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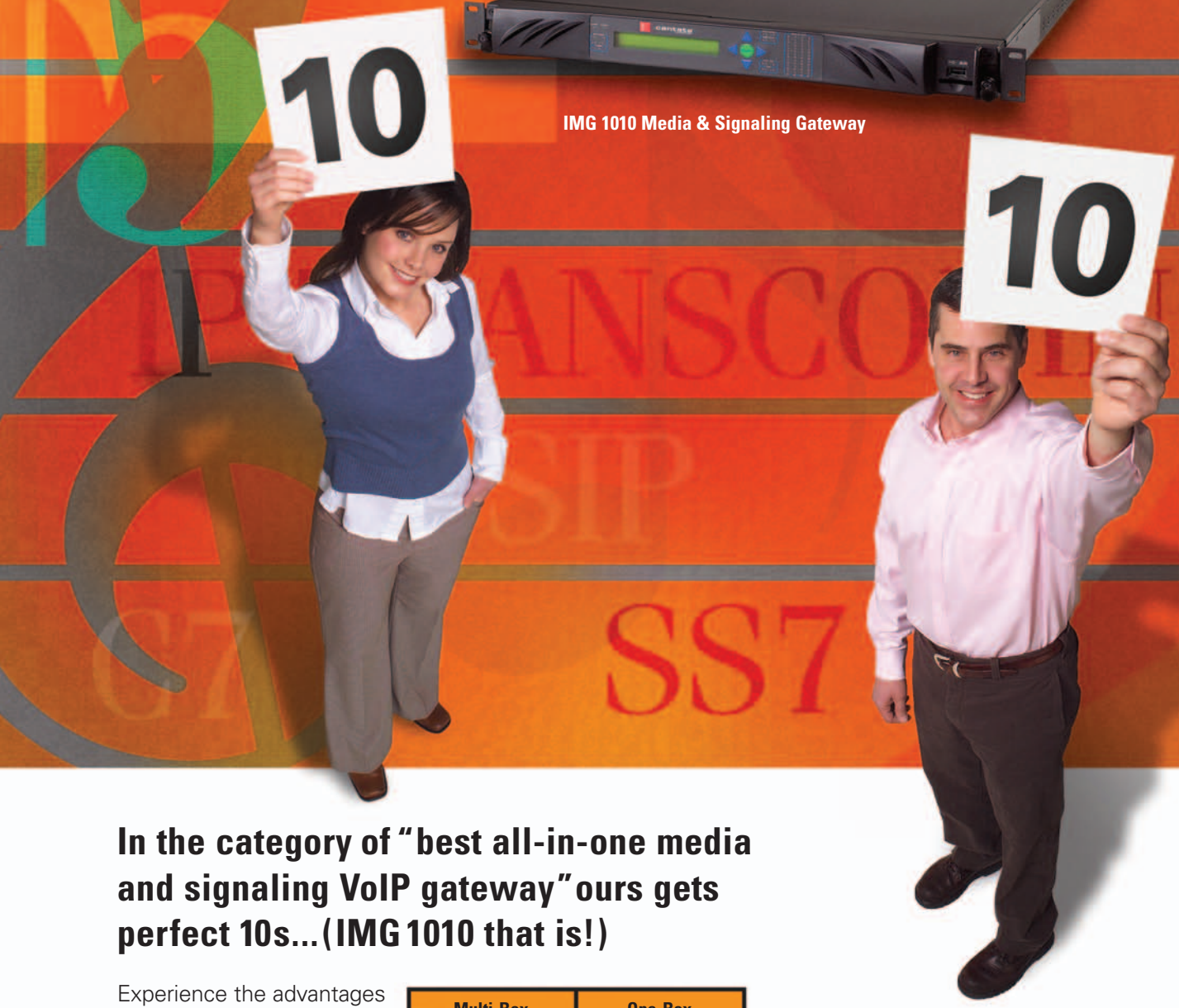

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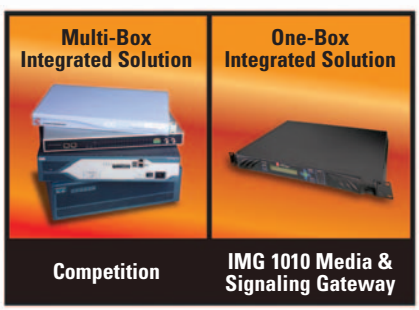

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editor's note

The DIAMETER of IMS Security

by Richard "Zippy" Grigonis

One of the topics in this month's issue is security (See "Are Current LI Solutions Sufficient in a World of Vulnerable IP Networks and Sophisticated Attacks?" by Dr. Supranamaya Ranjan of Narus).

Just before we went to press I found myself talking with Ben Volkow, the COO of Traffix Systems (news - alert) (http://www.traffixsystems.com), whose company provides Authentication, Authorization and Accounting (AAA) products and solutions for network equipment providers and operators moving to NGN and IMS. One of their specialties is working with DIAMETER, an AAA computer networking protocol devised by the IETF that's the successor to RADIUS.

"When a network operator migrates to IMS, it actually must manage and support two networks," says Volkow. "Their legacy network is still functional with millions of users and then there's the new IMS network. Problems start when operators find themselves with RADIUS running in the old network and DIAMETER in the new one. This means that those two networks cannot communicate; they cannot share functionality. So when operators launch their IMS networks, they need to build the entirety of their network functionality from scratch, because it's not easy to share functionalities from the existing legacy network; the two networks talk in different languages. A Tier-1 operator can have many HLRs [Home Location Registers] where the subscriber information is kept. So when the operator moves to IMS, it can't use the existing HLRs; it must buy the new version of HLR, called HSS [Home Subscriber Server]. So we're talking about duplicating network functionality and components and the OSS and BSS for the new IMS network."

"Furthermore, more network functionalities leads to more security risk," says Volkow. "There's a risk associated with one database. Having 10 databases leads to a risk greater than 10 times because if an attacker takes down any one database the other 10 won't work. Today's networks have HSS and SLF [Subscription Location Function] needed to map user addresses when multiple HSSs are used, and so in IMS you do have many more new databases. Thus, your security risks become extremely high."

"Additionally, IMS is an open architecture," says Volkow. "It's open to MVNOs and third party applications and Skype (news - alert) and things like AOL. Thus, it's subject to high risk, especially in the AAA area, which ties into online charging, and knowing how much credit you have, and whether you're authorized to use a service, what your password is, and so forth."

"AAA in IMS is more important than it was in IP Centrex or other legacy network services," says Volkow. "DIAMETER is used here, but, it's not just about security. It deals with QoS too, as well as bandwidth, rating and policies. Every 'W' question [who, what, where, when, why] in the network is communicated using DIAMETER. It's much more complex than RADIUS and involves more infrastructure. RADIUS was something that was used with billing and OSS, but DIAMETER is appearing everywhere. It's in softswitches, application servers, policies, GGSNs [Gateway GPRS Support Nodes], everywhere. Almost every network component needs to know about and communicate using DIAMETER."

Among other things, Traffix Systems offers an AAA NG Gateway that helps network operators migrate to IMS cost efficiently, using some of the existing functionality embedded in their operational legacy network, allowing for a unified network instead of multiple cases of reinventing the wheel. The NG Gateway also enables the operator to offer advanced IMS AAA DIAMETER-based functionality.

Richard Grigonis is Executive Editor of TMC's IP Communications Group.

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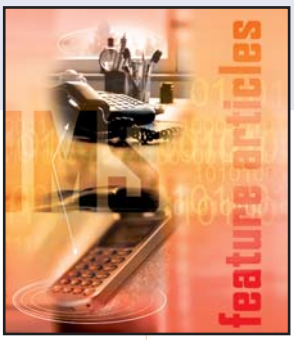
feature articles



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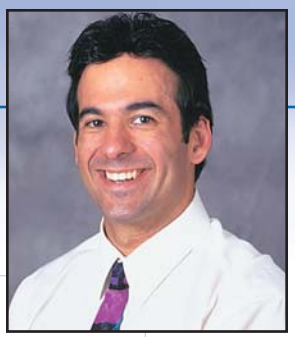

by Rich Tehrani

When I decided on the headline for this article I realized it might be viewed as potentially controversial. How, you may ask, can one have IMS without IMS? Well, there is an answer to this question and it may or may not be what you are expecting.

The benefits of IMS are great. We all realize this fact; moreover, service providers understand if they aren't able to provide the benefits of IMS to their customers soon they risk losing revenue. It is a fact. . . If service providers do not continuously look for newer and newer revenue generating applications to replace declining voice revenue, they are in trouble.

Enter Mavenir Systems (news - alert) (http://www.mavenir.com), a company based in Texas filled with some of the leading telecom minds in the industry. Mavenir's mission is to allow carriers to provide many IP communications services rapidly. Generally, the services we are talking about are the ones we generally associate with the IP Multimedia Subsystem or IMS.

Additionally, the company is positioned to allow devices which are not IMS-ready to have IMS functionality such as mobile Centrex over 2G. Mavenir works with a slew of endpoints whether or not they support SIP.

For example, to conference or transfer a call you simply enter a star code which is not audible to the other party or parties on the phone call.

Why would you want such functionality? Simple. By utilizing existing devices on the network your ability to recoup investments in new technology is potentially greater. Mobile Centrex and other services are not going to generate significant revenue quickly if most of the handsets on your network aren't able to access them. Mavenir allows non-IMS compliant devices to share in the IMS party.

Mavenir agrees with the premise I have been espousing for many years. Service providers need to embrace VoIP and provide it with enhanced services to be successful. Another path many providers are taking instead is to "acquire" their way into this inevitable scenario.

But even AT&T, for all its acquisitions, has had to embrace new technology to take on the threats posed by new VoIP service providers and the cable companies.

I've been writing about enhanced services for years and service providers have been providing few of them during that time. Unfortunately for such providers, innovation is now coming from the computer world. An example is Grand Central (http://www.tmcnet.com/958.1) the maker of a service which allows find me/follow me solutions and was recently purchased by Google.

In my talks with many equipment providers — especially on the fixed line side, I am learning more and more about the paralysis taking place in carrier boardrooms. These companies see their voice minutes declining and generally are afraid to invest in voice anymore. In fact they aren't sure what they should do.

In the wireless world there is still growth in voice service, but this doesn't mean the entire service provider market doesn't need to wake up. Remember the potential for Sprint/ClearWire (http://www.tmcnet.com/959.1) and Google (quote - news - alert) (http://www.tmcnet.com/960.1) to become major wireless competitors exists. This is no joke. Google owns Grand Central. What if they further become a wireless VoIP provider with a significant wireless footprint?

Service providers can only use M&A for so long to give the appearance of continued success. They need to both innovate and to start taking bigger risks while they still have a shot at staying successful in a world dominated by computer companies such as Apple and Internet companies such as Google.

So, as service providers begin to implement IMS they need to consider the fact that Mavenir's technology allows existing services to work in the world of IMS. So ringback tones, 911 and lawful intercept should continue to be functional.

Mavenir sells a universal gateway known as mOne which allows services such as video calls to become audio calls and back again to video calls depending on a device's capabilities. In addition, device/computer cloning allows an IM (Instant Messaging) session to be cloned via SMS, thus allowing conversations to be transferred from a phone to a computer and back. The same goes for voice calls.

Furthermore, the platform provides presence detection on 2G networks.

The company has come up with marketing/product bundles for their customers and, in my opinion, they make sense. Of course, you can never predict how successful new offerings will be but these seem like logical ideas which will at a minimum increase "stickiness" and in the best case increase ARPU.

Here are some examples:

- **Basic Mobile with Group Plan:** Allows voice and texting over 2G handsets and group billing of multiple handsets.
- **Desktop Edition:** Allows VoIP calling for mobile customers with additional benefits such as support for consumer electronic devices in the home.
- **Group Presence Package:** Provides presence information for address book and integration between IM presence and the IMS server.

I did get to see some demos in the company's Texas office which consisted of a video broadcast which I listened to on an analog phone and then saw it transferred to a video phone. When the call was transferred, the video signal was displayed.

There was also an FMC IMS demo utilizing the 3GPP VCC (Voice Call Continuity) standard. (You can find more on VCC and FMC here: http://www.tmcnet.com/961.1). This particular demo utilized the PCTel VCC client. I also saw a demo of a cloned IM/SMS session where both participants were able to use a mobile device or a PC to text message one another. The idea here is the ability to continue text conversations seamlessly across devices.

Mavenir Systems seems to have found a sweet spot in the service provider world as they facilitate the rapid deployment of new services across existing devices while at the same time allowing IMS-based networks to more easily tie into carrier networks' currently existing systems and devices.

Is this an IMS replacement? Perhaps. But it seems to me that "IMS stepping stone" is more like it. If you are a carrier, you should be spending time researching web services which provide advanced telephony functionality. There is a window of opportunity for service providers in which they can still be the innovators in the next generation of IP communications. This window is brief. It is highly recommended that you keep an eye on the VoIP 2.0 revolution and another on what Mavenir Systems is up to.

Acision is Born

When a single U.S. phone company, Verizon, reports that in one month they were responsible for sending 10 billion text messages, you may want to stand up and take notice.

To learn more about the SMS space, I took a trip down to Plano, Texas where the U.K.-based Acision (http://www.acision.com) has one of its four U.S. offices. The company was formerly named Logica CMG and is one of those companies most people have never heard of but provides technology many of us frequently use.

In short, the company is an enabler of various types of service provider messaging from SMS to voice and video. This month in fact the company celebrated its 15th anniversary of supplying the industry with Short Message Service Centers or SMSCs.

Thanks to Moore's law and clever design, the capability of Acision's SMSCs has dramatically increased over the years. In 1992 SMSC version 1.0 had a capacity of 10 messages per second. Today a single rack of the IP-based SMSC can handle 16,000 messages per second, with the ability to grow to "virtually" unlimited levels according to the company.

In Texas I spoke with Acision's Senior Vice President, Oswin Eleonara (you can call him "Oz"). This dynamic company spokesman tells me his company enables 300 clients to serve a billion customers. Whereas they've focused on the burgeoning international SMS market in years past, they now see tremendous potential for U.S. messaging growth and will redouble their efforts on these shores.

The company does more than messaging and recently entered the market of real-time behavioral analysis and predictive analysis, allowing service providers and advertising companies to determine how best to serve a target audience with ads. Their system also entails a marketing dashboard and has the ability to determine which group of people is most likely to buy specific offers sent via specific media methods.

Acision also has a speed browsing application which allows browsing at speeds 70x greater than today, according to Oz. The company also plays in the rating, intelligent charging and content enablement spaces.

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NexTone's Sridhar Ramachandran

Service providers today are faced with the reality that they must offer a host of multimedia services in order to compete, and they must be able to introduce new services quickly and efficiently, which also means they must be well equipped to manage network traffic better as subscribers access these next generation services.

What this new era of IMS-based network architectures and multimedia communications capabilities has affected is an alteration in the way service providers manage and bill for traffic. They can no longer simply consider bandwidth or minutes; instead, they have to managed individual sessions in order to not only enable accurate tracking, billing and troubleshooting, but also to effectively optimize their networks to ensure quality and reliability of their services.

NexTone has built its business on enabling its customers to manage and control their network traffic, especially at the individual session level. With NexTone components, they are able to deploy and manage new real-time IP service with ease and reliability.

Rich recently took the time to speak with Sridhar Ramachandran, co-founder and CTO of NexTone (news - alert) about the company's session border controller products, as well as how the move to IMS is changing the telecom industry.

Rich Tehrani's Executive Suite is a monthly feature in which leading executives in the VoIP and IP Communications industry discuss their company's latest developments with TMC president Rich Tehrani, as well as providing analysis on industry news and trends.

RT: What is the current state of the session border controller (SBC) market?

SR: The SBC market is a growing marketplace. According to Infonetics Research, it is growing at a compound annual growth rate of 44 percent and is expected to exceed $550 million in 2010. A number of vendors provide SBC products, and NexTone is one of the leaders in the space. NexTone enunciated the problem of VoIP peering, pioneered the solution, and hence created the product category back in 2002.

RT: How is NexTone different from other vendors in the space?

SR: NexTone fundamentally believes that, in this age of standardization, form and flexibility are differentiators in the marketplace. When we set out to build our product, we deliberately used these two dimensions of form and flexibility not only as differentiators, but also to give us a substantial competitive edge. As a philosophy, we did not invest in building proprietary and custom hardware to run our software. Instead, we leveraged best-of–breed, commercial off-the-shelf (COTS) hardware components. This has paid off tremendously, as today we can claim the highest performance of any SBC solution in the market. This philosophy also gives us the advantage of being able not only to scale down and embed our SBC software in any smaller hardware, such as CPE devices, but also to integrate with other network elements such as routers, B-RAS, and more.

As VoIP services started to take hold, the issue of interoperability between network operators reared its head, challenging service reach. This is a hard multidimensional problem to solve. The flexibility we architected into our software solution breaks down this problem so that NexTone's customers can enjoy unprecedented service reach. NexTone's advantage in solving the interoperability problem comes from a set of fundamental principles that helped drive a flexible software architecture. We follow through in our Interop Lab by using proven processes for multi-vendor and multi-network interoperability.

RT: What is your view on current market innovation?

SR: The current market innovation model has been focused on two major areas — security and Quality of Service (QoS) of VoIP systems. A general concern today, especially among the operator community, is that

any IP-based service will have security vulnerabilities similar to those we face on the public Internet. While current security practices may suffice to thwart most security threats within the closed-service IP network, most endpoints for VoIP may still be taken over by Trojans and attack the service infrastructure. NexTone has been a leader in the multi-layered security model required to thwart attacks on VoIP networks.

QoS is another area where there is currently a lot of innovation — in measurement, monitoring, and reporting. NexTone was the first to implement a voice QoS probe in the SBC so that operators can proactively monitor and dynamically adjust their networks when quality is impaired.

RT: What type of services are NexTone's products best suited for?

SR: At the core of NexTone's platform is a sophisticated policy enforcement and routing engine that is embedded with both H.323 and SIP protocol stacks. With this unique architecture, NexTone's SBC and corresponding MSX products offer service providers a lot of intelligence at the edge of their networks. NexTone's solution is widely deployed, and the company has enjoyed a significant position of strength in VoIP peering and wholesale VoIP applications. Operators offering VoIP use the breadth of NexTone's sophisticated policy-based session management and routing capabilities in addition to the security features that have become table stakes in the industry. NexTone has over 400 customers, and carries over 50 percent of VoIP international long distance traffic.

Many NexTone customers have traditionally been next generation carriers that manage predominantly VoIP traffic. What we see happening is that as traditional carriers migrate greater portions of their traffic to VoIP, they, too, are beginning to appreciate the enormous potential of NexTone's intelligent edge solution for their networks. We are now seeing an increasing number of carriers implement NexTone SBCs in between the service provider and consumers or businesses. Here the SBCs are using NexTone's policy-based routing and session management capabilities to provide traffic normalization at the edge and offload the network core.

RT: How does IMS affect the current telecom landscape?

SR: IMS is a standardization effort that has been going on for the last six years. IMS specifies a standard way to build an IP network that can be leveraged to deliver multiple services over a common infrastructure. IMS is thought of as the "build once, deliver many" infrastructure. However, before they invest in this type of infrastructure, operators are waiting for the standards process to complete. Meanwhile, the standards process requires small or pilot deployments to prove the standard out as well as to ensure interoperability. A number of best-practices organizations, as well as operators, are working to implement the standards and ensure interoperability of services. Once this process is reasonably understood and underway, operators will be comfortable with large-scale deployments of IMS-based infrastructure. This type of investment from the operators may be a couple of years out. Until that time, intense activity is needed in the standards making and standards debugging processes in the form of pilot trials.

RT: Are Triple Play and Quad Play services an end-all in themselves, or a means to a larger enablement of services and applications in the future?

SR: Triple play and quadruple play services, as currently deployed, enable an economic bundle that can eventually enable higher-revenue services for operators in the future. For the end user, bundling lowers the barrier to experimenting with a new application, and it enables the operator to begin monetizing a new application or service across an existing subscriber base.

First-generation triple play/quad play services tend to be a bundle of independent applications, such as wireline voice, video, and data. Once a subscriber base exists for this triple play service, operators have an incentive to invest in their infrastructures to enable a common IP-based delivery mechanism for all their service bundles. However, once these applications are delivered over a common IP pipe, the potential to enable new interactions between these applications can give rise to newer applications. The new applications will, in turn, attract new subscribers and increase revenue for the operators.

RT: Describe your vision of VoIP 2.0

SR: VoIP (define - news - alert) and the corresponding infrastructure investment have, until now, been about recreating the PSTN and voice services. VoIP is really an IP application, but it stands alone today. Interestingly, the technology and protocols that enable VoIP today straddle the worlds of traditional telecom applications and Internet applications. Even though VoIP's current commercial impact is in traditional telecom applications, where it has the most potential to affect everyone's lives is in Internet applications. VoIP will be embedded in Internet applications and create interesting "mash-ups" that lend audio communication capability to multiple applications. Until now, voice has always been thought of as person-to-person communications; with VoIP, one can enable person-to-application (or machine) communications that will open up immense productivity increases and collaboration flexibility.

http://www.tmcnet.com/963.1

Tektronix Proves Spectra2 VoIP Test Capabilities at Plugfest II

VoIP test solutions provider Tektronix (news - alert) announced the successful multi-vendor functionality of its Spectra2 IMS solution, which it demonstrated at IMS Forum's Plugfest II event. For network operators, Spectra2 offers a comprehensive, single-box IMS test solution. Core IMS testing is provided using the SIP and Diameter protocols. The solution supports signaling and media protocols and codecs for both PSTN and VoIP access. Further, dynamic parameter management capabilities make the solution ideal for platform testing in IMS and VoIP environments.

http://www.tek.com

http://www.tmcnet.com/964.1

Vodafone Portugal Turns to Ericsson for IMS

Vodafone (news - alert) Portugal has chosen Ericsson's (news - alert) Core IMS platform to deliver its next-generation converged fixed and mobile services. The common service environment supported by Ericsson's IMS solution will allow Vodafone Portugal to implement flexible and scalable advanced services. In addition, IMS provides a great deal of cost savings and flexibility by enabling convergence of mobile and fixed networks on an all-IP infrastructure.

http://www.vodafone.com
http://www.ericsson.com

http://www.tmcnet.com/965.1

Avaya Connects VoIP and Cellular Networks for Enhanced Communications

In order to enable the greater mobility these organizations seek, Avaya (quote - news - alert) has introduced Avaya one-X Mobile Dual Mode, designed specifically for users of Nokia's Eseries devices to enable single number and single device access for both inbound and outbound calls. With the solution from Avaya, business users need not worry about which device they use or where they can use it. With the Nokia Eseries, they can place and receive calls while in the office via the WLAN, from off-site locations via WiFi hot spots, or while traveling via cellular networks.

http://www.avaya.com

http://www.tmcnet.com/966.1

Evolving Systems Holds the Key to VoIP and Cellular Numbers

Evolving Systems (news - alert) is best known for its LNP services, but with its Tertio service activation platform, it provides a complete suite of services for network operators.

The Tertio service activation platform was designed specifically for a next-generation service environment, such that, as new services and network elements are introduced, the system does not need to be continually tested and modified to ensure compatibility. In essence, it is an IMS world activation platform, designed to work with all new services and features, much like an entire IMS network architecture is designed to work with various network components.

http://www.evolving.com

http://www.tmcnet.com/972.1

Wipro Secures Membership in the IMS Forum

Wipro Technologies (news - alert) has joined the IMS Forum in an effort to help accelerate IMS application and service interoperability. Welcoming Wipro Technologies to the IMS Forum, Michael Khalilian, Chairman and President of the IMS Forum, said that Wipro's expertise in IMS spanning across Service infrastructure, network infrastructure, and end-user integration will be very useful in helping them to bring about the early adoption of IMS and truly convergent services across the industry.

http://www.wipro.com
http://www.imsforum.org

http://www.tmcnet.com/968.1

Blueslice HSS Completes Interoperability with Motorola IMS

Blueslice Networks (news - alert) announced it has completed interoperability testing of its Home Subscriber Server 3000 with the Motorola (news - alert) IMS solution, including the Motorola Call Session Control Function (CSCF). Motorola and Blueslice have successfully executed the testing and product evaluation necessary for a successful collaboration as part of Motorola's best of breed ecosystem. Having completed more than 16 years of multi-vendor core network integration, Motorola has developed a comprehensive IMS interoperability program and is dedicated to providing its customers with a best-of-the-best approach to IMS.

http://www.blueslice.com
http://www.motorola.com

http://www.tmcnet.com/970.1

Carrier Access Enhances EdgeFLEX IP Solution

Carrier Access Corporation (news - alert) announced the general availability of the latest version of EdgeFLEX 100 and EdgeFLEX 600 products. These products allow the wireless operator to build a unified radio access network (RAN) for 2G, 3G, and 4G technologies, while laying the foundation for an IMS environment. The EdgeFLEX product line is a software-upgradeable solution eliminating the need of forklift upgrades and delivering to the operator a flexible asset that can be modified over time. As part of the Mangrove acquisition, Carrier Access has continued and completed development of these products, resulting in a portfolio that enables a complete solution for their customers from the cell-site to the edge of the RAN.

http://www.carrieraccess.com

http://www.tmcnet.com/971.1

Polycom Introduces Proxias Application Server

Polycom (news - alert) has introduced the Polycom Proxias application server, a flexible, carrier-class platform that enables service providers to cost-effectively offer rich-media conferencing services across geographies, organizations and workgroups as part of unified communications environments. The SIP platform is IMS-compliant and is optimized for the unique technical requirements and operational complexities of on-demand mixed-media (voice, video, content) conferencing and collaboration services offering an unmatched, scaleable foundation for developing and deploying these applications across networks, platforms, and devices with mission critical reliability.

http://www.polycom.com

http://www.tmcnet.com/967.1

India's Largest Operator Selects Tekelec

Tekelec (news - alert) announced that Bharat Sanchar Nigam has selected the Tekelec EAGLE 5 Integrated Signaling System solution to support its transition to next-generation networks. BSNL, India's largest telecommunications company, is extending an existing relationship with Tekelec for traditional SS7 signaling solutions initiated in 2005. BSNL is the incumbent operator in India with more than 40 million wireline and 30 million wireless subscribers. The Tekelec solution will provide BSNL with a separate signaling plane that utilizes Internet protocol (IP)-based connectivity and centralized control and routing to connect its varied, highly dispersed signaling endpoints.

http://www.tekelec.com

http://www.tmcnet.com/969.1

Aculab Realizes Success with Prosody X Media Processing Platform

Aculab (news - alert) has announced it has realized great success with the market adoption of its Prosody X media processing platform, having delivered products to 114 customers worldwide, with a significant total media processing capacity suitable to service more than 300,000 voice ports. The Prosody X media processing portfolio acknowledges the reality of IP in today's telco network infrastructures, and represents the full convergence of IP and traditional TDM voice communications, facilitating the seamless integration of telephony and networking.

http://www.aculab.com

IMS: The Best Solution for Quadruple Play

by Manuel Vexler

The question is often asked. "How many years away is IMS from its implementation?" Many also ask why IMS is even necessary, since we can deliver all the services with the current broadband network.

To answer these questions, we first should agree that today's wireline, wireless or cable Internet services are running on what is called a 'best effort of service delivery.' In other words, there is no mechanism to implement, control and deliver the end-to-end quality of services demanded by VoIP, video streaming, video conferencing and Fixed-Mobile Convergence. No, we are not saying that any, or all of these services cannot be delivered over the current packet network. The issue is however, that the best effort network operational cost is increased by the cost of IP traffic engineering, load balancing and customer support to handle complains about service performance. IMS provides a framework for implementing the much needed Quality of Service (QoS) for residential and business customers. Nowhere is this need more apparent than in the implementation of Quadruple Play services, delivering high speed internet, voice, video and wireless mobility in a single convenient package. There is much agreement between analysts, marketers and the public at large that such premium services will increase customer satisfaction, reduce churn, and increase convenience in having a single point of contact for all services.

We tend to think of Quadruple Play as a service which is offered by the vertically integrated companies such as at&t and Verizon in the US. However, other segment of the service providers industries are following the same business model. First, not all telecom companies have access to all technologies, hence they need to form alliances in order to put together the Quadruple Play service offering. For example, many independent services providers don't have both a fixed and a cellular business. The same is applicable to the cable companies. Not long ago, Advance/Newhouse Communications, Comcast, Cox Communications, and Time Warner Cable (the 'Quartet') started a joint venture with Sprint Nextel. A $200M cash fund was created for the development of converged services, national marketing initiatives and back office-integration. The addressable market is estimated at 41 million customers for cable companies and 46 million wireless subscribers from Sprint Nextel's. Among other services announced we note: integrated voice mail for mobile and fix voice services, wireless and cable joint email account, streaming video services to the wireless handset across Sprint's EV-DO wireless data network, and unified billing.

The connection between the joint venture and IMS is quite direct. Sprint will have to standardize on the network interfaces, otherwise the company will have to manage four separate IP networks with different interconnection technologies and interfaces. This is where IP Multimedia Subsystem, or IMS comes handy. With IMS Sprint will have to provide only one type of interface. Moreover these interfaces are already being tested for interoperability by the IMS Forum, in its IMS Plugfest™ events, hence multiple vendors can demonstrate their interoperability even before the services are rolled out.

Rich Tehrani's interview with Sprint's Tony Krueck, VP of Product Development is a good example of how Sprint is using IMS as a strategic technology. For instance Tony comments on the question of IMS Plans by saying."initially, even before the IMS hype got started… we utilized a lot of the pieces of the IMS standard before they were even blocked out — honestly, because it was cheaper. So, instead of building the applications for multiple networks, it was considerably cheaper to build them using a single set of applications that could interface back with the multiple types of access and networks that people would be utilizing."

In other words Sprint has already implemented an IMS architecture a few years back.

On the cable side, CableLabs™ has issued in 2006 an IMS set of specifications as part of Packet Cable 2.0. With these specifications, cable companies are now able to provide standardized interfaces for multimedia services, and to make the interconnection between any of the cable networks and Sprint cost effective, and consistent in delivering the much needed quality of services.

So, to answer the question, IMS is not years away, and the business case has been already proven by Sprint and the four cable companies forming the join venture to deliver Quadruple Play services to millions and millions of customers.

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IMS and Net Neutrality

by Ronald Gruia

There have been passionate deliberations over the past few years on what the extent of enforceable regulations should be in order to ensure that the net neutrality principle is upheld. The key question is whether or not service providers will leverage their control over the "last mile" to restrict the use of some applications or to single out some content providers and/or portal sites (particularly if they belong to the competition). While these vociferous debates have been going on for quite some time, what is new is that they have started encroaching into the IMS domain as well.

Since the IMS specification (particularly some efforts that came subsequently after the 3GPP R5/R6 specs, such as the Verizon Wireless-led A-IMS initiative) includes elements such as policy control and QoS management, there were some instances in which IMS was labeled as "anti-net neutral" by some experts. Net neutrality purists argue that while efforts such as A-IMS deliver significant security, network management and business policy enforcement functions, these very same improvements can be utilized as a way to enable operators to follow, manage and charge other service provider applications running in the Internet domain.

This subject was raised in one of the recent discussions at the IMS Forum[1], drawing interesting responses from some members. Net neutrality pundits point out that some service providers might be for instance tempted to create some "walled gardens" by redirecting end-users to their company's applications (should these end-users attempt to access a similar application from another provider). But arguably this capability is also there without IMS. Surely IMS does provide a framework by which operators can develop additional revenue streams via QoS and service prioritization as opposed to only via traditional charging methods.

Elements such as security, traffic priority, speed of authorization, and the offering of real-time services across networks to non-traditional devices enable more customized end-user package plans. But it is the ability to provide these differentiated services that will enable operators to deliver more applications that are better suited to users. This point was eloquently captured by Manuel Vexler, the Chair Technical Working Group and VP of Technology of the IMS Forum, who pointed out the following:

"We need to make sure that we explain that IMS is actually strengthening the ability to provide high quality services to more people by better utilizing the current Internet infrastructure. That is, the ability to accommodate multiple types of traffic over a common network, as well as delivering new services which a 'best effort' network cannot."

I could not agree more with Manuel's point. The fact of the matter is that, over time, the net neutrality story began taking a life of its own, and upon hearing statements such as "IMS is anti net-neutrality", there should be a concentrated effort to clarify the issue, which gets very convoluted when in fact it should not. One of my favorite ways to achieve this is by drawing an analogy with the United States Postal Service.

The main point of the "net neutrality" is to give all end-users access to the Internet, while allowing higher fees for QoS as long as there is no exclusivity in service contracts. This position is maintained by Sir Tim Berners-Lee, the inventor of the World Wide Web. Notice that in this definition, if one user pays to connect to the Internet with a given QoS and another one pays to connect with a higher QoS than the first one, both can still communicate across that network.

The analog of this "access to all" provision in the U.S. Postal Service world is that every few hundreds of people living in an area should have at least one post office in their vicinity, in order to ensure them access to mail service. It should be noted that such a stipulation is completely different from the class of services that the post office can offer. In other words, each person has the option of sending a letter via regular mail, registered mail, express mail, or even next-day delivery (each commanding its own premium). However, as long as all the people within that community have the availability of mail service, they can take advantage and use it, choosing the type of delivery that best suits their needs.

> "Net neutrality" has unquestionably been a topic that has received a lot of attention since the early 2000s, from legislators to service providers (be they established, traditional operators to newly created "over-the-top" players) to telecom equipment vendors and "Open Internet" advocates. While exact characterizations vary, the main notion behind the principle of net neutrality is to ensure that ubiquitous broadband networks (such as the Internet) remain free of gatekeepers over new content or services. In other words, net neutrality supporters are in favor of enabling end users to be, for instance, in control of what content they view and what applications they use on the Internet.

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[1] The IMS Forum is a multi-vendor non-profit organization devoted to the advancement of standardized, interoperable IMS services and solutions.

IMS works in the same way as the U.S. Postal Service in that it enables the provisioning of different classes of services. IMS allows carriers to charge more for certain enhanced QoS services, for instance. But that discussion should be separate and completely orthogonal from giving access to all of those services to everyone. In fact, it can be argued that by empowering carriers to charge more for differentiated services, IMS helps operators offer their services to even less privileged neighborhoods. The rationale is simple: since the operators are able to realize more revenues via the differentiated services, they are able to invest more in order to try to capture the business of some poorer areas.

While the U.S. Postal Service analogy might not quite be 100% applicable *per se*, it is still useful because it achieves the de-coupling of QoS and the accessibility to network resources. As more media and more bandwidth-intensive services start to be offered over broadband, there will be a higher impetus by the pipe providers to figure out how to get value for these applications.

Going back to the IMS net neutrality discussion, it would be quite challenging to establish a net neutral set of standards for IMS as opposed to variations of IMS suited to company-specific objectives.

There are other more pressing needs within the specification that need to be addressed. Handicapping or slowing down the IMS standardization process with regulatory constraints makes little sense. The bottom line is that there is no escaping from the fact that the two topics will remain intertwined for quite some time to come, in the sense that IMS could be seen either from a walled garden perspective (at the packet level) or as a disruptive technology (considering the potential of SIP). That said, IMS does have some unique and powerful features, and depending on how it is implemented by the service providers, those features can be quite beneficial to progress within the telecom industry.

Last but not least, while some pundits can be critical of IMS features such as tiered pricing based on a certain grade-of-service, the "walled garden" approach is contrary to the original vision of IMS as an integrated network architecture specification that can offer benefits for operators and end-users alike. Hence, the true value of IMS will be shaped by how the network operator elects to use this technology, so a carrier choosing to downgrade or limit services that are useful to even some of its subscribers can be in fact making a key strategic mistake.

converged views

IMS: The Stage is Set

by Arun Bhikshesvaran

A confluence of events has set the stage for IMS to deliver tangible benefits to operators and consumers.

Evolving and Converging Communications Channels

In today's world, we have relatively mature and developed audio, video, messaging, enterprise and content channels available to us, yet typically accessible in different and uncoordinated ways.

Ideally, we want these channels of media and communications available in an easy-to-use and personalized interface, further enriching our experiences and enhancing effectiveness. Building on the ubiquitous voice-to-voice communication, we want to incorporate video and messaging and even applications. Enterprises want to extend their communications channels and business backbone to mobile workers or partners so they can have access to the same applications and information outside the office as they would at headquarters. Content providers are developing partnerships and new business models with networks as distribution channels to push customized and targeted content, including advertising, to end users. The network capabilities and channels are also being leveraged by end users in unique and interesting ways to create social and professional communities with shared values and experiences.

We will continue to see further development, integration and convergence of these channels. This is where IMS promises to play a significant role.

IMS Architecture Maturing: Interoperability and Flexibility, or, as Easy as a Box

As discussed in last issue's column, a lot of heavy lifting has gone into developing, refining and gaining consensus on the IMS standard. Consequently, operators are buying in to the promise of IMS and have started to roll out IMS architectures and services. The architecture must support the business objectives, and the business must satisfy end user demands. Early commercial IMS deployments prove that depending on the business needs an IMS kick-start can be as simple as a prepackaged box solution, flexible as software middleware, or a visionary subsystem for media and communications control in an overall service-oriented architecture. Depending on the business objectives, there is an IMS architecture, solution and approach. With IMS, operators can be flexible and deploy best-of-breed components and avoid vendor lock-in. They also have the flexibility to develop differentiated services.

A significant benefit of IMS is interoperability and integration. Operators are packaging communications channels in a variety of ways and these packages are being fulfilled by a variety of players. Sometimes the network operator is the single provider. Sometimes bundles are created between the operator and content or applications providers. IMS gives operators a solid platform for guaranteed quality services, with room for differentiation in terms of service execution and bundles or chaining of services. Further, different end users will want different solutions to meet their needs. It will not be one video service or one way to share video that will capture the world's end users universally. But video will be used by all. A perfect example of this phenomenon is SMS (Short Messaging Service). Operators have global interconnect agreements on SMS, while different applications make differentiated use of SMS, adopted by users in different ways.

The promise of IMS for both operators and consumers has been abuzz since the IMS architecture was first conceived. The vision is well known – For operators, IMS brings cost savings over time, fixed-mobile integration and convergence, and the foundation for rapid and flexible deployment of revenue generating services. For consumers, IMS offers access agnostic and worldwide network capabilities for new and exciting multimedia and communications services – in other words, the ability to enjoy any application, any time using the device or screen of choice.

In the parallel, IMS enables multimedia interoperability between operators, networks, devices and applications, which is essential for mass adoption of new multimedia services.

Broadband Built Out

Practical IMS provides a future-proof basis for rich applications and interactivity, where media and communications come together. Commercial IMS deployments have proven scenarios atop the installed base of 2G and 3G networks and end user handsets, as well as over broadband networks be it wired or wireless. According to a recent study, the world had almost 300 million fixed broadband subscribers for the quarter ending in March 2007, with growth rates of 5% in the United States and 10% in China. Similarly, the world has launched more than 110 mobile broadband networks based on HSPA; there are more than 254 terminals available, and a strong growth of subscriber uptake of both terminals and PC cards. The industry has reached a tipping point in terms of broadband. All of the communications channels – voice or audio, video, messaging, enterprise and content – can now be delivered over a wired, wireless or converged broadband access network. We have the bandwidth for these channels to be packaged and bundled according to operator preference and consumer demand. Because IMS is access-agnostic, the standard plays an increasingly crucial role in converging and evolving these multimedia channels so users can access their channels anytime, anywhere on any device, in the way that suits them for personal and professional use.

Powerful Terminals

Given the nature of volume business, terminal vendors often resist to move first. Infrastructure must be available to motivate terminal development. As established the heavy lifting on the network side has been done, and terminals are becoming more powerful and able to run multiple complex applications simultaneously. Together, the network, broadband capabilities, and end user device applications are now emerging to deliver true and game-changing multimedia experiences to the end user. Whether the terminal is a mobile phone, handheld computer, gaming device, set top box or household appliance, the IMS architecture can be leveraged to present the multimedia channels in a personalized and orchestrated easy-to-use manner, in front of the couch, at the office desktop, or in the palm of the end user's hand.

IMS in the Market Today

We now see network and service providers leverage and commercially deploy IMS in various and interesting ways. Targeting both fixed, mobile or fixed-mobile devices; mass-market standardized services or leading edge internet-mobile value-chain services; and from providers operating in both mature and emerging markets.

- A large provider in Japan uses IMS to provide instant-talk and presence as part of an Internet portal experience. The portal is available on both mobile phones and PCs.
- A tier-1 operator in Europe chose to kick-start IMS for managed enterprise communications services, including one-number support for fixed broadband, PSTN and mobile terminals. The provider now utilizes the same platform for residential VoIP and IPTV communications.
- A leading provider in North America leverages the IMS architecture as a horizontal integration layer for multiple applications – both new and for migrating existing profitable applications. It also makes these applications available and accessible over multiple access networks from a variety of terminals.

An operator in Scandinavia decided to kick-start a proactive internal change by deciding to launch IMS-based enterprise communications services for a start, and re-organize to develop higher expertise on IMS architecture by driving multiple applications and business models to the IMS provider business platform.

The business environment is now driving the need for an array of capabilities provided by IMS. Not every provider business plan will need all capabilities from the get-go. Given the flexibility and scope of IMS, it is easy to claim that IMS is more than you need. And therein lies the secret. IMS is a framework; it is up to the provider and its technology guide and partners to match selection of IMS capabilities to the provider's business plan. It's all in the name of the business meeting and exceeding user demands for profitable services. The promise of IMS is now being realized as more and more operators commit to the architecture and see that flexibility is good and beneficial when targeted and managed. As this trend continues, end users and enterprises will benefit from new and converged services, potentially lower communications costs with the mass adoption of these services, and a more personalized multimedia experience accessible anytime, anywhere from the screen or device of choice.

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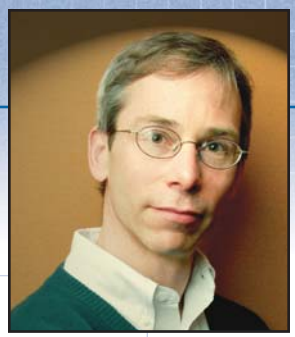
Wag the Dog



by Grant F. Lenahan

I hear lots of discussion about how we "justify IMS" and whether there is a "clear business case for IMS". That misses the point. When compared to the cost of building out broadband networks, IMS infrastructure is cheap. And when compared to the cost of IMS infrastructure, the Service Delivery Framework (SDF) components are even cheaper. Furthermore, IMS and SDP are the building blocks for differentiated or value-added services. So these components are the lowest cost (relatively) and have the most direct impact on the quality, quantity and uniqueness of services offered. It seems to me that operators would do well to invest in the best SDF they can afford — and reap the most revenues in return.

> Networks are Expensive. SDPs are Cheap. Personalized services are Priceless. Let's get our priorities straight.

Roughly speaking, the mobile industry invests about $100B annually in its 3G build out, according to ABI research. Fixed broadband investments are roughly similar. This translates into about $50 per year per subscriber for broadband infrastructure — and ultimately the network investment per subscriber will range from a low of abut $350 to a high of $1,500 — depending on whether it is wireless, copper, optical, and its capacity.

By way of comparison, the cost of IMS and SDF infrastructure is probably 1/10th to 1/25th of that — maybe $25-75 per subscriber, total. Yet these are the very components that let us do things like bill for service, insert targeted advertising, deliver consumer relevant news and information, or securely broker the purchase of digital content.

It's a basic fact of economics that commodity goods compete on price — driving down margins in the process. Consequently, companies the world over strive to make unique products for which customers will pay a premium — even a slight one — simply because the product suits them and they receive value. The difference need not be in the product itself, incidentally — within our own industry MCI (friends and family), Virgin Mobile (clear and simple) and AT&T Wireless (Digital one rate) all created sustainable differentiation through innovative billing plans. In MCI's case it was particularly effective because it was not only differentiated, but personalized — my calling circle would be different from yours. Clever.

So our goal, as an industry, should be to deliver as much value, and as much differentiation as possible over our expensive new broadband networks. If done right, it should generate not only higher revenues, but higher margins. Not all these revenues will necessarily come directly from the consumer either — they may come in the form of advertising or sponsorships — both forms that also require significant real-time personalization (performed by real-time SDF components in the network) in order to target the right ad at the right time to the right subscriber in accordance with the right plan.

IMS and its associated SDF components are the implementation choice for these sorts of customized services. Done right, it is a very sound architectural choice — since standards-based versions of both are real-time oriented, and both are modular, encouraging rapid, common re-use of service building blocks. Taken a bit further, this supports the sort of "mash ups" that have become the hallmark of Web 2.0 environments.

The business case for IMS — and the emerging segment called SDF — is essentially the business case for tomorrow's networks and services. Moreover, they represent only a fraction of the cost of the underlying transport networks being deployed. Operators need to stop asking "how can I do this cheaply", and start asking "how can I do this right".

For as long as most of us can remember, new services, and new pricing plans have been limited by technical feasibility. Services have been offered free until billing methods could be created. Pricing has been compromised due to limitations in billing and charging systems. "Promotions" have been limited to handset point-of-sale, ignoring promotion of new services to existing users. If 90%-95% of the total cost of delivery is already sunk in the transport network, how can saving money on the next 5% — the 5% that determined an operator's competitive position — be a wise decision?

Modularity and the re-use of service components are essential if we are to change both the economics of service creation/deployment, as well as greatly shorten the time-to-market. By re-using charging, session control, user profile

and other components, we save development time. But that's just the beginning of the savings. The much greater savings come over the life cycle of the service. Provisioning interfaces, for example, are largely unchanged. Many user parameters may never even require provisioning, since they are re-used (and therefore already exist). Maintenance costs are lower. Platform proliferation is reduced. Systems integration (and its associated maintenance) is reduced, etc. So not only does a modular approach like IMS / SDF bring services to market faster and cheaper, it also reduces operational and running service maintenance costs.

The real value here is not saving on new service development costs — after all, historically not that many services have been created in the first place — it is to enable innovation, new revenues, differentiation and thus maintain margins on those tremendously expensive broadband network investments. Ultimately the cost is in the "poles and the holes", while revenue and margins will be decided at the IMS/SDF layer.

The simple answer is that many IMS and SDF business cases assume the status quo in terms of innovation, pricing plans and personalization. They don't reflect the personalized services, the varied charging plans, the targeted ad insertions and myriad of other innovations that will be table stakes for any operator that wants significant share — and significant margins. By trying to extrapolate from the past, we're mis-characterizing the competitive environment of the future. All we need really do is look to the Internet.

I'd suggest that we need to think very carefully about how we maximize the revenue generating and product differentiating capabilities of our Service Delivery Frameworks, and the core IMS components that support them, such as network policy, and online charging. I'd also call the industry to change its question from "how do I minimize my deployment expenditures on SDF?" to "How do I cost effectively empower my creative innovators, and thus maximize my market share and margins?"

When our industry fully embraces the absolute necessity of service innovation — as the web players have — the business case will no longer be hampered by too-conservative services development assumptions. We will no longer be planning for failure, and then building Excel spreadsheets that validate our plans. Rather, as an industry we will accept the inevitable, and will build a technology infrastructure — and a cost structure — that allows us to compete, to innovate and to win.

You might observe that I view IMS and SDF as the tail that can wag the entire (network) dog, allegorically. So, appropriately, next issue I'll talk about that dog's Long Tail.

Have a great summer everyone!

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Where Are We Headed?

by Mike McHugh

Where is the IP Multimedia Subsystem (IMS) headed? Originally created as a wireless specification, it has thrashed around the telco world and is now migrating into many different market segments. As this technology continues to develop, the IMS discussion is shifting from architecture to services and applications.

Many service providers see IMS primarily as a means to develop and deploy more and better applications and services at lower cost. Since applications are increasingly driving the justification for the deployment of IMS, it makes sense that the service layer of the IMS architecture is an increasingly important consideration for service providers looking to provide services that can help generate new revenue streams. The concept of the service delivery platform (SDP) — sitting "on top of" or at the service layer of the IMS network — has arisen as a way to view this part of the IMS network.

Already being proven out by early adopters, service providers have been detailing requirements for the service layer of the network. There is a need for a complete ecosystem for the rapid development, deployment, management and billing of these value-added services in a device- and network-independent way. Additionally, service providers have articulated the desire to aggregate different network capabilities and services and different sources of content. To help enable application developers to access these services and content in a uniform and standardized way, carriers need to provide open and secure access to service capabilities. The service layer of the network also should make it easy for third parties, including independent software vendors and service providers themselves to offer new services.

Delivering on the promise of IMS will require a new kind of service model. This model should include new technologies, be standards-based, focus on cost-effectiveness and avoid costly integration services. Key technologies for this include Session Initiation Protocol (SIP) integrated with Service Oriented Architecture (SOA), Web Services and service orchestration. This new model embraces the concept of loose coupling, whereby each service capability provides unique functionality, coupled together via SOA, to create a complete service in a cost-effective and highly scalable manner.

Web Services are the modern standard for this model. When it comes to simplicity, plug-and-play, building and exposing basic and advanced services to the external service providers and enterprises, Web Services are the natural choice. Web Services continue to gain in the role of providing abstract interfaces to the core network services and capabilities. The simplicity of the Web Services concept is compelling as they are based on widely accepted standards such HTTP and XML. The success of Web Services within the SDP and IMS environments are dependent in their ability to integrate SDP with IMS, OSS, BSS and AAA systems, as well as multimedia and content solutions. (I'll address the common performance concerns regarding Web Services, SOAP and XML in a future column.)

Provisioning and management of application developers and content providers is one of the key facets of the SDP for which Web Services technologies are ideally suited. Issues such as SLA management, security and policy must be addressed. A highly automated process, based on standard, widely understood protocols and interfaces is required. This function needs to permit changes as services evolve. This is where Web Services come into their own. Publication, discovery, exposure and provisioning via Web Services can allow the management and control to be integrated with an operator's general account management infrastructure.

By using Web Services as one of the main technologies to deliver the SDP, operators can partner with a much broader range of content and application providers, many of whom will be small (perhaps even single-person) players offering targeted, highly specialized services. A large range of programming resources is available in the marketplace, reducing the need to rely on highly skilled and specialized engineers.

In summary, the time has come for the industry to embrace a next-generation service delivery platform, one that allows service and content/application providers to take full advantage of the benefits of service flexibility and re-use, which are afforded by modern concepts such as SOA and Web Services.

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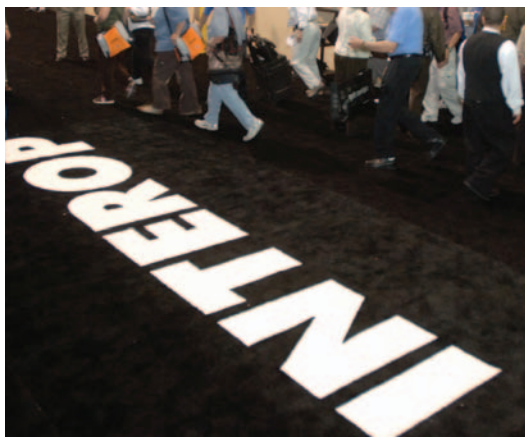

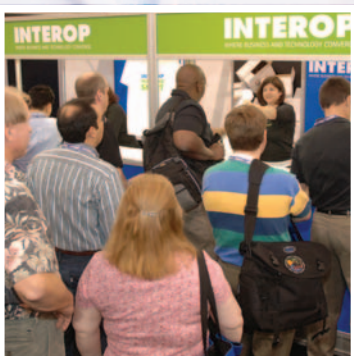

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Video Applications and IMS

by Richard "Zippy" Grigonis

One of the trickiest telecom applications is anything to do with video. That's because "video" can be construed as more than one application, it's video and audio and perhaps some data thrown in for conferencing and collaboration. After all, video can be used in mobile phones, IPTV, videoconferencing or even a PlayStation. To devise services that intermingle video with other voice and data service components to create unique, "blended" service packages that will hopefully cut down on customer churn, network operators and service providers can integrate all of these by using the IMS architecture, designed so that operators and providers can quickly develop and deploy new telecom services.

For example, imagine shopping for a new car and you're talking to your spouse (or significant other) over a 3G cell phone, trying to describe it. Finally you give up and say, "Okay, let me show it to you." Instead of ending the call, taking a picture with your camera-equipped mobile phone, sending an MMS (Multimedia Message Service) and calling again, Nokia has an IMS-based application, Real-time video, wherein you can switch from a voice call to video any time during a call. In November 2005, CSL launched the first 3G video sharing service in Asia (in Hong Kong). Back in 2001 CSL had selected Nokia to supply them with end-to-end network infrastructure equipment as well as project management services for CSL's 3G network implementation. Nokia and Siemens then joined their fixed and mobile network businesses in 2006 to create Finland-based player, Nokia Siemens Networks. (Nokia phones capable of supporting real-time video sharing include the Nokia N70, N90 and 6800.)

In Finland recently, TeliaSonera chose Nokia Siemens Networks to deploy a complete IMS network solution which will be used to offer advanced and hopefully enticing IP-based services such as VoIP, video calling and instant messaging. TeliaSonera thoroughly tested platforms from several IMS vendors before settling on Nokia Siemens and conducted interoperability trials on IMS and SIP with the GSM Association and other leading operators and equipment vendors. TeliaSonera's evaluation convinced them that new IP-based services such as video sharing will function efficiently across various networks.

Nortel Networks is also out to capture the potentially enormous IMS market, and has engineered their equipment accordingly. Their SIP-based Applications Server (AS) 5200 media and application server enables communications regardless of location, access type or media. The AS 5200 functions as an application server in the IMS architecture, allowing carriers to offer SIP-based multimedia services, including desktop video calling. Accompanying the AS 5200 is the Nortel Versatile Service Engine, a second-generation ATCA form factor computing platform hefty enough to handle the processing needs of such advanced IMS applications as IPTV, interactive gaming, video conferencing and video sharing.

Most web and streaming video applications rely on the Real-Time Streaming Protocol (RTSP) and HTTP proxy networks. IMS is SIP (Session Initiation Protocol)-based however, and this has led to concerns that adding video to IMS might be too ungainly, with separate SIP-based IMS, RTSP and HTTP proxy networks. Various ideas exist to combine these into a single hybrid platform that harmonize SIP, HTTP and RTSP service delivery. For example, the Java Specification Request (JSR) Group has been working on an API to allow IMS to better utilize RTSP. Among other things, they're defining an interface intended to be the standard API to write multimedia applications and services for both IP and converging networks. In any case, IMS-powered video applications such as Nokia's continue to appear.

Take for example, One Contact from the pioneering Portuguese 3G audio/video contact center company COLLAB (news - alert) (http://www.collab.pt). One Contact is an IP-based, SIP-powered, IMS-compatible, 3G contact center software-only solution offering full multimedia contact management. It seamlessly integrates video calls, enables multi-location contact centers in a distributed model and reduces deployment costs. Inbound callers to a customer service representative can start with a chat window, then escalate the call to an audio or even a video call. COLLAB targets everybody from 3G mobile operators and NSPs (Network Service Providers) who provide One Contact as a hosted service, to contact center outsourcers, "partial" outsourcers, and even large enterprise contact centers that want to fully own and control a One Contact system on their premises.

Carlos Quintas, founder and CEO of COLLAB, says, "Nokia has demonstrated IMS-based video sharing on top of the IMS architecture, and our One Contact product can do mobile video calls. These are just two of many rich call scenarios that will continue to appear as SIP, IMS and presence-based technologies continue to develop and proliferate. One minor matter: in staying within the SIP standard we did have to make a slight modification to achieve the video fast update for improved video call picture quality."

Richard Grigonis is Executive Editor of TMC's IP Communications Group.

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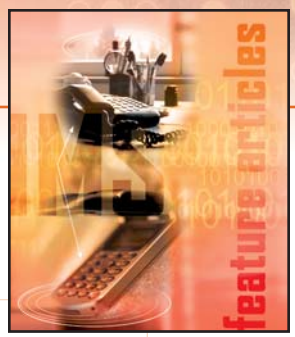


Are Current LI Solutions Sufficient in a World of Vulnerable IP Networks & Sophisticated Attacks?

by Dr. Supranamaya Ranjan

The May 2007 deadline for CALEA compliance has come and gone, yet debates surrounding the social and moral ramifications of Lawful Intercept (LI) still rage. An issue that has neither been initiated nor discussed at length is whether the systems designed to monitor terrorist and criminal activity are robust enough to defend themselves against malicious attacks.

A clever adversary could impact carrier revenue by either launching attacks that thwart successful interception (in an attempt to evade detection), or exploit the vulnerabilities of an LI system to launch other attacks. In the first case, a hacker can prevent ISPs from successfully intercepting targeted events and traffic data by launching a denial-of-service attack on the ISP's LI infrastructure. Further, a poorly architected LI solution may introduce new points of failure within an ISP's network, which the ISP may witness as a larger number of attacks against its infrastructure (much like a DoS or DDoS attack).

The picture may appear gloomy, but ISPs can proactively address the challenge either by deploying LI solutions with built-in security capabilities, or by complementing LI deployments with proven network security solutions.

LI Solutions

All LI solutions can be characterized either as active, passive or hybrid. Active LI solutions consist of an intercept device interacting directly with network equipment such as media gateway control servers to obtain all the flows that match the targeted user/service. In contrast, passive LI solutions sniff traffic off the wire, and the traffic is then analyzed offline by the intercept device and matched against the target. A hybrid LI solution is one that performs the initial target match passively against sniffed traffic, and on successful match, it configures the network equipment actively to intercept the media streams corresponding to the target.

Attacker Model

Irrespective of whether the intention is to deny successful interception or to exploit LI infrastructure to launch other attacks, attackers have access to an extensive and bewildering set of techniques that they can use to achieve their goal.

To illustrate the ease with which an attacker may thwart successful interception, consider a person who learns of an impending warrant against his VoIP phone number. His first reaction would probably be to stop all VoIP (define- news - alert) communication. Next, however, he could begin a "spam flood" attack targeted at the ISP(s) most likely to execute the warrant. In order to bring down the LI infrastructure, the attacker could launch a Layer 7 SIP flood with his VoIP phone number as the originating number. In order to execute the warrant, the ISP would begin intercepting all the packets in the flood, and depending on which portion of the LI infrastructure is the least provisioned in terms of resources, one or all components could be affected in the following ways:

- The access link between the routers and intercept device can be congested since the routers start forwarding the entire packet storm
- The system resources of the intercept device may be exhausted during a SIP flood for constructing in-memory the association of SIP control channels with the corresponding RTP sessions

Moreover, the agility and flexibility with which Internet identities can be obtained allows an attacker to launch a "smoke gas" attack. Consider an attacker who has learned of a warrant issued against him. Owing to the prevalence of dial-up VoIP solutions such as those offered by AOL and NetZero, and soft-phone software such as Skype, the attacker could quite easily obtain several new accounts, and initiate phone calls from each of these new accounts to himself. Alternatively, the attacker could lease out botnets, install soft-phone software on the zombie machines and commandeer them to dial his phone number simultaneously. In contrast to the

aforementioned attack, each phone call would originate from a unique phone number and the LI systems would parse these calls to build the detailed call graph. Some botnets have been known to consist of as many as 200,000 machines. Even if, under a conservative assumption, each of these machines was behind dial-up access (64 Kbps), the attacker would be able to create a flood of 1.28 Gbps — enough to congest an OC-12 or GigE link in an ISP. In addition, building a call graph with that many identities may stress the CPU and memory resources of the intercept device itself. Lastly, the call quality of legitimate callers would certainly suffer, since the media gateway controllers within the ISP would be expected to stop admitting new calls during the call storm.

The publicly addressable components of an LI system such as the reporting portals also introduce new vulnerabilities into an ISP's infrastructure. An attacker could initiate a buffer overflow exploit against the web portal in order to gain backdoor entry into the ISP's infrastructure.
Exacerbating this is the fact that the tools and resources for achieving such exploits are quite easily available. The attacker could begin with ICMP pings to determine publicly accessible machines and continue with port scans and OS fingerprinting techniques to determine open services on a machine, and then install malware known to exploit those services. Once the attacker has gained backdoor entry into the ISP's infrastructure, he could eavesdrop on all communications and parse all of the traffic. He could determine if a subpoena has been initiated against him, and thereby stay a step ahead of law enforcement agencies (LEAs) in the intercept battle.

Once the attacker has gained backdoor entry into the ISP's infrastructure, he could eavesdrop on all communications...

Why exactly would this be important for carrier networks and ISPs? Well, a lot of the DoS, DDoS, scan and worm attacks seen to date on the Internet have been launched by thrill-seeking script kiddies, cyber extortionists looking to make a quick buck, or by spammers looking for un-patched, vulnerable machines so that they could add them to their bot armies. However, once ISPs comply with CALEA and ETSI, the scenario changes, as "cyber mafias" could gain yet another customer. In fact, criminals or terrorists who, upon learning of impending intercept warrants against them, could be expected to approach cyber mafias to prevent successful interception. The results could be disastrous, with cyber attacks launched as fast as warrants are issued.

Unfortunately, ISPs and carriers will bear the brunt of such a mafia nexus. Imagine being an ISP that suddenly starts fielding a huge number of phone calls from disgruntled customers who couldn't check their e-mail, couldn't access their banking accounts and couldn't order life-saving drugs online, all because they were being DDoSed for opening up a cyber warrant against a particular target.

LI Security Solution

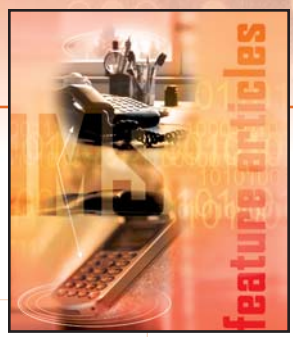
Fortunately, solutions and techniques that have been developed to solve the general problem of Internet security can be applied to securing LI infrastructure as well. The pertinent requirements of such a security solution would call for visibility across all the layers of the OSI stack as well as scalability to the high-speed links found in carrier-class networks. It is imperative to point out that, since every network has different traffic characteristics, an effective carrier-class security solution must adapt on-the-fly to subtleties in traffic patterns to provide a high detection rate while minimizing the false-positive rate (defined as the instances where legitimate traffic is classified as malicious).

Once an attack is discovered, it can be mitigated before it affects the LI infrastructure or even the ISP's network, thereby protecting the integrity of the intercept. Common mitigation methodologies such as Access Control Lists and Blackholing or null-routing can be used to drop all attack traffic at the edge routers of the ISP, before it affects the rest of the network. However, in some cases, it may be desirable to further investigate the attack traffic, which can be achieved via mitigation solutions such as Sinkholing or re-routing attack traffic to a different part of the network where it can be scrubbed and further analyzed. This can serve as an important tool for LEAs, who can then inspect the attacks to look for circumstantial evidence that can further implicate a target for interfering with investigation.

Summary

The deployment of a Lawful Intercept solution without a corresponding carrier-class security solution can not only compromise an ISP's ability to comply with a warrant from an LEA, it can also increase the risk of attack on core service and routing infrastructure.

Dr. Supranamaya Ranjan is Senior Member of Technical Staff at Narus. (news - alert) For more information, visit the company online at http://www.narus.com.



Distributed Architecture for VoIP Telephony and IMS Solutions

by Herman Abel

Forewarned, Forearmed

Although starting a new design is a pleasant situation to face, there are too many tough choices to be made. First, the complexity of voice solutions is on the increase and contemporary applications are hardly reminiscent of those of just a few years ago. VoIP (define - news - alert) and SIP are not optional any more, but must haves, while comprehensive support for the PSTN and SS7 is still needed. Second, marketing specifications become even more demanding with the need to reduce costs. Low price per channel, total cost of ownership, CAPEX, OPEX — this terminology suggests the key theme of requirements documents.

In this situation, on a daily basis, I observe that my customers are after an answer for two key questions. The first is a bit vague, but quite philosophical: what are the 'best practises' for the integration of complex technologies? In contrast, the second is a manifestation of the ruling materialism: how to get 'something for nothing', mainly in regards to how to reduce the solution costs without compromising the performance?

Suppose you are about to start the design work for a new voice-based application. Or maybe you've been given a task to develop an IMS-compliant system element or even a complete solution for a telco's service. Bets are that you are a customer of mine, but if not — there is enough to suggest you should be.

Sacred Simplicity or 'Custom is Another Law'

Ahead of introducing you to a concept that holds the answers to these important questions, it is imperative to realise the structure of the current generation of voice communication solutions and recognise the core of the existing problem in terms of functional limitations.

In the VoIP-less telephony world, with expensive call minutes and the mess of disparate CAS and CCS type PSTN protocols, most of the voice-based solutions had a common architecture, simply described as a host server with telephony boards. Whether voicemail, interactive voice response (IVR), contact centre, fax service or a gateway, what most had in common was that the solution was integrated in one physical unit. Utilising this conventional architecture, voice and data processing hardware i.e., telephony boards with analog and digital network access interfaces, a database, and high level logic in the form of a control application were all carefully integrated into a computer server to create an enterprise level solution or into a CompactPCI chassis for higher density, telco level solutions. The interconnection between the cards was done via the proprietary telephony bus H.100/H.110, while the high level application controlled the boards using the PCI bus that is present in the chassis or the computer server. An example of a solution utilising the common architecture is shown in Figure 1.

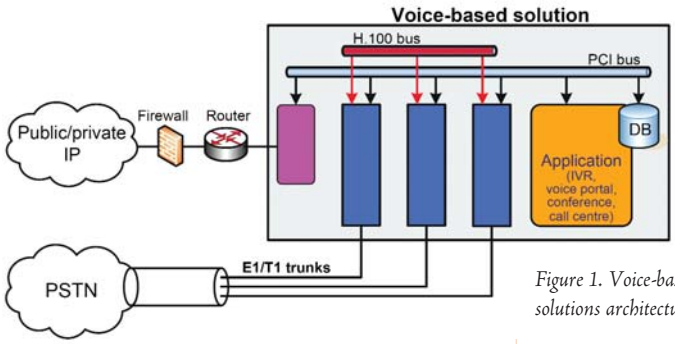


Figure 1. Voice-based solutions architecture.

Although achieving the main objective of delivering a defined functionality set within a reasonable cost, employing to the common architecture creates a significant headache to the developers when additional sophistication from such a solution is required. How to scale the solution with the minimal added cost? How to implement redundancy into the system, making it fault tolerant? How to manage the system remotely? How to allow hitless software upgrades and hardware maintenance in the system without interrupting the service? All these questions refer to a particular set of problems inherent to 'all in a box' solutions — problems which can be very costly to solve.

Righting Wrongs

Understanding the deficiencies of the common architecture of voice-based solutions makes a convincing reason to improve. As Karl Marx said, "the reason has always existed, but not always in a reasonable form."

The new approach is to implement a distributed architecture. Nothing but the best is good enough and the distributed architecture delivers the best. It offers scalability, redundancy, remote management and high service continuity at a minimal added cost. It utilises the inherent strength of IP to allow remote devices to communicate distantly and operate as if they were all present locally. It is imperative to acknowledge, that although the distributed architecture is a significant breakthrough in the way voice solutions are designed, it is merely an adoption of the practices used for at least three decades, in what is called 'distributed computing' and well known to everyone who ever used a UNIX-type operating system.

The fundamental approach in distributed architecture is the creation of discrete functions within a defined functionality scope. These functional elements exist in separate physical entities and communicate via IP. A solution can have each function in either single or multiple presentations (to eliminate a single point of failure). The minimal level of distribution is achieved by the separation of media processing elements from the call control (SIP service) and applications. Having the call control operating on the media processing blades takes the developers to square one and prohibits achieving the design goals.

An example solution based on the distributed architecture is shown in Figure 2. In this particular scenario, every function exists in multiple physical entities, including the application, media processing boards, firewalls, routers and the local area network (switches).

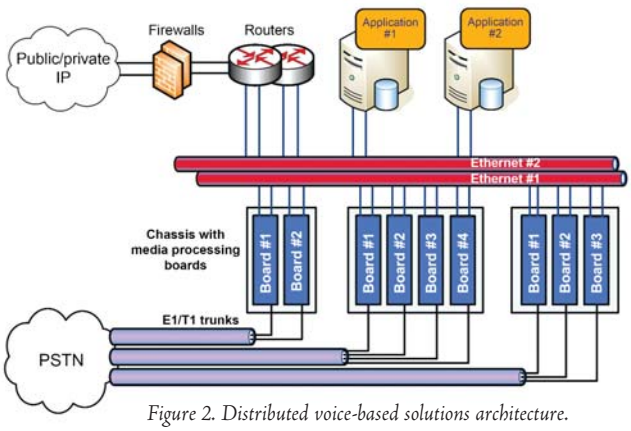


Figure 2. Distributed voice-based solutions architecture.

This example solution has three levels of redundancy for each element, also called protection. First is the connectivity protection, which is achieved by having dual redundant Ethernet interfaces, each connected to a different Ethernet switch. The connectivity protection is not always achievable on the PSTN side, therefore only VoIP calls will benefit from automatic failover to the alternative connectivity link. Second is board protection, which can be implemented utilising the venerable N+1 or N+n schemes. A solution can have alternative media processing boards that are designated to handle the media originally allocated to the main boards. Implementing an 'active-active' model is always desirable and simple 'random allocation' or 'round robin' load balancing techniques will help to minimise the impact of the board level failover. Finally, we have application level protection, which is achieved by having at least two application hosts sharing the database(s) and call control state information using handshake mechanisms. As software elements are usually the most prone to failure, application level protection is seen as vital.

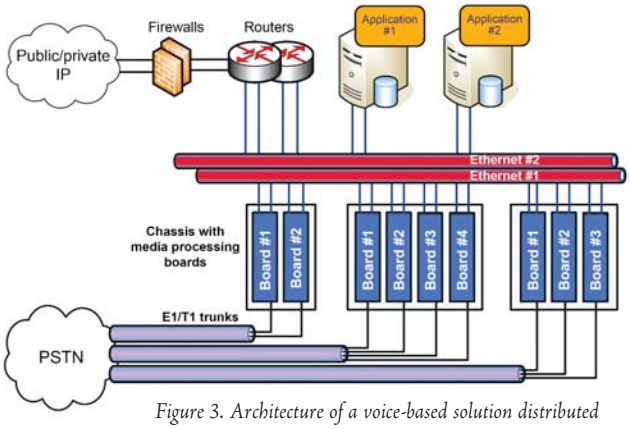


Figure 3. Architecture of a voice-based solution distributed between remote geographical locations.

Another example (see Figure 3) shows a true, boundary-less distribution of a voice solution between remote geographical locations. An example of a solution benefiting from such an 'extreme' form of distribution may be a contact centre for a bank, or any other large institution, with a major customer service centre offshore and branches in numerous geographical locations. Implementing a VoIP-based solution, which utilises the distributed architecture allows not only significant cost reduction for the voice calls carried over the public Internet or a VPN instead of the PSTN, but also high service continuity because of the ability to employ remote control applications or media processing resources in case of these elements' failure in one of the geographical locations.

Practicing Distribution

Is distribution a risky practice? It is surely not. *Au contraire, mon ami,* the decision to build a solution with distributed architecture pays back fast. And here is a list of the major reasons, which allow this technological advancement to make a real impact on a service provider's business. As Doctor Who said, "first things first, but not necessarily in that order".

First, and probably contrary to the common belief, distributed systems are inherently cheaper to build, because of the ability to use a set of commodity, optimal performance and quality hosts. The need to deploy industrial-grade servers or special computer blades is eliminated and solution control applications can be hosted on a standard server machine connected to the enterprise LAN.

Secondly, these solutions are much easier, faster and therefore cheaper to develop and test, since the communications over the IP protocol are simple to trace and analyse with a wide range of freely available software-only tools.

Thirdly, the intrinsic scalability, yet again enabled by the use of IP communications rather than local PCI and H.100/H.110 buses, abolishes the need for solution re-engineering with the service capacity growth beyond that originally planned. Distributed solutions are almost linearly scalable and require extra capital expenditure mainly for additional media processing resources, while other elements of the system are completely re-used.

Additionally, the ability to distribute is a colossal benefit in terms of deployment flexibility. With plural elements communicating via managed LAN or even public IP, the same solution design can be instantly installed in disparate deployment scenarios, entailing only minimal software configuration.

Finally, and probably the major rationale, is the simplicity and cost efficiency in achieving telco-grade reliability and service continuity. Eliminating the need to employ specialised proprietary or open standards hardware, developers of solutions based on the distributed architecture are saving tens of thousands of $/£/ /¥ per system, while achieving the same level of element redundancy and automatic failover. The *summum bonum* of the distributed architecture is that it allows the achievement of an identical level of service availability using commodity, lower cost computer servers and media processing hardware in PCI or PCI Express form factor.

Much in Little

The ability to physically distribute VoIP telephony and IMS solutions amongst separate hosts is seen as a real step forward in voice solutions technology. And there is much in little. The use of the distributed architecture allows leveraging the core strengths brought by IP and realising plural business benefits, including scalability, redundancy, remote management and high service continuity.

The bottom line is that solutions developers have a new path they can take, and the right combination of architectural features will deliver the greatest cost efficiency. Enabling technology, media processing boards and software, is available to assist in meeting the objective. It's important from the outset to be thinking in the direction of distribution — the earlier the better. "Resistance is useless," (Doctor Who again) but don't forget the Latin proverb to the effect that, "consequences of abuse do not apply to general use. . .".

Herman Abel is a Product Manager at Aculab (news - alert) (http://www.aculab.com) and is responsible for development of the Prosody portfolio, new product initiatives, definition of the next generation product strategy, markets analysis, and support of the global sales force.

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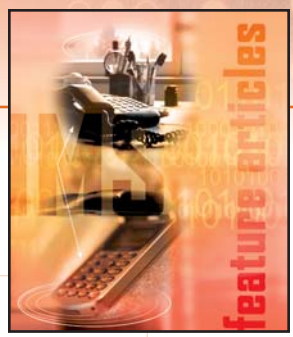

IMS Testing, Baited and Abated

by Richard "Zippy" Grigonis

In any case, the IMS Forum — a consortium of about 18 vendors including HP, Sonus, and UTStarcom — has once again chosen the University of New Hampshire InterOperability Laboratory (UNH-IOL) in Durham, New Hampshire, for their latest Plugfest. The UNH-IOL has become one of the premier non-profit testing facilities for networking and data communications products in North America, perhaps the world. The 32,000-square foot facility is run by both students and a full-time professional staff.

Unlike earlier Plugfests, this one will deal with more complicated applications such as multimedia, IPTV, wireless functionality, security, SIM card integration, IPsec and video conferencing. This may be the first Plugfest where gear is actually certified by the IMS Forum, which means that the network components are certified for interoperability for specific applications. A certain vendor's network element would be certified separately for multimedia, SMS, video conferencing, etc.

As it happens, Sonus Networks has also chosen the UNH-IOL as the debut test house for its new Interoperability Certification Program, an extension of its Open Service Partner Alliance (OSPA) program. Sonus provides the certification, and the lab performs the actual testing.

Mark Lunardoni, Director of Marketing Operations for Sonus (news - alert) (http://www.sonusnetworks.com), also spearheads Sonus' Open Service Partner Alliance program, which brings together vendors to test and ultimately offer service providers end-to-end packet-based network solutions. OSPA's goal is to "empower standards-based interoperability between applications, hardware vendors, and the Sonus product family". A particularly important part of the Sonus OSPA is the OSPA Interoperability Laboratory at the University of New Hampshire's UNH-IOL, where product interoperability and trial testing is done and complete solutions are ultimately produced. (For more on OSPA and its partners, go to http://ospa.sonusnet.com.)

"We do have many kinds of relationships with third parties," says Lunardoni. "There's actually a number of solutions that we provide based on our products and third-party products that are 'repeatable' solutions we sell regularly. There we do very proactive testing, such as testing of new releases. We have these items in our own support labs and we can reproduce issues that can occur at customer sites. So certainly one level of our OSPA is support of third-party products and our testing of them almost to the level of our own products before we send them out into the field."

"In the larger world that we work in, there's an ever-increasing range of different products out there," says Lunardoni, "and we must demonstrate their interoperability with our own products. The market expects us to be 'good citizens' within the overall IMS vendor community and we do regular testing, sometimes in our own labs at the request of a customer if they want us to help them on a particular issues. Or, we can test at the UNH-IOL in New Hampshire, where we've set up a testbed of our equipment, and we've worked with their staff on testing scripts. We also provide them with technical assistance and we make it possible for anybody who needs to work in a Sonus environment to go there and have their equipment tested on our testbed. The UNH-IOL is an exciting place and I always like going up there and seeing their entrepreneurial spirit. They work with a number of consortia and host other events, just as the IMS Plugfests, in which we also participate."

"Since every network is different, if you don't know the specific customer's environment," says Lunardoni. "You can only do interoperability up to a certain point. Still, if you can do some level of interoperability testing and demonstrate that the functionality works in a Sonus environment, then you're removing an awful lot of risk and are

When our next issue appears, the IMS Forum's Plugfest III will finally have taken place (October 15-19, 2007). Many industry veterans say they're awaiting Plugfest III with proverbial "baited breath". Of course, they probably don't realize that "baited breath" was originally spelled "bated breath", a contraction of *abated* meaning "reduced, lessened, lowered in force". That would imply that some of us have almost stopped breathing through terror, awe, anxiety or extreme anticipation. (Yeah, I guess IMS interoperability testing does do that to some people.)

guaranteeing a short time-to-install for any deployment using that equipment."

"As we look at the different tiers of our interoperability and partnership programs," says Lunardoni, "at the top layer are the repeatable solutions that we treat as our own products, and we do a lot of interoperability testing in our own labs. Then there's another set of products that may not be repeatable solutions, but they're important to a particular customer in a particular application in a particular environment. We test those in our labs, working with the customer. Finally, we have our OSPA certification program, run through the UNH, where a vendor can actually go there and get their product certified against a generic set of tests, and anyone who completes the certification then can use our Sonus Powered logo and market themselves as being interoperable with us."

Chad Hart, Product Marketing Manager of Empirix (news - alert) (http://www.empirix.com) says, "Although, externally, it doesn't appear that IMS is taking off, we're certainly seeing of activity in the lab, which is typically a precursor to actual commercial deployment. IMS is really getting proved out in both equipment manufacturer labs and especially service provider labs. We're particularly involved in interoperability testing. We participated in the MultiService Forum's (MSF's) Global MSF Interoperability 2006 (GMI 2006) Event that brought together equipment suppliers with Tier 1 carriers such as BT, NTT, France Telecom and Verizon, to demonstrate practical implementations of IMS convergence and to address key interoperability issues."

The Electric Automatic Acid Test

EdenTree Technologies (news - alert) (http://www.edentreetech.com) isn't really a test equipment company *per se*; they're an automation solutions company that offers a modular lab management and test automation solution for network hardware and software labs which includes remote connectivity management, computer configuration automation, and asset management tools.

EdenTree's Co-Founder and Vice President of Marketing, Roberta Gonzalez, says, "We have many customers on the service provider side using our solution to help automate their testing of IMS and VoIP services and solutions. For example, the Cisco softswitch group uses EdenTree solutions to automate testing in their Richardson, Texas labs. Their need is to test the entire IMS solution as well as of course the various products, such as Class 4 and 5 capable softswitch products and all of the other elements that Cisco brings to the network mix, both in the core and at the edge. They test the overall solutions at various stages, as well as the individual products. Of course, there are a bewildering number of tests one can perform: functional testing, capacity testing, interoperability testing, total solutions testing, you name it. These tests are done in various stages and by different groups at different labs situated in different geographic regions."

"As far back as 2004 Cisco did some forward thinking about how they could do this massive testing more effectively," says Gonzalez, "and in 2005 they began to implement some Layer 1 switching and lab management software from us at EdenTree that allowed them to take a variety of NTAs, ATAs, IADs and phones of all kinds and connect them to their softswitch network where they were testing the products' functionality, capacity and so forth. Using our solution, they could now create many different connections among all of those elements, easily and in an automated fashion via software controls of the Layer 1 switching infrastructure sitting in the lab. This is very much the 'flagship' solution that EdenTree provides, in that it shows how our software establishes a switching infrastructure that can be used in labs and particularly the labs of VoIP equipment manufacturers as well as triple play service providers."

"Vendor customers of ours such as ADTRAN, Cisco, Ericsson, Sonus and our service provider customers such AT&T, Comcast and Verizon, all have a common goal of being able to do more complete testing in their respective labs in a more automated fashion," says Gonzalez. "We're absolutely seeing this idea explode in popularity, especially over the first six months of 2007. We don't have to evangelize the concept anymore. Some of the other major testing companies are also embracing this automated testing concept. The testing equipment vendors recognize that, even though increased efficiency in the lab and increased automation of the lab may cannibalize some of their equipment sales, that's counterbalanced by the value that they can bring to their customers with automated testing solutions. It's a win for everybody."

"IMS software delivers an unlimited number of multimedia and voice services across wireline and wireless networks," says Gonzales. "The test equipment and ancillary devices for this tends to include various electronic equipment and computer-based applications from multiple vendors. In the case of software companies, they must deal with support for many kinds of computers, frequent new releases, heterogeneous test environments, and complex computer configurations. But once again, our new class of solutions can automate the computer setup process and can handle high-end UNIX, Linux, and Windows platforms. So, for both hardware and software vendors, customized automated testing increases both lab productivity and product quality while at the same time reducing costs."

So it looks like the "combinatorial explosion" of testing involved in establishing IMS worldwide will be relieved by those innovative testing companies that have risen to the occasion by automating the testing process.

Richard Grigonis is Executive Editor of TMC's IP Communications Group.

From the Desk of Michael Khalilian

IMS Forum is Accelerating Applications Interoperability

A Summary of IMS Plugfest™ II and the Plan for Plugfest III.

In June, we completed our second Plugfest event, Plugfest II, which is just one stop on our journey. There was an 80% increase in overall participation, and 80% of the participants from Plugfest I in January returned for Plugfest II. Both events were held at the University of New Hampshire Interoperability Laboratory (UNH-IOL).

Plugfest II demonstrated that IMS applications and services are a reality. There were 18 companies at Plugfest II that rapidly deployed and debugged a fully functional, end-to-end IMS network running "rich" multimedia applications, such as instant messaging and IP Centrex services; the number of test cases tripled from 13 to 43. Participants in Plugfest II included a cross-section of 4 to 5 key segments of the IMS industry in a clear example of the global reach of IMS. Companies from around the world set up short message services (SMS) and video messaging services, among others. For many of the companies, Plugfest II was their first interoperability event. We are encouraged that they were able to get so many pieces working in such a very short time.

The first IMS Plugfest allowed participants to demonstrate that by using IMS, a service provider could bring online a large best-of-breed central office switch in eight hours. At the second Plugfest, vendors showed that IMS enables a service provider to start providing on-demand, IP multimedia and mobile services in three days.

As the year progresses, we here at the IMS Forum — the industry's only Forum dedicated to the acceleration of IP Multimedia Subsystem (IMS) application and service interoperability — continue on our journey towards industry-recognized certification standards through interoperability testing.

Plugfest II showed that when vendors implement IMS architecture the result is an easy-to-use, quick-to-install-and-run delivery service. Vendors didn't get tangled in standards and the complexity of the operations as they appear on paper. They did a great job of taking complexity and it hiding inside the design. Vendors made interoperability appear simple. This is good news for the industry.

We also found convergence of services is easily supported by the IMS architecture. We saw how, in one platform, it is possible to combine several services such as Voice -over IP (VoIP), IP Centrex, PBX, fixed mobile and SMS.

Our final lesson learned is that companies are motivated to work together to come up with new services and applications. We feel strongly that the progress made at our Plugfest events held at the UNH-IOL demonstrates the importance of our vendor's IMS technology solutions to the service providers.

But the completion of Plugfest II was only the beginning of what we can do. The IMS Forum's third Plugfest is scheduled for October 15 to 19 at the UNH-IOL. IMS Plugfest III is dedicated to interoperability across fixed, mobile and cable IMS core components, and covers the test of VoIP, FMC, SMS, and multiple video services. The IMS Forum Plugfest is the only event covering applications and services for IMS running on all types of networks. For more details and registration, please check our website at http://www.imsforum.org.

Michael Khalilian is the President and Chairman of the IMS Forum and CTO, Pervasip Corp.

For membership information, or to participate in IMS Forum working groups, plugfest and membership info, please visit http://www.IMSForum.org or contact Michael Khalilian at MKhalilian@IMSForum.org.

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