Evolving Telecom products and services to IMS

As LTE deployments around the world gather momentum, there is renewed interest in rolling out IMS across carrier networks. If you have not begun the process, it is time to IMS enable your products.

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TECHNOLOGY BRIEF

What exactly is IMS?

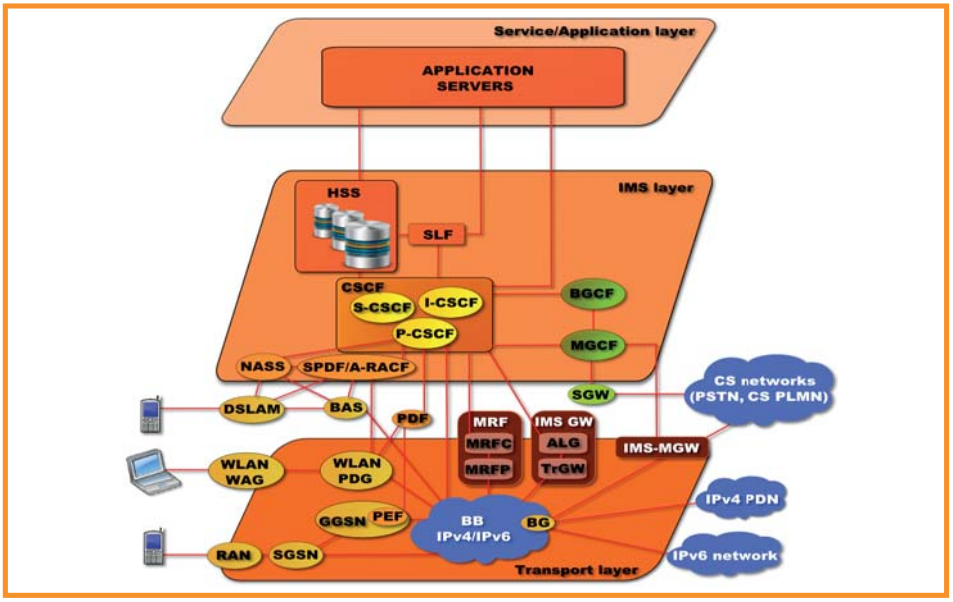
The IP Multimedia Subsystem or IP Multimedia Core Network Subsystem (IMS) is an architectural framework for delivering IP multimedia services in a standardized way across heterogeneous access networks and between networks from different Service Providers. It is made up from a collection of mostly IETF standards.

In much the same way as SS7 defined a common signaling mechanism to route calls from anywhere to anywhere across the PSTN, IMS provides a similar level of standardization for IP multimedia services globally across all carriers' IP networks.

Of course at the IP level, there is much more to do than signaling management. IMS must cater to authentication, service provisioning, session routing, end-to-end QoS, policy control and charging. It is intended to be access-network agnostic, supporting Wi-Fi, CDMA, GSM, WiMax, DSL and Cable modems... so long as the client is running IP. Even legacy systems such as POTS, H.323 and proprietary VoIP systems can potentially be supported through IMS gateways, notwithstanding the inherent limitations of such client devices.

The intention of IMS is to flatten the network and simplify service delivery and provisioning with the aid of a horizontal control layer that isolates the access network from the service layer. Historically each new service added to carrier networks, is implemented with a "stove-pipe" architecture, making it necessary for each provider to worry about routing, authentication and security as well as the service itself. IMS removes that complexity, so that providers only need to be concerned with the service. Services no longer need their own control functions, as the control layer is a common horizontal layer, which takes care of these things on behalf of many different services.

Sounds great, doesn't it? Unfortunately however, IMS has been slow to catch on for two main reasons: commercial motivation and implementation complexity.



Layered IMS Architecture

There are many types of new services that could be enabled in an end-to-end IMS environment. For example using presence to dynamically make decisions about which calls to accept and which calls to route to voicemail, depending on where one is at the time of the call. Or routing a voice call from certain people but not others to your IP TV session when you are watching TV and did not answer the phone. Or using presence to call the nearest available family member on the device the network knows is in use, in times of an emergency. However, as embedUR has experienced, IMS standards are incomplete, calling for a lot of glue-ware to ensure interoperability, especially during the transition to full IMS deployment.

LTE marks a turning point

Since 2003 carriers and telecom equipment vendors have been touting the benefits of IMS and pitching it as the single most important telecom technology development of the decade. Well, that decade has since passed, and still there are relatively few true IMS deployments to date, and many unanswered questions remain about where, why, and how IMS is best implemented.

Completely overhauling the global telecom network with complex, sometimes ambiguous specifications isn't easy. So it is hardly surprising that evolution to IMS has been sluggish. Yes, more efficient delivery of multimedia services would be nice and could enable new high-margin services, but the truth is, Service Providers have been faced with more pressing near-term challenges.

Now however, as LTE gains momentum, there is growing urgency to deploy IMS, since ultimately, the two will be joined at the hip. Until now, carriers have been dependent on circuit switched networks to carry voice traffic from 2G, 3G and 3.5G networks. WiMax and LTE mark the first departure from this dependence on circuit switching. Today, LTE is limited to data, but around the corner lies Voice over LTE (VoLTE) which will be the first manifestation of IP Voice end-to-end.

These developments set the wheels in motion for the complete overhaul of carrier networks that will finally unify voice, video and data on end-to-end IP networks. This will transform the way services are implemented and delivered, and dramatically reduce the operational cost of multimedia service delivery.

Simplicity is Complicated!

If commercial urgency was the first barrier, the second obstacle has been complexity. The difficulty with IMS is that creating simplicity for Service Providers and users is complicated for those that have to build the products. And since no Service Provider can possibly switch over to IMS overnight, IMS must co-exist in a transitional world for some time to come. Regardless how creative the standards bodies are, something is always found missing when it comes to large-scale deployment in the real world. As an embedded systems specialist, embedUR has seen this first hand. Despite ten years in the making, there is need for lots of software integration to provide temporary transitional solutions. That's where we come in.

Take SIP for example, IMS sits on top of SIP, so it does not need its own call control functions. It uses those inherent in SIP.

That's OK for simple functions such as a two way voice call, the SIP constructs work just fine within the IMS framework. But what if your application needs to implement some of the new multimedia capabilities, such as the split conversation flows, prescribed by IMS? Say you want to initiate a media transfer to one party, while you are already in a call with another party? You need specialized control messages and exchanges not defined in the SIP standard. The only option right now is to extend the protocol yourself. This is precisely what we had to do to make an IMS compliant SIP stack for a collaborative multimedia application on Android devices. This is where interoperability breaks down, or at least gets very complicated.

Another challenging area is QoS and policy enforcement. Legacy networks already have AAA servers to manage security, provisioning of the service profile and billing. But they are limited to a small portion of the access network. These policies do not extend end-to-end. IMS promises to offer end-to-end policy management, using sophisticated client databases that can be configured with client profiles for authentication, media capabilities and collaborative roles. There are some subtle and some not so subtle differences in the way client and call management is done in IMS networks and legacy networks. Using a simple voice call as an example, mis-matches between IMS and legacy systems, can cause service interruptions and delays such as post call delay, where the user is simply waiting in silence for the ring tone to start. Another tricky area is network hand-off, as a call is passed from one network to another where roaming delays can occur.

Time to commit to IMS

Just as Service Providers can't switch overnight, nor can equipment and application providers. You too need to transition your products gracefully into the IMS world. IMSifying them, if you will.

How much of this do you really want to have to learn, in order to make your products IMS ready? This is where embedUR can help you navigate the IMS standards and develop the client and server components you need to get to market as quickly as possible, without derailing your core engineering teams from the products and features that bring in revenue today.

embedUR has the experience to develop server-side components in core switches and gateways, and client-side IMS agents for set-top boxes, wireless APs, Radio Access Nodes, cable modems, Android, iOS and Windows Mobile devices. And we have the know-how and confidence to deconstruct protocols such as SIP in order to extend its features to support previously undefined functions for adding, deleting and selectively routing individual media flows in a call session spanning across multiple users.

We can add IMS capabilities to your products, either by building native IMS agents from scratch, or by integrating IMS toolkits and open source code with your software. It just depends on what's already out there to draw upon. In one recent project for example, we had to take an open source SIP stack for Android, and first extend it to support IMS. Then we needed to enhance the protocol itself to support various flow management extensions. This was necessary to build the client and server components for a mobile application in which the end user could transfer or add/delete media during an active IMS session – features hitherto unsupported by SIP.

IMS deployment has begun

While progress has been sluggish, it is certainly not stagnant. Many carriers around the world are conducting trials, some are in full-blown deployment. And that means they are using products from some of your competitors – equipment, middleware and application vendors who had a head start on IMSfiying their products. However, it is not too late to catch up. The big push in IMS is yet to come. But don't get complacent, time IS running out, production-grade IMS deployment has definitely begun.

Although a lot of activity is still below the radar, real deployments are on the rise. For example, AT&T's uVerse offering which began trials around 2008, uses IMS for the voice-over-IP offering to deliver standard calling features like caller ID, click-to-call and messaging. The uVerse

IMS deployments today only scratch the surface of what's possible. Here is a more advanced use case illustration: Jack is at a soccer game, and he wants to share it with two friends: Pete who is at home, and Steve who is at the mall. Checking presence information on his smartphone Jack can see they are online. Jack calls them both at once, and starts a three-way call. Pete was actually watching TV, so the call is routed to his IMS enabled Set Top Box, while Steve is on his Android smartphone and gets the call routed to the IMS enabled SIP client. Then Jack turns on his camera and the game starts streaming to the respective devices of Pete and Steve, while they are still talking. But then Pete says, "I need to go out" so he switches the flows from his TV to his smartphone and continues the conversation as he gets into his car. In the car he transfer the call again, to the IMS enabled car communication system so he can talk hands free, while the kids in the back watch the game. Meanwhile Steve says, "I must share this with Bill". He now extends the call via a text message to Bill who is on his laptop. Bill clicks a link, and joins the audio call and video stream. The opposition scores a goal. Bill texts back a ☹, and they all laugh!

voice and video offerings will merge to enable TV-screen access to call history and click-to-call from the IPTV remote. Verizon has begun IMS deployment in a small way too. We can expect all major carriers to gradually introduce IMS elements into their networks over a 5-10 year time frame, in a stepping-stone approach.

This extended period underlines the importance for equipment vendors to have IMS-ready equipment available now – prepared for whenever discrete parts of the network are overhauled. No one can expect carriers to go out and buy an IMS-ready platform when they already have something adequate in service. But they will build IMS capability over time, each time they need to upgrade a piece part they are already using. That's when incumbent solution providers can either retain the account, or lose it to competitors that are better prepared for IMS. A lot of this is already going in the area of fixed/mobile convergence. So playing nicely in both the IMS world and with legacy equipment and standards, and doing so now, is of great importance.

Of course these rollouts are just the tip of the iceberg. Over the coming decade every carrier will transform their entire network to IMS. Do or die. You need to be a part of that network, so if you have not begun IMS enabling your products, now is the time to get on the bandwagon. But wait, you have immediate revenue goals and all your engineers are committed to other projects that have nothing to do with IMS. That is precisely where embedUR can help. We can provide the embedded systems engineering you need, without derailing your high-priority revenue generating products.

Explosive Multimedia growth

If you have any doubt about the accelerating adoption of multimedia, and the growing need for IMS, consider some of the following trends:

The desire to add more monetization options to IPTV is already a big motivator for IMS, because an IMS framework offers by far the most cost efficient way to add and monetize multimedia integration services. If the penetration of Smart TVs, which is fast approaching 15% in the US and Western Europe, is any indication, people clearly want to do more, while watching TV! In the IPTV middleware world a variety of integration components exist already. MediaFriends Inc., ETI software, Innovative systems and other companies for example, extend IPTV middleware through services delivery platforms to deliver caller ID and messaging over a regular cable TV service, thereby enabling real-time communications and social media experiences that span TVs, PCs and mobile phones.

Another catalyst for IMS is the growing number of mobile apps designed around multimedia sharing at their core. With more than 50% of Facebook users on mobile devices, it's not surprising that mobile video sharing is on the increase. For generation X and Y, texting and multimedia are second nature, and they want more flexibility and control over it. Multimedia applications can now be integrated into Facebook, and this will encourage more sharing of live streams of multimedia content. Although still a fraction of the billion monthly video views on YouTube, Facebook had over 550 million video views in Feburary 2013 according to comScore's US Online Video Rankings, with more than half of those views on mobile devices. In contrast, only 25% of YouTube views were from mobile devices. Nevertheless, that's an awful lot of video, which according to Byte Mobile, consumes over 60% of the access bandwidth. So much so in fact, that it has given rise to an entire industry of mobile video optimization companies.

Whether it is Instagrams, podcasts, photos or streaming video, the demand for mobile multimedia is unstoppable - as is the rapid evolution of mobile devices producing and consuming that multimedia content. Within a year or two, video on Smartphones might seem like ancient history, as new devices hit the streets, empowering ubiquitous connectivity even more.

Consider the implications of imminent devices such as Google Glass, which

recently began shipping trial units to developers, in order to foster a plethora of new multimedia applications. Some of which will be viral winners for sure. Glass is expected to FCS sometime in 2013. Once these go on the market you can expect an avalanche of similar Augmented Reality products, all IP-based and pushing multimedia demand and expectations to new heights. Already, Motorola, Sony, Epson and others are developing similar devices that will compete with Glass. Meanwhile, Apple is known to be working on a wristwatch device with smartphone capabilities. Just wait and watch the feeding frenzy of major carriers as they bid for the rights to market these new devices and the imaginative new multimedia services that surround them.

Getting your products IMS-ready

As Service Providers begin to differentiate their IPTV services, and launch a broader portfolio of multimedia communications devices, it is becoming increasingly apparent that their customers have multiple services and accounts. The simple concept of a single bill for phone, Internet and TV, needs to be extended dramatically to cover a much broader spectrum of devices and service. We're not just talking about the paper bill, but the gamut of subscriber data, and how it is managed within the network. Remember how long the gap was between the "one bill" marketing, and the actuality of one bill arriving in the mail? At one time, circa 2008, one well known cable provider was actually sending three different engineers to commission cable, voice and Internet in the same household, and still sending three separate bills, all while marketing Triple-play and single billing. How ridiculous is that? Even today, some leading providers still cannot merge Mobile and terrestrial services on the same bill. If Triple-play, Quad-play service profile consolidation was/is hard for the giant Telcos to accomplish, imagine the challenges before them now. Unifying subscriber data from different discrete services, into a common repository, where every service can access it is one of their biggest operational challenges.

These and other problems have a bearing on how you should build your products so they fit into telecom networks as they evolve to IMS. The opportunity for you is to understand how these problems are being solved, and ensure your products plug into that framework right away. Also, to accelerate adoption and field trials, you will likely need to demonstrate proof of concept for new revenue-generating multimedia applications Service Providers can promote to their customers. In order to do this, you'll need to have all the necessary components in place, not just the application servers, but gateways, middleware, and of course the client functionality - either as part of your product portfolio, or in conjunction with other vendors' solutions. This requires extensive interoperability testing.

In our work with IMS, we have found the more complex the application the more one discovers shortfalls in the standards and protocols required for IMS interoperability. Invariably some tweaking or glue-ware is required to enhance protocols, security and control-plane to function at scale in an IMS framework. And that is where we can contribute the most toward IMS-enabling your products.

Communication protocols and control plane optimization are two of our specialties at embedUR. We can help you wade through the IMS standards, read between the lines and fill in the blanks, to bring your products to market readiness for IMS and ensure interoperability with both IMS and existing legacy systems. Plus, since we are actively involved in a variety of field trials with Service Providers we have a good understanding of how they are addressing the interoperability and system integration challenges outlined above.

By engaging embedUR as your partner to help you migrate your products to IMS, you will be able to avoid pursuing technology dead ends, avoid wasting precious engineering resources in acquiring new skills in an unfamiliar landscape and accelerate getting to market with IMS-ready products, without impacting your core revenue-generating projects.