



# LTE – What Voice Services? White Paper

November 2009

## 1 Introduction

**Much has been written lately about increased bandwidth benefits of LTE and Communication Service Providers (CSPs) plans to deploy the technology as the 4G foundation. Many CSPs have announced their LTE plans and some have even begun limited LTE data trials. For sure there's a coming wave of network upgrades and new handsets that will certainly transform mobile broadband.**

CSPs considering the transition to LTE data are faced with the decision of whether to also offer LTE voice services in order to better utilize the new network infrastructure, or deploy LTE data-only networks. For the most part, it seems that the desire is there to transition to LTE voice sooner rather than later. This strategy makes sense as LTE requires entirely new radio access technology, from antennas to base station controller upgrades, and keeping two radio access networks greatly increases OPEX which might be best spread across a wider segment of offerings.

It is the 'how' to deliver LTE voice services that has created confusion. When LTE was originally envisioned, the conventional thinking was that the CSP's networks would have transitioned to IMS architectures by then and therefore voice on LTE would naturally be based on VoIP. The reality is that as of this writing, there are very few true IMS production networks in place and therefore CSPs must reconcile how to quickly deploy LTE with the realities of network transformation timelines and budgets.

## 2 Options, options

Of course there are options on how to move forward with voice delivery architectures. The backdrop of which is the general agreement that current 2G and 3G networks will be in place for some time to come, and therefore CSPs must take into account not only how their network will evolve, but how to support roaming and handovers across multiple CSPs. In addition, the expectation is that current 2G / 3G subscribers will be the first to migrate to 4G as CSPs provide upgrade incentives, which puts additional burden of providing feature and service parity as part the upgrade as subscribers will expect their current call feature sets to behave the same once they upgrade.

**Among the most studied options for voice delivery are:**

- **Dual Mode Handsets.** *Having handsets that support both GSM and UMTS means that subscribers are able to roam in-out of the national/international networks and ensure service continuity when LTE networks are not yet fully built up.*
- **3GPP IMS.** *The CSP may take this opportunity to upgrade the core network to IMS architecture. Deployment of IMS-based LTE voice has been documented since IMS Release 8. Moving to IMS has the obvious advantage of commoditizing a large portion of the network, bringing with it all the benefits discussed for several years now.*
- **Voice over LTE Generic Access.** *Another option that has been put forth is Voice over LTE Generic Access (VoLGA), supported by a newly-formed industry consortium known as the VoLGA Forum. VoLGA proposes utilizing the IMS-based LTE radio access network, but maintains the circuit-switched network (either GSM or CDMA based) by introducing a network element known as the VANC (VoLGA Access Network Controller). The VANC is responsible for connecting the packet-switched LTE access network to the current circuit-switched core network, ensuring that existing MSC are not changed. Of course this ensures that there's minimal disruption to existing switching elements and current voice applications may be delivered.*
- **Circuit Switched Fallback.** *Here the handset normally operates in 4G (LTE) mode when accessing data services and idle, but switches to a 2G or 3G radio when it is informed of an incoming call, or an outgoing call is placed. A mechanism to inform the handset via 4G (IP data path) that a call is inbound does need to be formalized.*
- **Proprietary Solutions.** *Other options do exist, such as upgradable IP-enabled MSCs, but those tend to be tied to a specific vendor architecture.*

To be clear, these architecture options address how to marry the packet-switched LTE radio network with the service operator core network for the purpose of delivering voice. What is not immediately apparent is how does the CSP deliver voice applications, such as Find Me / Follow Me, Voice VPN, CRBT and all the critical revenue generating add-ons that subscribers use and would expect to migrate to LTE.



### 3 Service Brokering

Regardless of the architecture chosen, CSPs will be faced with application delivery challenges created by the transition in LTE to packet based voice. Today's voice services are predominantly delivered via Service Control Points (SCP) or Intelligent Network (IN) Application Servers connected via IN protocols such as INAP and CAMEL. Those services tend to be highly stable and profitable but also highly customized, and therefore not easily moved to SIP-based application servers. CSPs will need to deliver these same services (down to feature sets and even quirky behavior) on LTE subscribers to ensure migrated users have the same level of service and experience.

As CSPs evolve their networks for LTE and other networks, the resulting networks present tremendous challenges in voice services and application delivery. Realizing this, the industry has come forward with a purpose-built network element: the Service Broker, a solution specifically designed to overcome network architecture challenges and ensure voice service delivery from any network domain to any other network domain.

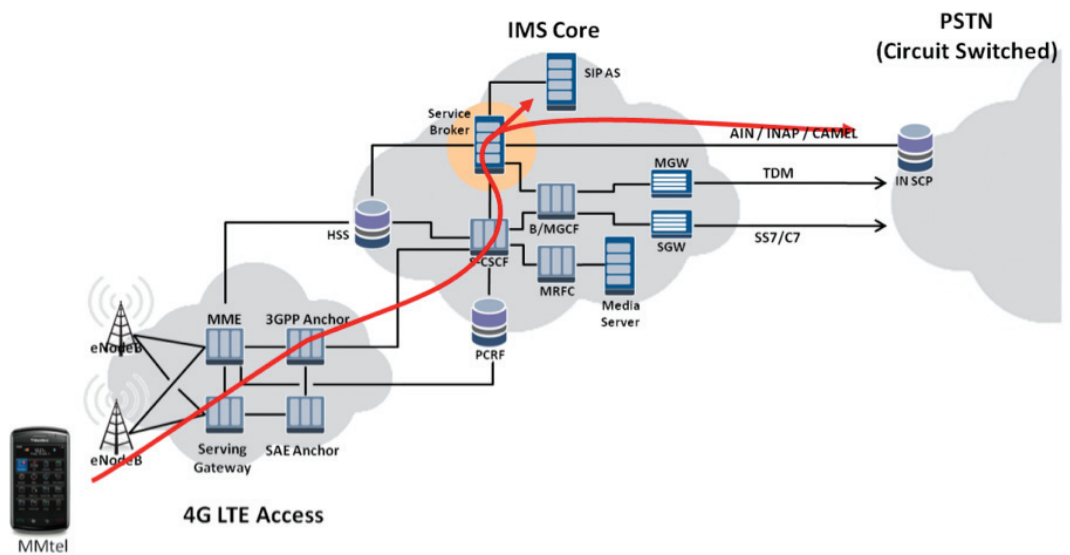
Service Brokers are placed between the application layer and the control layer, and assume and deliver a number of roles as needed: the IMS IM-SSF, SCIM, reverse IM-SSF, Media Resource Broker (MRB), IN trigger management and subscriber data management. All these roles have the common purpose of delivering and extending the reach of applications to all network domains of the CSP.

Let's take a look at how Service Broker might fit within two of the most popular network proposals, IMS and VoLGA.



## 4 LTE Voice over IMS

Service Brokers provide the capability of extending current voice services by providing seamless call / session interworking between the packet switched LTE access network, and circuit-switched 3G applications without requiring changes to either. For those CSPs that have fixed line networks as well, they are also able to reutilize voice services which may have been only offered in that network domain to new wireless LTE subscribers.

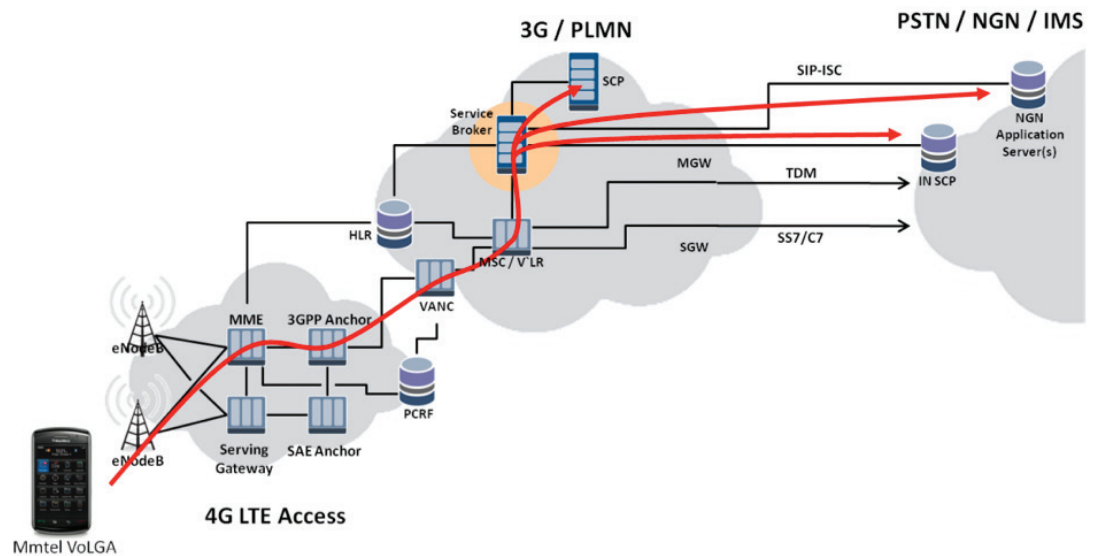


In the figure above, LTE clients are able to access all applications they previously used, such as PrePaid, CRBT, Voice VPN, Find Me / Follow Me, etc, and therefore are not required to change their subscribed services. From a network perspective, the Service Broker enables the IMS network to “see” the existing applications as new SIP-based applications, by providing the interworking required. As far as the IMS network is concerned, the Service Broker is the SIP server, while to the existing SCPS the Service Broker is an existing 3G MSC.

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## 5 LTE Voice over VoLGA

Those CSPs that choose to follow an architecture based on the VoLGA forum proposals, the Service Broker provides the inverse benefit: allowing next-gen SIP-based applications to be utilized by the existing 3G network. It also becomes possible to bring forward those applications residing on the fixed line network as well, further enhancing the service delivery options.



## 6 Service Broker Functions

Service Brokers provide other functionality that, once deployed, can be of added benefit to the CSP. Among the most often delivered features are:

- IMS SCIM (now renamed the IMS Service Broker)
- IN-IN Trigger Management
- Real-Time Charging
- Protocol/Call Flow Management
- Subscriber Data Management Interaction
- Media Resource Brokering
- Service Orchestration

The Service Broker's ability of performing orchestration and combination of discrete voice applications and services into new combined offerings (voice mash-ups) is particularly exciting. With this capability CSPs are able to create new revenue producing offers to subscribers where they previously were not available: CRBT and PrePaid, Find Me / Follow Me combined with Voice VPNs, etc.

Service Brokers also provide the capability of generating RealTime Charging events, either programmatically (via an API) or automatically as part of service delivery. The challenge facing CPSs is delivering new, innovative services that seamlessly integrate into existing billing platforms. Doing so often means normalizing charging events or even transforming charging events from one technology to another, as is the case in IN to IMS migration. Because the Service Broker is responsible for orchestrating and delivering combinational services, it is often then the responsibility of the Service Broker to generate a charging event upon successful start / completion of those enhanced services.



## 7 Ignite™ Service Broker

AppTrigger introduced its Service Broker solution, the Ignite™ Service Broker, to meet these needs of providing efficient and cost-effective application connectivity for tier 1 service providers worldwide. AppTrigger's Ignite Service Broker resides at the application layer and sits between the application layer and the core network to provide interworking and manage connectivity to the evolving network. The Ignite Service Broker is able to connect any application to any user by incorporating a number of open standard APIs and is purpose built to deliver signaling, media and feature interworking between disparate networks that converged and consolidated applications require.

The Ignite Service Broker solution leverages these capabilities to allow CSPs to preserve their investment in current revenue-producing voice applications by enabling interworking with next-generation network build-outs. This enables CSPs the ability to re-purpose today's profitable legacy voice applications with their new NG networks such as LTE, as well as to maximize investment and reduce risk in the deployment of new services with legacy IN/TDM networks.



## 8 Conclusion

CSPs are currently spending a lot of time and energy qualifying LTE radio access network technology, which will ensure live deployments maintain or exceed current mobile reliability. The next several quarters will prove interesting as CSPs choose LTE voice delivery architectures, much of it influenced by time and their own network design's requirements. Careful consideration of voice services and applications will ensure high-value customers (early LTE adopters) are able to enjoy the same voice features and services they are currently used to, ensuring they are permanent converts. Service Brokers will play a critical role in ensuring CSPs are able to immediately migrate current voice revenue platforms for those early LTE subscribers.



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