

VoLTE AND THE FUTURE OF Mobile Voice

► Despite more than two years of anticipation, the U.S. is still waiting for the widespread deployment of voice over LTE. MetroPCS was the first U.S. operator to launch a VoLTE handset back in 2012 but little has been said about its VoLTE service since T-Mobile US acquired the company last year.

AT&T has said it is doing final VoLTE testing and Verizon appears close to a VoLTE launch – most estimates have the operator deploying VoLTE this year.

Clearly the time frame from VoLTE has shifted as operators hit technicalities and deployment challenges. Experts say this shouldn't be a surprise, as anytime you deploy a technology that has to reside both in the network and the devices there is a higher likelihood of glitches.

Quality is another concern. Operators want VoLTE to be on par with circuit-switched voice but LTE network coverage is still expanding. Globally there are about 275 LTE networks commercially available in 101 countries, according to the Global mobile Suppliers Association.

On the device side, there are about 57 handsets that support VoLTE, the majority of which are offered by South Korean operators, according to the GSA.

Despite the delays and technical difficulties, some analysts are bullish on their projections. Strategy Analytics predicts that VoLTE users globally will increase from 9 million in 2013 to more than 800 million in 2018, with Asia-Pacific and North America dominating the market, at least initially.

With commercial VoLTE service around the corner, this ebook delves into the latest developments in voice services—from VoLTE to HD Voice and more. Find out why some in the industry claim that 2014 will be the year of a “renaissance in mobile voice.”

BY SUE MAREK
EDITOR-IN-CHIEF /// FIERCEWIRELESS

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VoLTE: Ready, Set...Wait

BY MONICA ALLEVEN

VoLTE promises clear calls and more efficient usage of the network, but success depends upon the technology being in both the devices and the network and getting those two elements to come together can be a challenge.

► Vendors and service providers still trumpet the benefits of voice over LTE (VoLTE), but unlike a lot of other industry sectors,

analysts aren't releasing sensational forecasts. Some analysts have even gone so far as to advise operators to take the slow road to VoLTE.

Many U.S. operators apparently followed that advice as they continue delaying VoLTE rollouts while they work out the technicalities. That said, there is nowhere else to go but up for a technology that hasn't even been formally or widely introduced

to paying U.S. customers. Strategy Analytics predicts VoLTE users globally will increase from 9 million in 2013 to more than 800 million in 2018, with Asia-Pacific and North America dominating volumes in the medium term.

WHAT'S THE HOLD-UP?

VoLTE promises to move voice calls from legacy, circuit-switched networks and onto IP-based LTE

"A key challenge with VoLTE devices today is the dreaded battery life problem. Just when we are getting devices to survive a day on a charge, VoLTE comes along as a high-drain application—at least so far it appears that way."

CHRIS NICOLL, ANALYSYS MASON ANALYST



networks. The result should be clearer calls that connect more quickly and use less bandwidth. However, successful VoLTE calls require VoLTE technology in the network as well as in the handsets, and as prior wireless technology rollouts have shown, getting the two to work together isn't always a slam dunk.

"The fact of the matter is 3G operators all have pretty good voice to start with," said ABI Research director Joe Hoffman. "There's not a really good business case. The business case comes when you wrap that in with everything else that comes with data communications or unified communications. That's when it all comes together and starts to make a lot of sense."

"The other issue is making sure you can make VoLTE calls between operators," he said. Operators will need to hold onto their 3G for years to come to accommodate roaming even if they would prefer not to carry the expense. "3G is not going to go away for a long time," he said, noting the improvements in voice quality with HD voice on 3G, which some U.S. operators are touting with greater regularity.

"I think the sticking point still is quality," said Current Analysis analyst Lynnette Luna. "U.S. operators in particular want VoLTE to be on par with circuit switched, and circuit switched has been enhanced for, like, the last 20 years. So it's really hard. I think that's why we see a lot of push-back."

Analysys Mason analyst Chris Nicoll said he doesn't think the situation will change much for the

"There's not a really good business case. The business case comes when you wrap that in with everything else that comes with data communications or unified communications. That's when it all comes together and starts to make a lot of sense."

JOE HOFFMAN, ABI RESEARCH DIRECTOR

foreseeable future. The reasons he cites relate to coverage and devices. Few operators outside of South Korea have launched services, and while the device ecosystem is definitely growing, VoLTE is still not available across the most popular devices.

"A key challenge with VoLTE devices today is the dreaded battery life problem," Nicoll said. "Just when we are getting devices to survive a day on a charge, VoLTE comes along as a high-drain application—at least so far it appears that way. I don't think operators want to go back to launching a service [as was done with LTE] with a premium device that literally has to be tethered to a battery or an outlet."

Voice support for most operators includes a "fallback" solution for non-native LTE calls or calls in areas where LTE is limited or lacking. "We also expect carriers will move more slowly towards Single Radio Voice Call Continuity (SRVCC) because the complexity of that solution demands a simplification by the equipment vendors for widespread implementation," Nicoll said.

ADDING VALUE TO VOICE

Elsewhere, several analysts point to China Mobile as one to watch. It's on a fast track with VoLTE, and Luna said it's likely to quickly follow that up with

rich communications services (RCS), which operators have been banking on to help add value to their services in an age when consumers can get basic voice services from over-the-top (OTT) players. RCS enables the delivery of communications beyond voice and SMS, adding instant messaging, chat, live video and file sharing across devices and networks.

While much of the industry's attention is focused on the Internet of Things and the Internet of Everything, it's worth noting that voice remained the biggest contributor to mobile operators' earnings in 2013, accounting for more than 60 percent of global service revenues, according to Informa Telecoms & Media. That said, the commercial case for offering VoLTE is the subject of much debate, and implementing VoLTE is proving to be fraught with challenges, the research firm noted.

Operators that attended Informa's first LTE Voice Summit in London last fall were broadly in agreement about the need to introduce VoLTE, but also aware of the risks. A number of those using circuit-switched (CS) fallback, particularly in Europe, reported that the technology was working well, giving them time to overcome some of the technical challenges before making the move to full VoLTE services, according to Informa. ●

U.S. Operators, Vendors Inch Toward VoLTE Deployments

BY MONICA ALLEVEN

When working properly VoLTE offers stronger performance. But in early tests VoLTE wasn't as good as legacy voice services.

► When a U.S. mobile network operator finally launches a commercial VoLTE service, a lot of engineers, marketers and everyone in between might find it the perfect occasion to celebrate.

That's because it's been a long road with some detours thrown in for good measure. Although South Korea's three main operators have been touting VoLTE for some time, it's not as quick and easy elsewhere. Combined, AT&T and Verizon have delayed their planned U.S. rollouts several times. The latest estimates have them rolling out VoLTE service sometime this year.

"In early tests, we've seen a lot of packet delay issues, and what we've seen is by taking the appropriate steps to configure the network, the appliance and so forth, the performance that operators are able to get out of VoLTE in an optimized situation are excellent compared to legacy services."

JEFF ATKINS, DIRECTOR OF MARKETING FOR SPIRENT'S SERVICE EXPERIENCE SOLUTIONS

Even the operators may have grown tired of putting target dates on VoLTE's launch. 556 Ventures analyst William Ho said that he, for one, is glad that

the big two are being honest about the difficulties and challenges with deploying the technology. "They've been burnt with forecasting VoLTE availability before and they seem to be pulling back from any future promises," he said. He also noted that Verizon has been very public about having its LTE footprint match its 3G footprint is because it can't let the "bread and butter" voice call drop.

Regional prepaid carrier MetroPCS was the first wireless operator in the United States to launch a VoLTE handset back in 2012, but little has been said about it since T-Mobile US acquired the company last year. Sprint has said it's in no rush to deploy VoLTE, noting, like a lot of others, that the LTE footprint needs to be big enough before it can be rolled out.

VoLTE AROUND THE WORLD
According to the Global mobile

Suppliers Association (GSA), 275 LTE networks have commercially launched in 101 countries, and that number will grow to at least 350 networks in commercial service by the end of 2014. But the number of VoLTE networks in service is far lower.

The GSA said that 57 phones support VoLTE from a list of manufacturers that includes Asus, Huawei, LG, Pantech, Samsung and Sony Mobile. The majority of them are offered by South Korean operators, where VoLTE has been commercially available since 2012, said GSA President Alan Hadden. One operator in South Korea, for example, already has introduced at least 26 VoLTE-compatible phones. Some other phones incorporating VoLTE functionality appear to be intended for customers in other markets, including China and North America, he said.

Some analysts point out that North America is unique, however, in some of its requirements for E911, for example, and the ability to replace circuit-switched systems. In a lot of cases, voice calls are still going to need to fall back to 3G networks where LTE is not available, and if the end user notices a stark difference between the quality of those calls between networks, that's not going to be a good experience.

That's the kind of thing operators are asking testing firms like Spirent to look at when they're evaluating devices before they're certified and accepted. "We've been specifically asked by customers to come in and help them compare different codecs that they could select and look at the transition from moving



from wideband to narrowband," said Jeff Atkins, director of marketing for Spirent's Service Experience solutions.

TESTING, TESTING

Spirent has been testing dozens of devices for multiple operators and handset OEMs to evaluate how customers will experience the VoLTE service. When it's working properly, VoLTE has the potential to demonstrate extremely strong performance compared with traditional voice service. But in some early tests cases, when VoLTE wasn't performing as well as legacy services, adjustments needed to be

made. "It's just one of those things that just takes time," Atkins said.

A lot of operators say they've been "tuning these 3G services for years and years," and their goal is to be at least as good, if not better, than those services. "It's not often talked about, but even though LTE has been out for several years now, there hasn't really been a large-scale test of the quality of service capabilities that are in the LTE standard, and those are really what enables VoLTE," he said. "This is in a way the first large-scale test of VoLTE technology in a kind of massive wireless setting, so it's a big deal. I think there are real

questions as to how well it will work, and that's really the main thrust of a lot of requests we're getting."

One common culprit is packet delay, or the "mouth-to-ear" delay in a person's speech, and it can be difficult to find exactly where delays are occurring through a call's progression in the network. Operators will often have a packet delay "end-to-end budget" because "as delays add up, if you get too much delay, it starts to become annoying to a user having a conversation with someone," Atkins said. "In early tests, we've seen a lot of packet delay issues,

and what we've seen is by taking the appropriate steps to configure the network, the appliance and so forth, the performance that operators are able to get out of VoLTE in an optimized situation are excellent compared to legacy services."

Over-the-top (OTT) services have made some real improvements over the past few years, and operators also are interested in not only how VoLTE performs against legacy services but also how it stacks up against the latest and greatest OTT services. Theoretically, operators have an advantage because they have the QoS features that allow them to prioritize VoLTE packets as they move over the network, whereas OTT providers don't have that same ability, Atkins said.

VOICE IS VOICE – PLUS MORE

Of course, the operators' marketing teams will need to retune their

messages based on the services they deploy. At the end of the day, subscribers to VoLTE will have to change their handset out for a service they're not absolutely sure will bring them more benefits over what they currently own, said Paul Gowans, mobility marketing manager at JDSU. "It needs to be marketed as something that is better," he said.

Most users, even those in the industry, think "voice is voice, it's kind of good enough," he said, equating it to the HDTV vs. standard TV scenario. Once you see it or hear it, "you wonder how you lived

without it." Of course, operators are interested in adding video conferencing and other Facetime-like services.

"If there's one thing we hear a lot from all our customers, it's 'how do we differentiate ourselves?'," Gowans said. "That is a key thing that operators continue to strive for, and maybe it's extra services or bundling or pricing or quality or all those things. It comes down to the user's perception. VoLTE is one of the elements of the services of that package of rich communications services." ●



"It comes down to the user's perception. VoLTE is one of the elements of the services of that package of rich communications services."

PAUL GOWANS, MOBILITY MARKETING MANAGER AT JDSU



Smartphone Battery Life – A Critical Measure of VoLTE Success

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► Many smartphone users would love it if the battery would last for several days—like mobile phones did before the smartphone was introduced. Unfortunately, all those useful features that make smartphones indispensable come at a price: dramatically increased processing power, bigger screens and much higher power consumption.

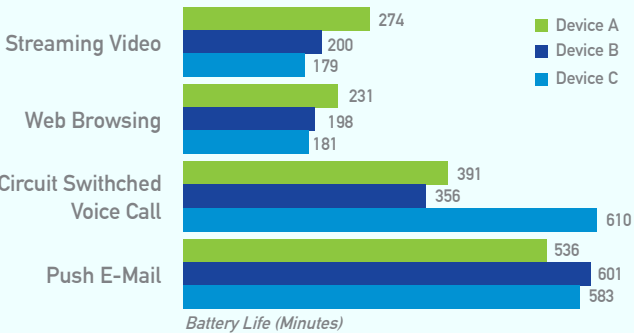
Bigger devices have enabled bigger batteries, but this trend can't go much further due to heat, space and cost limitations. Improving battery life going forward must come from improved device power efficiency. So what's the industry to do to make long term power efficiency improvements?

That means the right device design choices can measurably improve battery life.

To assess the power efficiency gains of new designs for mobile devices and apps, you need to accurately measure power consumption and battery life under real-world scenarios. But how do you measure battery life given there isn't a typical user profile: e.g., a teenage text-addict has a very different usage pattern than a mobile business executive, or a mother keeping in touch with children and friends.

The best approach is utilizing individual call scenarios including VoLTE, that mimic realistic real world usage conditions—including a mix of video, web browsing, SMS, data and push mail applications—to generate an accurate measure of actual performance in a user's hand.

What's the payoff for this kind of use case-based testing? For mobile operators, it allows them to identify which devices have the best and worst battery life and power efficiency. Then they can promote devices with the best battery life and work with device manufacturers to improve less efficient designs. For device manufacturers, it allows them to determine how well their



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devices are operating for specific types of user behavior and identify opportunities for improvement. For chipset providers, it lets them work with device manufacturers to make similar calculations, and enable application developers to determine how their apps impact battery life.

With power-hungry 4G services like streaming video on the rise, keep a close eye on this space and expect to see a lot more buzz about the real battery life of our smartphones when using VoLTE under realistic and demanding operating conditions. In the meantime, stay calm and keep those chargers handy.

Find out more about VoLTE related battery performance in the report titled ["Comparison of Battery Life Performance of VoLTE Capable Devices."](#) ●



VoLTE Upgrade Will Make New Video Services Possible

BY TAMMY PARKER

More creative bundling and pricing will be key to make video over LTE popular with customers.

▶ VoLTE is about much more than just delivering plain-vanilla voice service via data packets. The same network elements that enable VoLTE are also key to a future of advanced communications services that integrates many flavors of multimedia communications, including video over LTE.

You can't deploy VoLTE without deploying an IMS infrastructure," and an "IMS infrastructure enables both VoLTE and video," said Grant Henderson, vice president of marketing and product management with Radisys.

Ed Elkin, marketing director, advanced communication solutions, at Alcatel-Lucent, echoes that thought. "When VoLTE is deployed, practically everything that is needed is there for video," he said.

"The nature of video changes from two-way or multi-way calls, putting video into interesting places."

ED ELKIN, MARKETING DIRECTOR, ADVANCED COMMUNICATION SOLUTIONS, AT ALCATEL-LUCENT

Henderson calls 2014 "a watershed year, or transformational year," for VoLTE, but the same can't be said for video over LTE, which will ride on VoLTE's coattails. Though video is important for countering threats from over-the-top providers such as Skype video and Apple Facetime, video will initially be showcased primarily as "icing on the cake" in marketing campaigns with the main emphasis remaining on VoLTE, he noted.

That is because the bigger threat to operator revenues right now stems from voice competition. "OTT voice can materially impact a key part of their revenue stream," Henderson said. "I think the operators are going to be very much focused on revenue and service protection."

Although carriers will likely tout their video over LTE capabilities for competitive positioning, "pragmatically I think it's a battleground for voice in the short term," Henderson added.

However, operators must not ignore the fact that OTT providers are already using mobile video offerings for competitive positioning.

Juniper Research recently forecast that mobile video calling services such as Skype will serve some 130 million users by 2018. While they are not usually monetizing those services directly, OTT players are using video calling to gain a critical mass of users and lay the groundwork for future revenue streams from premium products or revenue-share partnerships, Juniper said.

OPTIONS AND OPPORTUNITIES

Operators that cannot make heavy upfront investments in IMS to enable VoLTE and video over LTE can make alternative arrangements to bring such services to their customers. For example, cloud-based voice platform provider Alianza last year announced a hosted fixed VoLTE offering aimed at Tier 2 and 3 mobile service providers.

While most operators of that size do not have significant LTE footprints or access to a broad ecosystem of devices to support a mobile VoLTE offering, they can expand their markets through fixed VoLTE services, which can include broadband data as well as voice over IP (VoIP), said Kevin Mitchell, Alianza's vice president of marketing.

For the rural independent carrier segment within North America, "we see that as the more immediate and easily addressable market for voice over LTE," he added.

Hosted VoLTE service could be used as the basis for residential video calling as well, Mitchell said. Further, service providers could extend VoIP and video service beyond the home to tablets and smartphones, using the same phone number and service.

For small- to medium-size businesses, a service provider could use fixed VoLTE service to deliver video calls to Polycom video-enabled phones in the office. Smartphones and tablets loaded with CounterPath soft clients, meanwhile, could be used by staffers outside the office for mobile video calling.

ENABLING REAL-TIME COMMUNICATIONS

Video over LTE "is no more complicated than VoLTE from a technology perspective. The interesting part comes with the business model and user experience," Alcatel-Lucent's Elkin said.

He suggests that creative bundling and pricing will be key to encouraging experimentation and usage of video over LTE. Video calling services might be bundled with data pricing plans, or perhaps only the calling party's data plan will be dinged for the data used in a video call.

According to Radisys' Henderson, VoLTE and video over LTE are really technology enablers for a host of expanded communications services. Similarly, Elkin noted that "no operators are looking at VoLTE as 'VoLTE-only.'"

Just as conference calling, call center services and other value-added services can be laid atop basic voice services, specialty services and solutions for business communications problems will eventually be layered onto basic video calling capability.

Elkin listed five services that can be enabled by video over LTE: Video telephony, video sharing ("you see what I see," with full voice and synchronization, unlike earlier, failed



"OTT voice can materially impact a key part of their revenue stream. I think the operators are going to be very much focused on revenue and service protection."

GRANT HENDERSON, VICE PRESIDENT OF MARKETING AND PRODUCT MANAGEMENT, RADISYS

offers), videocasting as a way of distributing video content, video conferencing and web-enabled real-time communications (WebRTC).

"What's really neat about WebRTC is the creativity it opens up," Elkin added. He noted that WebRTC will drastically grow the size of the video-calling community, so it can extend beyond just VoLTE users to include all users of WebRTC, regardless of the platform they are on.

"The nature of video changes from two-way or multi-way calls, putting video into interesting places," he said.

WebRTC can enable the simultaneous deliver of voice, video and data in a call. The communications innovations it augurs will eventually impact the competitive and service landscape for mobile operators, Henderson said.

To that end, mobile carriers will need infrastructure to support both voice and video services—including MPEG4 and AMR-WB for HD Voice—as well as new models and codecs being championed for WebRTC, such as VP8, VP9 and Opus, he added. ●

Voice Quality: Getting Better all the Time

BY TAMMY PARKER

The number of HD-capable phones has doubled over the past 12 months but interconnection and international roaming remains a challenge.

► Mobile HD Voice service is touted for its clarity and its ability to reduce background noise. But it is far from the final word in advanced voice services for mobile networks as a new codec, targeted specifically at LTE networks, is already waiting in the wings.

HD Voice offers numerous improvements over earlier voice codecs, including clearer-sounding calls, decreased background noise and greater realism/presence thanks to the improved voice quality.

Mobile HD Voice in 3GPP air interfaces relies upon the Adaptive Multi Rate Wideband (W-AMR) speech compression algorithm. W-AMR was standardized in 3GPP Release 5, and the first service launch using the technology occurred in 2009. The GSMA has also approved use of the term HD Voice for CDMA2000 network operators that deploy, at a minimum, Service Option 73 Enhanced Variable

Rate Codec-Narrowband/Wideband (EVRC-NW), which was standardized by 3GPP2 in 2010.

As of March 25, 2014, W-AMR had been commercially launched by 100 mobile carriers in 71 countries, according to the Global mobile Suppliers Association (GSA). The group added that the number of mobile operators offering W-AMR reflected 31 percent year-on-year growth.

Looking only at W-AMR deployments, 3G HSPA networks represent the majority of HD Voice services. The GSA said 89 HSPA-only operators offer commercial HD Voice service, while the service is offered by six GSM and HSPA operators as well as two GSM-only operators. In addition, South Korea's three national mobile operators offer HD Voice in conjunction with VoLTE.

Meanwhile, 329 HD Voice phones compatible with W-AMR have been announced by 19 manufacturers, the GSA said, adding most work on HSPA networks. "The choice of HD phones more than doubled over the past 12 months," noted Alan Hadden, GSA president.

HD Voice is currently restricted to users on a single network, who both must be in geographic areas served by HD Voice and using compatible devices. Ryan Heidari, director of product management at Qualcomm Technologies, said HD Voice has been marketed as a

Interoperability issues between circuit-switched 3G calls and VoLTE also impact HD Voice interoperability across networks.

PETER CARSON, SENIOR DIRECTOR OF MARKETING AT QUALCOMM TECHNOLOGIES

differentiator by the operators that offer it. But he noted the standard was actually designed to support internetwork HD Voice.

According to the GSA, "Interconnection between competing networks for end-to-end HD voice calling, as well as international roaming for HD calls, are priorities for 2014."

However, complicating matters is the fact that interoperability issues between circuit-switched 3G calls and VoLTE also impact HD Voice interoperability across networks, said Peter Carson, senior director of marketing at Qualcomm Technologies.

U.S. OPERATORS GET ONBOARD

Sprint introduced EVRC-NW HD Voice about two years ago on the HTC Evo 4G LTE smartphone. The service has only been available since then in select Sprint markets, but the operator recently announced it will provide nationwide HD Voice in July 2014.

Sprint's HD Voice device portfolio includes 25 postpaid devices and 20 prepaid devices, and all Sprint smartphones launched in 2014 are expected to be HD Voice capable,

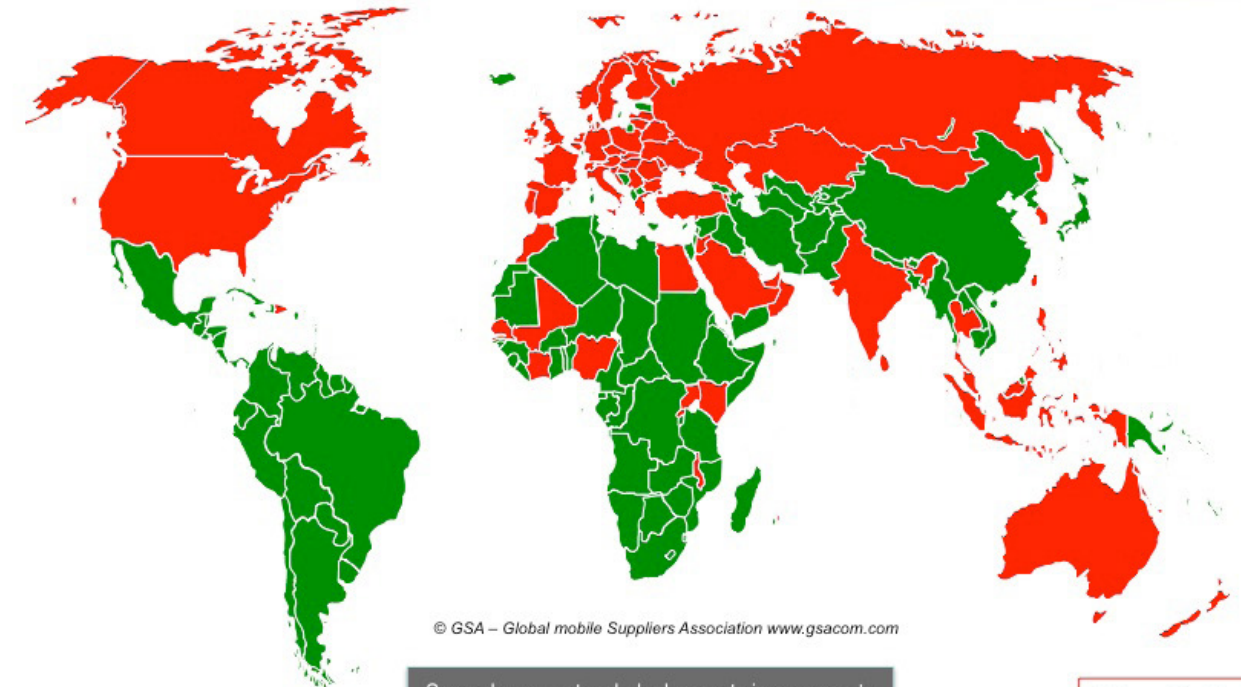
Mobile HD voice (W-AMR) service deployments

100 networks with commercial HD voice service in 71 countries



Countries with commercial mobile HD voice services

Over 31% YoY growth in number of commercially launched mobile HD voice networks



© GSA – Global mobile Suppliers Association www.gsacom.com

Several more network deployments in progress to support W-AMR HD voice service on GSM, 3G/HSPA and 4G/LTE networks

329 HD voice phones announced (GSA)

Network technologies:
 89 HSPA-only networks
 6 HSPA & GSM networks
 2 GSM-only networks
 3 LTE networks (VoLTE)

Source of data: GSA
 Mobile HD Voice: Global Update report – March 25, 2014

said company spokeswoman Adrienne Norton. She added that the operator intends to have some 20 million HD Voice-capable devices in use by its customer base by year's end.

"As for marketing efforts, our focus is on consumer device education with our installed base of subscribers. We are telling the HD Voice story via our retail channel as well as through wired and mobile digital efforts," Norton said. "It's still too early though for us to talk about specifics, including consumer response," she added.

T-Mobile US turned up HD voice in January 2013, offering service nationwide on its HSPA network, and the operator currently carries more than 20 HD Voice-compatible devices. In little more than a year, T-Mobile customers have made nearly 3 billion HD Voice calls, said T-Mobile spokeswoman.

Verizon has said it will include HD Voice as part of its VoLTE offering, which the operator has said previously it will introduce in the first half of 2014.

AT&T is expected to rollout HD Voice alongside VoLTE but

has delayed its VoLTE rollout from an end-2013 target date. AT&T has not provided a new VoLTE target date, but it is working to seed the market with VoLTE-capable devices, such as the PadFone X from Asus.

CODEC OF THE FUTURE

AMR-W was really designed for the circuit-switched 3G network, which has led researchers to seek a better alternative for LTE networks. AMR-W "doesn't have the robustness needed for packet-based services," said Heidari.

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VoLTE Hits the Road

BY TAMMY PARKER

A roaming architecture has been developed for VoLTE but no significant testing has been done.

► VoLTE roaming has so far been an academic exercise. After all, there is no need for VoLTE roaming until there is a critical mass of VoLTE networks around the world.

And that simply has not yet happened.

True, there are full-scale VoLTE rollouts in South Korea, but the operators there have such robust domestic footprints—the nation has 100 percent population coverage with LTE-- that they need not concern themselves with domestic VoLTE roaming in order to solidify their coverage.

So, what is the status of VoLTE roaming? "It's all done on paper in the theoretical level," said Dan Warren, the GSMA's senior director of technology.

Though different approaches have been proposed for enabling VoLTE roaming, the Roaming Architecture for Voice over LTE with Local Breakout (RAVEL) is envisioned as "the gold standard" for VoLTE roaming, Warren said. But he noted that no really significant testing has yet been conducted, and there are still a couple of ongoing technical discussions related to the ins and outs of making VoLTE roaming work.

"I don't think I'm breaking any trade secrets by saying things very rarely work straight out of the box or straight off of the paper, and our expectation is that voice over LTE

roaming won't be any different so there will be a need for a tire-kicking to take place," Warren continued.

GSMA completed a VoLTE implementation guide in October 2013, which addressed roaming. The group also launched a registry of known issues for LTE in general but with VoLTE included. The registry provides use cases and solutions to problems that have been found, enabling operators with similar issues to also resolve them without having to reinvent the wheel.

Some issues already being reported into the known-issues registry relate to roaming. "We know as a result of the kinds of issues that we're beginning to see on that issues registry that there are networks that are already looking at Voice over LTE roaming and how LTE and VoLTE devices attach and the problems they run into when they visit an overseas network," Warren said.

Of course, many of the challenges that will impact VoLTE roaming are the same as those impacting LTE roaming in general. The main issue in that respect is the numerous LTE spectrum bands that must be supported in devices, Warner said.

SMALL CARRIERS EYE VoLTE ROAMING

Verizon Wireless, the world's largest LTE operator, set the pace for LTE rollouts by the four national U.S. mobile carriers. However, many regional carriers were reluctant to build out LTE because they had no national roaming partner that would enable them to them to market a nationwide service, said Steven



"I don't think I'm breaking any trade secrets by saying things very rarely work straight out of the box or straight off of the paper, and our expectation is that voice over LTE roaming won't be any different."

DAN WARREN, SENIOR DIRECTOR OF TECHNOLOGY AT THE GSMA

Berry, president of the Competitive Carriers Association.

To meet FCC buildout requirements for the spectrum they bought for LTE deployments, numerous small carriers built fixed-LTE networks that did not require mobile service or roaming.

And although smaller operators are starting to roll out LTE, VoLTE

will be something of an afterthought for them "because you can't have VoLTE till there are compatible devices," Berry said. "Everyone knows there's not going to be a VoLTE device available until late this year or in 2015," he added.

According to Berry, Verizon expects to roll out VoLTE at the end of this

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Voice Quality: Getting Better all the Time (Continued)

The solution is a new super wideband codec, Enhanced Voice Service (EVS), which is expected to run on at least 14 kHz. In comparison, narrowband speed codecs limit the audio bandwidth to a maximum of 3.4 kHz, while WB-AMR increases the audio bandwidth to 7 kHz for higher-quality service.

EVS should provide even better voice quality than WB-AMR, improved sense/presence for conferencing and other calls, plus more reduction in background noise. Further, it supports music for applications such as ringback tones, music on hold and other in-call music.

The EVS codec is currently being standardized by 3GPP. It was conceived about two and a half years ago, and more than 12 of

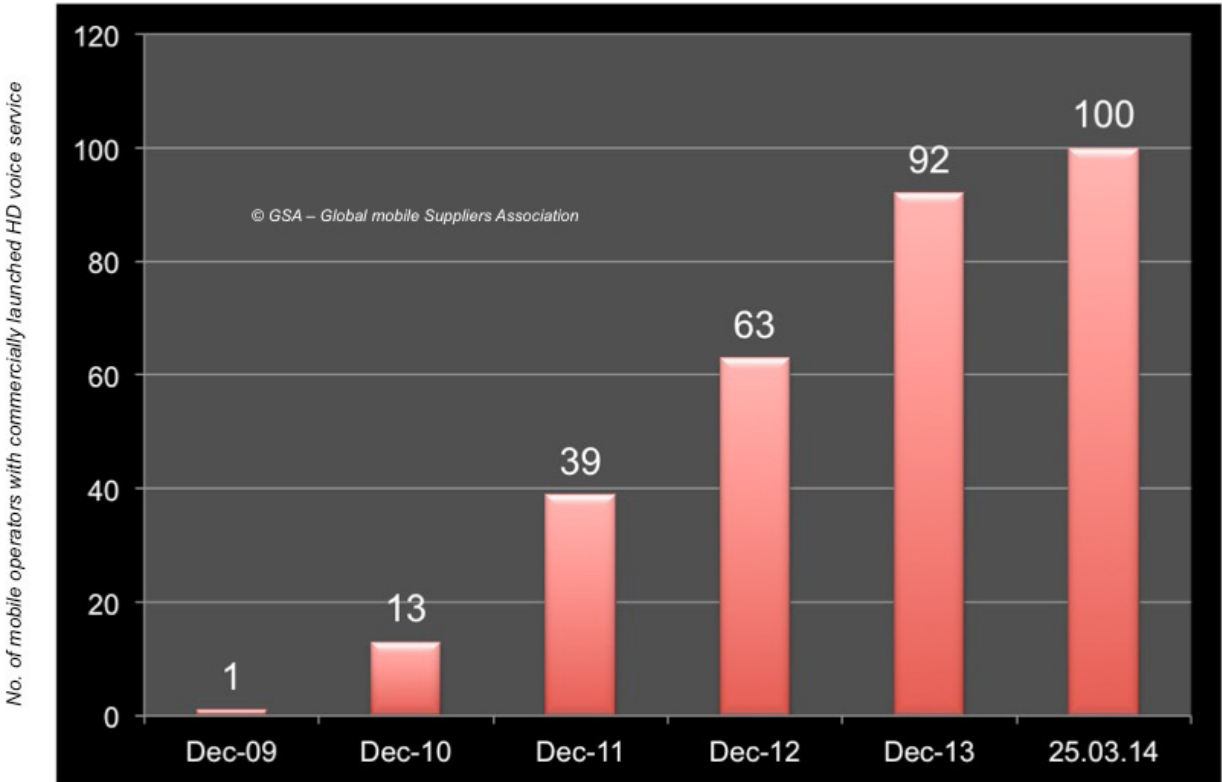
companies, including Qualcomm, are in a consortium working actively toward completion of the standard. The code will be ready by mid-year, and the final standard will be published by end of 2014, Heidari said. ●

“The choice of HD phones more than doubled over the past 12 months.”

ALAN HADDEN, GLOBAL MOBILE SUPPLIERS ASSOCIATION

Mobile HD voice (W-AMR) growth worldwide

Operator commercial launches - cumulative



Source of data: GSA
Mobile HD Voice: Global Update reports

VoLTE Hits the Road (Continued)

year and has told partners in its LTE in Rural America (LRA) program that it cannot guarantee when those rural carriers will get VoLTE handsets. If they are lucky, they will get the handsets at the same time as Verizon or sometime soon after.

Outside of Verizon’s rural partners, small U.S. carriers have not had much luck setting up roaming pacts with larger operators. “There are no LTE roaming relationships out there with AT&T or Verizon, unless you happen to be one of the chosen few in Verizon’s LRA program,” Berry said.

During the CCA Global Expo, held during March in San Antonio, Texas, Sprint announced it is adding 700 MHz Band 12 capabilities--compatible with spectrum held by many small carriers--to some of its devices, aiding NetAmerica

members with their LTE buildouts and joining CCA’s Data Services Hub.

“It is so huge for Sprint to say, ‘We’re going to help you create an ecosystem for LTE,’” Berry said. “Now small carriers have a way to survive, a reason to exist to build out LTE and a reason to exist,” he added.

Having Sprint in the data roaming hub adds ballast. The hub creates “a virtual Tier 1 carrier that has access to almost 100 million customers,” Berry said, making it very attractive to international mobile operators seeking LTE roaming deals with U.S. operators.

And Berry contends the CCA hub can handle not just LTE data roaming, but VoLTE roaming as well, given that VoLTE is basically just another data service delivered over LTE.

At its recent expo, CCA also launched the “CCA Device Hub Powered by Apkudo,” which will enable CCA members to pool their resources and gain access to the latest devices. The device hub could potentially help CCA members get VoLTE-capable devices once they are ready to roll out VoLTE to their customers. ●

“Everyone knows there’s not going to be a VoLTE device available until late this year or in 2015.”

STEVE BERRY, PRESIDENT AND CEO OF THE COMPETITIVE CARRIERS ASSOCIATION

