IMS Report Card

IMS Forum in cooperation with the University of New Hampshire InterOperability Lab
October 18, 2007

Executive Summary

This report is about dispelling the myths and addressing the hype about the readiness of the IP Multimedia Subsystem (IMS). Despite conflicting information about the readiness and complexity of IMS, much has been done to demonstrate the practical realities of the technology. Vendors from around the world have come together and have built IMS networks with real applications running over them in a matter of days. As was the case with the evolution of the Internet and VoIP, where not all standards were immediately implemented, it is our opinion that the same will hold true for IMS; services, products, and standards will move in parallel.

Introduction

The IMS architecture is one of the most hyped developments in the networking industry. IMS promises to enable a cost-effective common platform for delivering converged IP services over wireline, cable, DSL, GSM, UMTS, 3G, Wi-Fi and WiMAX networks. But the industry is glutted with conflicting information from multiple sources about how ready the technology is and how beneficial it could be to the service providers. The purpose of the first IMS Report Card is to provide factual data from the IMS Forum Plugfests to clarify the state of IMS as a technology.

The UNH-IOL is a neutral third party laboratory; it does not endorse any products, services, technologies or forums. However, through the cooperation of the IMS Forum and the UNH-IOL, it has occurred to both sides that a wealth of data and objective information has been generated that would perhaps benefit an industry audience beyond the circle of engineers, product managers and QA technicians who attend the IMS Plugfests. The three IMS Forum Plugfests that have taken place in January, June, and October of this year have proved what before were only concepts and yielded a number of “proof points” for the health and readiness of IMS technology. While detailed results are under non-disclosure, this Report Card provides enough information to be a useful tool for assessing the technology and markets for IMS.

The IMS Forum's mission is to accelerate the interoperability of IMS applications and services, enabling enterprise and residential consumers to quickly benefit from the delivery of quadruple play voice, video, internet and mobile services over broadband via cable, mobile and fixed networks. IMS applications and services comprise residential VoIP, entertainment including IPTV and gaming, IP Centrex / IP PBX and business Unified Communications including fixed-mobile converged services, videoconferencing and web-collaboration.

Together, the IMS Forum's member companies form a group of industry leaders, experts and visionaries focused on real-world, revenue-generating services and best practices for the IMS industry. The IMS Plugfests represent the industry's only event that verifies IMS Services interoperability.

The Plugfests, held every 3-4 months, bring together industry-leading IMS vendors from around the world, all of which build and test real IMS networks. It is the IMS Forum's vision that results from the Plugfests will serve as proof points for removing barriers to the adoption of IMS, and that the Plugfests will add industry-recognized certification for IMS applications and services interoperability.

The "IMS Report Card" below captures those proof points and matches them against the myths and realities clouding IMS's actual state of health and market-readiness. It is our intention that the snapshot that emerges provides a clearer and more comprehensive picture than has circulated until now – in so far as it can be revealed by the admittedly limited (but in many cases surprising) metrics and proof points obtained in the UNH-IOL lab during the first three rounds of IMS Forum Plugfest interoperability testing.

Elements present in the IMS Forum Plugfest networks to date are as follows:

IMS Functions	Elements
AS	9
HSS	7
S- CSCF	7
I- CSCF	3
P- CSCF	13
SEG	2
BGCF	2
MGW	2
IBCF	2
UE	14
Total	**61**

Table: IMS Functions and Vendor Implementations Tested in Plugfest I and II

Scope of the Plugfests

Phase I

1. Defining "reference" IMS test network
2. Basic interoperability between control and application layers (HSS, x-CSCF, MGF, AS, UE)
    a. Device registration
    b. Subscriber database interactions
    c. Basic call flows
3. IP-to-TDM interactions (media/signaling gateways)
4. Examine interaction of north/south interfaces to application servers

Phase II:

1. Enhanced interoperability and interaction east/west (AS to AS)
2. Nomadic services (moving profiles between multiple IMS core networks)
3. Presence services

Phase III

1. VoIP, Instant Messaging, & FMC
2. Video & Multimedia
3. Services for Businesses & Unified Communications
4. User & Application Profile Handling

Future Testing (Phase IV Tentative)

1. IPTV
2. Forward migration, moving from 2G to "3G IMS" (inclusive of cable, mobile and fixed)
3. Roaming (visited networks)
4. Security
5. Billing

IMS Report Card

	Myth	Reality	Proof Points
IMS Core	"…Gaping holes and inadequacies in the architecture that have surfaced must be addressed by vendors and carriers." *- Yankee Group analyst Arindam Banarjee in "IMS Architecture: Time for introspection and Reality Check", 11/2006* "IMS will stay at the crossroads for some time" *– Bob Emerson, VON Magazine, 8/2007*	This is the IMS Forum's *raison d'etre*. Technically the IMS core is service-ready for deployment today.	Plugfest II successfully deployed an IMS network capable of serving 250,000 + active subscriber lines, the maximum allowable by the hardware tested.
Apps	"General consensus that there is no Killer App" *– FierceMarkets IMS Executive Summit, Washington D.C. September 2007*	IMS provides a common platform for multiple applications and services; FMC, Femtocells, WiMAX and Wi-Fi all see IMS as a supporting architecture. Additionally, IMS allows carriers to deploy "converged voice services … without waiting for network convergence to happen." -"*Converged Voice Services Could be IMS Killer App", In-Stat report #IN0703835WWI, issued 9/2007*	Eight applications running on Plugfest II IMS core; SDKs are available on SourceForge (GPL) and from multiple vendors.

Deployment	"IMS is.. an unproven proposition." *- Jon Arnold, trends in IP communications Weblog*	IMS is being proven out by carriers now, including FT, BTT, BT, KTT and AT&T. Ericsson estimated that by the end of 2007, 100 operators will have begun implementing their IMS strategies with live network deployments. One Plugfest participant already enables ad-supported free video-conferencing.	A fully deployed all-IP, all-IMS infrastructure built on participant's technology allows subscribers around the globe to talk, send and receive SMS or MMS to each other with local rates and to chat and use file transfer for free.
Legacy network integration	"The difficult integration and service brokering work has not been done to make it possible for all the reusable components of IMS to be knit together in multiple different ways so that services work seamlessly over different access networks and different call models, as is the goal of the new architecture." *- Telephony Online, 2005*	IMS eliminates costly service integrations. Migration from proprietary carrier TDM networks to unified IMS will evolve following the path of softswitching; Plugfests have demonstrated basic PTSN to IMS calls via currently available and already deployed gateways using existing TDM and IP infrastructure.	Multi-subscriber IMS networks were created rapidly at Plugfests in a way that would utilize existing TDM hardware. Plugfest II demonstrated TDM-to-IMS phone calls and packet-to-wi-fi phone calls via FMC applications.
Complexity	"A recent survey of 24 carriers showed that 50 percent of those operators regard the complexity of deploying multimedia services as a barrier to IMS deployment, while 46 percent see a lock of consensus on IMS as another significant barrier." *-Light Reading, citing Infonetics Research, March 2007* "IMS is embryonic and evolving, and every piece is designed to address a different level or aspect of network technology." *-Ed Mier,* *Von Magazine, 2007*	While the IMS standard itself is complex in as much as it dictates workings between components, at its core IMS comprises only two simple protocols, SIP and Diameter, both of them fairly simple in themselves. No single engineer will be expected to know all of "IMS." Implementation requires a learning curve like any technology, but is not inherently more difficult.	Plugfest II deployed working end-to-end services deployed in a multi-vendor IMS network *within 48 hours*.

Interoperability	"No one is expecting IMS to emerge overnight or even anytime soon…. Three-quarters of the market does not expect … general IMS-based interoperability (plug and play at *most* levels)" to come of age for 3-7 years. - Results of E-mail Survey, Edwin Mier Consulting, VON Magazine 4/2007	Enough interoperability has been tested to enable multi-vendor service deployment today. Vertical interoperability between networks (e.g. "cable companies, vertical integration fixed-mobile) is still fragmented and additional integration (e.g. fixed/mobile) will likely evolve from the application down.	25+ companies from various facets of the IMS industry built multi-vendor core and ran applications end to end.
Business Case	"General consensus that there is no Killer App, rather a Killer Environment. But take the video share service as an example, an operator can implement it for $200k as a silo, or $1M with a lightweight IMS framework. Simple economics drive operators' decisions to not adopt IMS." - *Alan Quayle Telecom Weblog (http://www.alanquayle.com/blog/2007/09/the-divergence-of-cdma-and-umt.html)*	The business case for IMS requires looking at two things – ROI from services quality and consistency across multiple networks, and operational savings from administering a single network for multimedia services. E.g. IMS enables standardized database access and application interfaces. It is less costly to deliver "flate rate" "best effort" IP services in the short term. IMS' ROI depends upon capacity and offering more diverse, higher quality services.	While this is not demonstrable in a lab, experience dictates that interoperability is a major factor in achieving the business case: it controls costs and supports richer applications and services and faster deployment. Standard, interoperable pieces do not create, but do improve the business case.
Key Features	E.g. "IMS security specifications are lacking and the architecture may open up more vulnerabilities than benefits." - *Jim Duffy, Network World, 9/2007*	This is what critics initially thought about the Internet. All of the building blocks for supporting IMS architecture exist today. As standards evolve, further security, billing and accounting function refinements remain to be added and tested.	Total of 61 elements of 10 key IMS Functions tested in Plugfest I and II including security authentication. (See chart, above)

SIP Integration	"SIP in its IMS form has proven to be quite complex and presented many technological challenges. There were many gaps between the SIP initially defined by the IETF, and the features required for full IMS support." *- Adi Paz,* *Enterprise Messaging News, 2/2007*	The 3GPP has defined numerous SIP extensions for IMS networks. While, carriers are not required to implement SIP, they will do so by default in implementing 90% of the VoIP solutions on the market.	SIP is internal to IMS. SIP interoperability is ad hoc. However, SIP was designed with interoperability in mind from the start, and well-attended SIP-Forum "SIPit" interoperability tests add to it. The IMS Forum exercises the SIP IMS extensions as part of the Plugfest.
Standards	The standards are immature and vendors' solutions are not interoperable. Key challenges that lie in the way of IMS adoption: • Vendors' solutions are still not fully standard-compliant • There is a lack of vendor solution interoperability • Support for SIP and non-SIP-based services is a new requirement • Lack of standards definition for IMS service orchestration *-Yankee Group, 11/2006 (paraphrase)*	There is no single vendor delivering all of the components covered in the applicable standards, so blanket "fully standard compliant" is not applicable to IMS, and no one vendor is currently capable of delivering an end-to-end "IMS infrastructure."	"BT21C" had to use multiple interoperable vendors' solutions to build out a complete IMS network. Companies seen at the Plugfests are already delivering fully interoperable solutions using existing standards.

Findings / State of the IMS Industry

I. Advantages and limitations of the methodology used to generate the IMS Report Card

- We have tried to confine our conclusions, recommendations and predictions to principles traceable to actual results observed at the Plugfests.
- We are aware that our snapshot of the industry is not about IMS for everyone; each service provider is different, and specific concerns are largely specific to each individual carrier.
- This said, the data obtained thus far from Plugfest testing provides a unique window into the reality of the technology and its fitness for deployment.

II. Summary / State of IMS

Many believe that IMS rollouts will be driven by a killer application. The reality is that IMS will be implemented in different ways, as driven by different needs. Every service provider is unique. "Greenfield" companies entering the IP multimedia market for the first time are in a position to implement IMS from the ground up. Incumbent providers will likely build an IMS architecture in a piecemeal fashion driven by individual IP service rollouts. As an alternative, incumbents could build an IP network without quality of service and deliver services using the "best effort" model.

Service providers and carriers for years have known that they must reduce the cost of delivering existing services while providing a platform for new ones, but the urgency has perhaps never been as keenly felt as it is today. The convergence of IP and legacy communications technology is occurring at an accelerated rate. Each service provider will respond differently. In the end, many will select those features and specifications that serve needs specific to their business models.

In this scenario, the evolution of the IMS infrastructure would begin from the inside out, starting with individual applications at the core service layer and spreading from there. The immediate need served would be reducing long-term cost and while laying a foundation for easily and rapidly deployed services as they emerge.

What's certain is that it costs too much money for providers to continue to deliver new services using outmoded infrastructure or "one off" proprietary solutions that aren't interoperable. It is an open question whether we will ever see a proliferation of "all-IMS networks" – the complete architecture as described by the various standards bodies.

As is the case with most new technologies, IMS will probably be deployed and adopted in an evolutionary manner. Service providers may "bolt on" IMS in a piecemeal fashion based on their own unique needs. Eventually, the sought for "killer" application/s will reveal themselves over time once the infrastructure has been put in place. Perhaps, just as the spreadsheet, the "killer app" for the PC, needed the PC to exist first, a "killer app" will emerge to take advantage of IMS once the infrastructure is in place.

In the final analysis, additional pieces must fall into place before IMS deployments will proliferate. This we address in the next section.

III. Areas for continuing and future development

Security, billing and roaming (visited networks) are key areas that will need to be addressed further as we move forward. The IMS Forum Plugfest program is on an aggressive ramp to intensify the testing and interoperability of these critical areas as the IMS "ecosystem" matures.

It is one of the missions of the IMS Forum to seek and find common ground, those intersections that are common to most carriers. Interoperability of proprietary enterprise solutions and carrier back office systems that are unique to each are at the moment beyond the scope of the IMS Forum's activity. Back office systems will be need to be integrated and tested against IMS interfaces for example, and this will be different for every service provider. It should be pointed out that this is no different from other technologies that service providers have had to integrate such as the evolution to softswitching and VoIP technologies. IMS by itself poses no significant new challenges to this paradigm.

It may well be that the IMS Forum takes up this work to assist the services providers in this activity going forward. Active participation from the service provider community within the Forum could certainly spur such activity.

The IMS Forum in cooperation with UNH/IOL and its membership will continue to work hard in its mission to help the IMS industry develop to its fullest potential.

IMS as a technology is beginning to mature and more work needs to be done as standards continue to evolve, but the good news is that it is a demonstrably real technology with real vendors delivering real products and services today.

About IMS Forum

IMS Forum is a global non-profit industry association dedicated to the advancement of IP Multimedia Subsystems applications and services interoperability. We are a diverse group of industry leaders, experts and visionaries focused on real-world, revenue-generating services and best practices for IMS applications convergence. The IMS Forum is the creator and organizer of IMS Plugfest™, the industry's only event focused on IMS services interoperability verification and certification.

About the UNH-IOL

Founded in 1988, the UNH-IOL is one of networking's premier third-party proving grounds for developing technologies. Approximately 200 companies use the lab's 32,000+ sq. foot facility to extend their development and quality assurance efforts by testing and fine-tuning technologies, protocols and products for multi-vendor interoperability and conformance to standards. For more information, visit http://www.iol.unh.edu.