE came under the spotlight when a number of high profile global operators began trials and rollouts of the HD voice service. AT&T, T-Mobile USA, du and Telefónica Germany rolled out live services, while on the devices side Apple decided to build in VoLTE compatibility

into its new suite of iPhones. Meanwhile, China Mobile and KPN introduced international VoLTE roaming capabilities, illustrating the growing number of operators across the world that are actively pursuing the technology.

On the same question, 38% of respondents identified small cell and HetNet activity as the main priority for 2015, with

30% looking at LTE Advanced (LTE-A) this year. 2014 saw LTE-A being rolled out by numerous operators, including China Mobile, Ooredoo, Rogers, EE and more. Seen as a potential midpoint between 4G and the yet to be defined 5G, LTE-A trials based on carrier aggregation technology have been reported to achieve enormous mobile broadband speeds in »

34% believe quality of service with legacy networks is the biggest VoLTE challenge



- LTE network coverage
- RAN integration with IP network
- QoS between VoLTE and legacy networks.
- Roaming
- Other

the field of over 200 Mbps. Perhaps less representative of real-life usage, some reports from the lab have claimed to achieve more than 4 Gbps, which could be seen as more of an indicator of potential than achievable, realistic mobile broadband speeds.

At this stage, it appears LTE Broadcast technology is a nice-to-have rather than a priority, with only 12% of respondents looking at it in 2015.

So, with VoLTE being on the radar of so many companies, we asked our respondents what its most compelling value proposition is. Perhaps surprisingly, voice quality is not the primary factor driving VoLTE investment and development, garnering only 13.3% of respondents' votes. On the other hand, 28% of respondents indicated that voice service performance is its top value proposition. Meanwhile, introducing new multimedia services (20%), replacing

fixed line business (19%) and spectrum re-farming (17%) all featured prominently in the eyes of survey respondents.

But what are the primary challenges associated with making the vision and potential of VoLTE a reality in the near future? We've already identified that achieving a sufficient level of LTE network coverage will be one of the first hurdles operators and vendors need to clear, which is something that 31% of respondents identified and agreed with. The most frequently offered response, however, was achieving a consistent quality of service between VoLTE and legacy 2G/3G voice systems, which 34% of our respondents identified. RAN/IP integration and cross-network operator roaming capabilities were also identified as substantial challenges by our respondents, receiving 19% and 12% of votes respectively.

One of the clear trends emerging from the results so far points towards LTE service quality being one of the biggest considerations for operators so far. We asked our audience to tell us what feature was most important when evaluating the performance of LTE networks. 85% of respondents said that data throughput and uplink/downlink speeds were of high importance, ranking them one or two out of five. 78% of respondents, meanwhile, said that

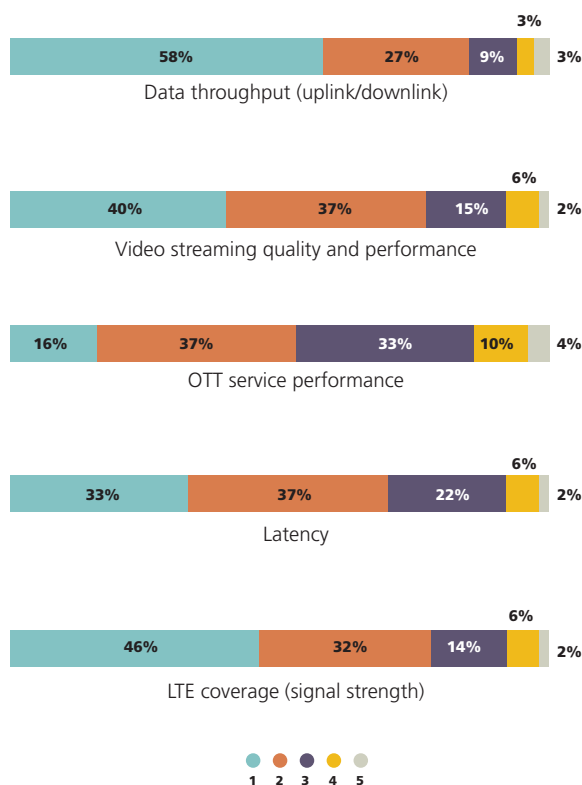
signal strength and coverage were of the same importance as data throughput.

With the growing adoption of over the top (OTT) services by consumers, whether that's communication services like Skype or Whatsapp, or media services like Netflix, operators are beginning to look at the performance of OTT services as one of the more important determinants of LTE network performance. 53% ranked OTT service performance as one or two out of five for importance, with one being the extremely important. Consequently, we asked our participants how customers usually react if an OTT service falters or becomes problematic. The natural inclination, according to our audience, is for customers to blame the network if any service delivery failures occur, which 51% of respondents indicated. 34% of respondents indicated that customers usually report the service itself. The user device (8%) and customer error (7%) each received a smaller proportion of votes by the respondents.

The emphasis we can see here, however, is that operators are under intense scrutiny by a large portion of users to deliver and manage a high calibre, always-available service over their network. This reinforces the recurrent trend being observed across the majority of questions in this section of



When evaluating performance of an LTE network, please rate the importance of the following considerations on a scale of one to five (with one being the highest and five being the lowest)



the survey. Performance is increasingly being viewed as the primary dictating factor in the success of LTE networks, and self-optimising networks (SON) are becoming recognised as a primary option for operators to automate the maintenance and upkeep of more intelligent LTE networks.

46% of respondents, when asked to highlight their expecta-

tions of SON, indicated that improving network performance is the goal, perhaps unsurprisingly. A close second place saw capex and opex reduction identified by 43% of the audience; with 26% stating that energy efficiency is a major expectation for the technology. Considering the early stages of SON's development, it's perhaps encouraging to see that 20%

of respondents are actively trialling the technology to evaluate its potential benefits. Meanwhile, 32% aren't looking to implement SON into the LTE network this year, perhaps indicating its longer-term value proposition to carriers.

The whole discussion around LTE is incredibly customer centric, considering the competitive landscape of today's telecoms industry. Respondents to this year's survey overwhelmingly identified the customer's ability to churn as a primary consideration for any LTE service provider, with 81% of responses agreeing that customers have considerably more service options today than in previous years. Meanwhile, 72% believe customer experience is becoming vital with LTE services, in the face of similar service and cost offerings from competitors.

The clear issue for respondents coming through in this section of the survey is that of network performance and scale. The majority of participants in the survey repeatedly identified quality of service based on network efficiency, coverage and speed; and that could be considered to be an indicator of how LTE is likely to mature over the coming 12-24 months. Referring back to the GSA's statistics on LTE network growth in 2014, the focus for 2015 and 2016 is likely to be on creating ubiquitous coverage. ■

SPONSOR COMMENT

Don Bell, Director of Business Development
- Office of the CTO, Ascom

Ascom Network Testing was pleased to participate in the Telecom.com Intelligence Annual Industry Survey 2015. As part of its focus on network quality and performance optimisation, Ascom is keenly interested in mobile network operators' views on LTE and the services the technology enables.

As we reviewed the results of the survey, Ascom found four of the results particularly interesting:

1. Viewed globally, ubiquitous LTE coverage is a top priority but far from complete, with the primary objective being to expand network capacity to address the demand for high speed data services.

2. Although not the primary driver for LTE rollout and expansion, VoLTE is a clear focus area for MNOs as they look to improve overall voice performance with enhanced Rich Communications Services.

3. When evaluating the performance of broadband LTE networks, traditional measures such as uplink/downlink throughput and signal strength/coverage area are still critical, but video streaming quality is fast becoming an important measure of network quality due to its broad usage and demanding performance requirements.

4. Understanding customer experience across different types of services is critical since customers typically judge the quality of the network based on the quality of the service being used or consumed, whether it is controlled by the operator or by an OTT provider.

Over the past 5 or 6 years, many LTE network rollouts began as a way to address the increased need for mobile network data capacity. However, as LTE matures and usage increases, managing network capacity becomes a priority and mobile network operators are faced with new challenges associated with ensuring high quality service delivery.

Ascom will continue to focus its solutions to help operators understand customer experience today and in the future with the advent of even more advanced network technologies.



NFV/SDN

Operators are coming under increasing pressure to deliver higher amounts of content at variable peak times, while simultaneously reducing the operating and capital expenditure levels in existing network infrastructure. NFV appears to propose a solution to operators by allowing the functional capabilities of hardware to be consolidated onto high-capacity, multi-purpose servers and distributed on demand. This section of the survey will analyse operator views on this burgeoning field of technology.

Key takeaways:

- 40% of respondents have either launched NFV or SDN in the live network, are trialling, or will launch in 2015.
- 63% agree network virtualization will enable more scalable and flexible service delivery.
- 68% believe SDN and NFV are highly complementary and provide a compelling value proposition for carriers when deployed together.



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In with the new

IN 2012, THE TELECOMMUNICATIONS INDUSTRY BECAME AWASH WITH TALK OF A NEW TECHNOLOGY THAT COULD HERALD IN A NEW ERA OF SERVICE PROVIDER NETWORKING.

One of the dominant trends being observed in the networking industry in the past 18 to 24 months is Network Functions Virtualization (NFV). 2015 looks set to be a big year for the technology, so we posed our audience a key array of questions to understand the industry's current mind-set towards the technology, as well as understanding some of the biggest challenges and potential use-cases in the next 12 months.

Having gained significant

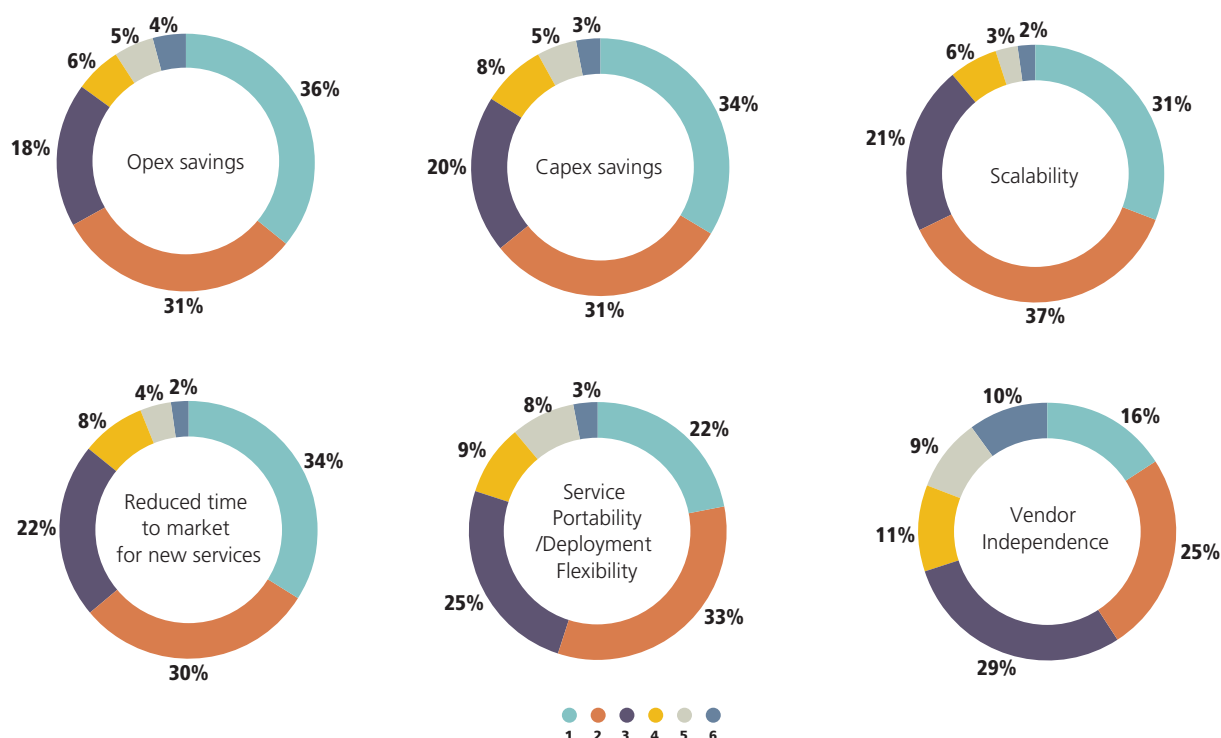
momentum among those involved with network infrastructure engineering and management; NFV, alongside the often synonymised software defined networking (SDN), is set to bring around rapid change to the underlying technology utilised by telcos for enterprise and consumer service delivery.

At its core NFV is the principle of virtualizing physical network functions, which occur at various points in the service provider network, on to

high-capacity, common off the shelf virtual servers in the data centre. These virtualized functions can then be consolidated if needed or deployed as single network functions, which minimises redundancy of physical equipment in the network and subsequently increases service provisioning velocity and roll-out, while reducing both capital and operating expenditure.

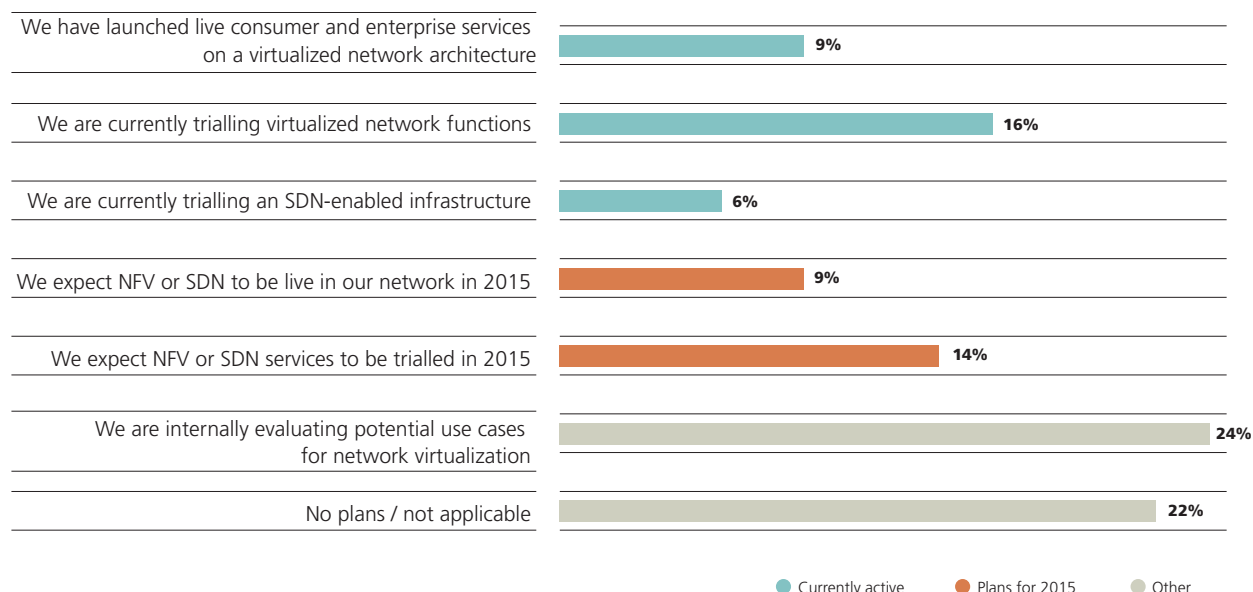
SDN, meanwhile, is the concept of separating the control/routing functions of the network,

What do you see as the primary benefits of network virtualization? (Please order with one being the highest priority and six being lowest priority)



Which of the following statements most accurately reflects your company's network virtualization, NFV or SDN position?

(Operators only, please select one)



from the movement of data on the physical infrastructure. The two technologies (SDN and NFV) are highly complementary and provide a compelling value proposition for carriers when deployed together, which is a view agreed upon by 68% of survey respondents. 16% believe they are purely independent of each other, while the remaining 16% believe they are, in fact, mutually exclusive and cannot be deployed without each other.

Survey respondents were asked to prioritise which of the key functional benefits of NFV is the most compelling. Respondents agreed that scalability (68% ranked one or two out of five), opex (67%), capex (65%) and reducing time to market when deploying new services (64%) were a high priority. There is the probability of much confusion in the market surrounding NFV, and its most

compelling value proposition, which is indicated by the narrow margins separating the most commonly identified benefits.

On the other hand, the value proposition of NFV could be so great that a plethora of benefits is quite befitting of its burgeoning status as an incredibly disruptive technology.

In the same question respondents indicated that vendor independence is of lowest priority, with 30% of all respondents ranking it as a four, five or six out of six. This would likely indicate a certain level of indifference to the possibility of maintaining a vendor-neutral network, with a further 29% of respondents ranking vendor independence as a neutral three out of five.

One of the most prevalent philosophies generally associated with the virtualization movement is referred to as "openness". Openness alludes to an enhanced

level of interoperability of vendor product and solution offerings in a wider multi-vendor stack. This could be seen as a realigned balance of power in the vendor/telco relationship, where operators know their requirements and vendors are compelled to provide a solution which can easily integrate itself with other external equipment providers in the industry.

Naturally, this begs the question of what will happen to hardware-based revenue streams if fewer pieces of physical network equipment are being sold. Operators may not conduct a complete overhaul of purpose-built hardware to a virtualized, NFV-based infrastructure for various reasons.

Currently, traffic is routed across existing physical infrastructure, and most operators are expected to introduce NFV gradually in specific segments of their network. This could »

40%
of respondents have either already launched NFV or SDN in the live network, are trialling, or will launch in 2015



herald a new hybrid network infrastructure utilising a combination of purpose-built hardware as well as NFV-based, virtualized infrastructure. Some functions may continue to exist on physical hardware, due to their performance intensive nature, such as IPSEC and compression.

At some point, when most of

today's network functions can be performed to scale on an NFV-based infrastructure, the future of revenue generation for vendors could be fundamentally redefined. Infrastructure vendors traditionally generate their revenues by selling physical bits of kit that sit in the network.

When there comes a time that

most of the network is software-based, vendors will have to redefine their revenue models. Given the state of the technology today, there will be smooth migration to NFV at a reasonable pace that is dictated by the readiness of operators and the maturity of the technology.

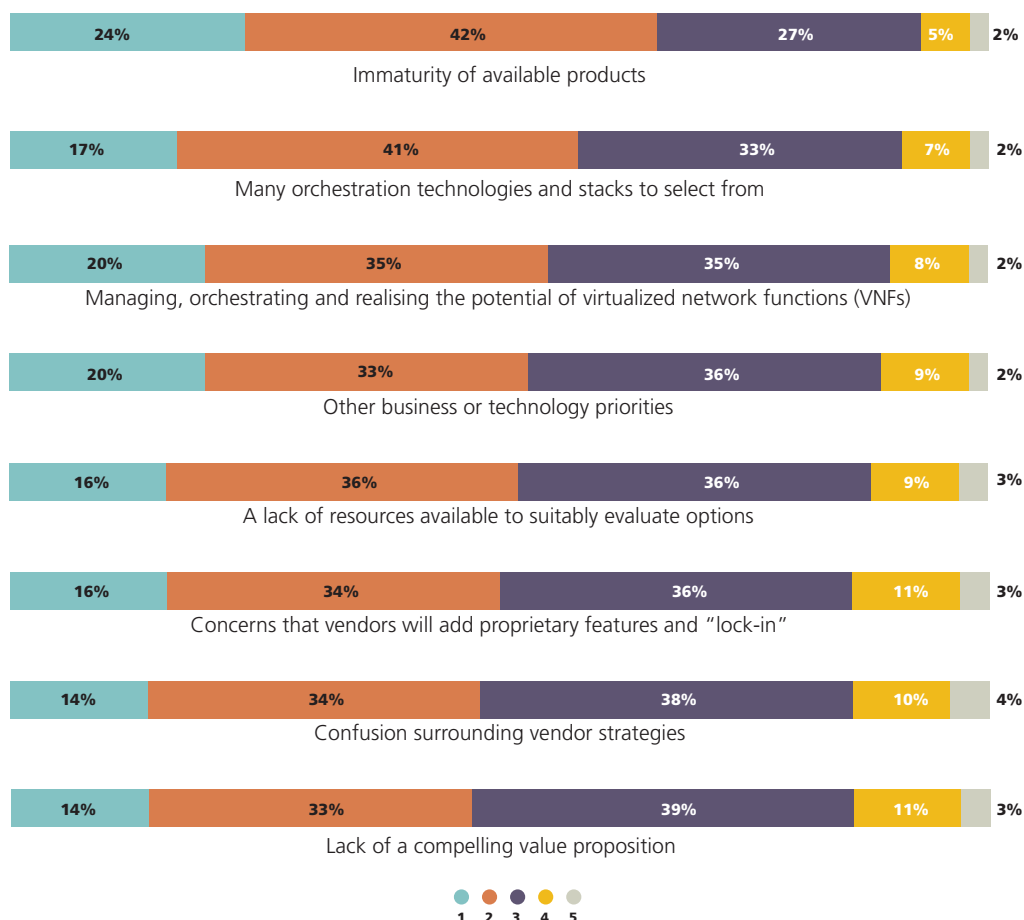
Theoretically, as vendors move

towards software based revenue models, the emphasis will shift to service licensing instead of hardware deployment. By taking a software-based approach, operators will still be forking out for the service from a vendor, who is therefore able to offset the inevitable decline in traditional hardware-based revenue models.

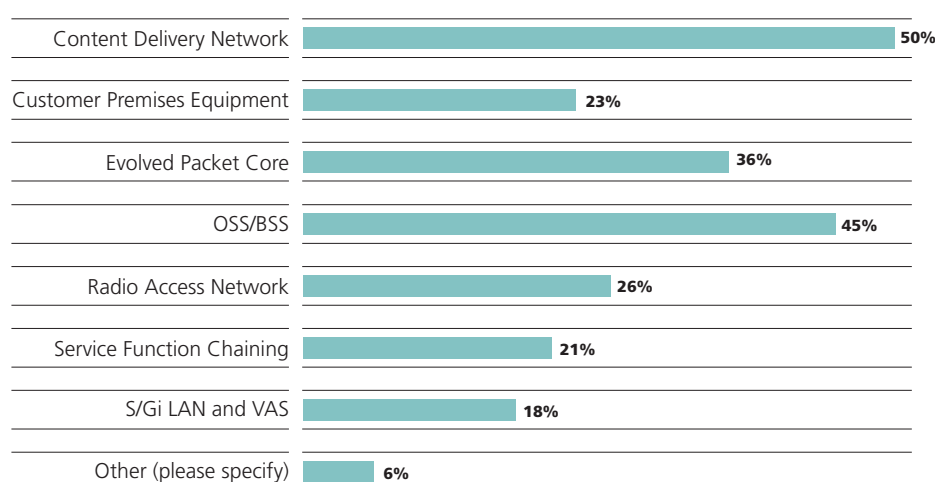
The NFV industry is still young, despite the marketing buzz, the rate of LTE deployments and general innovation. This rapid rate of technological advancement and mass market use of smartphones is leading to the frequently referenced data boom. As a result, operators are faced with increased pressure to adhere to the demands of their customers in an environment of growing competition brought in by competitor innovation, and new market entrants such as over the top (OTT) providers.

When asked how NFV will likely benefit telcos from a business angle, 63% of all respondents agreed that the technology will enable them to be more scalable and flexible in the delivery of services, ranking it one or two out of five. Interestingly, 55% of all operator respondents agreed that it will provide more competitive capabilities against other operators in their market, with an additional 49% indicating that NFV will help them ward off the competitive threat from OTT communication and media providers entering the market.

What do you consider to be the biggest challenge in bringing network virtualization projects to fruition?
(Please order with one being the most challenging and five being the least).



Which network functions have you identified as priority applications for virtualization? (Please select all that apply)



Since the growth in awareness of SDN and NFV in the wider telecoms industry, a number of start-up firms with specialised technology propositions have come out of the woodwork. Whether you're looking at start-ups with innovative methods of delivering SDN technology, or non-legacy vendors in the NFV space, vendor interoperability is leaving operators with more options to pick and choose their network equipment. Subsequently, higher levels of customisation opportunities could present operators with a chance to boost innovation in services and management. 55% of survey respondents strongly agree that this is a compelling benefit of NFV.

Moving on from the potential gains of NFV, we asked survey participants to indicate their active engagement with the trialling, deployment or other

investigations of the network virtualization technology.

30% of all operator respondents have confirmed they are actively developing a virtualized network architecture. A third of which have already launched live services for either consumers or enterprise customers, with the remaining two thirds trialling SDN or NFV-enabled architectures.

Incidentally, 43% of respondents are planning on deploying SDN and NFV across both mobile and fixed infrastructure. An additional 35% are aiming purely at the mobile network, 9% are targeting just the fixed network, and 13% are not planning to deploy SDN or NFV across either.

10% of operator respondents are expecting virtualized functions to feature in the live network by the end of 2015, with 14% expecting trials by the year end. This gives us a huge

insight into how rapidly NFV, as well as SDN, have evolved in the past few years. We can expect the number of live network deployments to more than double this year, but in total 54% of all respondents are expecting NFV and SDN to feature in trials or real-world roll-outs this year.

And that, it appears, is one of the biggest questions facing the network virtualization industry in 2015. When will NFV become a reality, and move from the lab to the field?

In January, the European standardisation body ETSI drew a line under the first phase of work being conducted by the NFV Industry Specification Group (ISG), with a wealth of proof of concept trials being undertaken across a broad cross-section of potential implementation areas.

With more than 50% of our survey respondents indicating

that 2015 will be the year they go-live with NFV, it appears that the movement by ETSI to initiate the next phase of the project is well timed for architectures to be refined, trials to be completed, solutions to be developed and implementations to begin.

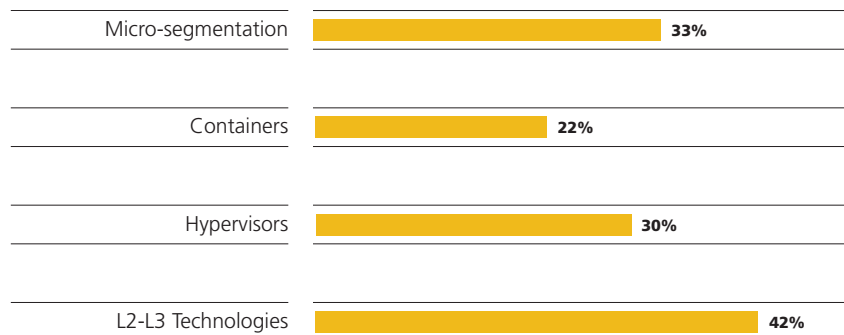
When we asked our audience what they perceived to be the main hurdles to implementing NFV into the live network, challenges associated with the management and orchestration of virtualized network functions featured as two of the top three.

Survey respondents indicated that there are too many orchestration technologies and stacks to choose from, with 58% rating it one or two out of five, with one being the most challenging. Meanwhile also 55% said that managing, orchestrating and realising the potential of virtualized network functions is one of the top challenges for them.

The biggest challenge identified by survey respondents relates to a lack of maturity in the solutions being offered by the industry's vendors. Being just over 24 months old, NFV is still in the early stages of development, from both a use-case and a solution development perspective. 66% of respondents ranked this immaturity as the top barrier to implementation of NFV, but collaborative efforts from variety of groups involving the majority of industry players are »



What technologies are you planning to deploy in the next 2-4 years?



helping to make rapid developments in available solutions.

The Open Platform for NFV (OPNFV) group started at the Linux Foundation in late 2014, and is dedicated towards defining and standardising a common architectural framework for NFV, upon which all solutions can be deployed, thus creating a ubiquitous and interoperable platform. Close to 40 vendors and operators are currently part of the project, which works closely with the ETSI NFV ISG to define its objectives and deliver a tangible outcome.

Meanwhile, from a business perspective, 53% of respondents indicated that there are other business and technology priorities over NFV implementation right now, and 52% said they simply don't have the resources available to suitably evaluate the options available to them.

On the subject of industry working groups, respondents were also asked to share their views on industry partnership ecosystems, such as the ETSI NFV ISG, Open Networking Foundation and OPNFV. The majority of respondents, 63%,

indicate they believe industry groups are an ideal way for keeping up with the most recent industry activity and developments, while 54% agreed that it's possible to gauge and monitor competitor activity by actively participating with industry groups.

When considering open-source technologies, for both SDN and NFV, such as OpenStack and OpenDaylight, 40% of respondents believe despite being ready for deployment more customisation opportunities are required to fulfil their potential. 37% believe they're not ready for deployment, 14% stated that they're not sure when open-source will be a viable option, with only 9% stating that it is already mature and ready for deployment.

Finally, we asked our audience about the early use case opportunities for NFV, and specifically which functions they would be looking to virtualize first. The top two responses appear to be leaning towards an emphasis on media and content management, with virtualization content delivery networks (CDN) gaining exactly 50% of votes from

respondents. Billing platforms and OSS came second with 45% of responses, while virtualizing the evolved packet core (the core network of LTE systems) was the third highest priority for operators, polling 36% of votes from our respondents.

42% of respondents are planning to deploy additional layer 2 & 3 technology to support an NFV infrastructure in the next 2-4 years. 33% of respondents are targeting micro-segmentation, 30% will look to deploy additional hypervisor capabilities, and 22% are targeting containers as a priority for NFV infrastructure.

While there are some major challenges to overcome before the real potential of NFV can be realised, the industry is rapidly moving in unison towards commonly agreed on implementation platforms for the technology. The advantages and gains of deploying an NFV-enhanced architecture are becoming increasingly evident, and every indication from our survey compounds the view that 2015 will be the year where the telecoms industry goes big on NFV. ■

SPONSOR COMMENT

Mallik Tatipamula, VP, Service Provider Solutions, F5

The results from this section of the survey certainly deliver some much needed clarity for CSPs investigating NFV. The value proposition of reduced operating and capital expenditure, increased scalability and responsiveness for telcos is compelling motivation to begin looking at network virtualization in more detail.

So many operators have indicated that 2015 will be the year they begin rolling out NFV, and considering the term has only been around for little over two years, it's incredible to consider the momentum being generated around the industry. What we, as a collective, need to continue working on is identifying and exploiting "easy win" opportunities and helping operators take the first steps into NFV. We need to enable operators to introduce NFV into parts of their network infrastructure which are non-mission critical like for M2M traffic.

By creating common architectural frameworks the whole industry can work from, we will be able to further accelerate the development of the technology. Also, providing a smooth migration path through enablement of hybrid network infrastructures will encourage more CSPs to embrace NFV. That's where a lot of the industry bodies are excelling at the moment, and that will continue to be the main area where we'll see progress originating from in the next 12 months.

Centralising points of control, accelerating the development of open and standard APIs for orchestration and management of virtual network infrastructure independent of vendors, and introducing efficient, streamlined and automated methods for delivering consumer and enterprise services will be a key milestone for telcos looking to achieve new revenue generating capabilities through network virtualization. Clearly, operators are investigating new means of differentiating themselves from their competitors, and that differentiation needs to start at an infrastructural level. The truly open, interoperable and bespoke nature of NFV will be one of the key enablers for such a change to occur.

When it comes to telco network infrastructure, the game is changing, and both vendors and CSPs need to be collaborating to make this evolution possible across the board.



SECURITY

In the field of information security, cyber criminals can appear to stay just one step ahead of the institutes they seek to disrupt. With the telecoms industry being at the centre of several high-profile incidents in the past 12-24 months, this section of the survey attempts to understand the methods being utilised by telcos to protect the data-centric networks they operate, which contain increasingly personal or sensitive customer information.

Key takeaways:

- 68% of respondents see customer data and personal information as a primary security concern.
- 48% of operator respondents mainly manage security in-house with some vendor support.
- 56% of respondents see both mobile malware and data theft or loss as the primary security challenges with managing device/mobile security.



About Kudelski Security :

Kudelski Security, a division of the Kudelski Group (SIX: KUDS.S), is an innovative, independent Swiss provider of tailored cybersecurity solutions to financial institutions, government administrations, the defense sector and the media industry.

The team of over 130 security experts delivers end-to-end cybersecurity training, consultancy, products and services, leveraging over 20 years' experience in advanced threat detection, attack prevention, asset and reputation protection and security assessments.

Kudelski Security is headquartered in Switzerland. Its global reach and multi-disciplinary incident response is reinforced by key international partnerships.

Learn more at www.kudelskisecurity.com



Security matters

AS COMMUNICATIONS BECOME INCREASINGLY DATA-CENTRIC, WHILE AT THE SAME TIME THE TELECOMS INDUSTRY MOVES TO TECHNOLOGIES DEVELOPED BY THE IT SECTOR SUCH AS VIRTUALIZATION, THE FULL ARRAY OF SECURITY CONCERNS COME TO THE FORE. THIS SECTION OF OUR SURVEY LOOKS AT RESPONDENTS' ATTITUDES TO THESE THREATS AND EXPLORES WHICH MEASURES ARE BEING USED TO COUNTER THEM.

For as long as there have been networks there have been security issues and as they grow, diversify and become more open, so they become potentially more vulnerable to malicious attacks. The LTE era means the telecoms and IT worlds are colliding, and while this creates numerous opportunities, it could also leave telecoms players more exposed, let alone the critical infrastructure they support.

In the last year alone there seemed to be a constant stream of high profile security breaches such as the Sony data grab, OTT image leaks from iCloud and Snapchat, not to mention continued disquiet about state snooping in the wake of the Snowden leaks. As telcos increasingly look to partner with IT players on both product

and infrastructure it has never been more important for them to understand the security landscape.

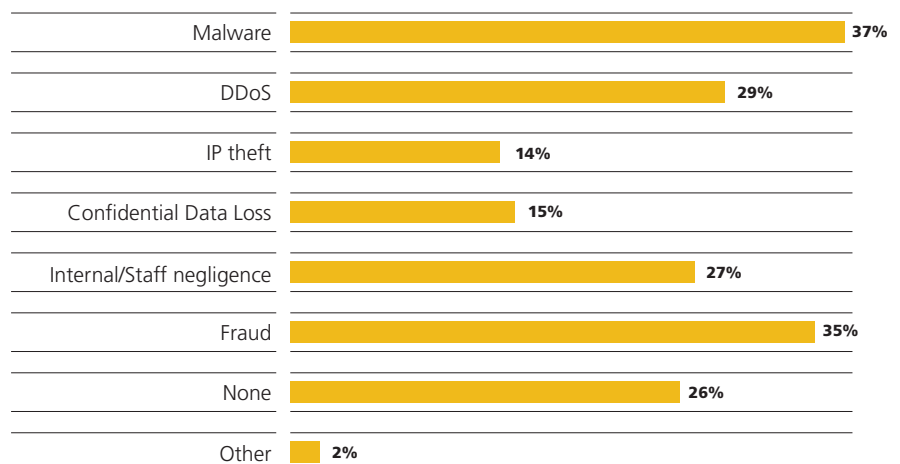
In the security section of the 2015 Telecoms.com Annual Industry Survey we sought to uncover the industry's views on security in general, how they perceive their current security environment, and what measures they think need to be implemented to maximise their security.

Our first question concerned security breaches already experienced by respondents' companies. With 2014 having been identified by the most recent ENISA threat landscape report as "The year of the data breach," respondents were asked to select all breaches their companies had experienced in the past year, and

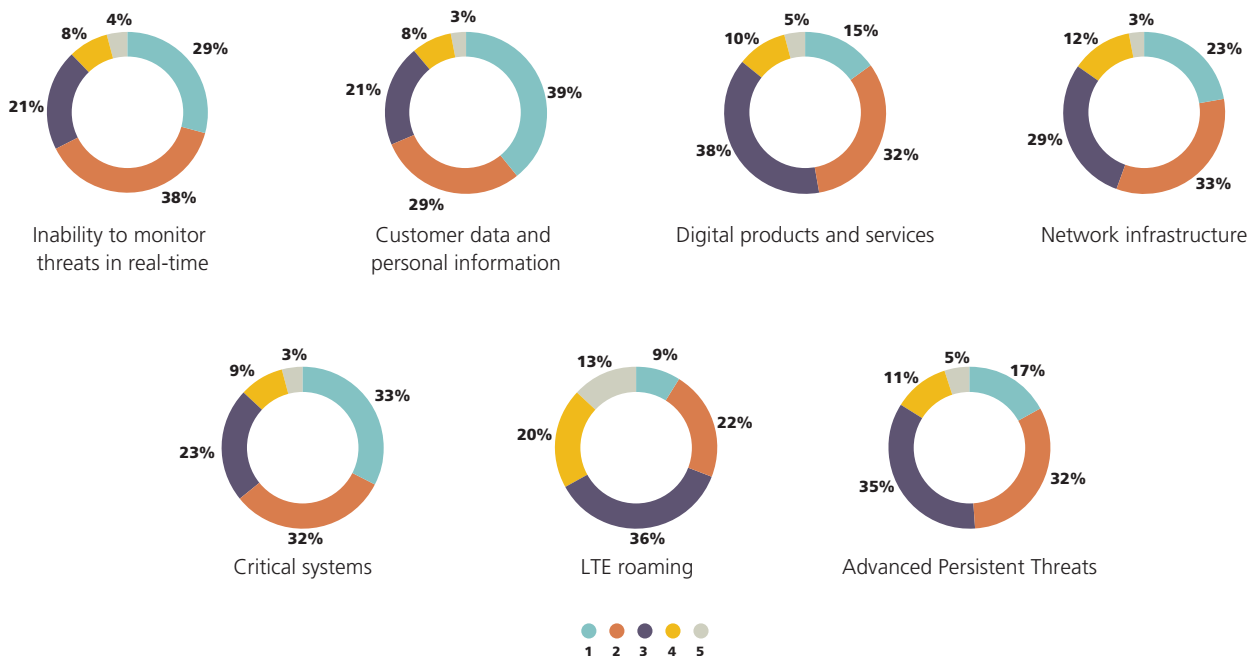
while there was no clear leader, over a third of them reported incidents involving either malware or fraud. While it's good to see that a quarter of respondents experienced no security breaches in the past year, a similar proportion did experience a DDoS attack and/or a breach resulting from staff negligence.

While crimes such as fraud and theft can occur anywhere, telcos might have previously considered themselves relatively insulated from cyber-attacks such as malware and DDoS. With the collision of the two worlds, however, that is clearly no longer the case, but the good news is that 75% of respondents revealed any service outage they experienced as a result of the breach lasted less than a day.

Which of the following security breaches has your company experienced in the past year?



On a scale of one to five (with one being the the largest and five being the lowest), what is the largest area of security concern for you today?



To get a sense of how they are approaching this evolving security landscape we next asked our respondents to tell us which were their largest areas of security concern. From a choice of seven categories, 'customer data and personal information' was identified as the biggest area of concern, although 'critical systems' and 'inability to monitor threats in real time' were also flagged up as important issues. In contrast 'LTE roaming' is not currently considered a major security concern.

Our next question addressed measures respondents are putting in place to address

these security concerns, specifically who they rely on to manage the security of their network hardware assets. Only a tiny minority of respondents confessed to taking no specific security measures for their network hardware and 48% said they mainly manage security in-house, with some vendor support.

While some respondents rely entirely on the network vendor for hardware security and a significant minority outsource their network hardware security to a specialist third party, the biggest business opportunity in this sector clearly lies in

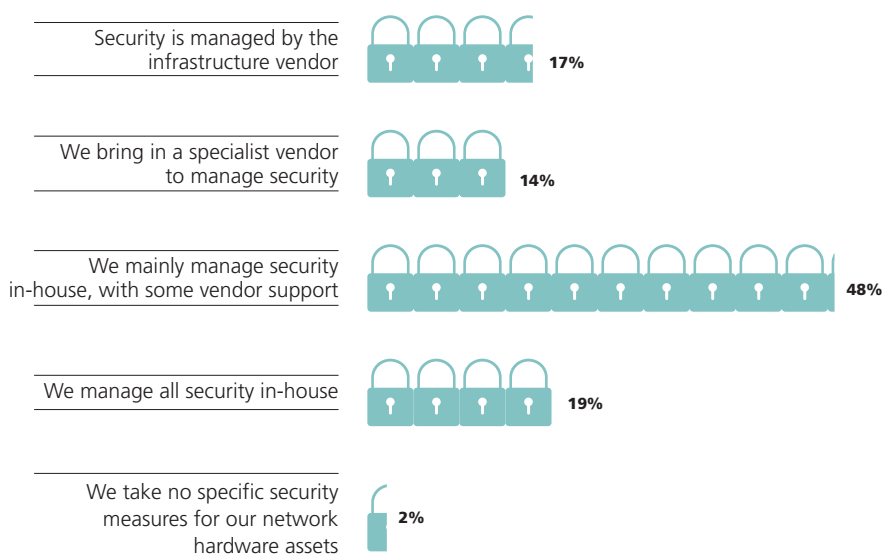
helping telcos to manage their own security.

Within the broad category of network hardware assets, we next sought a bit more granularity regarding which specific type of hardware respondents put the highest priority on securing. While LTE roaming had not been considered a major security concern, an all-IP LTE network was identified by 69% of respondents as a high priority for security, as was cloud-based storage. Meanwhile less than 50% of respondents considered VoLTE, small cells and handsets to be of high security priority. »

68%
of respondents see customer data and personal information as a primary security concern



How do you secure your network hardware assets?



48%

of operator respondents mainly manage security in-house with some vendor support

Drilling down further into the mobile device side of things, we next asked respondents to identify the main challenges associated with devices. The majority of respondents selected both mobile malware and data theft/loss as a key challenge, which tallies with the responses to our first question regarding security breaches experienced, the most common of which were malware and fraud.

Other challenges that were flagged up by around a third of respondents were data security, authentication and the need to monitor threats in real time, while around a quarter of respondents identified human issues such as insufficient

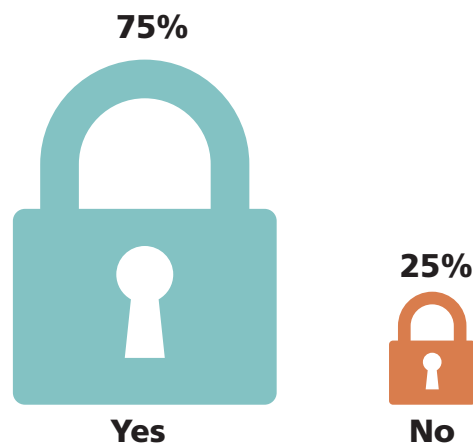
policy management and/or staff training as issues.

Our next question addressed

staff-related security incidents specifically and while, as the previous set of answers implied, almost half of respondents said they hadn't suffered any such incident, the majority had. There was a fairly even spread among the causes of staff-related security breaches, with 'misuse of sensitive information' and 'unauthorised user access' among the more prominent.

To get a clearer picture of broader attitudes to network security we asked respondents to tell us how much they agreed or disagreed with a few statements next. The most agreed-with statement by a significant margin was: 'Taking a proactive approach to general threat management is more beneficial than being reactive to individual threats,' while the majority of respondents also agreed that:

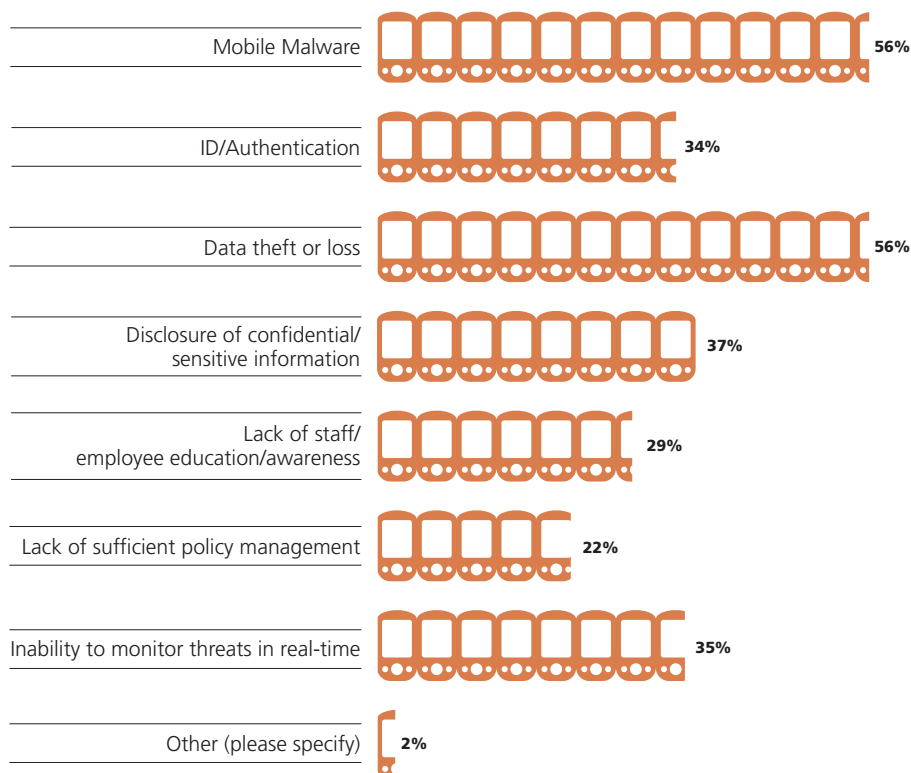
Considering the all-IP nature of 4G networks, do you utilise security techniques from classic IT experts?



56%

of respondents see both mobile malware and data theft or loss as the primary security challenges with managing device/mobile security

What would you say are the three main challenges you face in terms of managing device/mobile security?



'The reputation of my organisation is at great risk when we deal with security incidents.'

Conversely the majority of respondents disagreed with the statement: 'Network security is not a concern to me or my organisation,' further emphasising how aware our survey is of the importance of security and the consequences of inadequate implementation.

The final question of the security-focused section of the

Telecoms.com Annual Industry Survey went full circle back to the original premise of the section - that the telco and IT worlds are colliding in the form of LTE. We asked if, considering the all-IP nature of 4G networks, respondents were using security techniques from classic IT experts, and three quarters of respondents said they do.

It's clear from this section of the survey that the move to LTE is making telco companies more

aware than ever of the potential security threats out there. Just as it has been for IT managers for years, now network managers need to employ a wide range of security measures to protect their companies from the ever-growing array of threats out there. They are keen to learn from the IT sector but ultimately want to manage the situation themselves, so there are opportunities for providers who can help them achieve that aim. ■

SPONSOR COMMENT

By Kudelski Security

2014 was widely recognised by security experts as the year of the data breach. The cyberthreat landscape evolved quickly with the rising tide of sophisticated attacks prompting the development of new defences.

Current cyber defence practices are no longer effective in this new era where advanced, targeted cyberattacks are a powerful tool for organised crime. Partial victories in the fight against the cybercrime infrastructure have had a positive impact but do not stop criminals from developing new methods and pursuing new paths.

It has become clear that threat modelling and threat intelligence is a powerful weapon for discovering, classifying and fighting cybercrime in order to protect our digital critical infrastructure.

Telecom networks represent a large percentage of the digital critical infrastructure. Most nationwide business operations depend on telecom networks in order to offer better coverage, increased bandwidth and enhanced security.

The problem is that the telecoms evolution has been happening so rapidly that no-one has been assessing the existence of weaknesses in the end-to-end communication chain (e.g. flaws in equipment and software, human intervention).

Organized cybercrime is adept at exploiting such weaknesses, and the survey confirms that malware, personnel negligence, and fraud can have a domino effect on the overall security posture. Protection of critical systems, user data privacy and an inability to monitor threats against all IP LTE networks in real time, are three key security concerns highlighted in the survey. Whilst roughly 50% of respondents claim they manage security internally, it should be noted that the fast-changing threat landscape will require skills and resources not necessarily available within the structure of standard IT teams.



MOBILE CONTENT

Along with the continued growth of OTT content providers, BT's confirmed deal to acquire EE has shone the industry spotlight firmly on to the growing emphasis operators are placing on a converged, multiplay strategy which focuses on delivering content, mobile, fixed telephony and broadband to consumers. How operators utilise multiple offerings to attract new customers, discover fresh revenues streams and consolidate existing market positions remains to be seen. This section will deliver insight on mind-sets surrounding convergence.

Key takeaways:

- 64% of respondents believe operators that offer Pay TV as well as fixed/mobile broadband have a better proposition than those that don't.
- 66% believe multiplay operators will have achieved significant advantage over pure play operators within five years.
- 72% of respondents consider OTT partnerships to provide competitive advantage against other operators.

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Convergent strategies

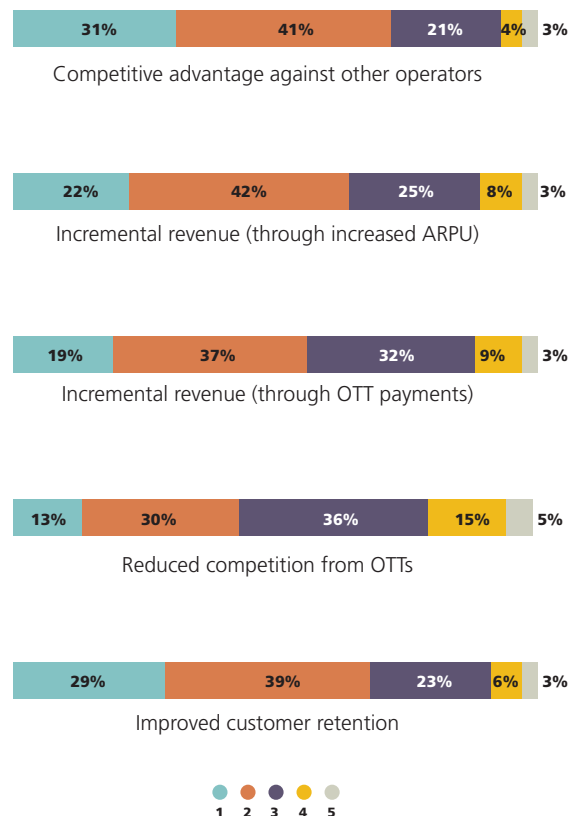
IN THE LAST FEW YEARS THERE HAS BEEN A SHIFT IN OPERATOR ATTITUDES TOWARDS OVER-THE-TOP (OTT) SERVICE PROVIDERS FROM DEFENSIVE TO COLLABORATIVE, AND THIS TREND CONTINUED TO SHOW IN THE RESPONSES. THE RIFT THAT HAS HISTORICALLY EXISTED BETWEEN THE TWO HAS BEGUN TO CLOSE AND THEY HAVE INCREASINGLY STARTED TO SEIZE THE OPPORTUNITIES OF PARTNERING. OF COURSE OTTS HAVE HAD A HUGE IMPACT ON OPERATORS' REVENUES BUT IT HAS BECOME QUITE CLEAR THEY ARE NOT GOING AWAY, AND IT LOOKS LIKE OPERATORS ARE NOW INCLINED TO TAKE THE ATTITUDE OF YOU CAN'T BEAT THEM, JOIN THEM.

Respondents were asked to rate five key benefits of OTT partnerships on a scale of one to five, where one was extremely valuable and five not at all. Last year, improved customer retention was considered the most important benefit with 51% of respondents rating it the most valuable, while competitive advantage against other operators was rated the second most important with 44% of respondents ranking it the highest. This year, these two benefits topped the table again but in reverse order, but also a higher percentage of respondents gave one or two for both.

Consistent with last year's findings, and those of the year before to that matter, reduced competition from OTTs was rated one or two by fewer respondents than any of the other five categories. However, with 43% rating it one or two, it was up by 38% from last year, perhaps indicating operators have formed better cultivated partnerships with selected OTTs thus finding competition from other such providers less pressing.

Overall though, operators' views on the advantages of OTT partnerships seemed to be quite well in line with last year's findings as incremental revenue (through increased ARPU) was rated third most important (39% in 2014) and incremental revenue through OTT payments fourth (37% in

With one being the highest and five being the lowest, please rate the following benefits of OTT partnerships in terms of their value to operators.



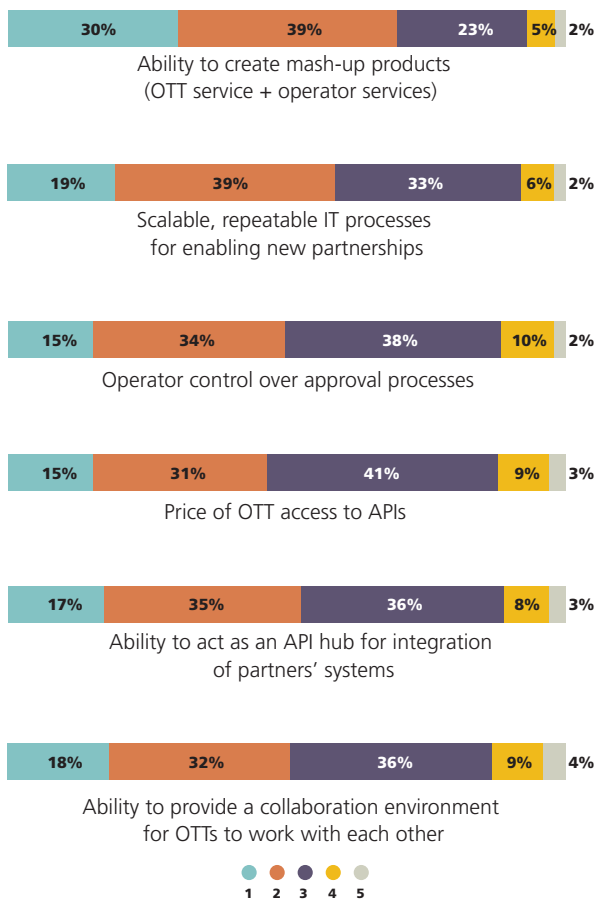
2014) both in this year's and last year's surveys.

What, then, makes for a successful operator-OTT partnership, and what are the most important attributes to make such collaborations beneficial to telcos? To create a workable partnership there are many things to consider, including IT processes, pricing to allow access to APIs and the possibility of creating mash-up products.

OTTs are great at innovating new (free) products but telcos have a lot to offer too in terms of packaging, marketing and promotion, and of course providing the network. But the entire sector is changing, the lines between different types of providers are becoming increasingly blurred, and it is clear operators need to evolve their businesses with this transformation.



With one being the highest and five being the lowest, please rate the importance of the following attributes towards the success of potential operator/OTT partnerships



Judging by the results, it seems as though operators are going through this change. We asked respondents to rate the importance of six attributes towards the success of potential operator-OTT partnerships. Overall, respondents view all of the attributes in higher regard in this year's survey than last

year. This seems to suggest a further step away from seeing OTT partnerships as an unavoidable consequence of market forces to viewing them more as an opportunity.

The most important attribute has shifted from operator control over approval process last year to scalable, repeatable IT processes for enabling

new partnerships this year with 59% of respondents rating it as important. Operator control over approval processes is still seen an important part of a successful relationship though as it emerges as the second most important attribute from this year's survey with 54% considering it important.

We then moved on to ask operators which business model they thought works best for operators partnering with OTTs and other players in the digital ecosystem: wholesale, where OTT pays the operator for the use of the capability; retail, where the end-user pays the operator as part of their subscription; or revenue share with OTTs. Just like last year, operators overwhelmingly found the revenue share option as the best model.

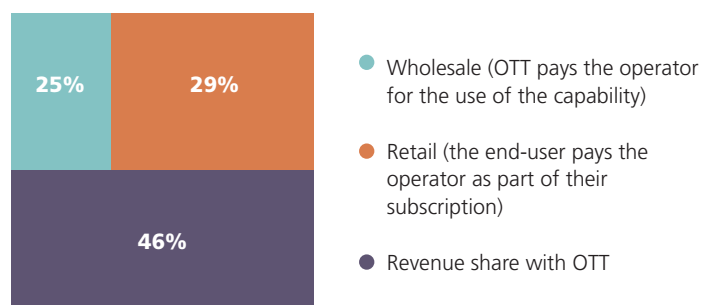
Lately the industry has seen

an increased push towards multi-play with operators and broadband providers alike expanding their offerings beyond traditional remits, often through acquisition. The trend is fuelled not only by stagnating revenues from core services, but also by the growing consumer demand for content on any device at any time.

We asked operators to rate the importance of content as a competitive differentiator, and it is clearly regarded highly with 71% considering it to be important. Indeed, in the last 12 months there has been plenty of movement, acquisition or otherwise, where operators have brought TV and music services to market as additional services.

One of the most pressing topics of the industry is multi-play, in more specific terms also referred to as quad-play or triple-play. The sector's »

Which business model do you think is best for operators partnering with OTTs and other players in the digital ecosystem?

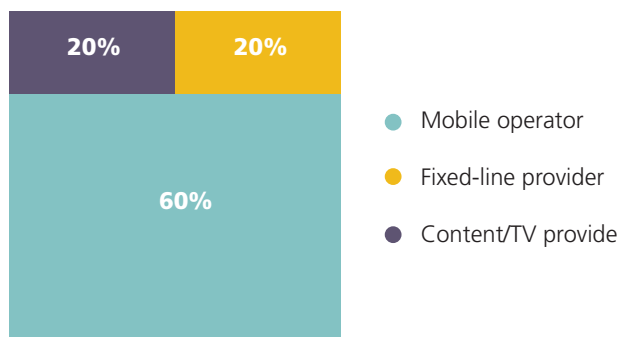




MOBILE CONTENT

64% of respondents believe operators that offer Pay TV as well as fixed/mobile broadband have a better proposition than those that don't

Which company type do you believe is in the strongest competitive position to move towards multiplay service offerings?



move towards multi-play is strongly driven through M&A activity. Recent examples of some aggressive acquisition activity to create more converged offerings have included such as French cable group Altice purchasing mobile operator SFR as well as fixed-line provider Portugal Telecom, while in the UK ex-monopoly telco BT is attempting to re-enter the mobile market by acquiring EE. Across the pond AT&T's pending acquisition for satellite broadcaster DirecTV is just one example of what has been happening in the US for some time now.

We asked our respondents to tell us who in the industry they believe is in the best position to start offering multi-play packages: operators, fixed line providers or content/TV providers. Respondents overwhelmingly vouched in favour of operators.

In the operator landscape

section, just over a quarter of operator respondents selected multi-play as one of three key means of competitive differentiation against competition in their market. At 26%, this figure is up 13% from last year's survey indicating a growing awareness of the importance of being able to offer more than one type of service.

We asked the respondents then to rate a number of statements relating to multi-play offerings on a scale of one to five where one showed strong agreement with the claim and five strong disagreement. It is clear from the results that operators favour vendors with integrated offerings over those who have a traditional, narrow focus. This is a trend not only driven by multi-play's growing prominence, but also the industry becoming ever more software and services-driven. ■

With one being strongly agree and five being strongly disagree, please state your agreement with the following statements relating to multiplay offerings.



Multiplay is a more powerful competitive differentiator than mobile network quality



Operators that offer Pay TV as well as fixed mobile broadband have a better proposition than those that don't



Pay TV is the most important element in a multiplay offering



Content availability across a range of devices is best managed by a mobile operator



Mobile service is the least 'sticky' element in a multiplay strategy



Domestic wifi is more important in a multiplay strategy than the mobile network



Multiplay operators will have achieved significant advantage over pure play operators within five years





DEVICES

The way in which we perceive mobile devices has radically evolved in the past 10 years. Since the launch of the first smartphones in the mid-2000s, the 3G era began to deliver the potential of mobile devices for, and led to the propagation of, machine to machine communications. "Smart" is beginning to feature on a daily basis for consumers as the Internet of Things begins to blossom, and this section of the survey is dedicated to analysing the modern devices industry.

Key takeaways:

- 57% of respondents agree that operators are too reliant on handset subsidies to attract and retain customers.
- 69% of all respondents believe that vertical applications will drive IoT/M2M growth and development the most.
- 51% of respondents believe Samsung sales will eventually be overtaken by a Chinese smartphone vendor.

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Smart moves

IT WASN'T SO LONG AGO THAT THE TELECOMS INDUSTRY CALLED MOBILE DEVICES "TERMINALS" AND THEY WERE PROVIDED BY NETWORK COMPANIES IN ORDER TO HELP SELL KIT. WITH THE 3G ERA CAME THE EXPECTATION THAT DEVICES WOULD BE MUCH MORE THAN JUST VOICE TERMINALS, BUT IT TOOK THE TOUCHSCREEN REVOLUTION CATALYSED BY APPLE AND GOOGLE TO TRULY MAKE THAT DREAM A REALITY.

Now that we're in the 4G era, and the touchscreen smartphone market has rapidly matured to the point of near commoditisation (apart from Apple), what we now count as a connected device has rapidly expanded to include, essentially, everything. We even call it "Internet of Everything" or more commonly "Internet of Things" abbreviated to "IoT".

IoT is one of those buzzwords that everyone involved in the industry wants to be seen to be all over, but of which definitions are hard to come by.

Essentially we're talking about pretty much anything being fitted with some kind of computational ability and the means to connect to the internet - something that is clearly possible given modern component miniaturisation. But the key, and as yet largely unanswered, question concerns what the commercial implications of this phenomenon is; i.e. how do you make money out of it?

The early cliché associated with IoT was the "smart fridge", an internet connected fridge that somehow man-

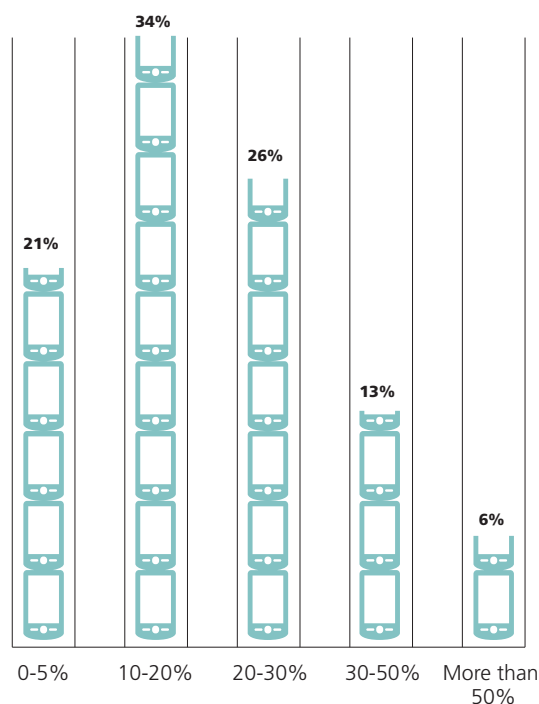
ages your groceries for you, including automating your online shopping and maybe even offering up recipe suggestions based on its contents. Apart from giving futurologists something else to evangelise and sceptics something else to denounce, the smart fridge served to illustrate that novelty alone is unlikely to be the key to monetising IoT.

This brings us onto another buzzword abbreviation often conflated with IoT: M2M, which stands for machine-to-machine and refers to devices communicating with each other largely without human intervention, thus greatly increasing the potential for automation and autonomous systems. It's now thought by many that this is the area most likely to yield commercial opportunities in the short term at least.

The first question in the devices section of the Telecoms.com Annual Industry Survey 2015 simply asked respondents to indicate how much of a priority IoT/M2M will be to their organisation this year. Just over half (54%) of respondents said they think it will be relatively high priority, indicating an awareness of its potential, but also limited immediate commitment.

When we looked a bit further ahead and asked what proportion of their revenue respondents expect to come from IoT-based services,

By 2020, what proportion of your revenue do you expect to come from IoT/M2M-based services?





57% of respondents agree that operators are too reliant on handset subsidies to attract and retain customers

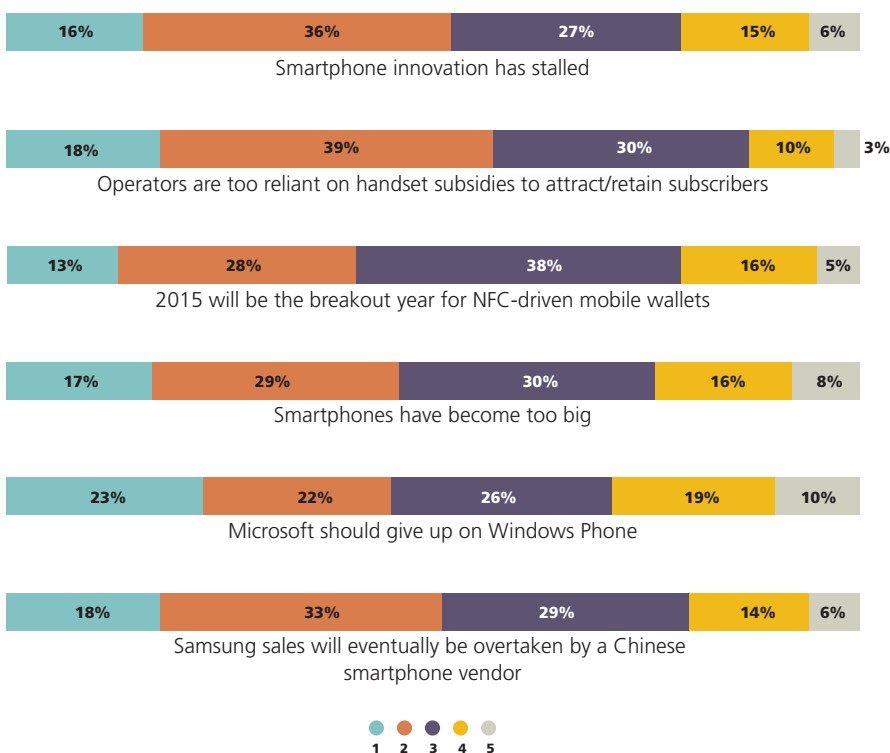
most respondents indicated the 10-30% range, with only 6% saying they expect the majority of their revenues to be derived from this source. This reveals another point of uncertainty: whether an entire business model can be built around IoT or whether it will be an incremental addition to existing business.

To explore that issue in greater depth we asked respondents to grade the significance of a range of devices in driving IoT growth for their business. It was not surprising to see relatively new, unproven categories such as wearables receive relatively weak endorsement, and while the majority of respondents believed mobile phones and tablets would be significant IoT growth drivers, vertical applications were the clear winner in this category.

This is consistent with our earlier observations about M2M and a more industrial use of IoT. Until a compelling value proposition is demonstrated consumers are unlikely to want to pay a premium to have more devices connected. However, if IoT can enable efficiencies, analytics and greater automation in industry then its commercial value will be easier to prove.

Moving onto mobile device brands, we asked which device vendor will have the greatest influence in 2015. Instructed to pick only one, half of respondents identified Apple, with a

With one being strongly agree and five being strongly disagree, please give your response to the following statements relating to handsets



quarter going for Samsung. No other vendor even got into double figures, percentage wise, but Chinese vendors Huawei and Xiaomi were favoured over established smartphone brands such as Sony, LG and HTC.

It's no great surprise to see Apple score so highly. Not only is it the defining brand of the smartphone era, it's also considered the most innovative and the most capable of defining the market. New trends such as the mobile wallet tend not to receive mainstream ac-

ceptance until Apple supports them and no technology does a better job of communicating with the mainstream consumer than Apple.

While Apple seems to be able to do no wrong at the moment, other smartphone players are still struggling to find a winning formula and operators continue to look at ways of reducing their reliance on handset subsidies. Our next question explored a range of handset-related topics by asking respondents to agree

or disagree with a number of statements.

The most strongly agreed-with statement was: "Operators are too reliant on handset subsidies to attract/retain subscribers", while the statement most respondents disagreed with was "Microsoft should give up on Windows Phone". A slight majority agreed that smartphone innovation has stalled and that Samsung will eventually be overtaken by a Chinese smartphone vendor, but only a minority agree that smartphones have »



DEVICES

69% of all respondents believe that vertical applications will drive IoT/M2M growth and development the most

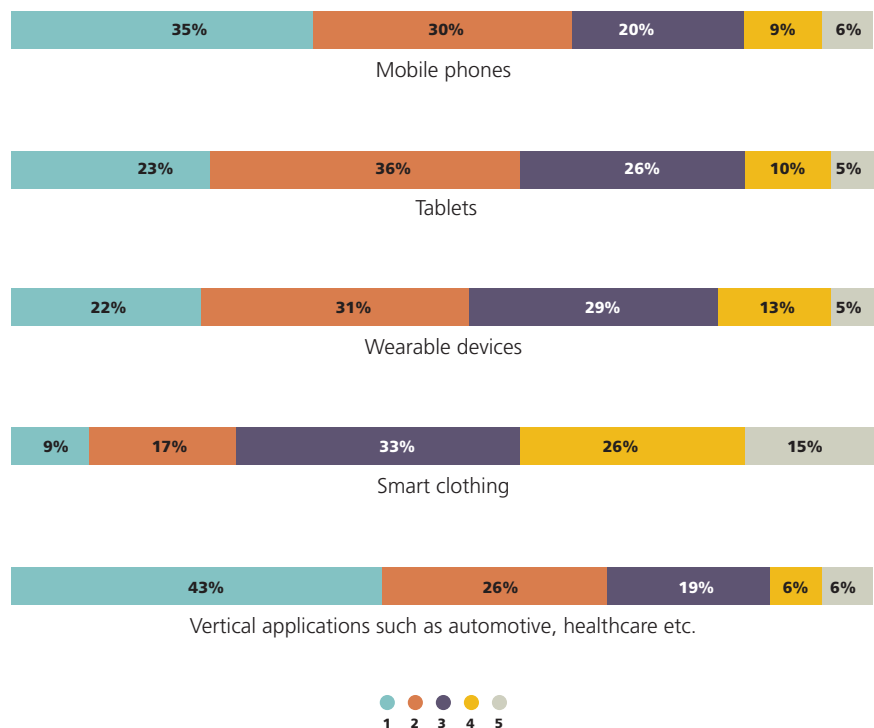
become too big and that 2015 will be the breakout year for NFC-driven mobile wallets.

The final question of this section, and indeed the entire survey (thanks for sticking with us), explored attitudes to the supposed 'next big thing' in mobile devices – wearables. When asked to what extent they agreed with the statement: "Wearable devices will become mass market products in the next year", opinion was entirely divided, with the same proportion of people agreeing as disagreeing. This reveals how uncertain the industry still is about this category and, once more, the arrival of Apple in this space in 2015 should clarify things somewhat.

The devices segment is essentially divided between the relatively mature handset market, where innovation has slowed and margins are tight for everyone except Apple, and nascent markets such as IoT and wearables about which there is still a great deal of uncertainty. As these new markets mature the commercial opportunities associated with them will become clearer and telcos need to watch closely to ensure they're not beaten to the punch.

The Telecoms.com 2015 Annual Industry Survey has painted a fascinating picture of a telecoms industry at a crossroads. The old business models are rapidly evolving as traditional revenue streams

With one being the highest significance and five being the lowest significance, please indicate which of the following devices and solutions will drive IoT/M2M growth for your business the most?



get squeezed and consumers demand more from their communications service providers.

While operators still place competition with each other and the cost of infrastructure investment as key competitive issues, they now consider OTT players and content providers as equally significant adversaries. This is fuelling the move towards multiplay consolidation – exemplified by the acquisition of mobile operator EE by fixed-line player BT in

the UK – in a race to be able to offer the most comprehensive suite of communications services to both consumer and enterprise.

The technologies operators need to use in this new environment are evolving accordingly. Support systems now need to enable instant product innovation as well as facilitate seamless collaboration with third parties. As these systems move to the cloud, network functions are increasingly becoming virtualized, creating

even greater efficiencies and flexibility.

The greater bandwidth afforded by 4G has just served to increase the demand for even more and is already eagerly anticipated. Buzzwords such as Cloud, Big Data and IoT abound, but companies are still struggling to define them, let alone commercialise them. One thing is clear, however: the world is growing ever more reliant on communications services and that can only be good news for our industry. ■