Kineto WIRELESS

VoLGA: Voice over LTE Via Generic Access

Why mobile operators are looking to the 3GPP GAN standard to deliver core telephony and SMS services over LTE

March 2009

A Kineto White Paper

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LTE: A Key Next Step in Mobile Network Evolution

The next-generation, all-IP access network is on the minds of all mobile industry leaders. Deployment of a Long Term Evolution (LTE) access network has quickly emerged as an important next step in mobile network evolution. With very high data transfer rates and exceptionally low latency, LTE promises to provide users with a true mobile broadband experience.

At the same time, the tremendous success of 3G/HSPA data solutions over the past year has demonstrated strong consumer demand for mobile Internet access services. The GSM Association (GSMA) recently reported that 3G data has become the fastest growing broadband service in the world, with millions of new subscriptions monthly.

As LTE enables operators to offer an even higher performance mobile broadband service at a significantly lower cost structure than their 3G/HSPA networks, they are looking to leverage the technology to capitalize on this proven consumer demand for a true 'mobile Internet.'

To meet this demand, a number of major mobile operators are now targeting LTE market trials as early as the second half of 2009. ABI Research Analyst Nadine Manjaro was recently quoted saying, "some operators may choose to bypass 3G and move directly to LTE, putting increased pressure on equipment vendors to meet accelerated timelines."

The Operator Imperative: Voice over LTE

As mobile operators plan for this next generation of mobile Internet, they are keen to avoid mistakes made by many fixed-line operators. The deployment of high-speed broadband networks left many fixed operators delivering a 'dumb pipe,' ideal for 'over-the-top' service delivery. Alternative service providers were able to quickly flourish by delivering voice over the top of fixed broadband networks, because the fixed operators themselves were slow to bring out their own competitive VoIP offers.

The mantra for mobile operators is to be 'smart-pipe' providers. This approach acknowledges consumer demand for a mobile broadband pipe providing straight forward Internet access. But rather than leaving it solely to over-the-top competitors to deliver voice services over these pipes, there is an imperative for mobile operators to seamlessly weave their own voice services into the broadband connection. Consumers can, and likely will, still subscribe to alternative VoIP providers, but a mobile operator's goal should be to put their own voice service front and center.

In this presumed approach, an operator would continue to leverage their existing circuit-based core voice networks to service subscribers when connected to the operators' 2G/GSM or 3G/UMTS access network. However, to service subscribers when connected to LTE, the operator would leverage a new IMS-based core network, upon which all of their current services would have been replicated (Figure 1).

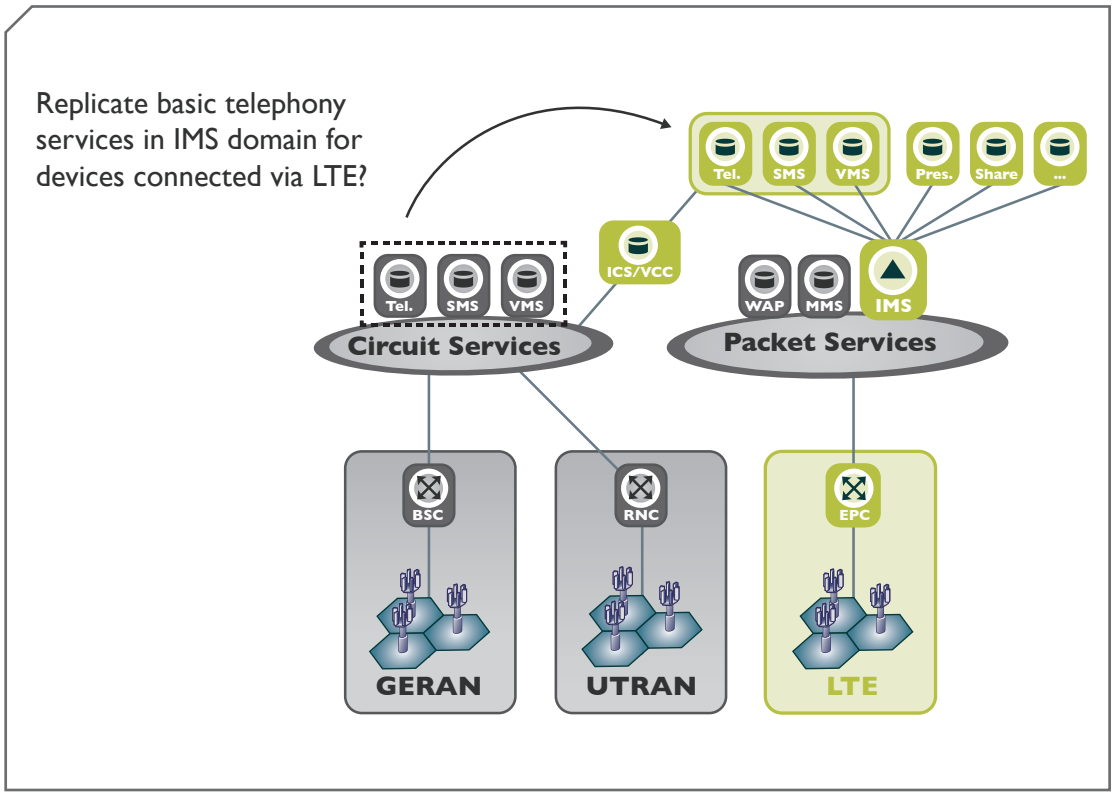

Figure 1: Operators are questioning the value of replicating core telephony services in LTE

However, several key trends in the communications market have emerged over the last few years that have caused significant changes in the IMS deployment plans of many mobile operators. For example, with the success of Internet-based search, commerce, music and Web 2.0 services, some operators are now rethinking their overall mobile data service strategy. Rather than putting effort into conceptualizing, developing and delivering their own mobile data services, many operators are now focusing on doing a better job at working with, and mobilizing, successful Internet-based services.

The success of Release 4 soft-switch MSCs is also having an impact on operator IMS plans. These new voice switches are providing all the feature richness of legacy MSCs, while providing the capital and operational cost advantages of all-IP systems. Still in the early stages of deployment, these systems face many years of depreciation. And unlike moving to an IMS-based telephony core network, softMSCs enable operators to continue to leverage all their existing (and expansive) operational support systems (billing, provisioning, services, customer care…).

As a result of these trends, the market is now starting to see several categories of mobile operators emerge when it comes to IMS. For some, the plan of record remains an eventual migration of all services to an IMS-based core network, albeit more slowly than originally anticipated. However, for a growing number of other operators, while they may still plan to deploy IMS, they are looking to focus those efforts on the introduction of new services rather than the recreation of existing services (e.g. telephony) in the IMS domain. The IMS Rich Communication Suite (RCS) effort within the GSMA is a good example of this new focus (see sidebar, p. 4).

Voice over LTE and the Rich Communications Suite (RCS)

To help facilitate IMS deployment, a number of operators and vendors are now working on the IMS Rich Communications Suite (RCS) specification. IMS RCS is a well-defined set of IMS-based services, consisting of three new applications (presence, instant messaging and active directory) all tied into basic telephony.

RCS, like IMS in general, is envisioned to be access-network independent, meaning it has been defined to work over today's 3G network, as well as LTE.

Pragmatically, RCS in a 3G network relies on the existing voice service core network and transport to deliver telephony, while adding new multimedia services over the packet access network.

Ironically, this serves as a model for GAN telephony over LTE: leverage the existing and proven 2G/3G telephony network while adding new applications as packet services.

This model also extends the RCS vision seamlessly into LTE with a GAN-based telephony service. As GAN enables operators to continue leveraging their existing core voice network over LTE, the RCS service continues to function in the same manner as it is transitioned into LTE versus a 3G access. The telephony component of the RCS service remains off the existing voice core, while the new aspects of the RCS services are derived off of the IMS core, mirroring how the service is delivered over the 3G access network.

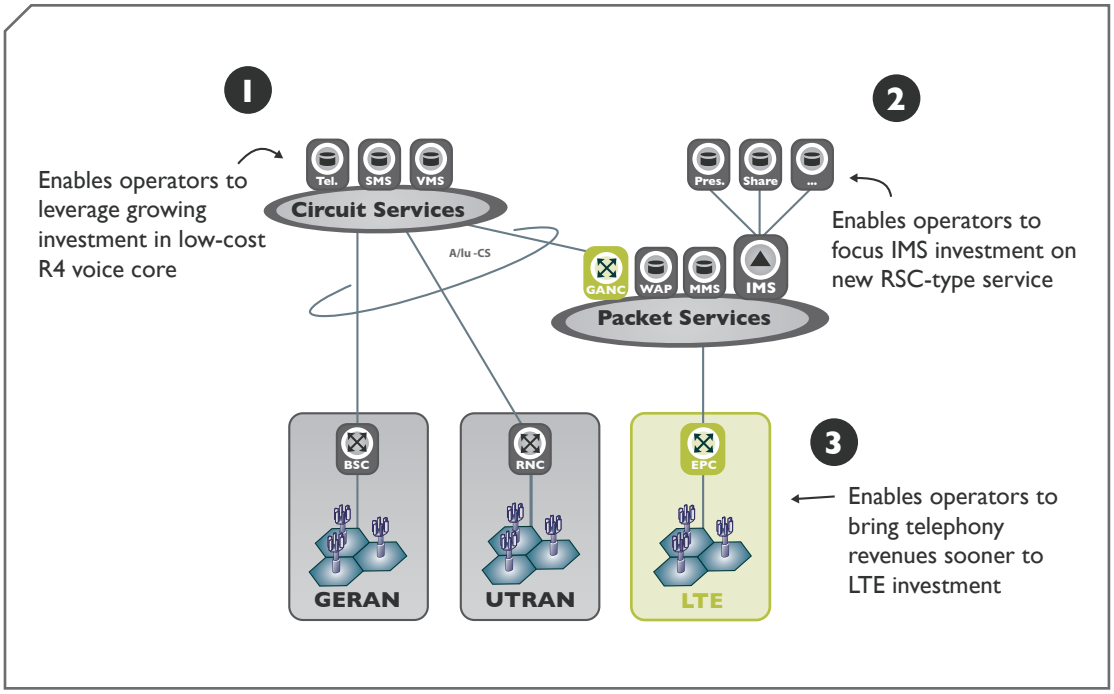

Figure 2: Elevate existing core voice services to become packet services over LTE

The Solution: Voice over LTE via GAN

As a result of these changes in the IMS market, a number of operators are now looking for an alternative approach for delivering their mainstream voice services out over LTE. These operators are keen to identify a method for voice service delivery over LTE that enables them to leverage their proven, installed voice core networks. The concept is to 'elevate' an operator's existing core voice network to act as a packet service delivered over the LTE access network. Rather than attempting to recreate core telephony services in IMS, simply make the existing telephony infrastructure a packet service delivered over IP via LTE. The existing 3GPP Generic Access Network (GAN) standard has quickly emerged as a favored approach for realizing this concept (Figure 2).

The 3GPP GAN standard, also commonly referred to as the UMA standard, is the technology behind a number of 'home zone' services deployed by leading operators worldwide. The premise behind GAN has always been to extend existing mobile services over any generic broadband access network. Originally applied to fixed broadband networks like DSL and cable, it quickly became clear that GAN also applies directly to mobile broadband networks, such as LTE.

The UMA/GAN standard, initially introduced in 3GPP Release 6, has been vetted and proven in commercial deployments worldwide with millions of subscribers today. The GAN specification was extended in Release 8 in 2008 to also include support for 3G core network interfaces (Iu), in addition to 2G (A/Gb) interfaces. Leveraging the 3GPP GAN standard as the basis for voice and SMS service delivery over LTE has a number of advantages:

Investment protection
Clearly, basing LTE telephony services on an existing (expansive) voice core network protects a substantial capital investment..

Proven service core
The existing, expanding and evolving voice core network is a proven, reliable resource at the heart of mobile networks worldwide.

Low-operational disruption
Expansive operation support systems (OSS) and business support systems (BSS) have been developed and integrated with the existing voice core network. These network services can be extended to the LTE environment.

3GPP standards-based delivery
The 3GPP GAN standard has proven an effective and robust method for extending mobile voice services over broadband packet access networks. With only minor modifications, the existing GAN standard can be used to deliver voice over LTE today.

Minimal impact to handset manufacturers
A key lesson learned from 3G network deployments was the importance of encouraging early handset development. With 3G networks deployed, operators waited years for viable handsets to begin loading networks. Any confusion over the telephony client will undoubtedly delay the availability of LTE devices. Defining LTE voice to be identical to the existing voice services of the 3G and 2G networks immediately de-risks a large portion of the handset development.

Supported by all major handset vendors
Today every major handset manufacturer, including Nokia, Samsung, LGE, Sony-Ericsson, RIM, Motorola and HTC, has developed GAN handsets. This too aids in de-risking LTE device development. These considerations have made GAN the leading approach for delivering telephony services over LTE.

The VoLGA Forum

Launched in March, 2009, the Voice over LTE via Generic Access, or VoLGA Forum (www.VoLGA-Forum.com) was initiated to specify and promote an approach for extending traditional voice and SMS services over LTE access networks.

The group is working to develop VoLGA specifications, based on the existing 3GPP GAN standard, which are designed to provide subscribers a consistent set of voice, SMS (and other circuit-switched) services as they transition between GSM, UMTS and LTE access networks.

VoLGA will support all existing circuit services as well as IMS RCS and other combinational services providing mobile operators a viable roadmap towards new revenue generating services. In time, it is expected that the VoLGA specifications will be presented to the 3GPP for consideration as a recognized standard.

VoLGA: A Long-Term Solution

Considering the overall transition to a full LTE environment, VoLGA offers a long-term telephony strategy. It is clear that any LTE telephony service or handset must support the 2G/3G as a fall back for service delivery. The use of VoLGA for telephony simply reuses the existing telephony client which is already required to be present in any LTE handset.

Even in a full IMS telephony deployment, the 2G/3G telephony client will be present in the handset. Similar to the RCS model today, operators can invest in IMS for non-telephony services while continuing to leverage their existing 2G/3G telephony networks for LTE with VoLGA.

An operator specifying voice over LTE has a fundamental requirement to provide the same service experience – capabilities, functions and quality – which are supported in today's mobile networks. The existing R4 MCS service core offers a natural platform for delivering these services. The implication is that mobile networks will support 2G/3G telephony services for many years to come.

Conclusion

Operators around the world are looking to accelerate LTE deployments. Rather than delivering an undifferentiated broadband connection, many of these operators are focused on being 'smart pipe' providers by weaving their existing telephony services into the offer.

Leveraging the 3GPP GAN standard to extend voice services from an existing core voice network over LTE offers the fastest, lowest risk path to LTE telephony. The development of a set of VoLGA specifications provides a concert path to bring voice over LTE via GAN. For all operators grappling with approaches for delivering voice over LTE, VoLGA provides long-term investment protection, as well as short-term service acceleration designed to deliver profitable telephony services today.

Even for those mobile operators looking to eventually migrate all services, including mobile telephony, to IMS, the VoLGA-based approach offers a good mid-term solution for voice over LTE.

Making the call:
Accessing telephony services with VoLGA

With operators looking to early long-term evolution (LTE) deployments in the second half of 2010, it is important to consider a potential timeline for adding telephony services to the network. The schedule will be dictated by the types of devices available to access the LTE network.

One thing is certain, the operators aggressive with LTE view telephony as a 'must-have' service available from day one. Therefore, these operators are considering different classes of LTE devices, each capable of supporting VoLGA for voice over LTE today.

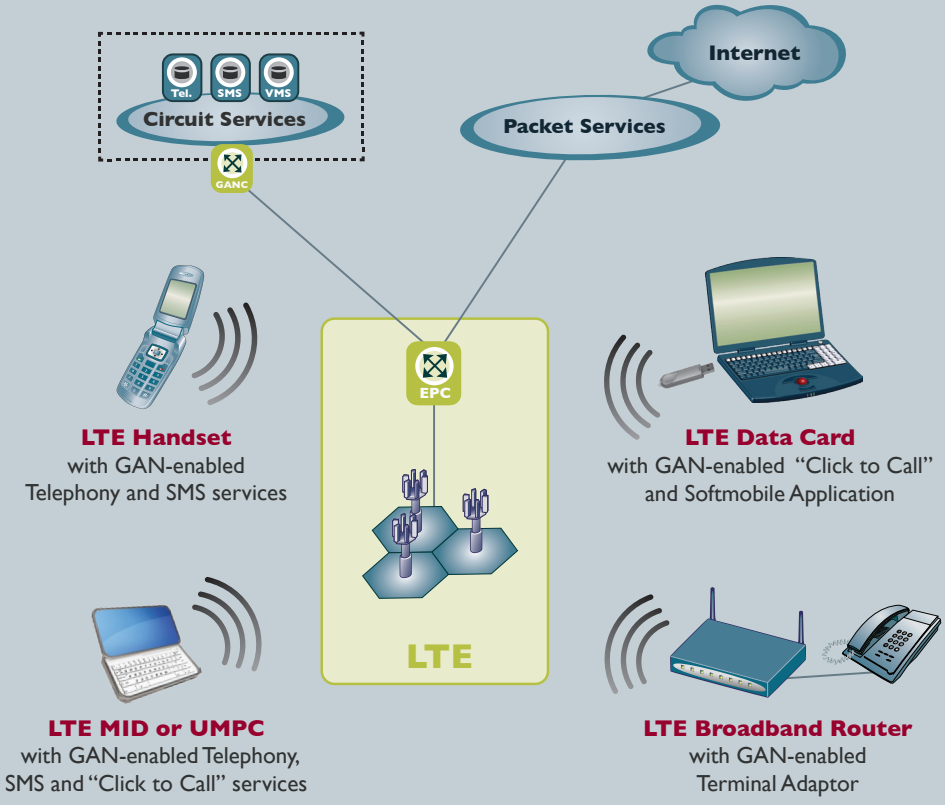

Figure 2: Elevate existing core voice services to become packet services over LTE

LTE Laptop USB Modem

An LTE 'dongle,' or USB modem, is likely to be the first option provided for consumers of LTE network services. The dongle is a well-known tool for delivering mobile broadband services.

With today's 3G dongle services, mobile operators don't typically provide their own branded VoIP service; thus, consumers have a high-speed IP network that invites VoIP competitors.

Today, it is possible to use UMA/GAN technology to provide a softmobile VoIP client, which derives service from the existing mobile voice core. Orange recently launched Unik PC in France, which is a perfect example of this service. The softmobile application resides on a USB key and is a self-contained application that runs on the subscriber's laptop.

For LTE, it makes sense to bundle a VoLGA-based softmobile client into the LTE dongle to deliver integrated broadband and telephony services to users from the start.

LTE Broadband Router

LTE is viewed as a replacement technology for today's fixed-line broadband connections into the home. With VoLGA, the LTE router can be used to replace the fixed home phone as well.

The fixed-line service is delivered via a VoLGA client in the broadband router with RJ-11 ports providing dial tone in the home; thus enabling the mobile operator to deliver broadband data, as well as fixed and mobile voice service, through a single, branded LTE connection.

T-Mobile's extremely successful fixed-line VoIP service, @Home, has demonstrated that mobile operators can capture fixed-line revenues with UMA/GAN today.

LTE MIDs (Mobile Internet Devices)

Operators are envisioning a new class of devices that will enable them to capitalize on the LTE network -- mobile internet devices (MID). MIDs are a cross between a mobile phone and laptop, specifically designed to deliver a media-rich mobile Internet experience beyond what a traditional handset can support, but without the overhead of a laptop. The MID would have an embedded LTE radio and be provided as part of a mobile broadband service.

LTE MIDs will likely provide an embedded (or downloadable) softmobile client to offset potential VoIP competition. Using an existing VoLGA-based softmobile client, operators can embed telephony directly into an LTE MID as part of a technology launch.

LTE Handsets

Handset manufacturers will develop LTE devices only when there is a clear mandate for telephony from operators. Any hesitation, confusion or delay in telephony or the approach for delivering telephony will serve to delay the handset market.

For the major device manufacturers, leveraging the existing R4 service components for telephony and utilizing the UMA/GAN engine for packetizing traffic over LTE is relatively straightforward. This approach relies on software elements already proven in the field. The effect of standardizing on VoLGA for voice over LTE is to de-risk the development of LTE devices and enable manufacturers to focus on the complexities of a new radio resource.