Smart VoIP
Enabling Mobile Operators to Deliver OTT VoIP
Introduction

Today’s mobile network operators face a variety of threats to their businesses. Perhaps none has more immediate disruptive potential than new services that divert voice minutes away from the mobile provider’s network and onto lower cost, IP-based voice providers, reachable from any broadband IP access network.

These new voice providers, enabled by a plethora of Over-The-Top (OTT) applications operating across mobile and fixed access networks, offer the user multiple alternatives to generic 2G/3G cellular voice services. Their rise in popularity is fuelled by all of the following: convergence in the availability of reasonably priced smartphone platforms with built-in Wi-Fi; operating system suppliers that openly encourage third party Voice over IP (VoIP) application development; the availability of low-cost or “all-you-can-eat-for-a-fixed-price” cellular data plans; and the fact that VoIP service is reachable from any broadband IP connection on the globe.

Those are the reasons uptake in the usage of mobile OTT VoIP applications has rapidly followed the underlying increase in smartphone penetration across all segments and tiers of the mobile customer base.

While mobile users may view this as a positive development that enables new, cheaper methods to communicate with friends and colleagues, there is a more insidious problem for the mobile operator. These OTT applications are regularly used to bypass the mobile network and its attendant tariff structure altogether (Figure 1). As voice minutes continue to make up a large percentage of the operator’s top line, any decline in revenues from the voice business will have a significant impact on overall margins.

Figure 1: 3rd Party OTT Voice Service Providers Compete Directly With Cellular Roaming Services
The opportunity to avoid using the mobile operator’s network for voice calls made on smartphones is primarily due to a reduction in the cost of data transport for VoIP services. For example, every smartphone contains not just a cellular radio but also a Wi-Fi interface over which the operator has no control. OTT applications can simply use a lower cost (or free) Wi-Fi service to connect to the OTT voice provider wherever broadband Wi-Fi is available.

Similarly, several years ago the cost of a cellular data plan was too high and the data service itself too unpredictable to consider using it for packet voice. Today, the introduction of lower cost, higher capacity data tariffs to match the rollout of new HSPA/HSPA+/LTE networks means the cost of packet voice transport in the cellular network is often negligible.

In several cases, it is now undoubtedly less expensive for the user to place a voice call using an OTT service that is reached over either the Wi-Fi or cellular data network path than it is to use the mobile operator’s service for calls to the same destination.

Consider two simple cases:

1. A businessman travels regularly outside of his home country to visit his customers and suppliers. While abroad, he takes advantage of the Wi-Fi service offered at his hotel, at retail and transport locations served by his global Wi-Fi connectivity supplier (e.g. iPass) and even the guest Wi-Fi at his customer’s place of business.

   The businessman could be saving his company significant expenditure if the cost of making those voice calls using an OTT VoIP service is less than making those same calls using a cellular roaming service.

2. A person has friends and family who live in different parts of the world. There is a great deal of convenience in using a mobile phone to stay in contact, but international direct dial rates on mobile tend to be quite expensive. The user resorts to an OTT VoIP service (on the mobile or on a laptop) to keep costs down.

In both of these examples, the user has a smartphone that is quite capable of making all of the voice calls described above over the 2G/3G cellular network. In both cases, the user elects to instead use an OTT VoIP provider and to bypass the mobile operator’s voice service completely because it costs him less money.

It is therefore no surprise that mobile operators consider OTT voice services significant threat to their business. If today’s users are becoming more aware of how OTT VoIP services can be used to bypass the mobile network, then as the gaps in Wi-Fi and cellular data coverage are filled in, the problem of voice revenue leakage from the mobile network to OTT providers will only increase in magnitude.
To date, operator responses to this problem have fallen into one of several categories:

(i) Block OTT VoIP services or charge users additional fees for using such services over their mobile data network
(ii) Reduce tariff plans for roaming users within a discrete set of visited networks, or for users in the home network who regularly call telephone numbers in one or more different countries
(iii) Partner with a 3rd party OTT service provider to white label their products with the operator’s brand for use in certain scenarios only (e.g. can only be used while roaming and connected to Wi-Fi) with the operator taking a share of the revenue from each call
(iv) Introduce a wholly owned OTT service using a completely separate OTT infrastructure with some level of back-end integration for billing consolidation purposes

These current solutions bring their own set of problems. Blocking or charging additional fees for OTT VoIP traffic is at best a short-term measure for which mobile operators have already backed away. While reducing tariffs may incent the user to continue with the cellular service, there is no commensurate reduction in cost for the mobile operator, therefore operator margins continue to be impacted especially in a roaming context.

Partnering with an OTT provider is a short-term fix, but the idea of handing a future potential competitor the identity of a large number of your mobile subscribers is not a sound marketing strategy. Building a competitive OTT service is a good idea, however using a completely separate network infrastructure to achieve this is an expensive proposition not just in terms of investment in equipment but in the integration and IT aspects necessary to fulfill all of the commercial, legal and regulatory aspects that are incumbent upon the mobile operator.

But what if the operator could provide their own OTT VoIP service using existing core voice platforms? What if VoIP calls that traverse those platforms (made over cellular data or Wi-Fi) could be detected and charged at a different rate? Or, further, that calls made over Wi-Fi by a user traveling abroad could also be detected and charged at a different rate to VoIP calls made from within the user’s home country? What if all this could be achieved without the introduction of any new, complex technology or any extensive integration work within the operator’s network?

In this case, our business traveler can use their home operator’s OTT VoIP service over Wi-Fi and take advantage of offered VoIP calling rates for each call placed (Figure 2). The home operator will collect all of the revenue for the call as it bypasses the roaming network and can sustain margins. Calls handled in the cellular network by the operator’s roaming partner will continue to be charged at the roaming rate, maintaining the revenue stream from roaming services.

Our home user utilizes the operator’s OTT VoIP service together with VoIP calling rates and does not have to think twice about placing an international phone call to a friend. The call is placed as a VoIP call over the cellular data network or Wi-Fi and only uses the operator’s core voice infrastructure.
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Figure 2: Using Wi-Fi and the Internet to Provide a Home Network OTT VoIP Service

As the same core platforms are used for billing, regulatory and legal compliance for calls placed over both the cellular voice and VoIP access networks, the amount of IT work required to enable a tightly integrated service is small compared to implementing the OTT service as a completely separate environment.

This is the promise of Kineto’s Smart VoIP application, a solution to the problem of the competitive OTT voice threat that puts control of service delivery, service cost and customer billing firmly back into the domain of the mobile network provider.

Kineto’s Smart VoIP Application

Kineto’s Smart VoIP solution enables mobile operators to deliver a branded OTT VoIP service using their existing voice platforms and infrastructure.

Even in the costliest roaming destinations, the Smart VoIP user can continue to enjoy a fixed tariff set by their home operator when connected over Wi-Fi, avoiding the shock of receiving expensive and unpredictable phone bills after returning from a holiday or business trip. The Smart VoIP operator receives the revenue for those calls rather than losing it completely or sharing it with other parties.

The operator can charge a rate appropriate to incentivize users to remain on their home network, rather than using a third party voice provider for making international calls over the cellular data network or Wi-Fi radio. Those voice minutes are retained by the operator rather than lost, and the user is rewarded for their brand loyalty through lower tariffs for Smart VoIP calls.
The OTT Smart VoIP service can work over any mobile operator’s cellular data network as well as over any broadband Wi-Fi network. For data paths where the packet voice traffic is transported over an open network (principally over an unsecured Wi-Fi interface or, the Internet) all voice and signaling traffic between the phone and the voice network is secured by an IPsec tunnel to prevent any tampering with, or eavesdropping of the voice conversations that are being carried.

The user has access to the same feature set as in the cellular network, including supplementary services such as Hold, Call Forwarding on No Reply and other standard voice service features.

Smart VoIP is a white label application meaning that each operator can customize the presentation of the Smart VoIP service on the mobile phone towards their subscribers. This enables operators to promote a strong brand identity consistent with the operator’s tailored messaging for their VoIP service.

**How Does It Work?**

To begin using Smart VoIP, the user downloads and installs the mobile operator’s Smart VoIP application from the marketplace or app store, then performs a simple activation process to enable the service.

When the smartphone is connected to the mobile operator’s network, the Smart VoIP service is protected using an IPsec VPN to ensure confidentiality for all voice traffic. Any Wi-Fi access point may be used: in a hotel, airport, coffee shop or private home. The only requirement is that the user must have authorization to use the Wi-Fi service. For example, either the Wi-Fi access point is open with no over-the-air security, or the user knows the WPA private key for a residential service, or has suitable credentials to use for a public hotspot service. (Smart VoIP is complementary to any automated Wi-Fi connection manager in the phone.) Even if the Wi-Fi network has no air interface security, the IPsec VPN extends all the way from the phone itself into the operator’s network so each conversation is secure.
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The Smart VoIP app contains an enhanced dialer application that can be branded with the operators only look and feel. The dialer can be used to make voice calls in the cellular network as normal, and over the Wi-Fi or cellular data network when available for the operator’s OTT VoIP service. If the device is not connected to a packet network interface, the call is offered only over the cellular voice network. However if an IP path to the operator’s network is available, then the caller also has the option to place the call using the branded OTT VoIP service instead.

For the operator, the Smart VoIP application requires a network access gateway into their mobile core infrastructure. The Smart VoIP gateway is a 3GPP-standardized GAN Controller platform for Release 4 MSCs that provides security over the IP access network and conversion of the IP traffic between the phone and the gateway into a format suitable for the 3G interface to the core network. The GAN Controller appears as a RNC to the R4 core network.

For an IMS core, the gateway is a similarly 3GPP-standardized Packet Data Gateway (PDG) to provide security over the IP access network.

Operators have several options to control Smart VoIP service usage. Principally, the solution can be tailored to enable the use of Smart VoIP on certain interfaces only when the user is traveling. For example, operators can allow it only over Wi-Fi when in a visited network to avoid the possibility of accidentally running up large data roaming charges.

Importantly, the Smart VoIP solution requires no new investment in, or modification to, core network platforms. Smart VoIP operates over standard, existing interfaces into the core and exists within the operator’s access network only.
Conclusion

Mobile operators are losing ever more roaming and international calling minutes to newer players in the alternate voice provider market. To compete while maintaining a reasonable profit margin on the business, mobile operators must offer a similar solution. It best for the operator if it uses packet transport between the subscriber and the network such that the service can be used from any broadband IP end-point whether over a Wi-Fi or cellular data connection, in country or abroad, subject to operator policy.

While several options exist for providing a competitive response, the option to roll out a branded, OTT VoIP service using the same core infrastructure that is already in place for cellular voice users presents an ideal scenario for the operator. The service can differentiate on feature set, while setting a tariff for calls placed using VoIP that is attractive enough to promote brand loyalty amongst its user base.

Kineto’s Smart VoIP application enables users who download and activate the application to connect to an existing R4 or IMS mobile core over any IP transport. The user enjoys the same quality voice service as if they were placing a call from within the operator’s cellular network, even if they are currently located on a different continent.

Operators can deploy Smart VoIP in their networks to ensure they are prepared for the OTT VoIP threat and as an opportunity to brand new voice service offerings to their customers, all the while maintaining the value of their standard 2G/3G cellular voice tariffs in both home and roaming network environments.