Future of Mobile Networks Outlook 2015

02

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Welcome

Welcome to the Telecoms.com Intelligence Future Mobile Networks Outlook 2015, our overview of some of the biggest challenges mobile architectures will face over the next 5-10 years as we move from LTE towards the network of the future.

The mobile network will undoubtedly be at the very core of the society of the future. 5G is getting ever closer to reality, with SK Telecom already publicly stating they will be launching a 5G service in time for the 2018 Winter Olympic Games. Back in Europe, meanwhile, expectations of whatever 5G will actually be are still being mapped out by a growing number of standards and research bodies. The Internet of Things (IoT) is also taking hold of the telecoms industry, and a report ran by Telecoms.com Intelligence earlier this year identified mobile networks as the primary enabler of a future society filled with connected and intelligent "things".

With the evolution of technology comes an ever-increasing number of threats facing the telecoms network; and as such guaranteeing the security of the future network is absolutely essential. Mobile malware, DDoS and various forms of attack on the DNS, CPE or other parts of the network edge mean collateral damage in the form of customer connectivity is the biggest risk. If 5G requires ultra-low latency for instant data communications, and IoT needs wide-spread and always-on connectivity for millions of devices, an outage in service could be devastating for operators.

With the requirement for ubiquitous coverage also comes a need for full network assurance and next generation management capabilities; and so virtualized network management and automation techniques are becoming increasingly in-demand. Meanwhile, operators are dragging voice services into the new century kicking and screaming with VoLTE and high-definition calling tech.

This report looks to investigate all of these issues with four dedicated reports, focussing on security, 5G, VoLTE and network assurance in what we believe to be four of the pillars for the future mobile network. More than 400 industry professionals responded to our questionnaire, so this report will put forward the view point of a significant representation of today's telecoms industry.

We hope you find this useful as you tailor your strategy towards achieving the next generation of mobile cellular connectivity.

Many thanks,

Tim Skinner
Intelligence Content Manager
Telecoms.com

SECURING THE MOBILE NETWORK

Key takeaways:

- 41.1% of the audience say IoT is the top security priority for future networks
- 78.2% say the security of IPv6 needs to be managed by a dedicated solution
- Malware attacks on CPE and Mobile devices has increased in the last year, according to 87.6%

About F5:

F5 (NASDAQ: FFIV) provides solutions for an application world. F5 helps organisations seamlessly scale cloud, data center, and software defined networking (SDN) deployments to successfully deliver applications to anyone, anywhere, at any time. F5 solutions broaden the reach of IT through an open, extensible framework and a rich partner ecosystem of leading technology and data center orchestration vendors. This approach lets customers pursue the infrastructure model that best fits their needs over time. The world's largest businesses, service providers, government entities, and consumer brands rely on F5 to stay ahead of cloud, security, and mobility trends.
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Dynamic Defences

As technologies evolve, so do the cyber threats facing them. Mobile networks are perhaps one of the fastest evolving technologies today, with innovation being driven within new all-IP LTE networks; and virtualization technologies providing operators with new management and operations capabilities.

Due to the rapid rate of network evolution, operators must also keep up with modern information security threats and mitigation techniques. But, in among the plethora of technologies involved with constructing the future mobile network, which future service does the industry see as being the most important to secure? According to our survey, to which we received more than 400 responses, 41.1% of the audience believe M2M and IoT applications, of which there willl be significant growth in the coming years, is the top security priority. It's likely this has been specifically identified due to the sheer volume of anticipated machine-based connections as IoT takes off. A previous report conducted by Telecoms.com Intelligence focussed on IoT and identified security challenges as being the single biggest inhibitor to the future development of the M2M-based technology.

Elsewhere, wireless broadband was the second most-commonly identified security concern, with 30.4% of responses; while VoLTE, the emerging high-definition voice technology, was seen as a top priority by 26.8% of the audience.

Voice over LTE, VoLTE, has seen tremendous growth in terms of real-world deployments across the globe in 2015. However, potential frailties in the IMS network could lead to traffic management issues and quality of service degradation if not appropriately secured. What is referred to as a "signalling storm" can occur when SIP registration latency issues arise or are exploited, and DDoS-like attacks could be seen as a prime example of an attack on a
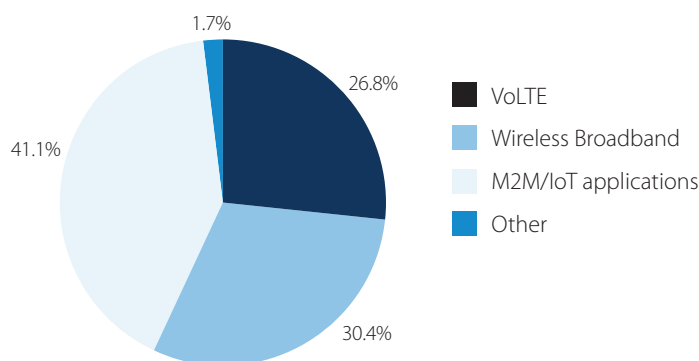
Which of the following is a security priority in the LTE network?

VoLTE network. Such is the interest in VoLTE security, despite its broad-scale adoption by operators, that we asked the audience to indicate their level of agreement with a variety of statements relating to the field.

58.9% of the audience either agreed or strongly agreed that traditional firewalls are insufficient in meeting the more advanced diameter or SIP signalling security requirements of VoLTE; which came just short of the 59.9% of the audience that most commonly agreed with a statement saying there's still a need for SS7 security, the traditional signalling protocol, despite the increasing significance and emergence of VoLTE. Finally, 55.9% of the audience said VoLTE will cause security issues that the operator community is not yet ready to prevent with existing security solutions; which could be seen as a worrying concession considering the increasing number of VoLTE rollouts by operators around the world.

Next up we looked to ascertain current operator attitudes to the evolution towards IPv6. We asked our respondents to indicate the extent to which they agreed with a variety of statements relating to the network address protocol. It was most commonly agreed upon that, despite its promise as potentially being more secure than its previous iteration – IPv4 – IPv6 will still require a high level of consideration and planning for security. 78.2% of all

respondents either agreed or strongly agreed with a statement saying IPv6 security is something that needs to be managed carefully with an appropriate solution. Furthermore, 76.2% agree that IPv6 security needs to be architected into the broader network, agreeing with the statement: "A security architecture for IPv6 is a mandatory component of the overall network design."

While receiving a reasonably positive response, the highest disagreement rating of all came in response to the statement "IPv6 is inherently more secure than IPv4, so there is less of a need for IPv6 security," which was disagreed with by more than a quarter of the audience – 27% no less. Based on these numbers, it would appear the belief that IPv6 will be more secure than its predecessor is misguided.

Elsewhere, respondents were asked to state how attacks on DNS services have changed over the past 12 months. 42.8% of the audience stated they've witnessed an increase in DNS attacks over the past 12 months, meaning there could be a desire for more efficient security measures to protect the service going forward. That being said, there was confusion or uncertainty in 37.1% of the respondents, who said they don't know. Beyond that, 8.4% said there's been a decrease in DNS attacks in the last 12 months, and 11.7% said there's been no change.

The same trend was observed in our

question which ascertained how at-risk customer premises equipment (such as routers) and mobile devices are from an increased level of malware attacks. An overwhelming number of respondents said that malware is more of a threat to CPE and mobile terminals now than it was 12 months ago – agreed with by 87.6% of respondents. Therefore, the remaining 12.4% of the audience said malware has become less of a threat.

We also asked what the biggest challenge to currently deployed Gi firewalls was. Cited by respondents as the primary challenge for them was ensuring scale and performance due to LTE traffic growth, identified by 55.2%. Next up was security failings in signalling functionalities such as SIP, Diameter and DNS – voted for by 34.8%. Elsewhere, a lack of IPv6 security functionality at scale, poor DDoS defences and a lack of state of the art CGNAT functionalities were all identified by 23.7%, 21.4% and 21.4% of the audience respectively.

We previously alluded to DDoS as a potential threat against VoLTE services, but the prospect of a distributed denial of service attack against the telco LTE network will invariably lead to collateral damage in the form of user service disruption. Typically speaking, DDoS attacks aren't sophisticated or difficult to identify; they don't sneak under the radar. DDoS attacks are an act of brute force, simple but potentially devastating as spoofed IP traffic

attempts to knock a victim off the network.

Traditional approaches to cleaning a network falling victim to an attack require re-routing DDoS traffic through a scrubbing centre, where illegitimate traffic is analysed and malicious flows are removed. This has become something of a less desirable solution recently due to its costly and timely nature; as more dynamic and responsive solutions are being seen as desirable in order to manage attacks growing in velocity and scale. 20.1% of the audience, when asked to select a preferred DDoS protection technique, identified an inline DDoS solution – where detection and mitigation of DDoS attacks are both done inline in the data path. 40.8% said an inline solution combined with an on-premises scrubbing centre was most desirable, with 23.1% choosing the same combination but keeping scrubbing centres off-premises and hosted with a third-party. This would appear to indicate, in general, a desire from the audience to see an increasing amount of DDoS protection stored and managed by cloud technologies.

Finally, it would seem the audience primarily sees the majority of security service monetisation opportunities coming from enterprise managed services customers, as voted for by 76.9% of respondents. The remaining 23.1%, meanwhile, believe residential security services to possess the more lucrative opportunity for operators.

Sponsor's Comment
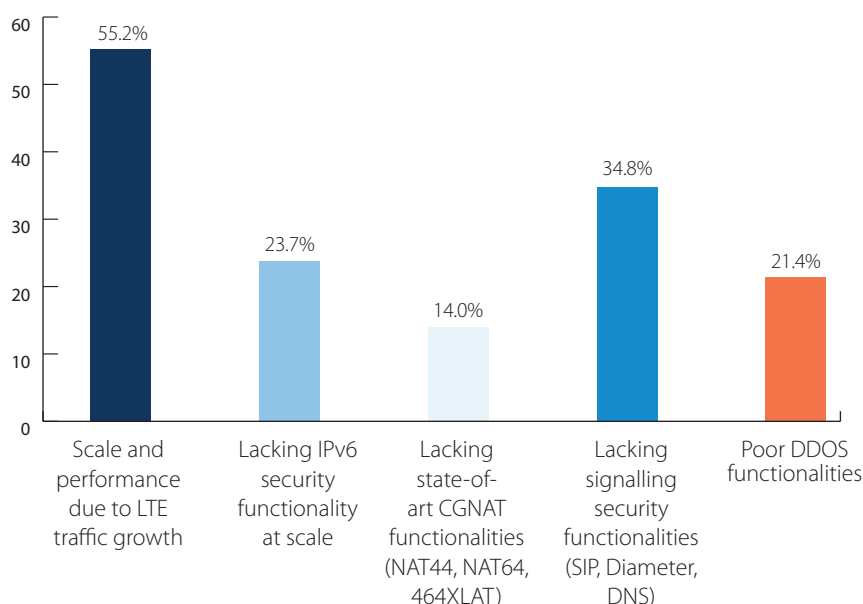
Mobile Service Providers (SPs) are experiencing unprecedented levels of growth and evolution across their networks – with migrations to LTE, virtualization of network functions, the introduction of VoLTE, new broadband services perpetually being introduced to users, and exponentially increasing numbers of connected devices that are accessing their networks. All these evolving trends are simultaneously presenting scalability challenges for SPs plus an increasingly difficult security threat landscape.

The collective responses to the survey support F5's vision and approach and highlight the need for highly scalable, flexible, and effective solutions across every domain to allow for a new and comprehensive approach in securing their networks, their application services, and their customers – all while maintaining high levels of service availability. Respondents have shown that among their top concerns are DDoS mitigation, signaling protocol security, being able to leverage security information and threat intelligence, and being able to scale. Attacks on DNS services is cited as a major concern, and in spite of the large numbers of respondents (37.1%) showing a lack of awareness to these attacks, there are "hit and run" attacks on DNS services that may still be occurring and causing degradations and outages on their networks.

Scalability is an important factor – and being able to quickly detect, absorb, investigate, and act to stop attacks across the entire network. A primary challenge securing the Gi-LAN domain as noted in the survey is "ensuring scale and performance". This challenge will permeate throughout every network domain as new broadband services continue to cause higher levels of concurrency and increasing rates of connections per second. In addition to Gi-LAN services, scale and performance is an increasing issue with DNS services and will become a greater issue with IMS services as the number of VoLTE subscribers increases.

Which are the biggest challenges with currently deployed Gi firewalls?

Category	Percentage
Scale and performance due to LTE traffic growth	55.2%
Lacking IPv6 security functionality at scale	23.7%
Lacking state-of-art CGNAT functionalities (NAT44, NAT64, 464XLAT)	14.0%
Lacking signalling security functionalities (SIP, Diameter, DNS)	34.8%
Poor DDOS functionalities	21.4%

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THE ROAD TO 5G

Key takeaways:
- Spectral efficiency thought to be the most important feature in development of 5G
- 25% of respondents think cost of roll-out will be the biggest inhibitor
- Mobile commerce expected to major beneficiary of 5G

About Tata Communications:

Tata Communications is a leading global provider of a new world of communications. The Tata Communications global network includes the largest global submarine, wholesale voice, and Ethernet backbone networks. Our Tier-1 IP network connects more than 200 countries across 400 PoPs, and supports mobile, video, voice and IT infrastructure solutions. We also manages the most extensive global on-net mobile signaling and voice communities.

Tata Communications connects and enables innovation across mobile operators and applications providers. From Signaling, LTE roaming, IPX, and Mobile Messaging, to Voice, Video, and Managed Operations, we help our customers monetize new business models, deliver a quality user experience, and drive efficiency.

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The start of a long journey

It was hard to have a single conversation at this year's Mobile World Congress without the term 5G cropping up at some stage, despite the fact that the standard has yet to be defined, let alone ratified. But just because marketing professionals across the telecoms industry find it hard to resist associating their brands with the next major epoch in mobile technology, that doesn't detract from the many substantial challenges it's already possible to hope will be met by the standard.

In this section of the Telecoms.com Intelligence Future of Mobile Networks survey we look to explore the industry's expectations of 5G and drill down into which specific features are anticipated.

We opened by asking respondents when they think they'll be rolling out commercial 5G services. General industry expectations are for the first 5G services to go live around 2020, so it's no surprise to see that two thirds of respondents are looking to 2020

or later for the commencement of any 5G services. In fact most of those think they will have to wait until 2021 or later. On the flip side a full third of respondents think 5G services will start to appear sooner than 2020, with 18% expecting to see them as soon as 2018.
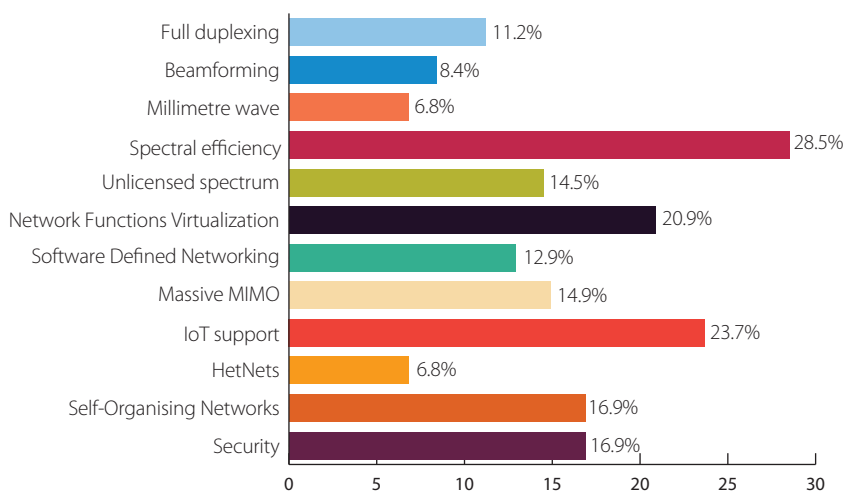
While it's quite possible that some of the technology which will comprise the 5G standard will be found in commercial services that soon, it's unlikely to be formally called 5G as the final ratification of the standard is unlikely to have happened by then. Of course that won't stop the marketing people jumping on the bandwagon and the term 'pre-5G' is already being used liberally.

One of the main reasons for this is the wide array of technologies that are already being positioned as likely contributors to the eventual standard. In our next question we asked respondents to select two from a list of features they

think will be the most important in developing 5G.

The clear leader, selected by 28.5% of respondents, was spectral efficiency. This indicates that for all the other improvements and new technologies introduced, none will be as important as making better use of the finite spectrum resources. One of the reasons this will be so important is the anticipated growth of the Internet of Things (IoT) and the consequent increase in traffic. This anticipated trend corresponds with the second placed feature in our survey, which was IoT support, chosen by 23.7% of respondents.

Another interesting feature of this question was the broad range of opinions, with seven other features being chosen by at least 10% of respondents, including NFV/SDN, SON, unlicensed spectrum and full duplexing. In other words 5G is going to be the product of a large number of technologies, but at its core it needs to solve the problem of carrying an

5G is going to be the product of a large number of technologies, but at its core it needs to solve the problem of carrying an exponentially growing volume of traffic over a finite amount of spectrum

Feature	Value
Full duplexing	11.2%
Beamforming	8.4%
Millimetre wave	6.8%
Spectral efficiency	28.5%
Unlicensed spectrum	14.5%
Network Functions Virtualization	20.9%
Software Defined Networking	12.9%
Massive MIMO	14.9%
IoT support	23.7%
HetNets	6.8%
Self-Organising Networks	16.9%
Security	16.9%

Which of the following network or technological features do you think will be the most important in developing 5G?

exponentially growing volume of traffic over a finite amount of spectrum.

Turning the previous question on its head, we then asked what our survey considered to be the biggest single potential inhibitor to 5G. Once more there were a couple of clear leaders, with 24.9% of respondents identifying the cost of network roll-out as the biggest inhibitor and 20.1% anticipating issues associated with the standardisation process. If we were to send this survey back in time to a similar stage in the development of 4G or even 3G it's likely those two would still have been prominent concerns. Other inhibitors identified by more than 10% of respondents were device compatibility, consumer demand and spectrum availability.

We then looked to canvass opinion on a few statements regarding the evolution of mobile commercial models as we get closer to the launch of 5G. 74% of respondents either agreed or strongly agreed with the statement "Mobility will play an increasingly important role in the commercial interactions between companies," while 60% thought there will be an increase in enterprise based MVNO models and consequent improvements in BYOD and MDM efficiency.

On the whole there was a strong consensus that commercial models are likely to evolve significantly on the road to 5G as consumers become more sophisticated and new business paradigms such as IoT gain traction.

Drilling down on the matter of commercial opportunities, we asked respondents to select the two specific opportunities they think will receive the biggest boost over the next five years. The three options that received significantly more support than the rest were: Payments (41.5%), Contextual services based on location/time/preference (37.1%), and Advertising (33.5%).

For payments to be the most popular is no great surprise as we're at the start of a mobile payment revolution following the launch of Apple Pay and competing offerings from the likes of Google and Samsung. As this area matures it could
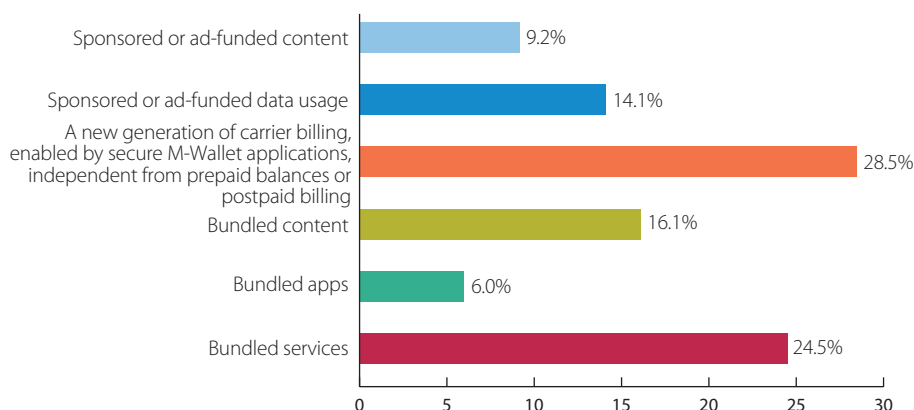
Which of the following commercial models do you think will receive the greatest boost on the road to 5G?

well be combined with things like LBS and advertising, as companies look to exploit the potential of people paying for things with their smartphones. The potential for secondary commercial interactions both at the point of purchase and subsequently is almost limitless, but those that succeed will be the ones which demonstrate clear benefit to the consumer too.

Underpinning those opportunities are the commercial models employed by telcos, so next we asked respondents to identify the single commercial model they think will receive the greatest boost on the road to 5G.

Over a quarter of respondents (28.5%) selected 'A new generation of carrier billing,

74%

of respondents either agreed or strongly agreed with the statement "Mobility will play an increasingly important role in the commercial interactions between companies,"

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enabled by secure M-Wallet applications, independent from prepaid balances or postpaid billing' as the commercial model they expect to see proliferate in the coming years. This is especially interesting in the light of all the previously mentioned mobile wallet initiatives coming from platform and device companies, implying respondents don't expect operators to take these competitive threats lying down and anticipate them fighting hard for every consumer dollar.

To do this telcos will need to play to their strengths, which is one of the reasons behind the current consolidation trend in the industry. Almost half of respondents identified some sort of bundled offering as the commercial model most likely to be boosted, with 24.5% selecting bundled services, 16.1% bundled content and 6% picking bundled apps. If operators are able to perform strongly in both carrier billing and bundling they should be able to retain control of the customer relationship to a large extent.

The move to an all IP mobile environment is likely to remove communication barriers, both geographical and technological. Once more we asked respondents to indicate their agreement, or otherwise, with a few statements, this time regarding borderless mobility services enabled by an all IP mobile environment.

The statement most emphatically agreed with was "It will enable seamless mobile

voice and data communication services between mobile networks and Wi-Fi service providers internationally". The spread of VoLTE will ensure subscribers never have to leave an IP network while using their devices, which in turn opens up a number of new opportunities for dynamic switching between cellular and Wi-Fi. While VoLTE is still in its infancy today, this paradigm is expected to be established by the time 5G comes around.

To round things off we asked a simple final question: "Do you believe that new generation networks will fundamentally change the mobile ecosystem?" The answer was emphatically in the affirmative, with 75.9% of respondents saying "Yes".

The road to 5G will be a long one, but there's no question we're already on it. While the consensus is for commercial 5G services not to appear until 2020 or later, claimed 'pre-5G' technologies are already being developed and marketing professionals across the telecoms industry are keen for their brands to be associated with 5G today.

Many of the challenges faced by previous generations of mobile technology will need to be confronted once more, such as standardisation, cost of roll-out and consumer education. But the potential rewards are greater than ever as more people and devices are set to do more things over more networks. Commerce is set to be increasingly defined by mobile technology so pretty much everyone has a stake in the development of 5G.

While the consensus is for commercial 5G services not to appear until 2020 or later, claimed 'pre-5G' technologies are already being developed and marketing professionals across the telecoms industry are keen for their brands to be associated with 5G today

Sponsor's Comment

5G is starting to gather pace, but in order for mobile network operators to be able to effectively adopt the technology and promote its benefits to their customers, we need to see closer cross-industry collaboration. A new generation of technology can too easily suffer from hype and become subject to interpretation, with no common definition of standards or technical specifications. The majority of respondents of this survey indicated that 5G will become more commonly available from 2020 onwards. This means that the industry has some time to work on the technical specifications, and consider the types of commercial models and new revenue opportunities that 5G might bring.

As mobile data usage continues to grow globally – driven by new higher bandwidth applications and faster, more feature rich devices – it is crucial that mobile network operators are able to harness this growth in a way that is commercially sustainable, while creating opportunities for new services, leveraging innovations such as augmented reality and the Internet of Things. The fact that people are already thinking and talking about these new commercial models is encouraging.

At Tata Communications we are committed to supporting our customers along their journey from 3G through 4G towards 5G, delivering a New World of Communications™. We harness our technical capabilities and domain expertise across our global network to deliver managed solutions for multi-national enterprises and communications service providers worldwide, with unparalleled expertise in emerging markets. We not only provide a global network and core network technology, but also complex network interconnection, technology inter-working and service interoperability for the global communities we serve.

As technology evolution continues to shape the mobile ecosystem, we are working with our customers and partners to define new services and business opportunities enabled by 5G, and we are excited about the potential for industry-wide innovation.

IMPLEMENTING VoLTE

Key takeaways:

- 34.1% of respondents aren't sure when they'll be launching VoLTE
- 30.6% see gaining ground on OTT players as a key reason for deploying VoLTE
- Maintaining continuity between VoLTE and legacy 2G & 3G networks is the biggest challenge, said 56.9%

About Astellia:

Astellia is a leading provider of network and subscriber intelligence enabling mobile operators to drive business performance and customer experience. Astellia's vendor-independent real-time monitoring and troubleshooting solution covers end-to-end 2G, 3G and 4G from radio access to core network. Astellia's scalable products and expert services address the needs of operators' full value chain. Astellia has close partnerships with more than 200 telecom operators globally. Headquartered in France, Astellia has worldwide presence with offices in Brazil, Canada, India, Lebanon, Russia, Singapore, South Africa, Spain and USA.

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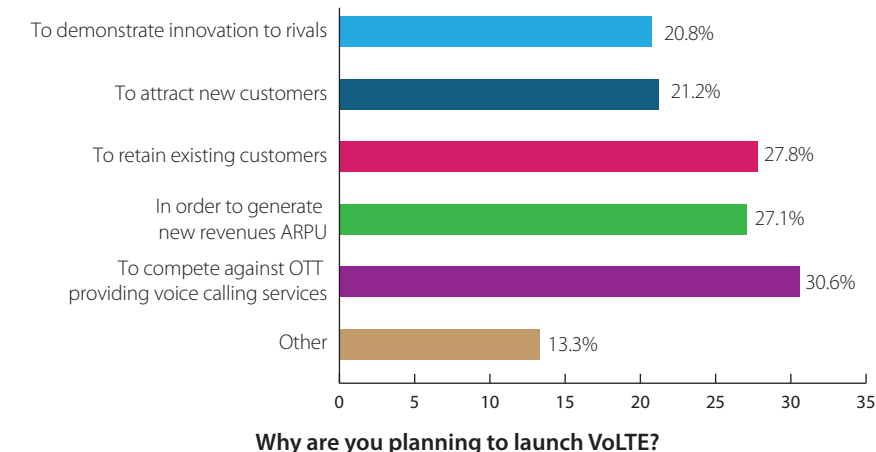
ASTELLIa
BEYOND THE NETWORK

Vocal Clarity

Recently, voice over LTE, or VoLTE, has become tantamount to being the future of voice for operators, as well as a potential bastion for securing revenues from what has become a haemorrhaging revenue stream for operators. Voice services as a meaningful source of income have been losing relevance to operators, for the best part, as a new generation of tech-savvy users lean increasingly towards over-the-top instant messaging platforms, coupled with a public perception of unreliability and poor quality of service being offered up by traditional circuit switched voice systems.

While data networks have, deservedly, received countless upgrades and technological advancements in recent years, unsurprising considering the proliferation and monetisation opportunities of data services over the past few years; voice services seem to have slowly died a death, and haven't received an upgrade or overhaul of note for a decade or more, since UMTS and GSM. VoLTE could well present an opportunity for operators to make voice an opportunity for monetisation once again for mobile.

Voice over LTE instead bundles up voice into data packets being delivered across an LTE network. Based on the IP multimedia subsystem, VoLTE therefore makes legacy circuit-switched telephony-networks redundant and also requires less capacity to transmit and receive calls.

The promise of VoLTE as a means for delivering next-generation voice services is, for the time being at least, tempered by the mandatory technological requirements across the entire chain. From the user handset to the operator network, potentially onto an international IP exchange or additional operator's network, and onto the receiving user's handset, compatibility with VoLTE has to be built in at every stage. To such an extent, the business case for such hefty investment must make it a priority area for any operator to invest in.

To start this section of the survey, we asked our respondents to identify their

Why are you planning to launch VoLTE?

- To demonstrate innovation to rivals — 20.8%
- To attract new customers — 21.2%
- To retain existing customers — 27.8%
- In order to generate new revenues ARPU — 27.1%
- To compete against OTT providing voice calling services — 30.6%
- Other — 13.3%

progress with launching VoLTE. 17.3% stated they have already rolled out voice over LTE services, which is congruent with a report from the Global mobile Suppliers Association recently which stated that 25 operators globally have now launched VoLTE, with an additional 103 investing in deployments or trials. Thus far, the Far East has lead the way with live deployments, which may come as little surprise. Nearly half of the world's live VoLTE rollouts have originated from China, Hong Kong, Japan, Singapore or South Korea. An additional 10.6% of respondents believe they'll have launched VoLTE by the end of 2015, with 22.7% targeting a live deployment by the time 2016 is out. It would seem that just over a third of respondents 34.1% aren't able to determine when they'll be able to launch VoLTE, suggesting that it's not on everyone's radar just yet.

Most commonly associated with VoLTE is high definition audio quality; however it remains interesting to ascertain why an operator would want to undertake a substantial investment in an emerging technology. We asked our respondents to identify the two main reasons why they're planning to launch VoLTE. While decision was relatively evenly split, the most commonly identified reason for deploying the next generation voice tech was to try and gain ground on over-the-top voice communications apps and services, with 30.6% of responses. The next two top responses were both related to existing customers; 27.8% said VoLTE will

help retain existing customers, and 27.1% reckon it will help to boost ARPU and generate new revenues. Elsewhere, 20.8% want to use VoLTE to demonstrate innovation to industry competitors, while 21.2% want to use VoLTE to attract new customers.

As mentioned previously, high definition voice is the most frequently referred to benefit of VoLTE, as legacy circuit switched voice networks become phased out by IP data-based LTE networks. Unsurprisingly then, 31.0% of the audience believes HD voice is the main perceived benefit. 24.7% of respondents meanwhile think the speed afforded by 4G services should be considered as the biggest win; whereas 18.4% think that secured quality in congested areas is where VoLTE will excel.

Considering one of the main gripes users have with traditional voice is its unreliability and lack of quality, it's unsurprising that nearly 50% of all responses identified quality and stability of calling as the main service benefit of implementing VoLTE.

From a business angle, our respondents believe the primary benefit of implementing voice over LTE will be ana enhanced efficiency when utilising spectrum, voted for by 26.7% of the audience. Narrowly behind, nearly a quarter (24.3%) of voters said an ability to build rich services will prove to benefit operators most; while 23.9% reckon that VoLTE will enable operators to offload voice calls from the 2G and 3G networks, freeing them up for more rudimentary data usage. Two of the least

perceived benefits from an operator's business perspective, each on 12.2%, were enhancing competition against OTT applications and reducing the network opex. When we consider that 30.6% of respondents identified competing more efficiently with OTT as one of the two more idealistic reasons for implementing VoLTE; it would appear that other pressing factors form the basis of responses when it comes to more realistic expectations of how VoLTE will benefit operators.

A lot has been made of the promising services the next generation of mobile voice technology will enable; and so we sought to determine which services operators are prioritising first, when it comes to launching VoLTE. Instant messaging is a relatively low barrier-to-entry and easily launched application, however when a low percentage of the audience previously said that competing against OTTs was a priority, it seems incongruous that 42.4% of respondents said IM services will go live at the launch of VoLTE. The next most favoured at-launch service for our audience was presence and availability visibility (29.8%), closely followed by multiparty audio conferencing (29.4%). It would appear that videoconferencing and data sharing can wait until VoLTE matures, with 38.8% and 36.5% of the audience respectively saying those services will be delayed in their introduction. There seemed to be most confusion over when push-to-talk/squawker services will be launched, if indeed they are at all with 55.7% of the audience saying they don't know when it will be introduced.

To end, we came back to some of the previously alluded to technological challenges of implementing VoLTE. The most pressing concern for the majority of respondents came down to maintaining service continuity with existing 3G and 2G networks, as voted for by 56.9% of the audience when asked to identify the three primary challenges. In a VoLTE world, when subscribers leave an area covered by LTE, maintaining continuity of service between the IMS core running a VoLTE service and legacy circuit switch-based 2G and 3G by utilising single radio voice call continuity (SRVCC) will be essential to ensuring quality of service and customer experience. Also heavily voted for with 51.4% and 50.2% of responses were roaming/interconnection challenges and handset interoperability respectively, though it is thought those challenges will significantly decrease in size as global VoLTE rollouts pervade and more handset providers ensure compatibility with future models. Of least concern to the audience, apparently, was SIP signalling issues – identified in just 20.8% of voters.

Finally, it would seem that operators are keeping their cards close to their chest, as 43.1% of all respondents said their plans to launch VoLTE will be soft, and without publicity – so as not to create a rod for their own backs if any glitches are stumbled upon. 26.3% said a progressive rollout will start with the consumer market (12.9% targeting the enterprise market first); with 17.6% of all respondents expecting a full launch including publicity to introduce VoLTE to their market.

Sponsor's Comment
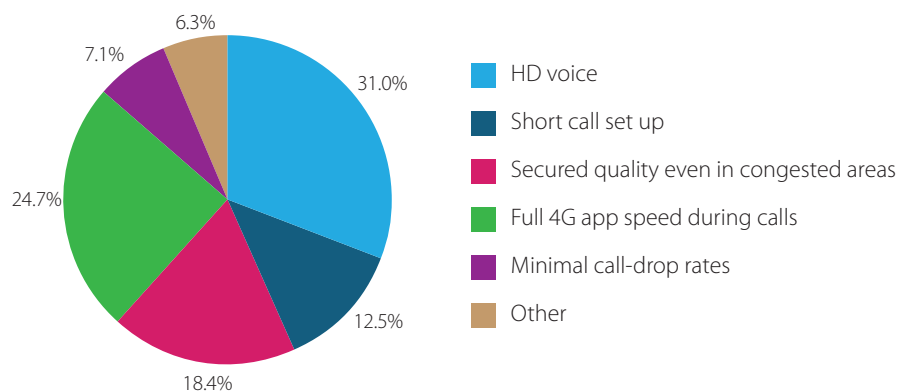
Today, VoLTE has become the next logical move for handling end-to-end voice calls over IP. As with any new network feature introduction, VoLTE comes with a lot of challenges to be tackled within a very aggressive time schedule.

The results of this survey show that almost 50% of respondents identify quality and stability of calling as the main service benefit of implementing VoLTE. In order to provide optimal service quality and a superior VoLTE customer experience, operators therefore need a monitoring solution to efficiently benchmark vendors, detect malfunctioning handsets and assess interoperability issues between vendors.

At Astellia we understand operator's most pressing concern of maintaining service continuity with legacy networks. Astellia offers therefore KPIs to monitor, analyze and troubleshoot E2E call traces and hand-over efficiency between Core IMS, legacy Core CS, EPC and 4G RAN, 2G/3G RAN. Through E2E KPIs Astellia masters the global performance of SRVCC and pinpoints origin of delays occurring during handover.

Unsurprisingly 31% of all responses indicate HD voice as the main perceived benefit. Astellia provides VoIP call quality metrics including Mean Opinion Score (MOS), packet delay, jitter, packet loss and latency. Through relevant Key Performance Indicators (KPIs) mobile operators get precious information which helps them troubleshoot areas with poor quality, investigate customer complaints and hence improve the customer experience.

On top of its multi-technology (2G/3G/4G) troubleshooting solution, Astellia also offers Consultancy Services consisting of on-site experts engaged with operators' teams during Lab Tests, Field Interoperability and Friendly User Tests. They generate dedicated reports, pinpoint issues, find out root causes, and provide evidence to transfer tickets to the right vendor.

- HD voice — 31.0%
- Short call set up — 12.5%
- Secured quality even in congested areas — 18.4%
- Full 4G app speed during calls — 24.7%
- Minimal call-drop rates — 7.1%
- Other — 6.3%

What is the main perceived service benefit of VoLTE?

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THE FUTURE OF NETWORK ASSURANCE

Key takeaways:

- 81.5% of the audience says the future network should be managed from a converged, cross-domain, end-to-end perspective
- 34.4% say IoT and M2M communications will be the biggest driver for network assurance
- 43.6% of respondents reckon NFV management will be absorbed into OSS

About MYCOM OSI:

MYCOM OSI is a leading independent provider of best-in-class Service Assurance, Automation/Orchestration & Analytics solutions to the world's largest Communications Service Providers (CSPs) that empower them to: create intelligence out of billions of disparate data across vendors, technologies and domains; align network, service and customer teams; empower users with flexibility and autonomy from vendors; deliver efficiency through automation capabilities. MYCOM OSI is headquartered in London UK, has 250+ staff worldwide and has been 100% focused on telecom networks for 25+ years.

mycomosi

In need of assurance

The network is the operator's means of directly interfacing with its customers. Customers interact and conduct transactions with the majority of services they utilise on a daily basis, such as going to the supermarket or making a purchase online. The relationship between operator and subscriber on the other hand is unique. Instead of conducting regular, frequent and direct transactions in order to make a call, download a video or browse the internet; the service an operator provides to its customers is always-on, working in the background to offer continuous availability with high quality.

Without its network, the operator has no product or service offering; and so managing the gamut of multi-vendor and technologically-varying systems is of paramount importance in ensuring the quality of service and experience being delivered to customers. The arrival, and maturity, of 4G LTE services has brought with it further complexity in an already complex tapestry of network equipment. To add another level of complexity for operators, exponentially increasing data consumption has brought with it an expectation of full, 24/7 availability. All of which means that not only must operators manage a network bursting with more complex technologies than ever before, but they must also do it in a more efficient way.

In this section of the survey, we asked our respondents a variety of questions relating to how network assurance techniques are likely to evolve as the mobile network itself evolves.

We began by asking the respondents to indicate their level of agreement with a variety of statements regarding the future of network assurance. 81.5% of all respondents agreed or strongly agreed that assurance of the future network should be managed from a converged, cross-domain and end-to-end perspective; which indicates that our audience sees network assurance being managed with a holistic approach across all elements of the network. A further 77.6% agreement
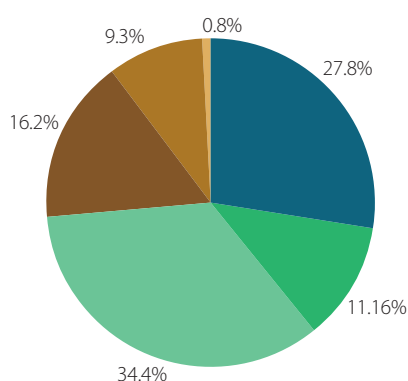
Which do you consider to be the biggest driver for future network assurance?

rating was observed with a statement saying assurance should also be approached from a customer-centric perspective driven by intelligent analytics of both the network and of user behaviour, in order to maintain quality of service. Similarly 72.2% said assurance of the future network should be automated by using tools to such as SON, orchestration and automated workflows.

Most interestingly, perhaps, is the relative indifference with which the following statement was met: "the assurance of the future network should be primarily focused on critical M2M/IoT communications over non-critical consumer traffic". 44.4% of the audience met the statement with neutrality or disagreement, which would appear to buck a recent industry trend suggesting IoT will dominate the future network. This response, however, could be attributed to early days of technology maturity and operational readiness of the operators.

However, that is not to say IoT or M2M will not still be a major consideration for the assurance of future networks, even if they are not solely tailored towards the emerging technological trend. 34.4% of our audience believe increased IoT and M2M communications will be the single biggest driver for network assurance. A further 27.8% of the audience concluded that the increasing need to improve network quality as a market differentiator against competitors – as alluded to at the start of

this section of the survey.

Another industry trend, converged multi-play services, was met with a less than enthusiastic response by the vast majority of the audience, with only 9.3% saying it represents the biggest driver for developing new and future-proof network assurance methods. Elsewhere, 11.6% of the audience said the biggest driver is increased consumer mobile video, while 16.2% indicated the pressure of enterprise services being hosted in the cloud is the most influential factor in moving towards new network assurance models.

Along with a number of industry trends over the past few years, network automation is shrouded in mystery while simultaneously being seen as an Elysium of network management. Nearly half, 47.5% of all respondents said they don't know when they'll be able to implement automated network assurance techniques. 8.5% indicated they already have, while 30.5% said network automation will be deployed in their network between 2016 and 2020.

Participants were then asked to indicate their level of agreement with a number of statements related to how automated network assurance should be implemented. The statements were intended to understand the level of trust respondents have in automated systems, and whether operators should be going all-in on intelligent and automated network management systems. Two responses

received an identical agreement rating of 57.9%, the first of which could be viewed as a concession from the audience that networks are becoming too complex for humans to manage: "I have to trust automated network assurance because it's too complex and vast to control manually". The other statement to receive 57.9% agreement showed the audience is more than happy to implement automated optimisation software on the provision that control of the software programming stays with the user.
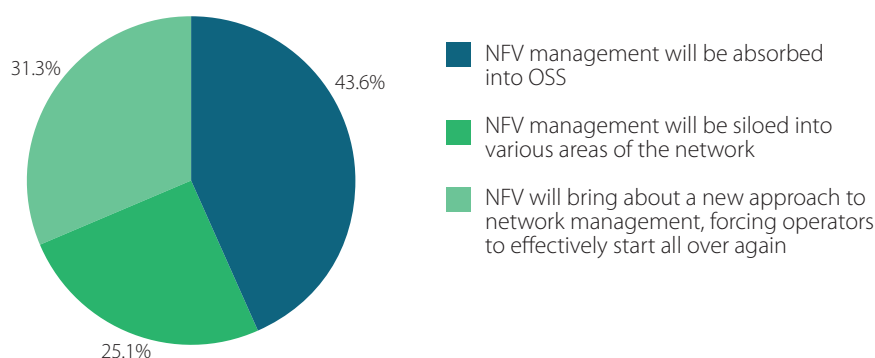
Considering the above, it is unsurprising to see more than three quarters of respondents either agreed or strongly agreed with a statement located somewhere in between each of the previous two - 75.3% said there must be a balance between trust of automation and manual programmability.

In recent years, network functions virtualization (NFV) has developed at significant speed, so operators are now being given the opportunity to tidy up cluttered networks, reduce layers of complexity and begin inserting automated means of managing and orchestrating the delivery of network services. As much as NFV promises to help operators deliver new services to consumers and enterprise users; there also exists the opportunity to optimise OSS internally, potentially to drive unification of varying network systems and simplify the management thereof.

43.6%, a majority in this question, of the respondents said NFV management will be absorbed into OSS; while in stark contrast 25.1% believe NFV will be siloed into various areas of the network. It is also worth noting the remaining 31.3% of the audience reckons NFV will be a clean slate for managing the network – saying that NFV will bring about a new approach to network management, forcing operators to effectively start all over again.

NFV itself is in line to provide operators with the ability to conduct more advanced operations on the network; with more efficient processing of traffic and flows being one potential use case. Utilising advanced analytics of traffic, consumer behaviour and network operations was prioritised by respondents as the primary approach – 51.7% saying that the future of network assurance will be based on utilising big data and real-time analytics to create improved customer related actionable insight. 25.5% of respondents said NFV, and other forms of network virtualisation, will drive the future of network assurance. Finally, just behind, with 22.8% of the votes was the notion that assurance will be heavily reliant on automation.

One thing that was largely agreed upon by the vast majority of respondents, however, was that quality of service will be the most important priority for strategic investment in future networks – agreed with by 79.5% of all respondents.

Which of the following statements regarding NFV do you most agree with?

- 43.6% NFV management will be absorbed into OSS
- 25.1% NFV management will be siloed into various areas of the network
- 31.3% NFV will bring about a new approach to network management, forcing operators to effectively start all over again

Sponsor's Comment

Mobile networks will become more and more complex as they add new technology layers of NFV, 5G and IoT.

In addition, data traffic will be pumped into the future networks by millions of 5G devices and billions of connected devices that include sensors, wearables and smart utility devices. A new breed of customers from verticals like automotives, energy, smart cities, etc will re-define the current communications network as digital services network, requiring new standards for network/service management. MYCOM OSI is involved in defining and managing performance management of future 5G and IoT networks, as an industry partner of 5GIC in UK.

A future-proof assurance system should offer an E2E cross-technology view, and serve industry verticals which will consume the digital services employing stringent SLAs. An assurance system offering flexibile, customizable reporting, alarms and KPIs will be in high demand. MYCOM OSI's PrOptima™ manages and optimizes performance for some of the largest multi-technology networks.

With NFV being deployed across networks, IT centric policies are being adopted for speedier service rollouts across the networks. To derive maximum benefit from the new cloud based services, intelligent analytics that offer decision making based on correlation of network, service and customer behaviour will be needed. MYCOM OSI offers ProInsight™ for such analytics.

In future networks, automation will take over labour-intensive tasks, from radio optimization, configuration management to corrective, closed loop actions. This will increase employee productivity and reduce downtime as engineers focus on higher decision making activities. As operator processes automate, there will be a dramatic improvement in network availability and reliability. MYCOM OSI offers ProActor™ for automating processes to improve productivity in complex networks.

MYCOM OSI's service assurance, automation and analytics solutions create intelligence out of billions of disparate data sources, empowering network operators with information and efficiency.

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