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VoLTE: Why, When and How?

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Getting the industry thinking

Synopsis

Mobile operators are moving to a data-centric world. LTE has become the most rapidly deployed cellular network technology in the industry's history and the demise of circuit switching—while still on the distant horizon—is now in sight.

In the commercial infancy of LTE the industry has, for good reasons, focused on the improvements the technology can deliver to data access and services. But LTE is also the future of mobile voice, and the migration to this new evolutionary stage of speech communication has already begun.

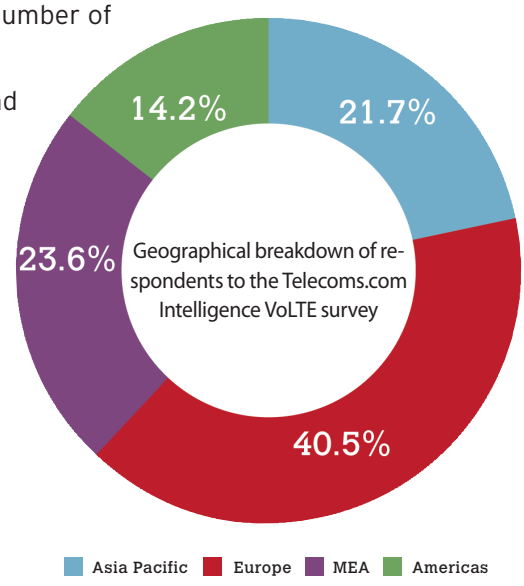
For many years operators have neglected the development of voice services in favour of expansion and diversification. Failure to drive innovation in voice has allowed over the top (OTT) providers to launch more sophisticated services and threaten operators' most fundamental offering.

The arrival of Voice over LTE (VoLTE) offers operators the chance to regain some ground through the development of a richer suite of integrated services. Perhaps more importantly, VoLTE is a crucial step towards greater efficiency in the network, both in terms of spectrum management and the number of network technologies operators need to maintain.

This whitepaper will argue that VoLTE creates a significant opportunity for operators, but warns that the evolution from existing voice services will place before them a number of serious challenges.

None of these are insurmountable but operators must seek out and develop the expertise to understand and address these challenges if they are to fully exploit the commercial and technical benefits inherent in VoLTE.

The paper draws on previously unseen data from a survey carried out by Telecoms.com Intelligence of operators' attitudes towards VoLTE and their plans for its introduction. There were more than 100 respondents to the survey, representing operators from around the world.



Introduction

The fundamentals of business are the same for everybody: For profit to be made, revenues must be kept up and costs kept down against a backdrop of competition. It might be simple, but it's not easy—and there has probably never been a more difficult time than now for mobile operators to strike this balance.

The industry is in one of its periods of painful transition. Operators are beginning the costly mass migration to a new network environment, LTE, at a time when their core services are becoming commoditised. Traditional revenue streams are under pressure from both inter-operator competition and the presence of a new breed of platform- and region-independent internet services players that are quicker and more effective than operators at innovation.

For many operators the move to LTE—and the associated costs—cannot be deferred. Fresh spectrum allocations are required and existing network technologies have reached or are nearing their performance limitations. Operators are victims of their own success; demand for mobile data services is voracious. For this reason LTE deployment has progressed at a rate never before witnessed in the industry.

The first network was deployed at the end of 2009. Just over three years later, at the beginning of 2013, there were 145 commercial networks in 66 countries, according to the Global Mobile Suppliers Association (GSA). There were 381 operators investing in LTE in 114 countries at January 8th, and GSA forecasts that there will be 234 networks in commercial operation in 83 countries by the end of 2013.

As LTE advances its predecessors recede. In Western Europe and North America, GSM and second generation CDMA subscriptions are already in decline, according to data from Informa's WCIS Plus. WCDMA subscriber numbers are forecast to begin dropping from December 2015 in the US and a year later in Western Europe. Regulators in many markets are encouraging the process by enabling operators to refarm existing spectrum holdings so that older technologies can be phased out.

Indeed part of the attraction of LTE is that it gives operators the chance to consolidate to a single network technology. But for all the industry's focus on LTE data services, voice remains essential to the offering.

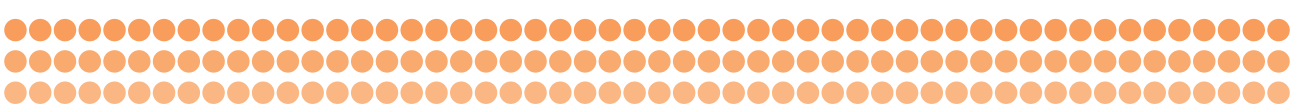
We hear much about the decline in voice revenues as end users take advantage of their increasingly data-centric devices and the non-telco communication services that they enable. But the fact that voice revenue is declining does not mean it is disappearing.

Globally voice revenues have been decreasing for some time, with data accounting for a growing share of overall income. For some operators the balance will soon shift in favour of data but Informa forecasts that voice will still account for more than half of all mobile operator revenues out to 2017, when global revenues are expected to hit $1.18tn, of which $604bn will derive from voice.

In order to retain its appeal and fulfil these expectations cellular voice must evolve. Numerous internet players, including, Skype, WhatsApp, Kakao Talk and Viber, are already offering rich voice communications and users are reacting with enthusiasm.

Voice over LTE (VoLTE) is the mobile industry's response—a solution that will enable operators to make that eventual consolidation to one network technology while at the same time evolving voice services to the standards that have been set by OTT players. It also promises to improve operators' data service capability because it is more spectrally efficient than previous voice technologies, which will free up more bandwidth for non-voice services.

For mobile operators there is clearly a great deal riding on its success.



One Voice

In a survey of mobile operators carried out in January 2013, these technical and evolutionary benefits emerged as key attributes of VoLTE. Respondents were asked to assess a number of advantages to the technology and 38.5 per cent rated better network efficiency as very important. A further 37.5 per cent rated it as important.

The potential for voice to be combined with rich media services scored a higher average rating, with 40 per cent of respondents scoring it as important and 38.1 per cent very important.

The mobile industry is already working on a response to rich services from OTT players, namely the GSMA's RCS project. While some operators have launched RCS services it has yet to achieve widespread adoption. According to Ajay Joseph, chief technology officer at iBasis, the combination of VoLTE and RCS could be a powerful one.

"VoLTE could be the engine that drives a converged, IP-based communications paradigm for which RCS was the outer layer," he says. "RCS brings a nice client to the equation and both RCS and VoLTE are specified on SIP-IMS. So far there haven't been any efforts to combine the two; it's either VoLTE or RCS. But RCS should be the icing on the cake of VoLTE."

Related to this, the ability that VoLTE gives operators to conduct simultaneous voice and data sessions was also seen as a key strength of the technology, as was better call quality (see panel on HD Voice).

Operators will face a number of challenges en route to the realisation of these benefits, however:

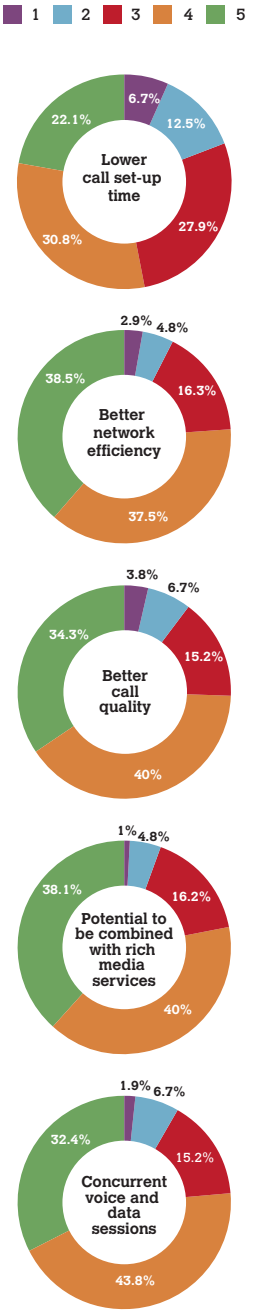
- **Inter-standard connectivity**
  The vast majority of operators are staggering their deployment of LTE, meaning that interim solutions that connect their VoLTE and legacy voice services will be required.

- **Inter-operator connectivity**
  Despite being a community based on standards, mobile operators have struggled with interoperability since the launch of text messaging. VoLTE will be no different.

- **International Roaming**
  Interoperability issues will be even more complicated when users are roaming. If operators are successful in creating more sophisticated voice services for their customers, those customers will not want to lose access to them at the national border.

- **Devices**
  Handset availability, which has always been a drag on new network technology, will affect VoLTE in terms of service launch and performance.

Q: As an all-IP technology, VoLTE offers significant advantages over today's voice infrastructure. Rate the following 1-5 in terms of their importance, where 5 is the most important



Clear Definition – HD Voice

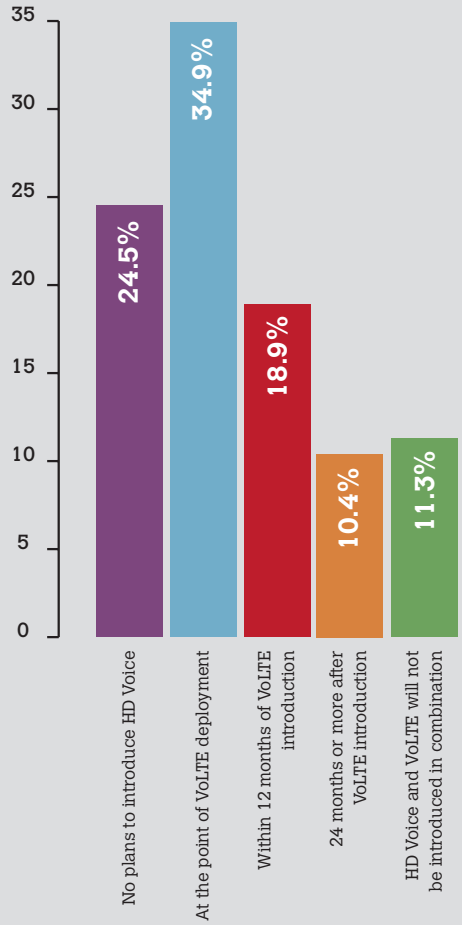
VoLTE supports the wideband advanced multi-rate codecs that enable the next evolution of the phone call: HD Voice (HDV). While HDV is not dependent on VoLTE—there are a number of deployments on 3G networks in the market already—availability is expected to ramp up with the arrival of VoLTE.

34.9 per cent of respondents to the survey said they plan to launch HDV at the same time as they deploy VoLTE.
Indeed 72.7 per cent of respondents agreed that HDV should be packaged with VoLTE and RCS as a single enhanced communications experience.

A quarter of respondents said that the operator they work for has no plans to launch HDV, which chimes with the assessment from 67.9 per cent of respondents that HDV will emerge as a competitive differentiator between operators.

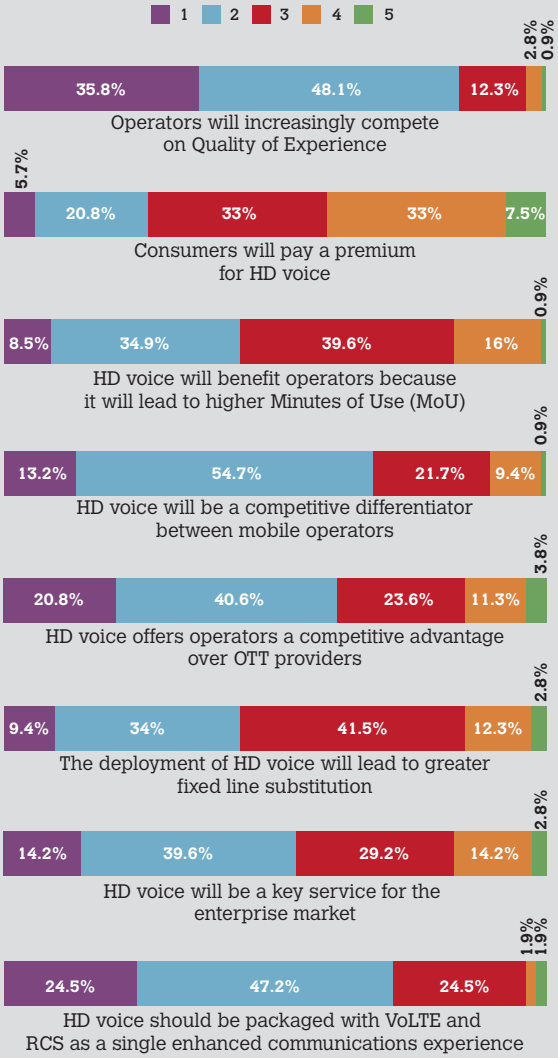
More importantly, it gives operators a level of functionality that OTT providers can't match, a view supported by 61.4 per cent of respondents.

Q: At what point in your VoLTE deployment do you plan to introduce HD voice?



Q: Do you agree or disagree with the following statements regarding HD voice?

(Where 1 is strongly agree and 5 is strongly disagree)



Timing The Journey

The first VoLTE launches—two in South Korea and one in the US—have already happened. But it will be some time before the technology is widespread. More than half the respondents to the survey have yet to commercially launch LTE networks. Just under one quarter will launch in 2013, 14.2 per cent in 2014 and 16 per cent in 2015 or beyond. 45.3 per cent of respondents have already launched.

The planned timing of respondents' VoLTE launches reflects different levels of priority, as well as operators' assessment of other factors. Almost one fifth of respondents want to get VoLTE into the market within six months of their commercial LTE launch. A further 29.3 per cent expect it to launch between six months and a year after their LTE network.

The largest share of respondents, 34.3 per cent, plan to introduce VoLTE between 12 and 24 months after LTE launch, while the remaing 14.1 per cent do not see it coming into service until at least two years after their LTE network goes live.

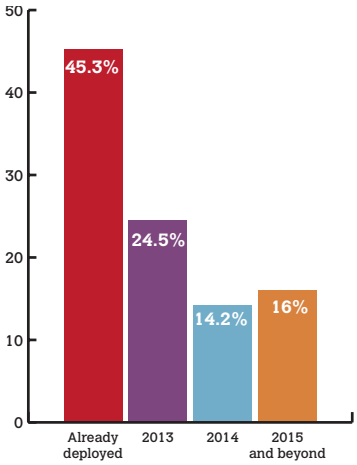
The more cautious operators may be wary about handset availability. Almost 30 per cent of respondents said they do not believe that VoLTE will be supported by half of all new handsets coming to market until the first half of 2015. One quarter expect this to happen in the second half of 2014 while 12.3 per cent are more optimistic, predicting the first half of 2014—more or less a year from the publication date of this paper.

Optimists are in the minority, however. More than one fifth of respondents, 21.7 per cent, don't expect half of new handsets to support VoLTE until sometime after 2015, which may be more realism than pessimism.

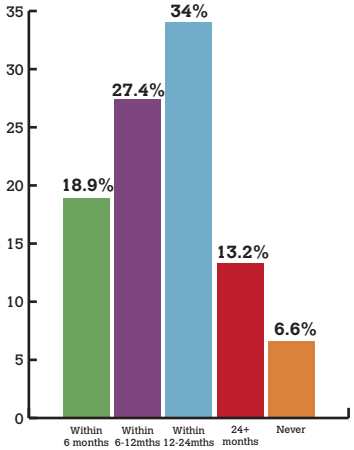
46.3%

OF OPERATORS PLAN TO INTRODUCE VOLTE WITHIN A YEAR OF COMMERCIAL LTE LAUNCH

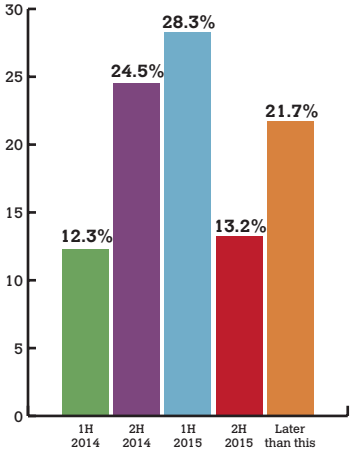
Q: What is your timeframe for commercial LTE deployment?



Q: How long after your commercial LTE launch do you expect to introduce commercial Voice over LTE (VoLTE services)?



Q: By what point do you expect VoLTE to be supported by at least 50 per cent of new handsets coming to market?



Step by Step

Timing will also be affected by the deployment strategies that operators employ for VoLTE. The survey revealed that the majority of operators will look first to Circuit Switched Fall Back (CSFB), whereby users' voice and data sessions are carried over different networks. 62.3 per cent of respondents said that they would be deploying CSFB initially, before moving to an IMS overlay, with Voice over IMS (VoIMS).

However, a significant number–17.9 per cent–plan to move straight to VoIMS. It is likely that these operators will be among the later movers to VoLTE and to LTE in general. They are also likely to be operators in smaller markets as moving to VoIMS in one go across a market the size of the US, say, would simply be too challenging.

There was a smaller showing for the use of CSFB alone, with 12.3 per cent of respondents saying that their plans for Voice service in an LTE world do not move beyond this more cumbersome solution.

As with previous generations of network technology, LTE is being deployed in islands by most operators. So it is likely that, at some point, operators will have VoIMS in some areas of their network but will be limited to CSFB in others. This presents another connectivity headache as operators need to ensure that any call which begins in one environment can be sustained as the user moves to the other.

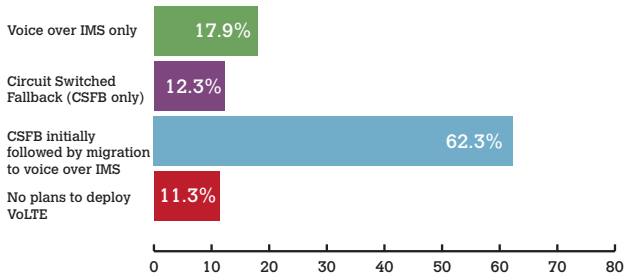
The solution to this is a technology called Single Radio Voice Call Continuity (SRVCC) and it divides the industry.

Just under 30 per cent of respondents believe it to be a priority and their firms are planning its deployment within six months of VoLTE launch. And yet 23.6 per cent of respondents said that they had no plans to implement SRVCC at all. One quarter of respondents said they would implement it within a year of VoLTE and 21.7 per cent said it would be implemented at some stage, but not within the first year.

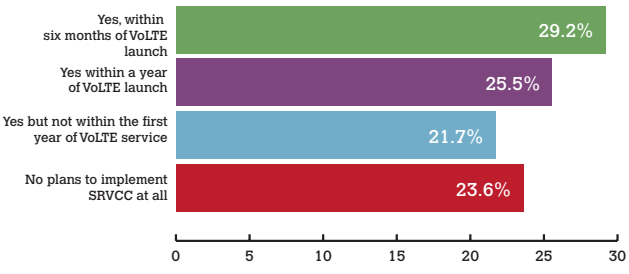
23.6%

OF RESPONDENTS SAID THEY HAD NO PLANS TO IMPLEMENT SRVCC AT ALL

Q: What is your VoLTE deployment plan?



Q: Do you have any plan to implement Single Radio Voice Call Continuity (SRVCC) to support in-call handover from LTE to CSFB?



Connecting The Market

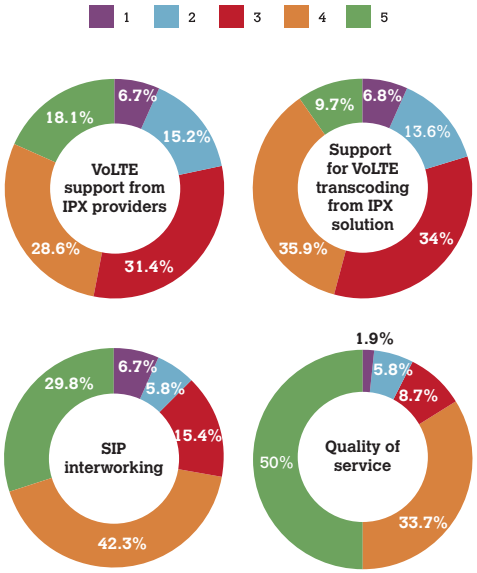
Clearly the implementation and interoperability of VoLTE in an operator's own network is a complex enough process. When attention turns to the interworking between operators, however, the challenge intensifies.

It is expected that LTE will drive mobile operator uptake of IPX services as operators look to simplify the process of interconnection with domestic competitors. Respondents to the survey appear more focused in the immediate term on Quality of Service and SIP Interworking as features that should be supported by IPX providers than they are on VoLTE. QoS was rated as important or very important by 83.7 per cent of respondents and SIP Interworking by 72.1 per cent.

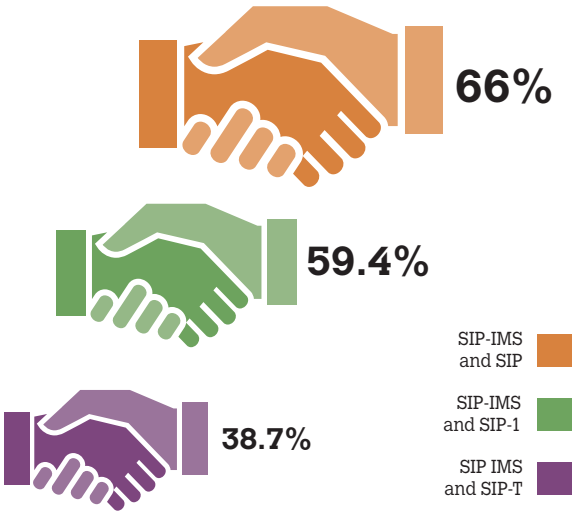
Not that operators are uninterested in VoLTE services from IPX providers. Support for VoLTE was judged to be very important by almost one fifth of respondents and important by a further 28.6 per cent. Support for VoLTE transcoding was deemed important or very important by 45.6 per cent of respondents.

Asked which types of SIP interworking they would be most likely to require, 66 per cent of respondents chose SIP-IMS and SIP. When the same question was posed in relation to trans-coding requirements for VoLTE, 61.3 per cent of respondents said they would want IPX providers to support transcoding between any and all codecs.

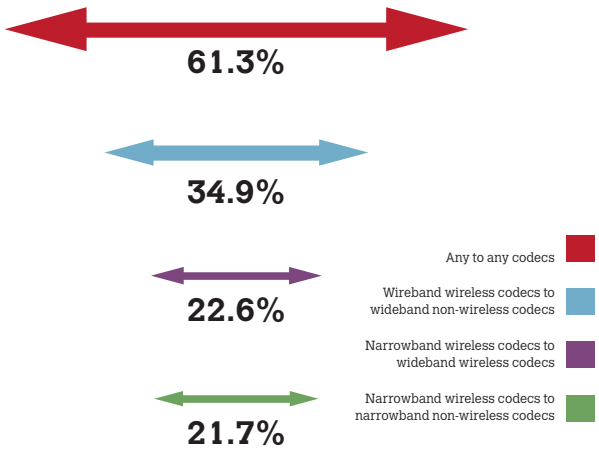
Q: Rate the following requirements in terms of feature support from an IPX provider, where 1 is not at all important and 5 is extremely important?



Q: Specifically, which of the following types of SIP interworking are you likely to require?



Q: Specifically, which trans-coding requirements would you require IPX providers to support for VoLTE?



Going Global

International roaming is a hygiene factor for today's mobile consumers, and mobile operators need to decide how they are going to manage the continuity of VoLTE services for both inbound and outbound roamers.

A small number of operators are keen to support inbound VoLTE roamers as soon as possible–13.3 per cent of respondents said they would have this functionality in place at the point of VoLTE launch, while 18.1 per cent said they would have it within a further six months.

Almost one third said they would aim to support inbound VoLTE roamers within two years of their own VoLTE launch and the same proportion said they would look to do it inside a year.

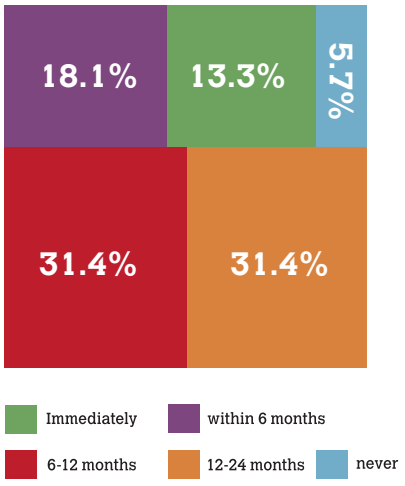
It was interesting to note that, when asked about the service that their own customers would get while roaming onto foreign networks, respondents were less flexible. Almost one third of operators said they would make VoLTE a requirement of their roaming agreements once they had launched it and a further 34.9 per cent said they would steer their customers onto networks that support VoLTE for inbound roaming.

Where operators are more sanguine is in their approach to the technology that is used to offer voice in the LTE environment. Almost half of respondents said they would be happy with CSFB, with the key priority being that the call did not drop. A further 47.2 per cent said they would accept CSFB but only when the visited operator did not have VoIMS funcitionality in their network.

There is a dash of contradiction in these figures; operators want to ensure that their own customers are supported but are less driven to support those of their roaming partners.

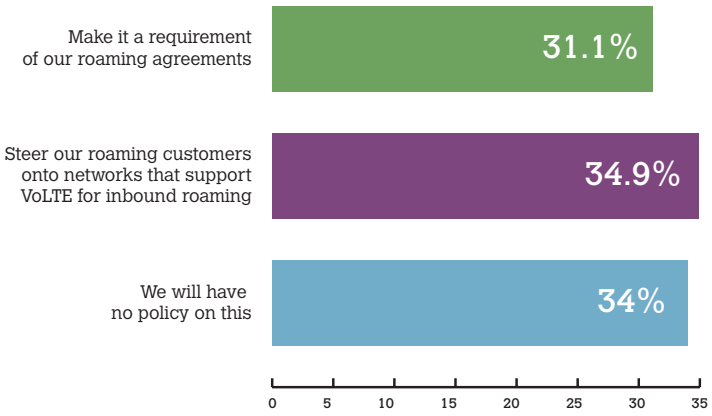
The various challenges inherent in VoLTE roaming are well understood. Network interoperability was rated at the highest level of severity by the largest number of operators, followed by the resolution of charging, billing and policy disparities between roaming partners. Synchronisation between operators' modes of VoLTE operation and concensus on commercial models are also obstacles that require careful navigation.

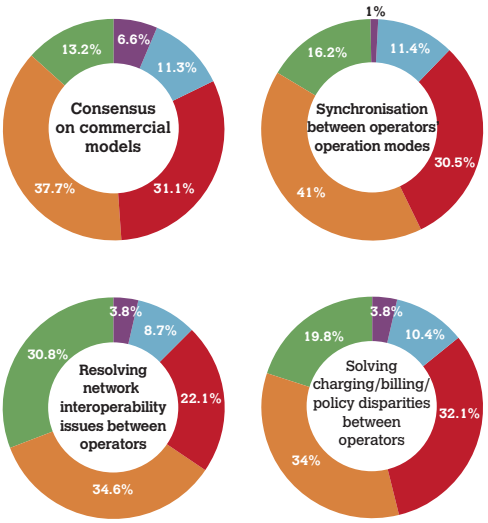
Q: How soon after you have deployed VoLTE will you support it for inbound roamers?



Q: Rate the following challenges to VoLTE roaming, where 1 is not challenging and 5 is extremely challenging

Q: How will you manage VoLTE within your roaming policy?





Orchestrating RAVEL

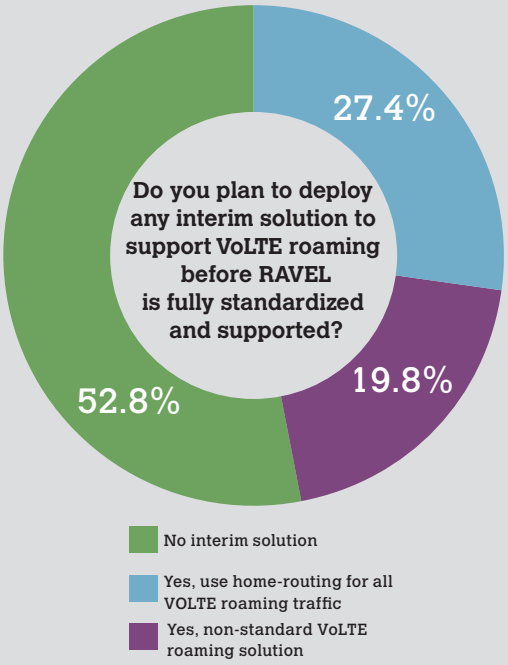
The routing of international calls has always been a problem for mobile operators. All too often the answer—particularly in the case of 'tromboning' calls all the way back to the home network—has been inelegant and costly. LTE data sessions can be broken out locally, negating the need for convoluted routing solutions. But in a VoIMS environment all of the intelligence that decides how to route the call resides in the home network, meaning that the call still has to be routed back.

The industry's solution to this issue is Roaming Architecture for Voice over LTE with Local Breakout (RAVEL). Currently in the midst of standardisation at 3GPP, RAVEL is intended to enable the home network to decide, where appropriate, for the VoIMS call to be broken out locally.

Three quarters of respondents to the survey said they support an industry-wide move to RAVEL for VoLTE roaming. This is emphatic in its enthusiasm but 25 per cent remains a significant share of respondents still to be convinced.

Just over half of respondents said they plan to support VoIMS for LTE roaming using the RAVEL architecture, while 12.3 per cent said they would support it, but not using RAVEL.

Until RAVEL is available, 27.4 per cent of respondents said they plan to use home-routing for all VoLTE traffic, while just under one fifth said they would use a non-standard VoLTE roaming solution.



Q: Do you support an industry-wide move to the Roaming Architecture for Voice over LTE with Local Breakout (RAVEL) forVoLTE roaming?

Conclusion

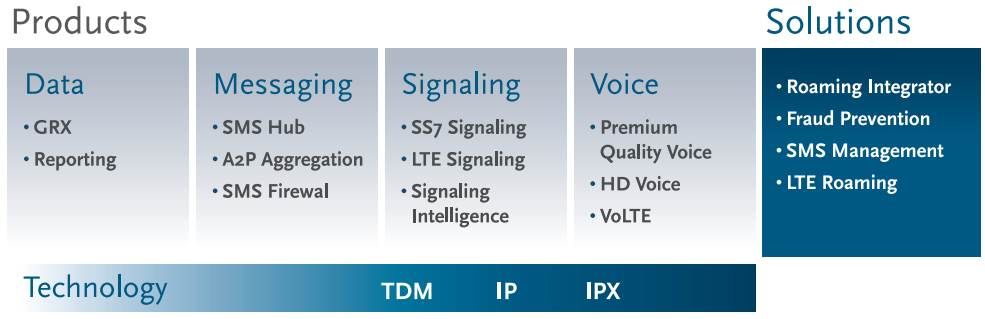
Mobile users around the world may be embracing data services but voice remains fundamental to telephony. Users love it, and it generates huge revenues for the mobile industry worldwide.

Mobile operators must consolidate their network portfolios in order to reduce their costs as overall revenues flatten—and they cannot do this without embracing Voice over LTE.

The migration to VoLTE will take time and involve a number of separate steps, new standards and interim solutions. Operators need to find partners and suppliers that have expertise in voice as well as data to help them take these steps and negotiate the huge interoperability challenge that VoLTE represents.

iBasis – Offering a Portfolio of Smart International Connectivity Services

Comprehensive Portfolio of International Mobile Services



Realizing the evolution to an all-IP world

- Pioneer and leader in IPX, the new standard in true multi-service private IP interconnection
- Enabling innovative services that enhance revenue and user experience: HD Voice, LTE Roaming, RCS, VoLTE

Innovating Voice

VoLTE, with its high fidelity voice, resiliency with IP quality of service and inherent ubiquity, is an excellent vehicle to enable MNOs to compete with OTT providers. iBasis will help you achieve a successful transition to VoLTE using our extensive IP/SIP interworking expertise to ensure interoperability across protocols, and the company's HD voice footprint of fixed and mobile operators to enable end-to-end HD service. The iBasis multiservice IPX, including the LTE Signaling eXchange (LSX), will also help MNOs resolve the complexities of the new VoLTE roaming architecture.

VoLTE: Why, When and How?

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Getting the industry thinking

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ABOUT IBASIS

A wholly-owned KPN company, iBasis is a leading international voice carrier and a provider of data services for mobile operators. The company offers a comprehensive portfolio of voice termination services and data services, including messaging, signaling and roaming, for many of the world's largest fixed and mobile operators, as well as "over-the-top" and voice-over-broadband service providers. The company can be reached at its worldwide headquarters in Burlington, Mass., USA at +1 781-505-7500 or on the Internet at www.ibasis.com.