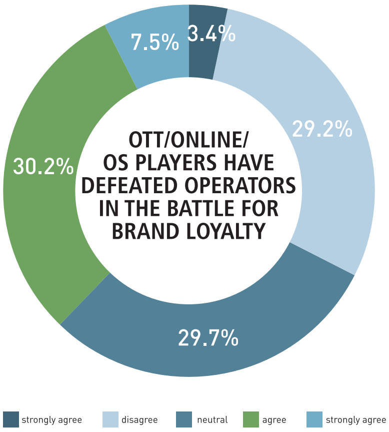
TELECOMS.COM INTELLIGENCE INDUSTRY SURVEY 2013

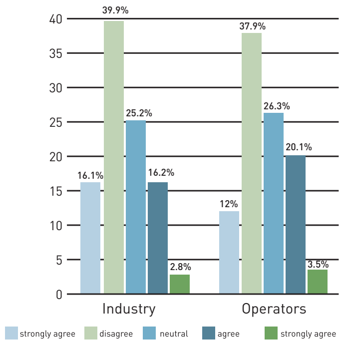
WHICH TYPE OF ORGANISATION DO YOU BELIEVE IS BEST POSITIONED TO OFFER A CENTRALISED BILLING SOLUTION?

260 INDIVIDUAL OPCOS REPRESENTED

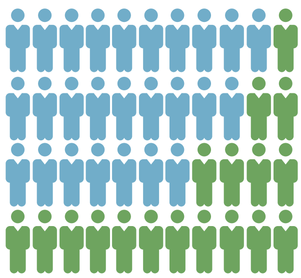


76% SEE BANKING AS THE MOST IMPORTANT NON-TELCO REVENUE OPPORTUNITY

MOBILE OPERATORS ARE SUFFICIENTLY INNOVATIVE IN THEIR ROAMING STRATEGIES

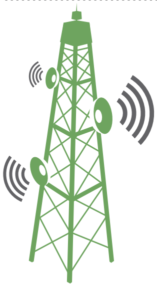


1,931 RESPONDENTS



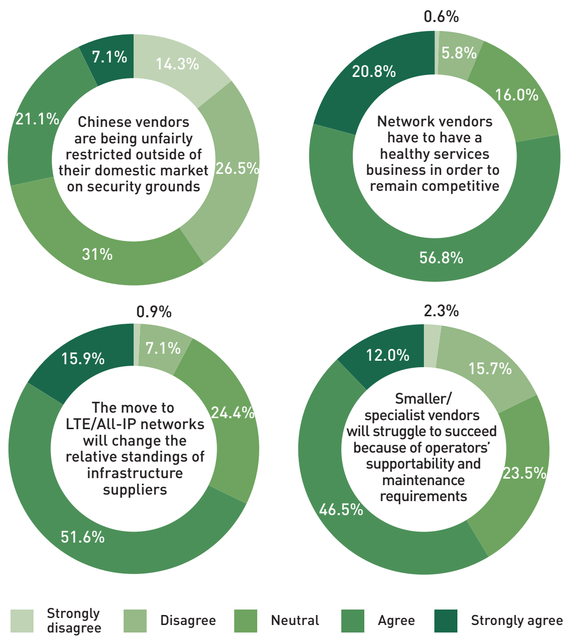
WHERE DO YOU EXPECT OPERATORS TO BE MAKING THE MOST INVESTMENTS IN CLOUD SERVICES?

25.6% 31.2% 43.2%



37.5% BELIEVE SINGLE NETWORK MARKETS CAN BE SUCCESSFUL

TO WHAT EXTENT DO YOU AGREE WITH THESE STATEMENTS ABOUT THE TELECOMS VENDOR LANDSCAPE?



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Getting the industry thinking

CONTENTS

Welcome to the Telecoms.com Intelligence Industry Survey 2013

This is the first time we have conducted survey of this size, targeted at the industry as a whole and covering a broad range of industry segments. The survey was completed by 1,931 Telecoms.com readers. Some 600 of them work at operators around the world and 260 individual opcos were respresented.

From the outset the intention was to gauge views industry-wide but we were naturally keen to see how mobile operators in particular would respond. And there were indeed a handful of notable disagreements between operators and their industry peers, particularly when operators were asked to rate their own performance in certain key areas.

What really struck us about the results of the survey, however, was how closely the isolated operator responses matched those of the wider industry—vendors, consultants, systems integrators and analysts, among others. This was even true on contentious issues like roaming pricing regulation.

Perhaps this reflects the fact that the industry has aligned in the face of the threat from external players and newcomers that threaten to disrupt the status quo for all concerned. A more mischievous interpretation might be that, in these tense times, operators are increasingly taking their lead from the vendor community anyway...

Whatever the explanation, our survey of the market has yielded a wealth of information about the issues that are most exercising the industry. Some of the numbers are truly surprising: who would have predicted that 35.7 per cent of respondents would believe that single network mobile markets, in which operators compete at the service layer only, are commercially viable. Never mind that operators themselves buy into this model with greater enthusiasm (albeit only just—36.1 per cent) than the wider industry.

And then there are the contradictions. While more than a third of the industry believes in a single network market model, network quality was rated as the most effective competitive differentiator for operators.

These kind of discrepanices are what makes surveys interesting, though. What they highlight is that the industry as a collective, just like the individuals that make it up, can at times be self contradictory and indecisive.

I hope you enjoy digesting the results of the survey and find them as interesting as we have. Please don't hesitate to get in touch if you have any comment to make.

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OPERATOR LANDSCAPE

The Big Picture

Mobile operators are not having an easy time of it. Here we reveal how the industry views their prospects and the choices ahead of them.

By the end of 2012 a number of truths relating to mobile operators and their lot were moving towards universal acknowledgement. They are saddled with the burden of data traffic that is showing explosive growth. Continued investment in the network is essential yet the compensation operators derive for delivering this traffic is dwindling fast, in relative terms. Meanwhile their noses have been bloodied in the service innovation space by OS developers and internet players who between them are generating much of the traffic that the operators must transport.

Despite the centrality of the network to the performance of the applications and services so beloved of the smartphone generation, it enjoys none of the adulation they inspire. It is given short shrift by consumers frustrated when their experience doesn't pass muster, despite being by far the most complex element of the end to end service, and often when the network itself is not at fault.

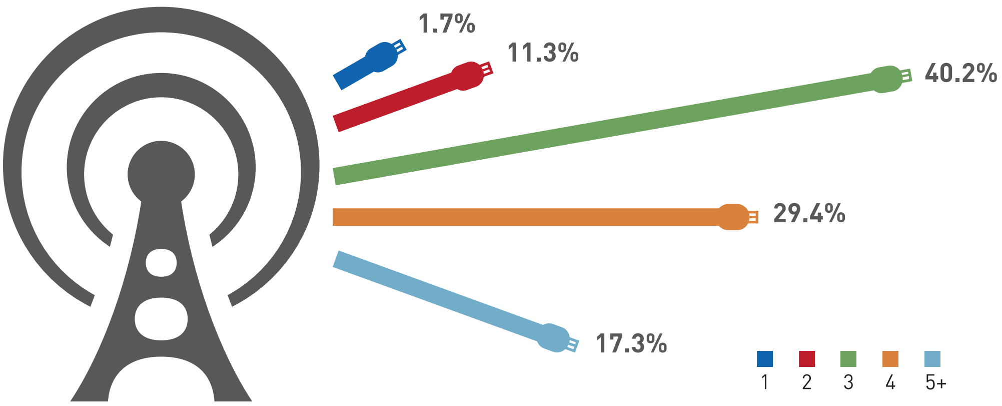
Beset from the outside by these competitive assaults things are no easier within the operators' own community, as inter-operator competition gets fiercer every year. More consolidation is needed in many markets as operators battle one another for territory in what has become a scale game.

These are the messages we've been hearing from the market watchers but how are mobile operators perceived by themselves and the wider industry?

Two thirds of respondents to our survey believe as a starting point that mobile operators are simply too numerous, with just under 65 per cent saying that further consolidation in the operator community is necessary. Asked how many operators their own domestic market will be able to support in two years' time, they set on the middle ground, with just over 40 per cent identifying three as the magic number. A further 29.4 per cent felt their market could sustain four operators, while 17.3 per cent boldly asserted that there were pickings rich enough for five or more players.

For some years now provocative voices—some in high places—have been heard to suggest that each market really only needs one physical network, upon which the companies we know today as operators could compete at the service layer. As you might expect, rejection of this notion was firm, with 44.3 per cent of respondents saying they disagreed or strongly disagreed that this was a commercially viable model.

More interesting, however, was just how many respondents came out in favour of the idea. More than 35 per cent of survey respondents said they agreed (7.2 per cent strongly) that a



HOW MANY SEPARATELY OWNED AND OPERATED NATIONAL MOBILE NETWORKS WILL YOUR COUNTRY OF RESIDENCE BE ABLE TO SUPPORT IN TWO YEARS TIME?

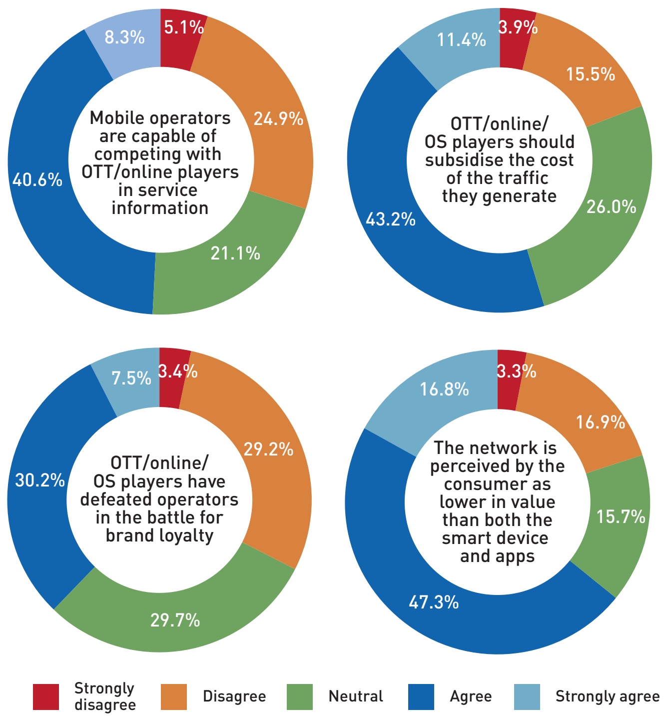
63% OF RESPONDENTS BELIEVE THAT NETWORK SHARING IS ESSENTIAL TO THE PROFITABILITY OF LTE

reveals considerable optimism as much as anything else.

Opinion was split fairly evenly on the question of whether or not OTT players have defeated network operators in the battle for brand loyalty. 37.7 per cent of respondents said that they had, while 32.6 argued the reverse. Certainly there is a feeling that consumers don't love the network as much as they should, or might. 64.1 per cent of respondents agreed that the network is perceived as lower in value than the device and the application.

But for all the tensions between operators and the new wave of competitors, pragmatism rules. A whopping 83 per cent of respondents believe that operators can and should parther with OTT players to their mutual benefit. Only 4.3 per cent felt that this was neither desirable nor possible.

TO WHAT EXTENT DO YOU AGREE WITH THE FOLLOWING STATEMENTS REGARDING MOBILE OPERATORS AND OTT PLAYERS?



VERTICAL LIMITS

For some time the mobile industry has looked to vertical sectors for enhanced revenue streams. In some of these sectors operators are able to offer little more than connectivity and a solution (hosted or not) to manage that connectivity. But in others some operators are looking at more in-depth participation.

It was interesting to note that, despite its relative high profile in the connected device arena—and despite significant momentum gathering within this sector—the automotive industry was ranked as offering mobile operators the least potential for incremementaI revenues. Just ten per cent of respondents scored this sector full marks for potential, and it got an average rating of 3.16 out of five.

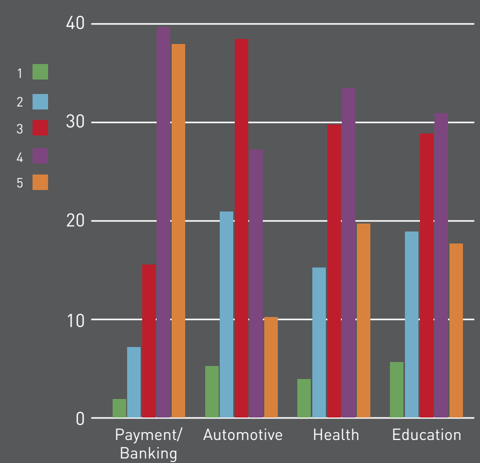
Equally interesting was the fact that the industry has continued faith in the ability of mobile operators to derive decent revenues from payment and banking services. This was the highest scoring sector, reflecting moves than many operators are already making to create a presence of their own in this space, rather than working as an enabler to established players.

Confidence remains high in opportunities for operators in the media and content space, which was close behind payment and banking. Bridging these two sectors in third place was advertising and marketing, which scored 3.7 out of five. Also related, and in fourth place, was retail.

It was something of a surprise to see health and transport somewhat off the pace, as a number of operators have made moves in e-health and ticketing services. And despite the widespread attention given to smart metering, expectations were relatively low for the utilities space.

RATE THE FOLLOWING NON-TELCO SECTORS FOR THE POTENTIAL SERVICE REVENUE OPPORTUNITIES THEY OFFER MOBILE OPERATORS

(ranked 1-5, where 5 - the greatest opportunity)



65% OF RESPONDENTS BELIEVE THAT MORE CONSOLIDATION IS NEEDED AMONG MOBILE OPERATORS

single network market could be made to work. And when you consider that one fifth of respondents took a neutral stance on the question, respondents who actively dismiss the idea of a single network market are in the minority.

Network sharing is blurring the lines between collaboration and consolidation and one of the drivers towards this approach to reducing the number of individual networks per market is clearly the move to LTE. 63 per cent of respondents agreed (17.9 per cent strongly) that network sharing is "essential" to the profitability of LTE.

That is a remarkable statistic. The industry isn't saying that network sharing will help to achieve profitability for LTE, or to enhance what profitability operators might derive; it is deeming network sharing essential. This throws down a gauntlet to regulators and national governments to prioritise the success of the mobile markets under their governance over auction revenues and the perceived competitive benefit of maintaining high numbers of independent network operations.

So how are the regulators themselves perceived? Our survey suggests their performance is seen as middling. While only 6.4 per cent of respondents scored the regulator in their home market one out of five in terms of the regulator's success in supporting its mobile sector, even fewer, 4.7 per cent awarded top marks. The average rating was just over three, with 20.5 per cent scoring their regulator as a two and 30 per cent as a four.

When asked what they believed regulators' highest priorities should be in relation to mobile markets, the clear leader was maximising the potential of available spectrum. Just shy of half of all respondents said that this ought to be top of the regulators' to-do list, compared to just 9.8 per cent of respondents who thought instead it should be maintaining the number of mobile network operators. This was the lowest score of all options.

In second place, with 28.5 per cent of respondents ranking it as the highest priority, was improving coverage in rural and unconnected areas. This was closely followed (at 24.9 per cent) by improving the attractiveness of the sector as an investment opportunity.

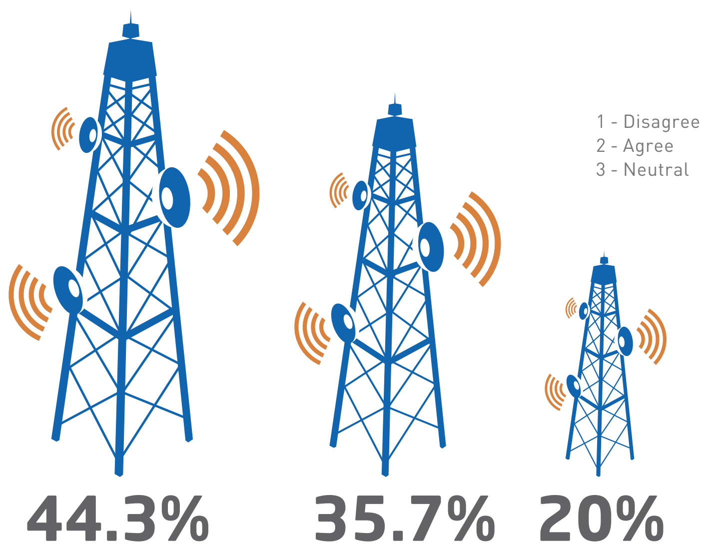
There was little support for further regulatory intervention on pricing, wholesale or retail and, despite a clear support for consolidation in the operator space, only 13.7 per cent of respondents felt that creating the right environment for further consolidation ought to be the top priority for their national regulator. This perhaps suggests that respondents felt regulators' contribution to a more consolidated operator landscape should be to refrain from intervention as much as possible.

Even the most operator-friendly regulator in the world can do nothing to protect them from the gains being made by internet, device and OS players in customer relationship and service revenue. And mobile operators should perhaps be worried that less than half of our respondents believe that they are capable of competing with these disruptive players in terms of service innovation.

While 48.9 per cent of respondents agreed (8.3 per cent strongly) that operators can compete, 30 per cent felt that the battle was lost. The remaining 21.1 per cent came down on neither side.

More than a quarter of respondents opted to keep out of the debate over whether or not OTT players should subsidise the cost of transporting the data that they are generating. But among the remainder feeling was strongly in favour. 54.2 per cent of respondents felt that these players should subsidise their own traffic and, surprisingly, 48.7 per cent of respondents said they felt that the OTT community could be persuaded to do so. We have seen nothing from these players to suggest that they are willing to contribute to transport costs so perhaps this statistic

A SINGLE NETWORK MARKET WITH OPERATORS COMPETING AT THE SERVICE LAYER IS A COMMERCIALLY VIABLE MODEL

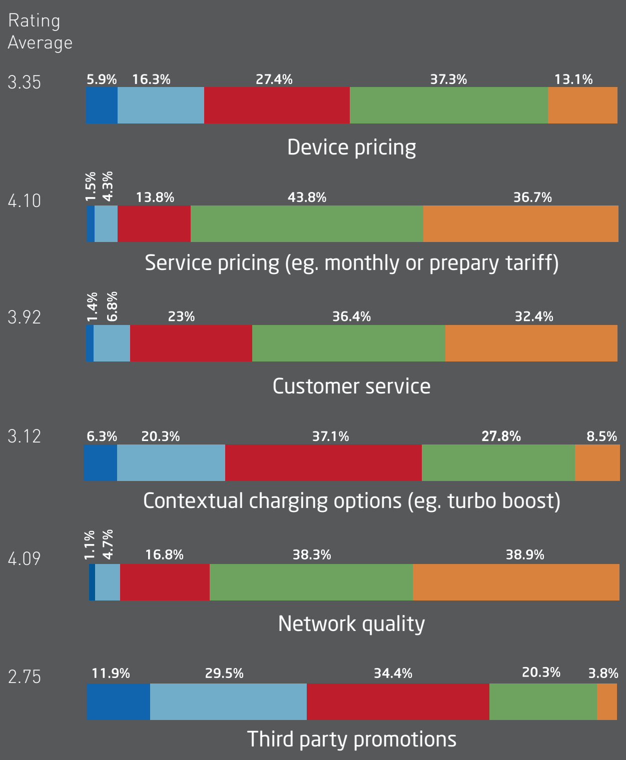


48.7% OF RESPONDENTS BELIEVE THAT OTT PLAYERS CAN BE PERSUADED TO SUBSIDISE THE COST OF THE TRAFFIC THAT THEY GENERATE

COMPETITIVE LEVELS

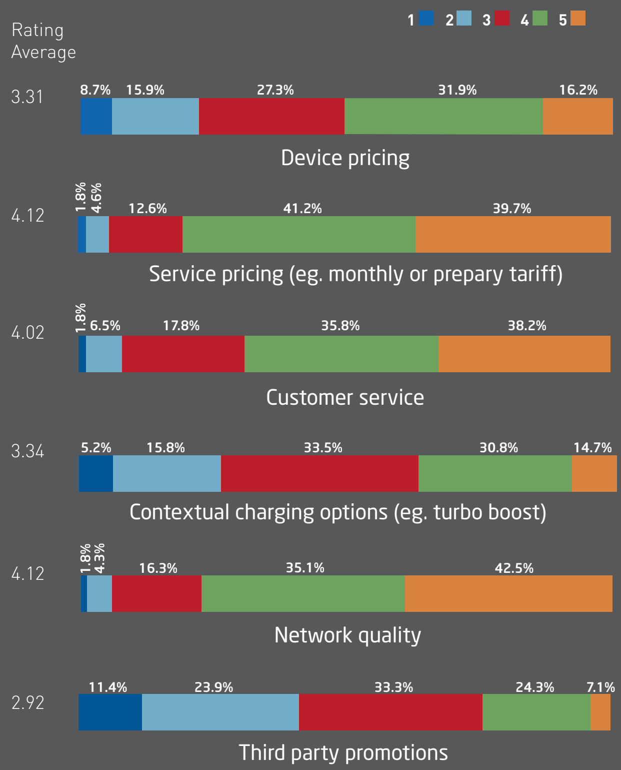
WHAT ARE THE MOST EFFECTIVE COMPETITIVE DIFFERENTIATORS FOR OPERATORS TODAY?

(ranked 1-5, 1-least effective, 5-most effective)



WHICH WILL BE THE MOST EFFECTIVE IN TWO YEARS TIME?

(ranked 1-5, 1-least effective, 5-most effective)



Over the last 24 months or so much of the focus on mobile operators' competitive travails has been on the threats posed by external players, from Apple, Facebook and Google to network independent communications service providers like WhatsApp. But the battle between the operators themselves remains intense, despite a number of collaborative initiatives designed to shore up their defences against external invaders.

At times of stress human beings often seek out the familiar and it seems that mobile operators are no different. Asked what the most effective competitive differentiator for operators is today, respondents voted overwhelmingly in favour of service price and network quality. These trusty old weapons scored 4.1 and 4.09 out of five when respondents were asked to rank the effectiveness of a range of compeititve differentiators.

The popularity of the network as a differentiator is somewhat at odds with the drive towards network sharing and the increasing willingness of the industry to consider the concept of the single network market. Its high ranking is surely due in part to the fact that the industry is in the midst of a shift to a new network technology and therefore focused more on the network itself than it would be in the middle of a technology cycle. But the fact that customer service also scored high, at 3.92, shows an understanding that the softer side of the business remains important against a backdrop of rough parity in network performance.

It was interesting to note that device pricing is losing traction, scoring 3.35 as an effective differentiator. This perhaps reflects the fact that device vendors are asserting much more control over the channel, leaving operators less room for manouevre and differentiation.

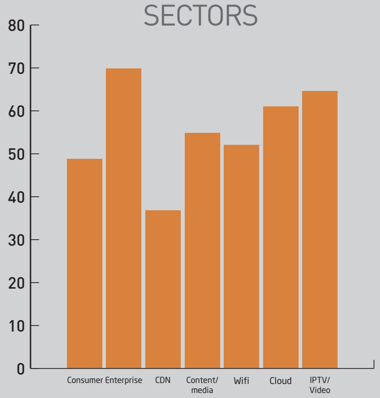
And two of the Big Ideas for new competitive advantages—contextual charging options like turbo boosts and third party tie-ups and promotions like O2's More offering—have yet to set hearts racing. They scored 3.12 and 2.75 respectively.

We then asked respondents to tell us how they think these things might evolve over the next 24 months. The only shift in the rankings saw contextual charging overtake device pricing in terms of perceived effectiveness. Device pricing was the only option judged likely to decrease in effectiveness, while all othersare expected to become increaseingly effective, with the same differentiators leading the way in two years' time as today.

Fixed Opinions

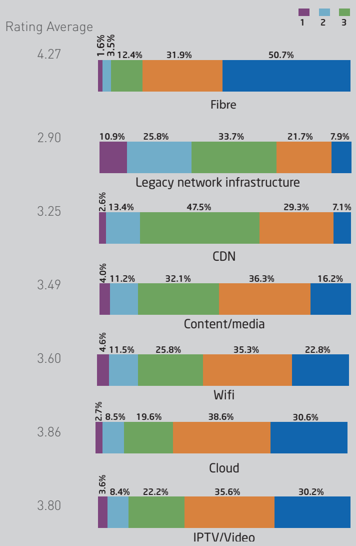
In line with their mobile counterparts, fixed operators are facing significant investments to bring their infrastructure up to scratch.

PERCENTAGE OF RESPONDENTS WHO SAW HIGH POTENTIAL FOR THESE SECTORS



RATE THE FOLLOWING IN TERMS OF THEIR IMPORTANCE AS AREAS OF INVESTMENT OVER THE NEXT 24 MONTHS

(Ranked 1-5, where 5 has the highest importance)



For 2013, FTTx, cloud computing, and Software Defined Networks (SDN) emerged as the key topics that these operators are focusing on. In the cloud sector there is a global land-grab underway as some operators rush to take control of physical assets such as data centres in order to resell virtual services through an on-demand model.

Just as this approach depends very much on scale, and the ability of the service provider to dimension resource in line with customer requirements, a similar concept is forming in the transport network layer. Here we are seeing moves to commodity hardware and software that can adapt to network demands on the fly, introducing flexibility and cost-efficiency where once there was only rigidity.

There was little doubt about the segment that respondents to the 2013 Telecoms.com Intelligence Industry Survey felt offered the most revenue potential for fixed operators. The enterprise sector was ranked as having high or very high potential over the next 24 months by 70 per cent of respondents. IPTV / Video was in second place, with 64.6 per cent of respondents ranking it high or very high.

Interestingly, however, IPTV / Video had the best score when the very high potential rankings were taken in isolation, despite its rating average score placing it second overall.

In third place was Cloud, judged as having high or very high potential by 61 per cent of respondents. Both Cloud and Video services are applicable to the enterprise sector, reinforcing the strong showing for enterprise as a revenue generator.

Content and media came in surprisingly high as a revenue generator over the next 24 months, with 54 per cent of respondents seeing high to very high potential. But Content Delivery Networks themselves make for a less convincing prospect. Almost one half of respondents remained sitting on the fence, with 46.9 per cent unsure as to whether they offer potential or not within 24 months.

Asked about the most important areas for investment for fixed operators, respondents to the survey displayed similar judgements. As you might expect given the focus on enterprise, fibre is high on the investment agenda. A whopping 83 per cent of respondents rated it as an important to very important area for investment over the coming two years. And this is clearly a forward-looking sector: Almost 70 per cent of respondents judged investment in legacy network infrastructure of low to middling importance.

Reflecting the potential revenue streams identified in the previous point, both cloud and IPTV/video are tipped as strong investment areas. Again CDN is in no man's land, with operators apparently unsure as to whether it will make for a sensible investment in the near future.

Perhaps this reflects a feeling that operators should not have to invest in networks to carry traffic that generates revenues for other players; an argument similar to that bouncing around the mobile market. On the other hand, more than 52 per cent of respondents said that content and media would be important investment opportunities for fixed operators over the next 24 months, with 16 per cent identifying it as a very important area.

As with the mobile sector, we asked respondents to rate the regulator in their domestic market. The split was even: Almost half of respondents (46 per cent) do not believe that regulation in their home market does enough to support the fixed line telecoms industry. The other 54 per cent judged their regulator's efforts sufficient.

Maker's Marks

The vendor community is under just as much pressure as the operators it serves. With disruptive newcomers, shifts to new technologies and an ever-more demanding customer base, the industry's vendors have their work cut out.

Whatever pain is being felt by telecoms operators, you can be reasonably sure, will soon find its way to the industry's supply side. Of the big seven Western vendors that once had the mobile infrastructure market more or less sewn up, only three remain—two of which are joint ventures that have never looked entirely at ease.

The disruptive influence of Chinese vendors Huawei and, to a lesser extent ZTE, has been significant in terms of price, competition and innovation—and the responses of the incumbent vendors have been varied.

Ericsson has looked to build strength in breadth, beefing up its portfolio through acquisition, while defending the leadership of its sector-defining services operation. Nokia Siemens has stripped itself of non-core assets to focus on becoming the industry's "mobile broadband specialist" and has duly established the lead in LTE contract wins.

Alcatel Lucent, meanwhile, has looked to leverage its Bell Labs heritage and focus on innovation across wireless, fixed and optical. It was the only one of the three Western incumbents to make the MIT Technology Review's list of the 50 most disruptive companies in the world in 2012.

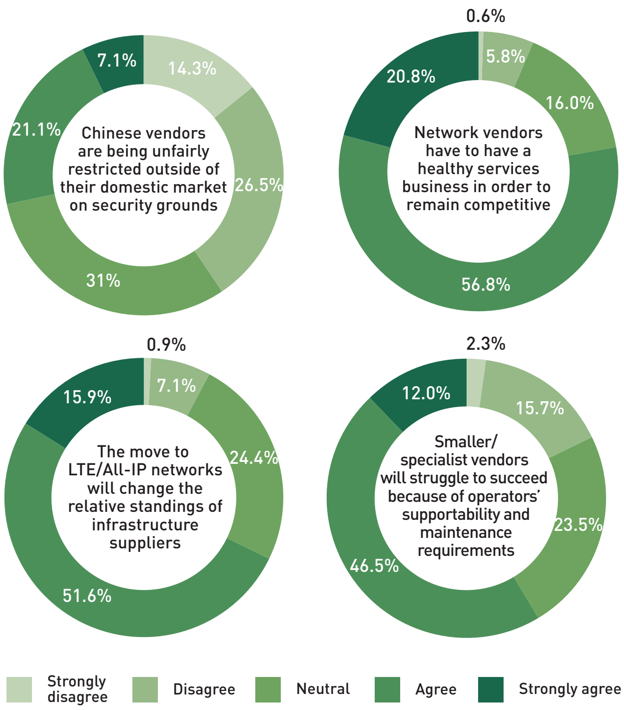
But there are other players gravitating towards the mobile network space as we converge on an all-IP world; Cisco and Samsung among them. The network supply sector hasn't been stable for a long time and, while the eventual winners are all in the mix, it seems likely that there are still difficult times ahead.

Indeed almost 68 per cent of respondents to the survey agree (16 per cent strongly) that the transition to all-IP networks will spark a shift in the relative standings of infrastructure providers. And the industry is upbeat—perhaps surprisingly so—about the prospects of companies looking to break into the space. Almost 60 per cent of respondents felt that relative newcomers have a reasonable chance of success.

This view, that the market has room for more contenders, was also reflected in responses to the suggestion that the infrastructure sector is too crowded. 32.4 per cent of respondents disagreed with this suggestion, mirrored almost exactly by the 32.8 per cent who agreed. More than one third of respondents remained neutral.

The outlook is less promising for smaller, specialist vendors. While almost one quarter of respondents were neutral on the prospects of lower-tier players, 46.1 per cent felt that they will struggle to succeed because of operators' supportability and maintenance requirements. The lot of these vendors is also made more challenging by the portfolio expansion of the bigger players, whose scale

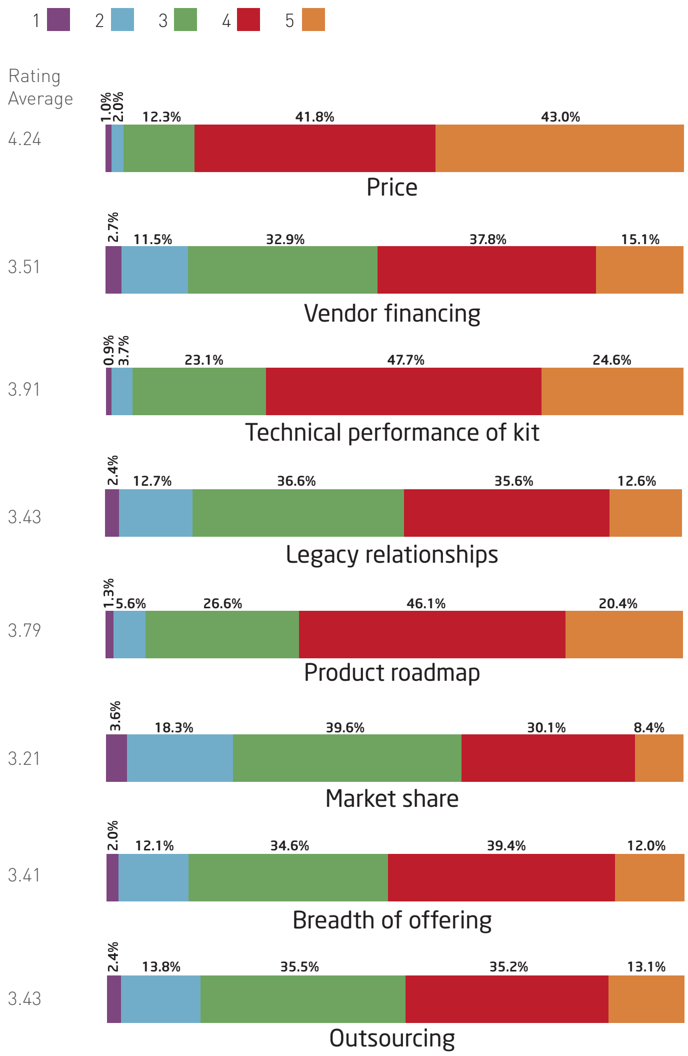
TO WHAT EXTENT DO YOU AGREE WITH THESE STATEMENTS ABOUT THE TELECOMS VENDOR LANDSCAPE?



73% OF RESPONDENTS RATED ONGOING COST REDUCTION AS AN IMPORTANT AREA OF FOCUS FOR VENDORS. ONLY 44 PER CENT FELT THE SAME ABOUT EXPERTISE IN BROADCAST NETWORKS

WHAT ARE THE BIGGEST INFLUENCERS IN OPERATORS' SELECTION OF NETWORK VENDORS?

(ranked 1-5, 1-lowest influencer, 5-strongest influencer)



can enable them to bundle products and services at very attractive prices.

Attractive pricing, of course, is how Huawei and ZTE entered the market. This is no longer their only differentiator and their contract wins in more mature markets with higher tier operators reflect a greater willingness among operators to judge them side by side with their Western counterparts. But they have had some high profile problems in some markets, including India and the US, where they have been viewed with outright suspicion.

Some 28.2 per cent of respondents felt that Chinese vendors are unfairly restricted outside of their domestic market, while 40.8 per cent disagreed. What is not clear of course is whether those who disagreed felt that Chinese vendors are not being restricted, or that restrictions are not unfair.

One criticism often levelled at the Chinese pair is that they have underdeveloped services plays. A substantial majority of respondents—77.6 per cent—felt that a healthy services business is essential to vendors wanting to remain competitive.

In slight contrast, 46.1 per cent suggested that the vendor market will separate out along Supply + Service and Pure Supply lines, which might free some vendors from having to build that important services business.

Yet for all the talk of services and breadth of offering, price remains the most important factor for operators choosing network suppliers. 85 per cent of respondents rated price as an important or very important influencer for operators when spending with an equipment vendor, followed by around 70 per cent for the technical performance of the product.

Outsourcing and service offerings were rated as one of the lowest influencers, perhaps suggesting that operators are indeed seeing sales relationships as increasingly separate from services.

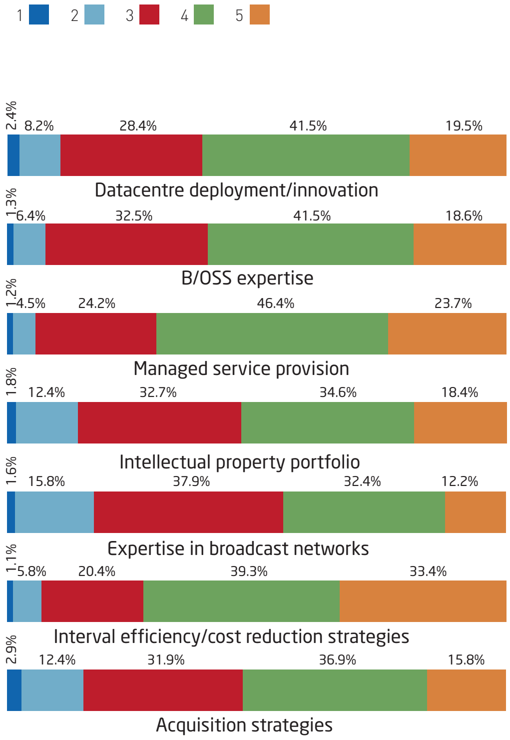
Past performance is not necessarily an indicator of future success, with market share ranked lowest out of all influencers. Legacy relationship was also down the table, with breadth of offering and vendor financing fractionally ahead.

We then asked respondents to rate a number of technologies in terms of their importance to operators over the next two years, in a bid to discern where vendors might be best placed to put their investment. Small cell offload is set to be the most significant technology for operators over the next 24 months, with around 60 per cent of respondents rating is as important or very important. An associated technology, carrier grade wifi, was close behind.

Software defined networking (SDN) a contender for 2013's hype term of the year, ranked

RATE THE FOLLOWING SKILLS AND AREAS OF EXPERTISE NETWORK EQUIPMENT PROVIDERS NEED TO DEVELOP IN ORDER TO REMAIN COMPETITIVE

Ranked 1-5, 1-least important, 5-most important



alongside carrier grade wifi.

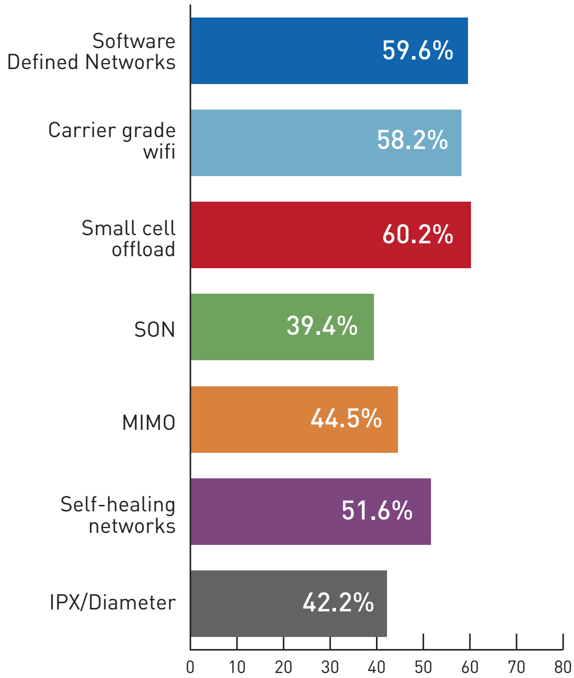
A couple of rungs down the evolutionary ladder from SDN and a technology that has been widely discussed for some time, SON (self organizing network), actually garnered the least interest from respondents. But self-healing networking technology, which is where SON is headed in the future, was of importance to more than half the respondents.

Joining SON towards the bottom of the list were IPX/Diameter and MIMO.

For vendors, technology must be complemented by skillsets so we then turned our attention to the kind of skills and areas of expertise in which vendors should be investing. Internal efficiency and cost reduction strategies scored the highest, with just under 73 per cent of respondents marking this out as important or very important, despite all the downsizing we have already witnessed.

Managed services placed second, with B/OSS expertise and innovation around datacentre deployment and management also near the top of the table. Expertise in broadcast networks, touted by at least one big vendor CTO as the next important area for development, scored lowest of all, while acquisition and intellectual property portfolio development were also seen as less important areas for focus.

PROPORTION OF RESPONDENTS WHO RANKED THE FOLLOWING TECHNOLOGIES AS IMPORTANT OR VERY IMPORTANT



60%

OF RESPONDENTS RATED SMALL CELL OFFLOAD AS IMPORTANT OR VERY IMPORTANT OVER THE NEXT 24 MONTHS

SECTION 3: BILLING

With this section of the survey, sponsored by AsiaInfo Linkage, we asked the industry about the perceived rewards in working towards centralisation and standardisation in operators' **billing systems,** the challenges involved in such projects and the possible solutions.

We found that:

- Operators are in favour of standardisation but are less convinced about the benefits of a centralised BSS strategy.
- Centralisation is perceived to be more difficult to achieve than standardisation, but few respondents believe either to be impossible.
- Reduced opex and the ability to standardise offerings to international enterprise customers are believed to be the most important benefits.
- Internal politics, cultural conflicts and operational risk are the biggest challenges.
- A central cloud installation of the billing system that can be accessed by inidividual opcos offers a convincing solution.

Standard Issue

Large multinational mobile operators have often struggled to fully exploit the benefits of scale and yet, as our survey reveals, there is clear enthusiasm for centralised or standardised billing systems.

Success for mobile operators is increasingly dependent on scale. It is broadly accepted that, from network infrastructure deployment to handset procurement, the bigger you are the more benefits are available. And the drive for greater scale seems set to continue for some time to come: Two thirds of respondents to the Telecoms.com Intelligence 2013 Industry Survey believe that further consolidation within the mobile operator community is necessary.

But the benefits of scale are only as great as the operator's ability to leverage it; size in itself is only the starting point. All operators that have expanded their footprints over the last 15 years have struggled at one time or another to truly reap the rewards. Some have failed outright.

More often than not there is huge diversity in the systems installed at different opcos, meaning that it is difficult to bring them all into aligment. Meanwhile cultural and political barriers to progress are just as difficult to negotiate as technical problems, with frequent disagreements between group HQ and the national outposts.

Nowhere are these issues more likely to prove disruptive than in billing strategy. Different markets vary in terms of pricing, bundling and the creation and marketing of new offers. Individual opcos have far greater awareness of their own markets than the corporate management team at HQ and are likely to resist any attempts to mandate new billing systems. Beyond this there is the very real danger of service disruption and revenue leakage that comes with any large system swap-out.

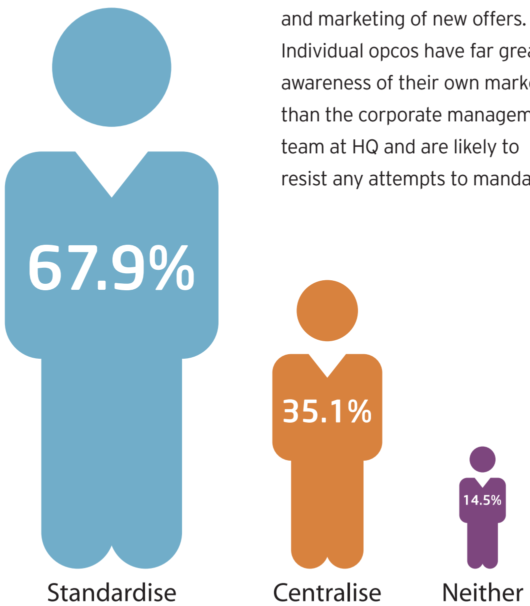
Despite all of these concerns, greater alignment of international operators' billing systems is seen by the industry as a priority. Respondents were asked about standardisation and centralisation, two approaches to introducing greater consistency in billing, with standardisation emerging as both more attractive and more achievable.

More than two thirds of respondents said they believed international operators should look to standardise their BSS systems across footprints, while just over half as many felt the same way about centralisation.

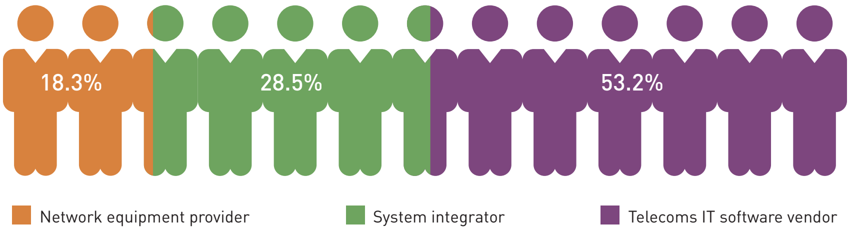
Reduced Opex was perceived to be the greatest upside of a centralised strategy, with a rating average of 3.79 out of five. Expressed another way, 65.7 per cent of respondents felt it was highly beneficial. Close behind, with 63.1 per cent of respondents voting the same way was the ability that centralisation of the BSS gives operators to offer consistent services to international enterprise customers.

Reduced Capex and the ability to offer consistent products across different opcos were also seen as important upsides.

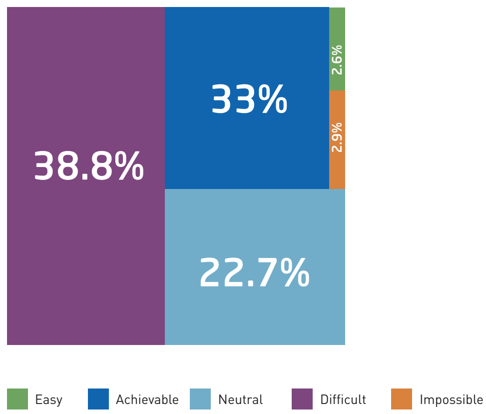
DO YOU BELIEVE INTERNATIONAL OPERATORS SHOULD LOOK TO CENTRALISE AND/OR STANDARDISE THEIR BSS SYSTEMS ACROSS THEIR FOOTPRINT?



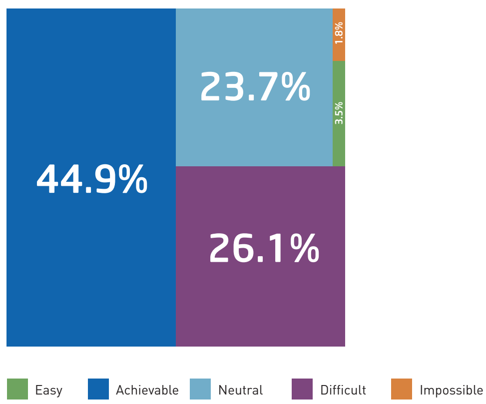
WHICH TYPE OF ORGANISATION DO YOU BELIEVE IS BEST POSITIONED TO OFFER A CENTRALISED BILLING SOLUTION?



TO WHAT EXTENT DO YOU BELIEVE GROUP-WIDE CENTRALISATION OF BSS IS AN ACHIEVABLE GOAL FOR AN INTERNATIONAL OPERATOR



TO WHAT EXTENT DO YOU BELIEVE GROUP-WIDE STANDARDISATION OF BSS IS AN ACHIEVABLE GOAL?



It is not surprising that respondents should identify these benefits to centralisation. The more important question is just how achievable it is for operators to implement. For group-wide centralisation of BSS opinion was evenly split. Exacly one third judged it achievable, while 38.8 per cent said it would be difficult.

For standardisation, where each opco manages its own iteration of the same system, the task was judged to be a lot more straightforward. 44.9 per cent of respondents felt it would be achievable, and 26.1 per cent difficult. Less than three per cent of respondents judged either to be impossible, however.

Just how difficult operators would find it to centralise or standardise their BSS would depend on a number of factors. Respondents to the survey identified internal politics and conflicting business cultures as the stiffest challenge. In fact more than one fifth of respondents—21.6 per cent—rated this as having the highest level of severity. Operational risk, which placed second overall, had nowhere near as high a rating at the top end of the scale, with only 12.5 per cent of respondents giving it the highest level of severity.

There is little doubt that the extremity of the reaction to this question reflects first hand experience of the issue among our respondents. Indeed it is worth noting that, despite the enthusiasm shown for BSS standardisation as a concept, and to a lesser extent centralisation, 14.5 per cent of respondents felt that neither should be attempted. That is a significant swell of opinion against the model.

Andy Tiller, VP for Corporate Marketing at Chinese BSS vendor AsiaInfo-Linkage, says these figures chime with sentiments that operators have shared with him. "When we speak to the local opcos they are often very bullish; they say that they're the experts and they need to maintain their independence from group," he says. "This is understandable, but it's one of the reasons why benefits like cost savings are not being achieved."

The third most serious challenge identified by respondents was that posed by regulation. This was judged as having the highest level of severity by more people than operational risk, in fact, with 15.8 per cent giving it the maximum rating.

It is of particular concern in Europe, where regulation around the storage of customer data prevents that data being housed outside of the customer's home market. Tiller describes this as "complicated but not unsolvable", adding that while there are some benefits lost in having to partition the database, the computing can still be done on a centralised server.

In light of this particular challenge to centralisation/standarisation of BSS in Europe is was interesting to note that respondents clearly believe that Europe is going to lead the way in adopting such strategies.

The emergence of the cloud as an internal tool for operators may hold the key to enabling what is clearly a desirable BSS evolution in the face of what are equally serious challenges and objections. When asked if standardisation of the BSS function would be easier to achieve if the operator hosted a central, private cloud BSS installation which was accessed by the national opcos, 16.3 per cent of respondents answered that it would be "much easier" and a further 48.3 per cent "somewhat easier".

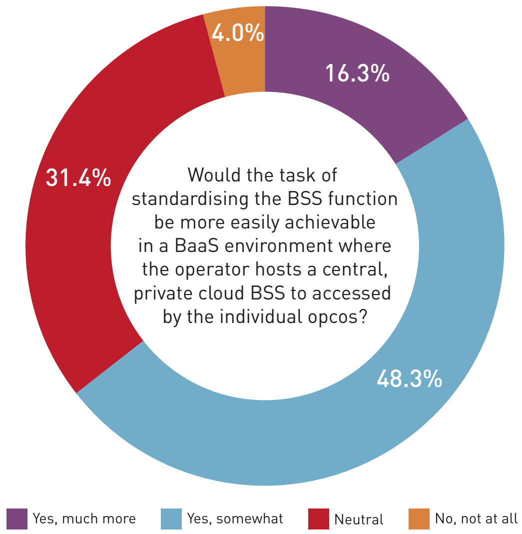
"With multitenancy, BSS becomes software as a service," says Andy Tiller. The group isn't

65% OF RESPONDENTS BELIEVE OPERATOR BSS STANDARDISATION WOULD BE EASIER IF GROUP HQ HOSTED A CENTRAL, CLOUD-BASED BSS

taking control or defining the operation. "The business processes are flexible, the products and offers are flexible and the local opco can still operate their own system remotely. New technology platforms are the key to making this work, and potentially overcoming the political issues as well."

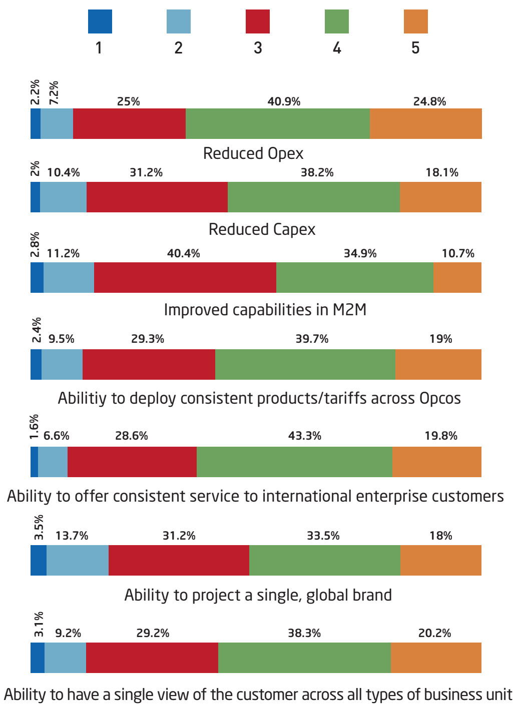
The BSS supply market is crowded, populated by nimble startups, established sector specialists and tier-one infrastructure vendors like Ericsson and Huawei that have enormous scale and investment to put into their offerings in the area. So which of these companies is best placed to manage the kind of centralisation/standardisation projects that promise the cost/efficiency improvements that this survey suggests are available?

Respondents came down clearly in favour of Telecoms IT software specialists, with more than half—53.2 per cent—voting for this class of provider. It might give the large network vendors pause for thought that only 18.3 per cent of respondents suggested that they are the right people for the job, compared to 28.5 per cent for systems integrators.



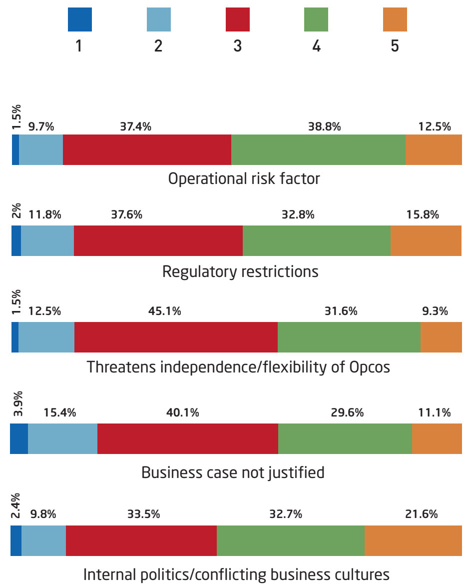
RATE EACH OF THE FOLLOWING BENEFITS OF A CENTRALISED BSS STRATEGY

(ranked 1-5, 1-not benificial, 5-extremely benificial)



RATE EACH OF THE FOLLOWING CHALLENGES TO THE STRATEGY IN TERMS OF SEVERITY

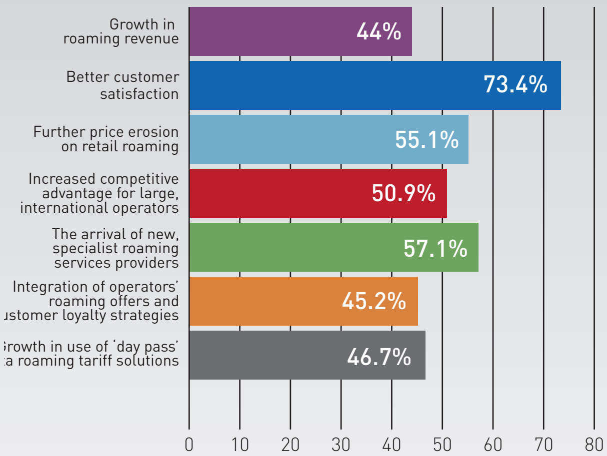
(ranked 1-5, 1-insignificant, 5-severe)



SECTION 4: ROAMING

Roaming remains hugely important to mobile operators, with Informa forecasting that revenues from roaming services will reach $28.3bn worldwide in 2016. In this part of the survey, sponsored by Openet, we sought to gauge views on the evolution of roaming services, the impact of past and future regulation and the business models available to operators.

What outcomes do you expect from the impending EU legislation intended to create a roaming services marketplace?



OPENET

About Openet:

Since the introduction of mobile data services in 1998, Openet has helped service providers capitalize on opportunities and overcome challenges. With competitive pressure accelerating, today's service providers rely on Openet software to evolve business models around networking smartphones, M2M devices and third party services. Openet's portfolio combines policy and charging control with device and third party interaction to enable innovative charging models, to control operating cost and to personalize services. More than 80 of the world's largest service providers in 28 countries use Openet's high performance software. **For more information, please visit www.openet.com.**

Travelling Circus

International roaming was one of the facilities that made GSM a truly global success story. But the high price premiums it has attracted have been controversial and the industry seems to realise that, in the face of regulation and alternative access technologies, it needs to change.

Roaming has long been a contentious issue. For a function of mobile service that was fundamental to the vision of GSM from the outset, it has proven a thorn in the industry's side from the time it first became commercially available. The practical issues it created were huge, even when operators were only trying to provision voice. As services have become more sophisticated and diverse, so have the challenges to providing them across borders.

More recently the principal problems with roaming have been commercial. Despite the availability of improved routing solutions for roaming calls and sessions, prices—both inter-operator retail—have remained high. Users have voted with their feet, disabling data roaming when travelling overseas or to neighbouring countries—aided by the widespread availability of free wifi. Regulators, meanwhile, have led a charge against retail roaming rates under the banner of consumer rights.

What was once a cash cow for operators that required (and received) little innovative attention—even within their own international footprint—is changing fast. In July next year EU legislation will come into effect that allows end users to buy their international roaming services from independent providers, while retaining their own mobile number. Meanwhile the notion of service as defined by geography is fading fast thanks to internet-based communication and social media platforms that have huge global reach.

Against this backdrop we set out to discover what the industry as a whole thinks about international roaming, from the types of services that are on offer and the prices that should be paid for them to the impact of regulation and the opportunities for service innovation.

In the face of competition from internet players, the industry has little option but to concede its shortcomings. More than 55 per cent of respondents felt that mobile operators are not sufficiently innovative in their roaming strategies compared to 19 per cent who felt that they are. Operator responses taken in isolation offer a slightly more favourable view, with 23 per cent arguing that they are sufficiently innovative. But half of the operator respondents surveyed held their hands up to falling short in this regard.

There was a similar split on the persistently divisive issue of pricing. Just short of one quarter of the industry felt that operators were justified in charging a significant premium for on-net international roaming. For operators this figure rose to 35.5 per cent. And while 48.4 per cent of respondents overall argued that such premiums were not justifiable, the corresponding figure for operators in isolation was exactly one third.

It is not surprising that operators should be more lenient on themselves than the industry as a whole. Indeed what stands out is the fact that, despite being more forgiving overall, a significant number of operators believe that they no longer have the right to charge substantial premiums for roaming services.

This is reinforced by another conspicuous statistic. Asked whether the mobile industry's historical view of the market as being defined along geographical boundaries is now out-dated, 64.4 per cent of respondents agreed that it was, with more than one fifth expressing their view in the strongest terms. Among operators the figure was only slightly lower, at 59.8 per cent.

71% OF RESPONDENTS BELIEVE THAT ROAMING USERS ARE MORE FOCUSED ON COST THAN QUALITY OF SERVICE

Roaming-related regulatory intervention on price has been one of the most contentious issues of the last decade, yet more than half of respondents felt that it has been a positive influence. Indeed more than 60 per cent of respondents (and just shy of half of operator respondents) believed that further regulation is necessary.

Despite this surprising enthusiasm for intervention, respondents recognise the ongoing threat that it poses to operators' businesses. Continued regulatory pressure on pricing was rated as the most significant roaming-related challenge that operators face, with more than 60 per cent of respondents scoring it 4 or 5 on a 1 - 5 scale of severity. Implicit in what appears to be something of a contradiction there may well be a recognition that some operators could suffer individually, even as the market grows overall.

Further evidence to support this was revealed in answers to questions concerning the impending EU legislation on roaming services. In July next year EU consumers will be able to buy roaming services from alternative providers, be they other existing operators or specialist newcomers, on a fixed term basis that will allow them to bypass their domestic provider, while retaining their domestic mobile number.

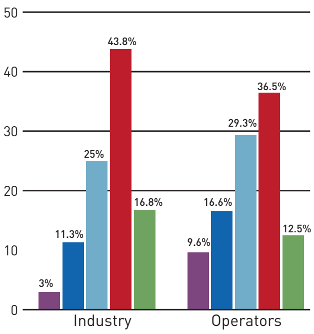
Asked to score a range of possible outcomes of this legislation, almost three quarters of respondents (73.4 per cent) said they expected customer satisfaction to improve. This will come at a cost, however, with more than half predicting further price erosion on retail roaming and 57.1 per cent foreseeing that erosion being driven in part by the arrival of new roaming providers into the marketplace.

The operators best placed to defend themselves against such invasion, unsurprisingly, are the large, international players with footprints to leverage. Half of respondents felt that a new roaming marketplace is likely to increase the competitive advantage of these players.

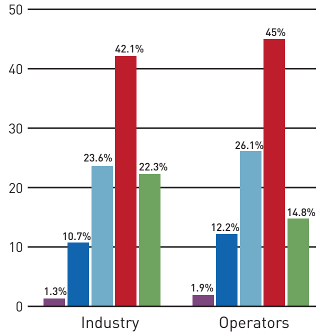
When competition intensifies operators must improve their responsiveness and more than half of respondents felt that operators will need to be able to develop and launch new roaming tariffs in three to four weeks or less (15.1 per cent said one to two weeks would be the requirement) in order to compete effectively.

In their domestic markets, many operators are looking to Quality of Service as an increasingly important differentiator. In a roaming environment, where operators have no control over the visited network, QoS is a

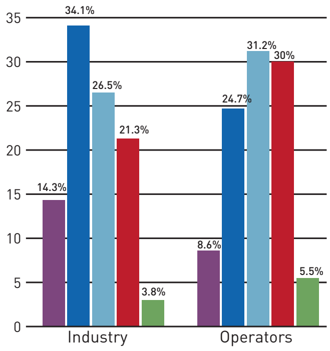
FURTHER REGULATION ON REGULATION ON REGIONAL ROAMING CHARGES IS NECESSARY



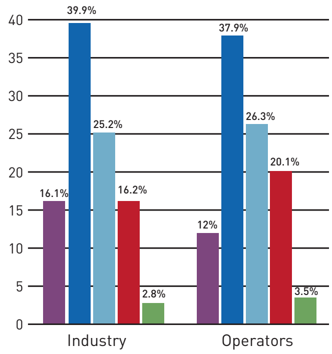
THE MOBILE INDUSTRY'S VIEW OF THE MARKET ALONG GEOGRAPHICAL BOUNDARIES IS OUT-DATED



MNOs ARE JUSTIFIED IN CHARGING SIGNIFICANTLY MORE THAN DOMESTIC SERVICE FOR ON-NET ROAMING SERVICES



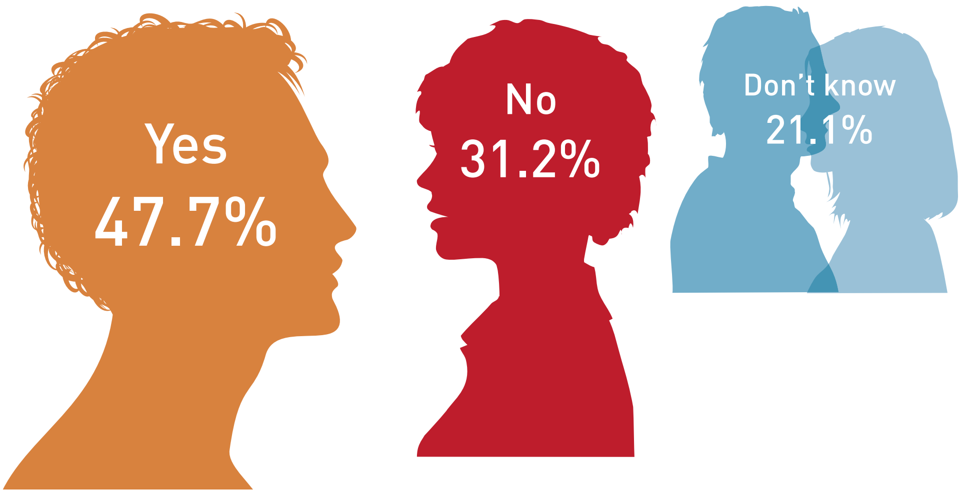
MOBILE OPERATORS ARE SUFFICIENTLY INNOVATIVE IN THEIR ROAMING STRATEGIES



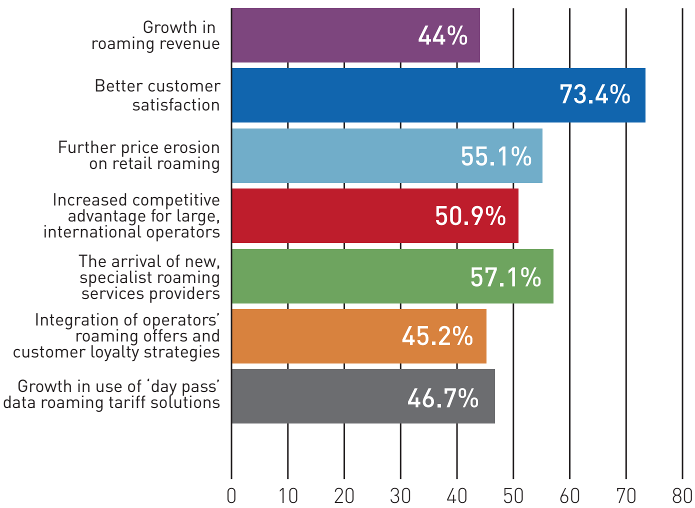
strongly disagree | disagree | neutral | agree | strongly agree

19.8% OF OPERATORS BELIEVE THEY SHOULD INCREASE ROAMING CHARGES IN UNREGULATED AREAS TO COMPENSATE FOR LOSSES IN REGULATED AREAS

SHOULD OPERATORS GUARANTEE THEIR OWN CUSTOMERS SUPERIOR QOS TO INBOUND ROAMERS AS A MATTER OF COURSE?



WHAT OUTCOMES DO YOU EXPECT FROM THE IMPENDING EU LEGISLATION INTENDED TO CREATE A ROAMING SERVICES MARKETPLACE?



tricky issue and 59.1 per cent of respondents rated the management of QoS for in- and outbound roamers as challenging or very challenging for operators.

A significant majority of the industry believes that users are far more flexible on QoS when roaming than they are when they're at home. Almost 71 per cent of respondents said that roamers are more focused on cost than QoS, although 17.8 per cent felt there was no difference and 11.2 per cent thought that roamers were likely to be more sensitive to quality than to price.

One of the principal challenges with roaming QoS is whether or not to differentiate between the service quality delivered to inbound roamers and that delivered to domestic customers. This is a question that divides the industry. More than one fifth are honest enough to say they don't know the answer while 47.7 per cent felt that operators should prioritise their own customers as a matter of course. 31.2 per cent of respondents said operators should remain neutral.

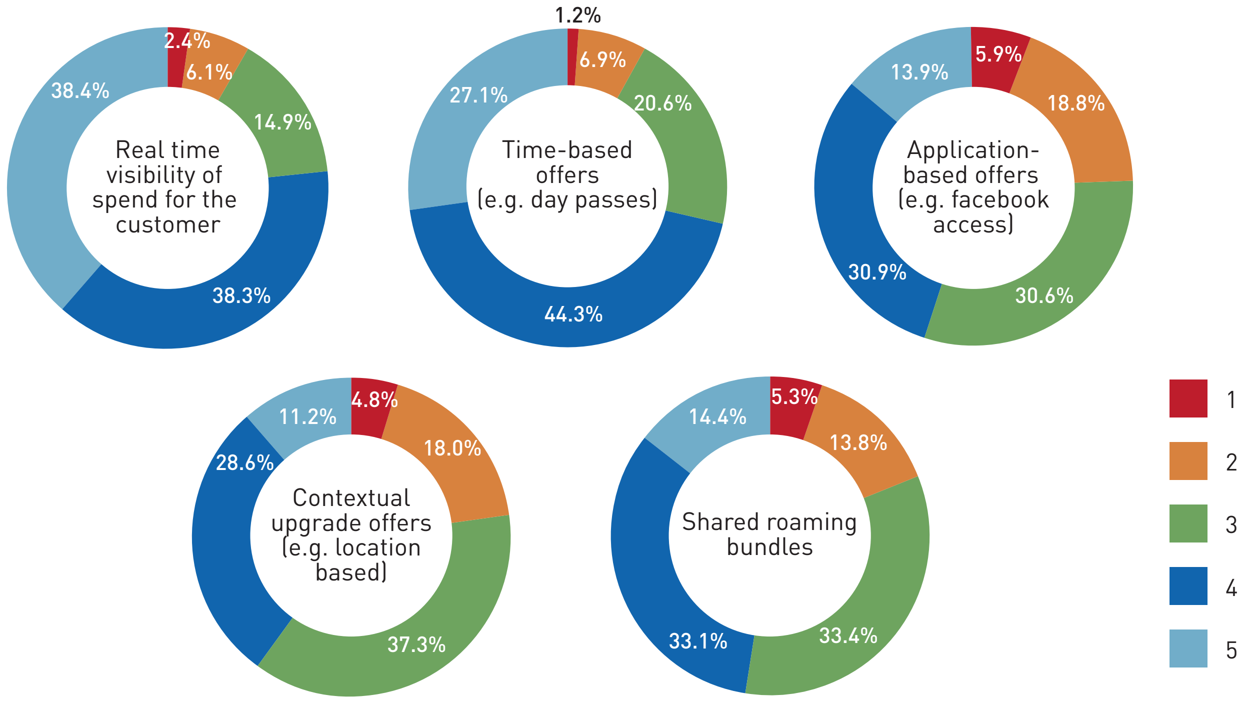
We expected this question to generate contrast between the responses from the industry as a whole and those from operators in isolation. In fact the split was almost identical, with each answer for operators differing by less than one per cent from that of the wider industry.

In a bid to remain competitive in the roaming services market, and to increase the potential of that market by encouraging greater uptake among consumers, operators are changing

51.1% OF RESPONDENTS BELIEVE OPERATORS NEED TO BE ABLE TO DEVELOP AND LAUNCH NEW ROAMING TARIFFS IN FOUR WEEKS OR LESS TO REMAIN COMPETITIVE

HOW SUCCESSFUL DO YOU BELIEVE THE FOLLOWING STRATEGIES COULD BE IN ENCOURAGING SUBSCRIBERS TO USE DATA ROAMING SERVICES?

(Ranked 1-5, 1 being unsuccessful, 5 very successful)



their strategies. In 2012 Telefónica began offering capped usage within the EU at €1.99/day for effectively unlimited mobile data access. When we asked respondents what strategies they felt would be successful in encouraging uptake, day passes such as Telefónica's scored well, with 71.4 per cent of those surveyed rating them as successful or very successful.

This was the second highest rating, with application-based offers, contextual upgrades and shared roaming bundles all some way behind. The most compelling strategy according to our respondents will be for operators to ensure that users have real-time visibility of their consumption. This was judged likely to be successful or very successful by 76.7 per cent of respondents.

"This survey clearly highlights the top three strategies for operators to increase data roaming usage and subsequent revenue as service passes (e.g. 30MB for a day), real-time visibility, and on-device sales/purchase," says Corine Suscens, senior marketing manager, EMEA at Openet. "By combining them, operators will not only offer customers the level of control that they crave and which has been a barrier to data roaming usage, but also maximize revenue potential by making purchasing very easy and convenient."

Finally, it came as no surprise that the industry believes overwhelmingly that roaming-related special offers are best provided to users through their device, most likely in a service provider application. More than 60 per cent of respondents felt this was the best sales channel for such operators, although there remains an enthusiasm for online sales (desktop) with almost one fifth of respondents suggesting this would be the best sales channel.

SECTION 5: FRAUD AND REVENUE ASSURANCE

Revenue Assurance and Fraud Management activities will become increasingly important to network operators as they become exposed to ever more vertical sectors and learn to share control points with external players. This section of the survey, sponsored by WeDo Technologies, focused on the new tests that operators face in this area and what factors might be impacting on their RAFM.

We found that:

- Payment and banking services are believed to represent the biggest risk of emerging business areas for telecoms operators.
- Lack of data consistency across internal systems and inconsistend procedures and policies are hampering operators RAFM efforts.
- Almost one third of operators believe they are less prepared than they should be for the move to LTE.
- Telecoms operator are wary about outsourcing their revenue assurance and fraud management functions.
- More than 70 per cnet of operators believe that group level and external benchmarking of revenue assurance, fraud and risk management is of high importance.

Risky Business

Fraud and revenue assurance are becoming more important as operators' diversification exposes them to ever more risk. As our survey found, however, there is room for significant improvement in the management of these key functions.

In a presentation last year, Martin Creaner, chief executive of the TM Forum, explained that the TMF sees the telecoms market separating into three strata; a top layer of service and application retail, a middle layer of digital service provision and a lower layer of core computing and communications infrastructure. While the number of companies in the middle layer will number in the thousands, Creaner predicted, there will be only 20 - 25 providers of that core infrastructure at the bottom.

The industry faces a new land-grab, he said, where operators, OS and smartphone vendors and internet players are all competing for ground, but in different directions. Compared to the old world land-grab that saw operators battling each other for customer acquisition, this new scenario is far more complex.

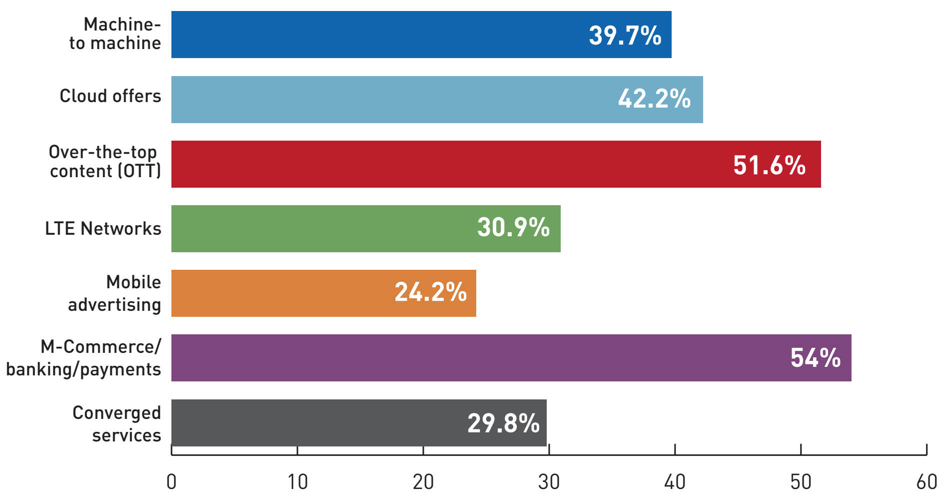
Such diversification brings with it two trends that are particularly relevant to fraud and revenue assurance: The more players with which operators must interface across all areas of their business—and think about all of the verticals that operators are now involved in—the more data is being generated and the more risk is being created.

Just because an operator provides the transport does not mean it will be the central control point for all the data being generated. Operators need to manage that data effectively for three key reasons; to enhance their position in this new world, to ensure that risk is kept to a minimum and to make their own business processes more efficient.

This data isn't easy to manage, though. Each piece of data has been likened to a needle in a haystack, but a needle that only exists for a fleeting moment. Real time analytics are essential—and the integration of all the data being generated equally vital.

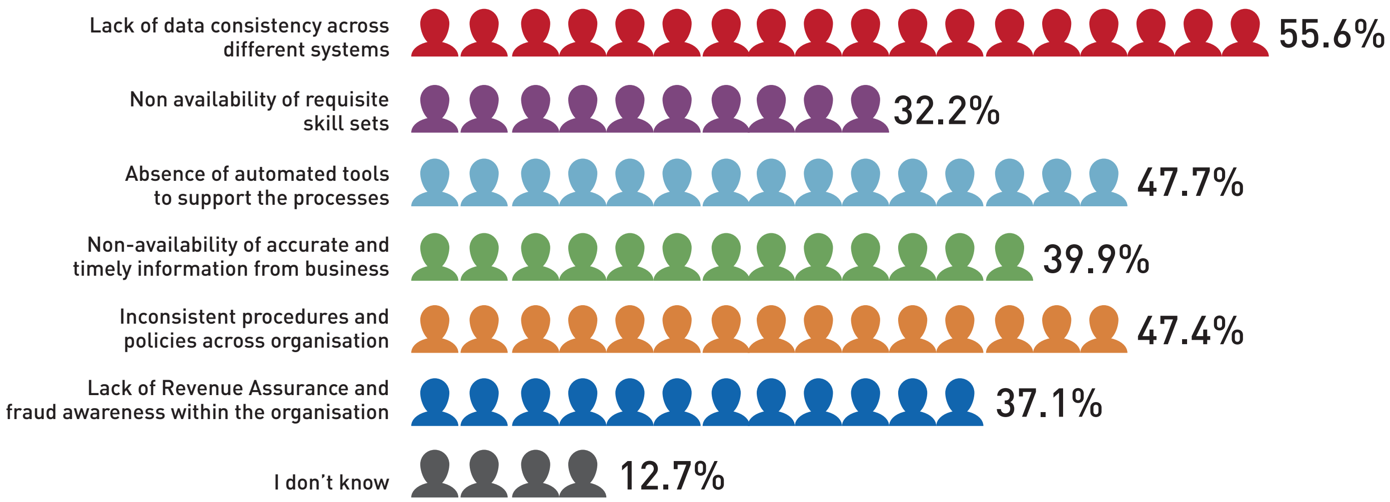
In this section of the survey we wanted to find out how the industry views fraud and revenue assurance, functions which have, in the past, struggled for attention within operators' executive management. In times of high growth

WHAT DO YOU THINK ARE THE FACTORS THAT ARE MOST LIKELY TO IMPACT REVENUE ASSURANCE AND FRAUD MANGEMENT ACTIVITIES FOR TELECOMS OPERATORS?



31.1% OF OPERATORS BELIEVE THEY ARE LESS PREPARED THAN THEY SHOULD BE FOR LTE

WHICH OF THE FOLLOWING STATEMENTS DO YOUR THINK ARE THE REASONS WHY ORGANISATIONS/TELECOMS OPERATORS DO NOT MAKE THE MOST OF THEIR REVENUE ASSURANCE AND FRAUD MANAGEMENT FUNCTIONS?



and soaring profits this may not have been an issue. But these are no longer the characteristics of our times.

We first asked respondents to rate a number of emerging service areas for their potential impact on revenue assurance and fraud management (RAFM) activities for operators. M-commerce/mobile payment services and OTT content were considered a risk by the largest number of respondents, 54 per cent and 50.9 per cent, respectively. Cloud offers were in third place, deemed a risk by 42.3 per cent of respondents. Clearly the industry has concerns about services that the operator does not control end to end.

More worryingly, perhaps, it also has concerns about its own core area of operations. While more than 60 per cent of operator respondents said their firm was prepared or very well prepared to manage the challenges and risks inherent in the transition to LTE, more than 31 per cent said that they were less prepared than they should be.

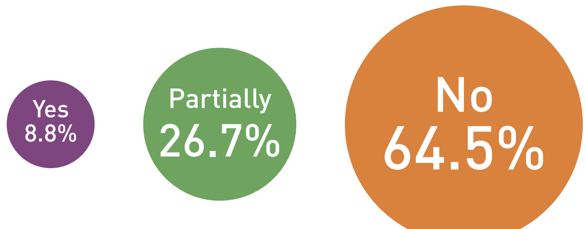
With regard to internal systems, the greatest risk is perceived to be fraud, originating internally or externally. Beyond that the billing environment was judged the most vulnerable area. More than half of operator respondents, 51.9 per cent, felt that poor system integration in B/OSS was a risk, with 47.6 per cent identifying billing and rating systems errors. The next highest scoring answer was new product releases and tariff configuration which was judged vulnerable by 36.2 per cent of operators.

Integration between different systems is a key issue in revenue assurance and fraud management. Almost 60 per cent of operator respondents said that a lack of data consistency across different systems was one reason that their organisations do not make the most of their RAFM functions. Just less than 50 per cent said that the absence of automated tools to support processes was a problem, 45.3 per cent cited inconsistent procedures and policies across organisations and 41 per cent the lack of accurate and timely information from other areas of the business.

"It is incredible that, in 2013, the lack of data consistency across different systems across systems is still the biggest obstacle to effective RAFM," says Sergio Silvestre, chief

6.4% OF OPERATOR RESPONDENTS SAID THEIR ORGANISATION USES NO RAFM TOOLS AT ALL

WOULD YOU, AS A TELECOMS OPERATOR, OUTSOURCE REVENUE ASSURANCE AND FRAUD MANAGEMENT FUNCTIONS?



Operator responses only

marketing officer at revenue business assurance specialist WeDo Technologies. "Clearly there is a significant opportunity for specialist companies to help operators to improve their performance in this area. This challenge will only increase in the all-IP, real time and OTT services world the telecoms industry is evolving into."

M-COMMERCE/ PAYMENT SERVICES WERE CONSIDERED THE RISKIEST OF THE NEW WAVE OF SERVICES, RATED LIKELY TO IMPACT AN OPERATOR RAFM BY 51%

But systems are not the only shortcoming. One third of operators said that a lack of RAFM awareness within the organisation was a problem and almost as many cited the absence of requisite skill sets.

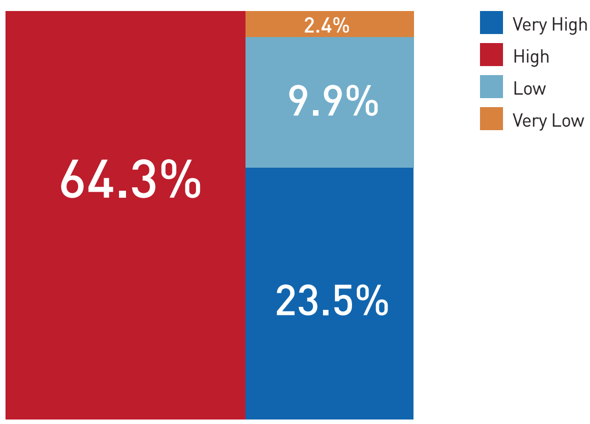
Despite acknowledging these serious problems, most operator respondents were wary of outsourcing RAFM functions. 64.5 per cent of operator respondents who expressed an opinion said that their organisation would not outsource. Only 8.8 per cent said that they would, while 26.7 per cent said they could consider partial outsourcing.

There is no doubting the importance of RAFM to the operator community, with 87.8 per cent of operator respondents who expressed an opinion rating group level and external benchmarking of RA, fraud and risk management as important or extremely important. And within operators the teams responsible for RAFM have, as often as not, access to the C-suite. Just shy of 60 per cent of operator respondents said their RAFM team reports directly or jointly to the chief financial officer. Five per cent said the team reports to the CTO and ten per cent to a dedicated RA head.

And yet there are some operators that have a far less stringent approach. 6.4 per cent of operator respondents said that their organisation uses no RAFM tools at all. Almost 17 per cent said they use only fraud management tools and nine per cent only RA tools. The largest segment, 43.4 per cent, said they use third-party supplied tools for both fraud and revenue assurance, while almost one quarter—24.3 per cent—use tools developed in-house.

This, combined with a reluctance to outsource, suggests that operators are wary of ceding what control they have over RAFM, particularly as the world is evolving in such a way as to expose them to further risk through their involvement in other sectors.

HOW IMPORTANT DO YOU THINK IT IS FOR TELECOM OPERATORS TO DO GROUP LEVEL AND EXTERNAL BENCHMARKING OF REVENUE ASSURANCE, FRAUD AND OTHER RISK MANAGEMENT?



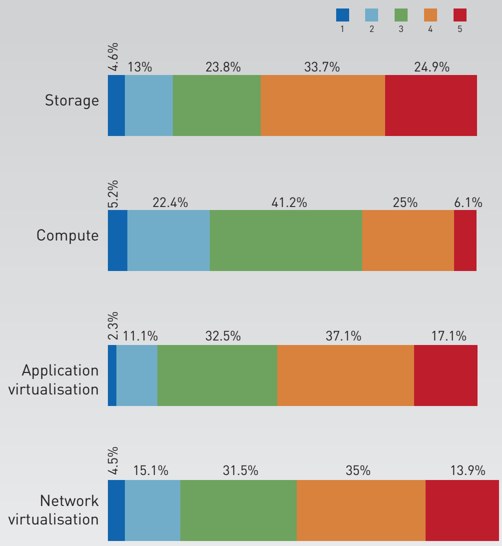
Operator responses only

SECTION 6: CLOUD

The cloud offers telecoms operators the chance to revolutionise their own internal operations while at the same time delivering a new range of enterprise and consumer solutions to their customer base. Sponsored by Radisys, this section of the survey focused on investment and return opportunities for operators in the cloud.

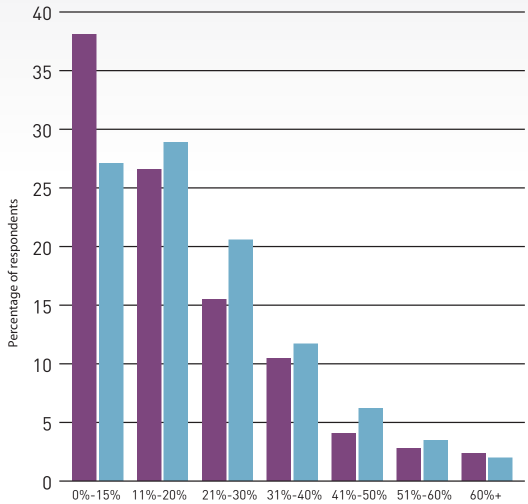
radisys.

Rate the following cloud services in terms of revenue potential for operators? Please reate each on a scale of 1-5, where 1 is lowest potential and 5 is the highest potential



What percentage of capex do you expect operators to be investing in cloud within 24 months?

What percentage of revenues do you expect operators to be deriving from cloud services within 24 months?



About Radisys:

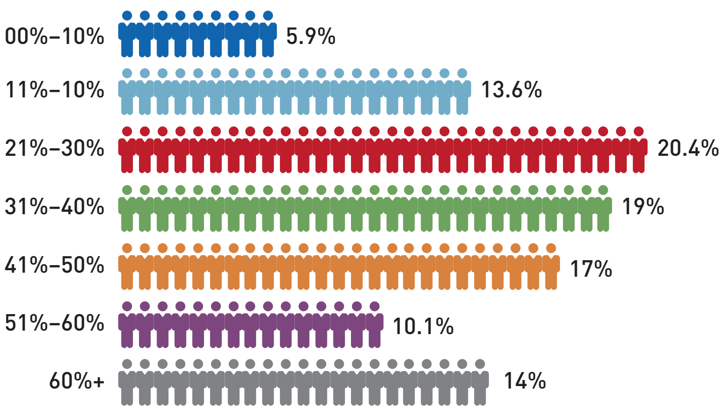
Radisys (NASDAQ: RSYS) is a market leader enabling wireless infrastructure solutions for telecom, aerospace and defense applications. Radisys' market-leading ATCA and MRF (Media Resource Function) platforms coupled with world-renowned Trillium software, services and market expertise enable customers to bring high-value products and services to market faster with lower investment and risk.

Radisys solutions are used in a wide variety of 3G & 4G / LTE mobile network applications including: Radio Access Networks (RAN) solutions, wireless core network applications, Deep Packet Inspection (DPI) and policy management; conferencing and media services including voice, video and data.

Cloudy Outlook

Our analysis of the fixed line landscape identified cloud as one of the key revenue generators for operators over the next 24 months and as a result is a sector expected to attract a lot of investment.

WHAT PERCENTAGE OF TELECOMS OPERATORS WORLDWIDE DO YOU EXPECT TO BE SELLING CLOUD SERVICES WITHIN 24 MONTHS?



Over 80 per cent of survey respondents said they expected some operators to own their own cloud infrastructure within the next two years, and over 90 per cent expect operators to be selling cloud services within the same time frame.

Although only about 12 per cent of respondents think more than 50 per cent of operators worldwide will own their own cloud infrastructure by 2015, the majority think between 11 and 30 per cent will have some kind of cloud platform in place.

There are slightly higher expectations of operators actually selling cloud services within the same time frame, but this may be due to a healthy outsourcing market where operators are reselling cloud services from specialist providers.

In terms of operator capex likely to be invested in cloud, the vast majority (77 per cent) expect less than 30 per cent capex to be invested. A similar amount of respondents expect less than 30 per cent of revenues to be generated from cloud services by 2015.

Large corporate and small enterprises are the clear leaders in terms of where those revenues are coming from, with the majority in each case expecting to see more than 20 per cent of revenues come from these segments.

Indeed, Manish Singh, CTO of Radisys, believes that enterprises at present are looking mostly for SaaS applications and in terms of value delivery for providers, that's where the greatest opportunity resides.

"Operators are going to build and offer different cloud services to a varying degree across infrastructure, platforms, software and services. Clearly all these operators are looking at offering SaaS, but cloud takes them to the next level," says Singh. Today many of these operators have existing touchpoints with CIOs in the enterprise space where they are providing connectivity solutions, and the future is all about offering connectivity and computing bundles to the enterprise.

"This is where the operators really shine in managing infrastructure that is reliable, robust and secure along with connectivity and computing services," Singh says.

Other operators look set to account for a surprisingly small amount of revenues. The responses from operator and non operator respondents were almost identical, which supports the suggestions that operators may be relying on larger, specialist service providers and will buy their cloud activity from these wholesalers.

We actually found this result surprising, given that some operators we've spoken to in the past said they were scaling up their assets in order to sell cloud services to their smaller peers. Perhaps it's a matter of semantics though—these large carriers may well see themselves as 'cloud providers' and not operators, just as they may also see other operators as large enterprises.

Singh says this is one possibility but the key point is that cloud is certainly a scale game. It is the tier one operators that

25% OF RESPONDENTS SEE STORAGE AS THE BIGGEST REVENUE GENERATOR FOR CLOUD SERVICES

CLOUD BY CATEGORY

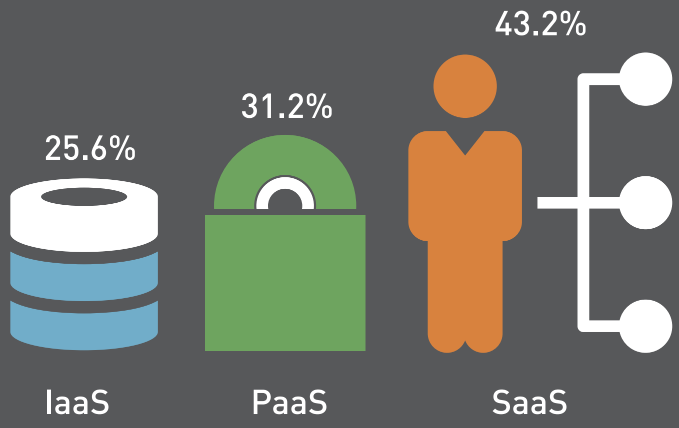
Broadly speaking, cloud services fall into three categories:

IaaS (Infrastructure as a Service), which encapsulates pretty much any kind of hardware such as servers, racks, or data centres both in the private cloud and in the virtual or public cloud. Organisations could dynamically add more web servers or storage capacity as an example. Sometimes called Computing as a Service (CaaS). Amazon Web Services fall into this category.

PaaS (Platform as a Service) Third party providers or operators can provide access to public toolkits allowing organisations to develop their own custom software applications. These platforms are virtualised across servers and datacentres, negating the need to invest in hardware and other provisioning capabilities. Examples are Google's App Engine or Microsoft Azure.

SaaS (Software as a Service) This is software on demand. A cloud services provider switches the traditional licensing model for software to a pay-as-you-go, allowing users to switch resources on and off when needed. Along with rapid scalability, users benefit from a single installed version of the service that is also managed by the provider. Salesforce is an example.

WHERE DO YOU EXPECT OPERATORS TO BE MAKING THE MOST INVESTMENTS IN CLOUD SERVICES?



are building the large cloud offerings, while tier two and three players are expected to go more for hybrid cloud models where they build a portion of the infrastructure and outsource the rest, or even go for a 100 per cent rental play.

A lack of revenues from internal use of cloud services was not really surprising, as it is expected that operators will be allocating some of their cloud capacity to internal projects. It just means they won't be generating revenues from this activity.

Unsurprisingly, consumers aren't expected to contribute to cloud revenues, with SME-specific products cleaning up here. But perhaps this situation may change as the market evolves.

On the subject of evolution, Singh notes that in the past the tier ones were wireline operators but they are now offering wired, wireless, converged plays and IPTV, so they are effectively becoming content distributors. The cloud play is the next level of convergence and is further blurring the lines with the addition of computing alongside connectivity.

Reflecting the propensity of enterprises to use cloud-based software, as well as its relatively straightforward 'outsourcing' model, SaaS is the clear leader in terms of where operators are expected to be making investments in cloud services. Over 43 per cent of respondents picked this as the main area for investment, followed up by PaaS with 31.2 per cent.

IaaS was only seen as a key area for investment by a quarter of respondents, but this may be because this is where the most serious investments are expected to be made. This is the domain of Amazon and Google —giants with lots of scale.

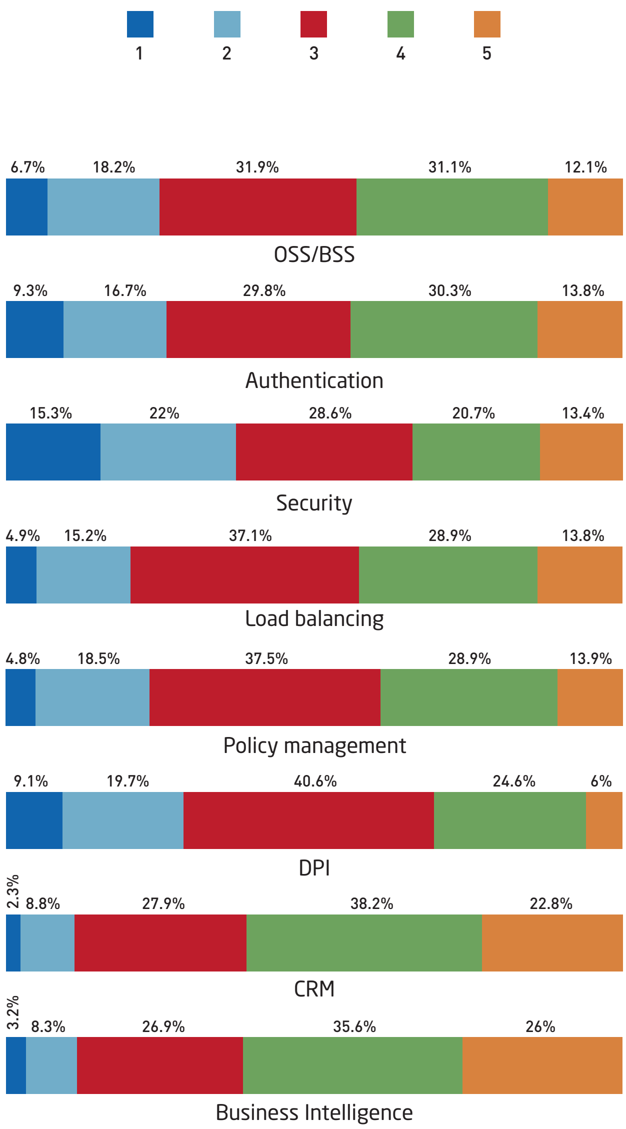
Perhaps in reflection of this expectation, compute was seen as middling in terms of revenue generation by the majority of respondents (41.2 per cent) with a rating average of just 3.

But there wasn't really much in it—the alternatives had a similar rating average, but just edged the majority of respondents into the 'important' category. Storage was seen as the most important revenue generator with almost 59 per cent of respondents seeing it as important to very important. Application virtualisation got 54 per cent of votes in the important to very important category, while network virtualisation was seen as important to very important by 48 per cent, but this figure may well rise as SDN and network virtualisation becomes more widely adopted and developed.

61% THINK BUSINESS INTELLIGENCE FUNCTIONALITY IS RIPE FOR MOVING TO THE CLOUD

RATE THE FOLLOWING CORE NETWORK APPLICATIONS FOR SUITABILITY TO BE MOVED TO THE CLOUD

Ranked 1-5, 1-least suitable, 5-most suitable



In this respect Singh expects operators to be looking at how they can adopt some of the capex and opex benefits of cloud onto their own business through virtualisation and workflow consolidation. He expects some of the principles of cloud computing to be applied to core network elements and applications going forward.

In terms of the most suitable applications to be moved into the cloud, Business Intelligence and CRM were the clear leaders, both with more than 60 per cent of respondents considering them suitable or very suitable for hosting in the cloud.

Load balancing, OSS/BSS, authentication and policy management also sway towards suitability for hosting in the cloud, chiming with other research in this paper that suggests billing and back office platforms are ripe for centralisation.

But there is currently a lack of faith in the cloud for security assets, with the majority of respondents sitting on the fence with regards to its suitability. It's a phenomenon outsourcing companies have wrestled with for some time, because security faces a significant psychological barrier to outsourcing. The statistics show that DPI faces even bigger hurdles in this area, which is likely because operators want to keep a tight grip on the tools that can help them monitor and, if necessary, throttle traffic. DPI also remains at the heart of the net neutrality debate and as such still attracts a lot of political and regulatory attention. This probably encourages operators to play their cards close to their chest in this regard.

But Singh expects this to change over time. "Right now it's all about time to market, but as the market matures and the landscape starts to shift you'll get more differentiation.

"There is interest around virtualisation of core network infrastructure and bringing in SDN. That's where there will be lots of movement and activity and the incorporation of cloud principles into how operators build infrastructure. I see change taking place in three vectors," he says.

"There will be a huge vector around security, and operators over time will start differentiating their offerings on security; they will also start differentiating on SaaS in terms of what software applications they are bringing to market; thirdly, while other cloud players like Amazon and Google have large datacentres they don't own the connectivity and pipes, whereas operators do. And as scale becomes more important, delivery will also become an important factor, and that is where there will have to be more differentiation and better connectivity," Singh says.

SECTION 7: CEM

The mobile phone is widely regarded as one of the most effective channels for customer interaction available, so long as it is used properly. In this section of the survey, sponsored by Gemalto, we looked at mobile operators' own use of the channel for **customer experience management.**

We found that:

- Mobile marketing is felt to be important or essential in operator loyaly strategies by almost 90 per cent of operator respondents.
- 53.7 per cent of operator respondents believe that the mobile channel is a real differentiator for customer relationship and should benefit from heavy investment.
- 17.6 per cent of operator respondents said that mobile represented more than 50 per cent of their customer relationship channel mix.
- Price and network performance remain the two leading retention tools for mobile operators but CEM is not far behind.

The Benefit of Experience

Management of the customer relationship is becoming more popular as a means of operator differentiation. But just how well are operators themselves exploiting their own channel for CEM?

In recent years much has been made of the importance of Customer Experience Management as mobile operators have looked for new ways to defend their market share. Customer retention ought to be cheaper than acquisition, and is crucial at a time when new networks are being deployed and the broad parity between different operators' networks is temporarily disrupted.

As devices and their users have become more sophisticated the very product that operators sell to their customers has emerged as a potentially powerful retention channel in itself. And if operators can make the mobile work for them as a customer relationship management tool, then perhaps they can sell the same opportunity to other brands looking to engage with their customer base.

But in tough times relatively new and untested ideas can struggle to gain traction, as organisations and their customers revert to comforting norms. In this section of the survey we sought the industry's opinion on operators' use of their own product in their wider CEM strategies.

To begin with we wanted to gauge the importance of customer retention relative to acquisition. Almost 60 per cent of the industry felt retention to be more important, while 38.6 per cent rated the two as equally important. It was interesting to note that, among operators themselves, there was greater inclination towards balance, with 42.7 per cent of operator respondents rating retention as equally important as acquisition and 55.9 per cent saying it was more important.

There was almost no difference at all between operator and industry-wide opinions as to the effectiveness of a range of retention tools. Service price is clearly felt to be the most persuasive argument an operator can make, with 78.3 per cent of respondents rating it effective or very effective. Network performance placed second with 68 per cent of respondents grading it the same way.

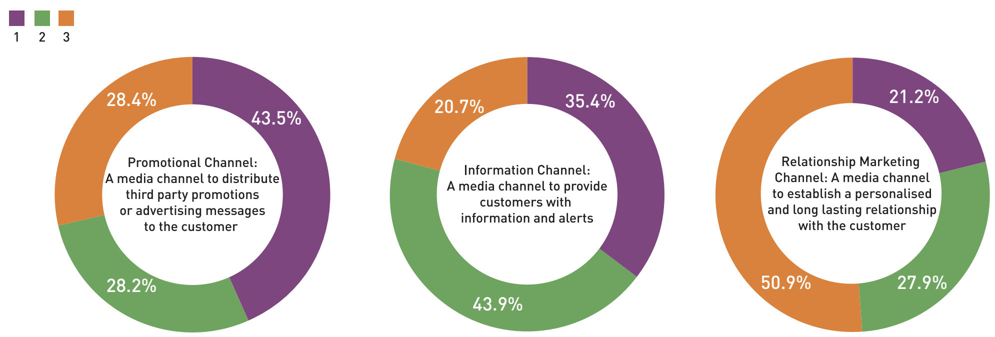
CEM was deemed the third most powerful retention tool, with 65. 4 per cent of respondents believing it to be effective or very effective. The fact that it was scored lower than price and network performance ought not to be taken as a negative judgement. Two thirds of the industry believe that, done right, it can help operators to retain customers. And it was noteworthy that CEM was felt to be more useful than device upgrade, which was once the mainstay of customer retention.

Non-network services and partnerships scored poorly. Operators like O2 in the UK and Orange in a number of markets have made significant efforts in such areas but only 23.2 per cent of respondents felt such strategies to be effective or very effective. In fact 38.9 per cent rated them as ineffective or very ineffective.

A similar spread of opinion was reflected in respondents' assessment of mobile as a

WHAT IS THE MOST IMPORTANT FUNCTION OF MOBILE MARKETING FOR OPERATORS?

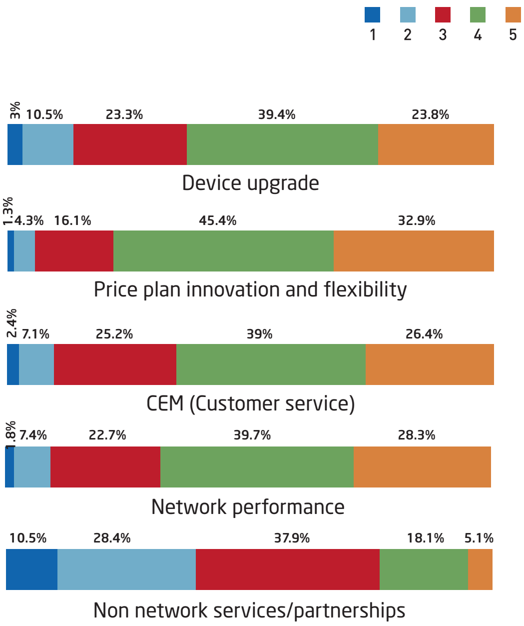
(Ranked 1-3 by preference with 3 being most important)



65.8% OF OPERATORS SEE CEM AS AN EFFECTIVE OR VERY EFFECTIVE CUSTOMER RETENTION TOOL

RATE THE FOLLOWING MOBILE OPERATOR RETENTION TOOLS

(Ranked 1-5, where 5 is the most effective)



channel for communication with the customer. Over half of respondents felt that the most important function of mobile as a marketing channel was for operators' own relationship marketing. By contrast the use of mobile as a promotional channel for the distribution of third party content was deemed the least important by 43.5 per cent of respondents.

And when asked to rate the importance of mobile marketing in their own loyalty strategy, operators were emphatic. 55.6 per cent of operator respondents deemed it important while one third felt it was very important or essential.

The biggest disparity between operator responses and those of the wider industry in this section of the survey arose when respondents were asked about their investment strategies for mobile as a marketing and CEM tool. While 41.4 per cent of respondents overall judged mobile as a real differentiator and something in which operators should invest heavily, the proportion of operators who voted the same way was 53.7 per cent.

Despite this enthusiasm, just under one fifth of operators–18.8 per cent–said that they had yet to invest in mobile as a marketing and customer relationship channel but planned to in the future. The remainder said they prefer to outsource this part of their strategy rather than invest in in-house programmes.

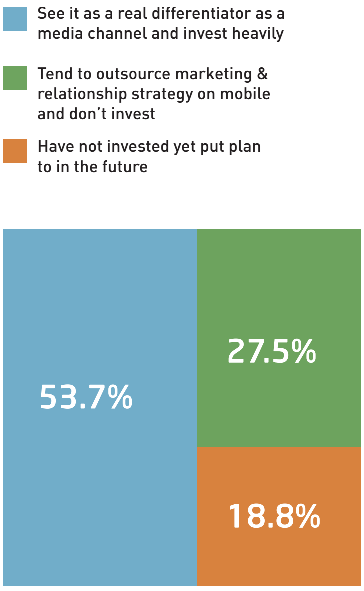
Caroline Doussot, head of mobile marketing and advertising at Gemalto, says she was somewhat surprised at these statistics. "Most operators see it as a differentiator and want to invest heavily," she says. "But stilll almost a third don't want to manage the process in-house. Ownership of the mobile as a media is a strong weapon for operators in managing the lifecycle of their customers and relationships with them. It's strange that more than one quarter believe it should be outsourced."

Doussot argues that, by taking the lead in mobile marketing in their own customer relationship strategy, operators will demonstrate the value of the channel to non-telecoms brands. And respondents to the survey seem to bear this out. Investment in operators' relationship marketing departments was seen as important by just under half of respondents, very important by a further 28.5 per cent and essential by 14.9 per cent.

Along a similar line, 59.6 per cent of operator respondents said they believed that

HOW DO OPERATORS USE MOBILE IN THEIR MARKETING AND CUSTOMER RELATIONSHIP STRATEGY?

(Operators only)

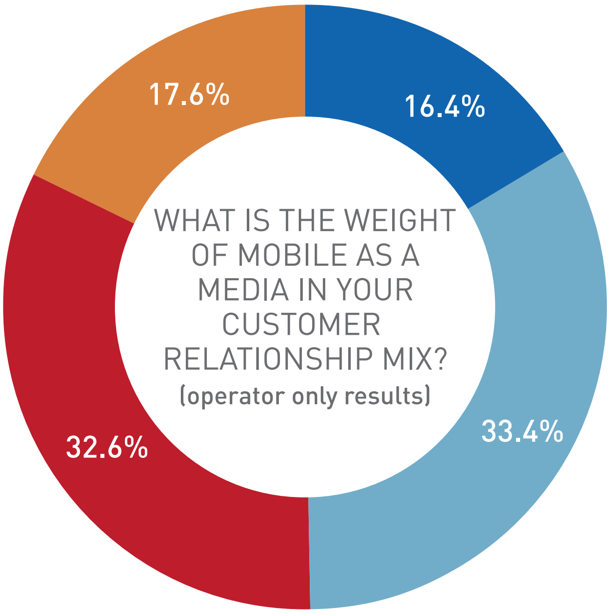


50%+ THE WEIGHT OF MOBILE AS A MEDIA IN THE CUSTOMER RELATIONSHIP MIX FOR 17.6% OF OPERATORS

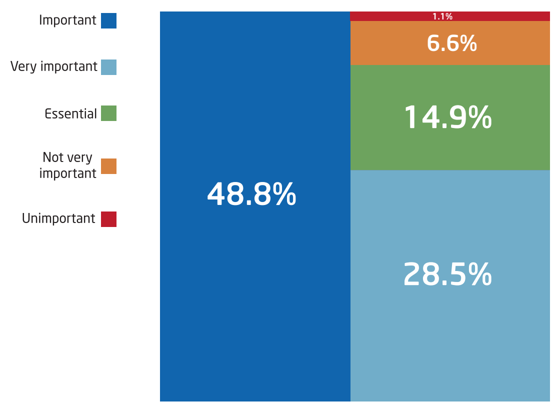
database opt-in management was a core business for them. "The industry sees the operator as the core enabler for the mobile marketing ecosystem," Doussot says. "At the moment that ecosystem is not organised and suffers from too much fragmentation. The mobile channel is not open to the market and the audience of this survey clearly feels that mobile operators should be the ones organising it," she says.

Unsurprisingly there was a positive response to the question of how non-telecoms brands view mobile as a channel for customer engagement. More than half of respondents felt that these brands view it as important, with 19 per cent opting for very important and 5.6 per cent for essential. However, this still left one fifth of respondents who believed that non-telecoms brands view mobile as unimportant.

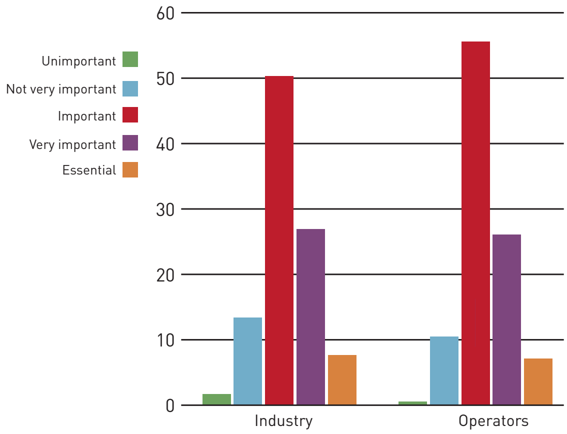
So what are operators doing to prove the case for mobile? Some, as you would expect, are more advanced than others. Of operator respondents to the survey, 17.6 per cent said that mobile accounted for more than 50 per cent of their customer relationship media mix. This proportion was almost exactly mirrored by the number of operators for which mobile represents ten per cent or less. The remainder were split evenly, with just over one third saying that mobile represents between ten and 30 per cent of the mix, and just under one third between 30 and 50 per cent.



HOW IMPORTANT IS IT FOR MOBILE OPERATORS TO INVEST IN EXPANSION OF THEIR RELATIONSHIP MARKETING DEPARTMENT (CRM, CEM, LOYALTY DEPARTMENT ETC?



PLEASE RATE THE IMPORTANCE OF MOBILE MARKETING IN AN OPERATOR'S LOYALTY STRATEGY



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