IMS: Transforming Network Architectures

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IP Multimedia Subsystem (IMS) has emerged as a formidable catalyst for network change. Next- generation networks, based on IMS and Internet Protocol, will empower a rush of new applications and services needed to enrich the overall user experience. As IMS momentum increases, network equipment providers (NEPs) have growing incentive to retool their businesses and accelerate time to market with open, standards-based network architectures that fuel fast, cost-effective and flexible delivery of an evolving lineup of new IMS-enabled services.

While this change will not be completed easily or overnight, IMS already is making inroads into carrier networks around the world. More than 200 service providers, including notables such as BT, Cingular, Sprint and Verizon, are in the throes of IMS trials or early deployments. NEPs choosing to adopt an integrated approach—comprising a broad base of signaling protocols along with carrier-class infrastructure in a flexible, open architecture platform—are best positioned to assist service providers in delivering a rapid infusion of new applications.

Business Darwinism—Telecom's Survival Of The Fittest

There is much at stake here. Network operators need to transition to more service- and subscriber- centric business models in order to have the best chance to survive in a hotly contested environment. Despite consolidations in the service provider ranks

that have reduced some of the competition, the need to stand out remains imperative. An increasing number of carriers are turning to converged services to increase revenue, reduce churn, and improve brand loyalty.

Among NEPs, competitive pressures also abound. In response, other Tier One NEPs are striving to stay competitive by moving higher up the value chain and focusing more on applications and quality of service. Some Tier One NEPs have even begun relinquishing their reliance on legacy, proprietary platforms in favor of leveraging commercial off-the-shelf (COTS) hardware and software that produce substantial economies of scale and quicken the development pace.

Meanwhile, more aggressive and agile Tier Two NEPs are making major headway by adopting a new breed of cost-effective network service-ready platforms—featuring integrated protocol stacks, high availability middleware, and powerful computing capabilities—to lower total cost of ownership and meet accelerated time-to-market goals. Tier Two NEPs face a unique opportunity, and being first to market is their best shot at securing reasonable market share.

Another intriguing competitive force consists of emerging Tier Three NEPs. Often, they are looking for that one "killer app" to get noticed, grab some market share—and most likely be rewarded by getting gobbled up by a larger entity. Time to market is their highest priority, so they are eager to implement an integrated hardware and software platform that gets them in the game quickly.

Whatever their tier, NEPs are experiencing unceasing pressure in this new climate of "Business Darwinism," which is altering the telecom landscape. For NEPs to not only survive—but also thrive—they must adopt more time- and cost-efficient business and technology practices. NEPs migrating to an integrated IMS hardware and software approach over legacy, proprietary platforms

will be more successful in helping service providers seize and secure market share.

Key Business Drivers: Applications Rule

IMS business momentum is building. NEPs that figure out how to leverage the power and potential of open-architecture IMS platforms stand the best chance of capturing the lion's share of this market.

In preparing for IMS, traditional business models are giving way to faster, more adaptable approaches for grabbing and maintaining a bigger chunk of the increasingly competitive market. Critical byproducts of this competition are declining average revenue per user (ARPU) rates and rising customer churn. IMS promises relief by permitting service providers to embrace new measures that lower network costs while speeding and simplifying the creation of revenue-producing services to increase customer satisfaction.

Some of the emerging applications fueled by IMS and next-generation networking include:

- Location-based services
- Presence-based telephony
- Instant messaging between wireline and wireless networks
- "Walkie talkie" style push-to-talk
- A common voice mailbox for wireline and wireless calls
- Mobile video gaming
- Video sharing
- IPTV

Thanks to IMS, these so-called "lifestyle services" can be blended and bundled for seamless access regardless of device. The most talked about applications being targeted as new revenue sources are collaborative multimedia and interactive services, which are aimed specifically at younger audiences. In many ways, the IMS transformation will be driven by end-users who want one common framework for accessing and using all applications—wherever they are, whatever

device they are using. To satisfy this demand, service providers are seeking innovative ways to leverage existing network resources while providing customers with more network flexibility and hastened availability of these new services.

IMS represents an outstanding business opportunity for NEPs to help service providers break free of their reliance on commodity-priced voice and data services. With IMS capabilities in their networks, service providers of all kinds and sizes then will be able to deliver more first-to-market or unique service opportunities while reducing total lifecycle costs. This is possible with IMS because network functions and information now can be shared across many applications with various access devices.

To maximize their IMS opportunities, NEPs need to elevate their involvement beyond the technical realm and engage a higher-level business audience in the process. By focusing on the business potential of IMS, NEPs can get projects off the ground faster while clearing many ROI hurdles that could slow IMS network transformations. In doing so, NEPs must also develop an in-depth understanding of the varying business objectives and expectations in how wireline, wireless and cable providers are approaching their IMS network deployments. For example, wireline providers are very network-centric while their wireless brethren are more application-focused as cable companies look for the fastest way to enter the race.

Since fulfilling the promise of IMS lies in delivering new services and applications, it's highly advisable that NEPs adopt an 80/20 business rule, whereby the vast percentage of their engineering resources is focused on perfecting the recipe for their application "secret sauce." The remaining 20 percent then can be dedicated to working with outside experts and network architects with vast experience in integrating open, standards-based IMS building blocks. This business

approach, which necessitates a shift in traditional thinking, is designed to lower risks, reduce costs and speed service delivery.

Key Technology Drivers: Leverage Open, Standards-Based Architecture

For decades, NEPs have relied on creating their own proprietary platforms with little to no outside assistance or expertise. The aforementioned changing market conditions have dictated that NEPs no longer can take years or millions of dollars to complete their development cycles. In the evolving IMS arena, proprietary platforms will become obsolete rapidly because of their inability to scale without lengthy, exorbitant upgrade investments.

Over the past five years, an increasing number of NEPs have started migrating away from these legacy environments toward more collaborative-based solutions. Yielding to economies of scale and the relentless squeeze of time to market, business-savvy NEPs are relinquishing time-consuming, build-it-from-scratch network infrastructures in favor of utilizing open, standards-based COTS systems.

This fundamental shift will impact how IMS networks will be assembled. Historically, service providers supported the introduction of each new service with a dedicated network node or nodes. Over the decades, self-contained "silos" continued to spring up. Now, the vertically integrated silos throughout circuit-switched networks are being replaced with a horizontally layered architecture that promises more efficiency and adaptability because it is being constructed around a set of open, standards-based technologies.

The emergence of an IMS-enabled network provides a common service platform, doing away with the need to reinvent the wheel every time a new service is introduced. Instead, IMS permits many of the technology building blocks common to all applications—such as provisioning, management, directory and billing—to be reused immediately and repeatedly. The result: a more homogenized, common network infrastructure for expediting the creation and delivery of new services with improved flexibility, reliability, quality and security.

Unlike a revolutionary technology such as Voice over Internet Protocol (VoIP) with myriad competing protocols, NEPs and service providers will see IMS unfold in evolutionary steps. IMS is much more easily deployable because it is based on one overlying, widely accepted technology standard—Session Initiation Protocol. SIP provides the controlling component to allocate the increased and various network resources needed for IMS. By leveraging SIP technology, IMS makes the network aware of every application, device and end-user. The influx of IMS elements propels a litany of services with a high personalization, which in turn increases carriers' revenue, differentiates service offerings, empowers end-users, and reduces churn.

The fastest and most economical route for NEPs to enter this new way of business is by acquiring readily available COTS elements. By doing so, NEPs can expect to save at least 60 percent over building the same components in-house from lowering both capital expenditures and operating expenses. Most importantly, adopting a standards-based COTS approach will enable NEPs to add high availability, scalability and distributed fault tolerance functionality.

Critical Success Factors: Integrated IMS Protocol Software

While hardware ruled supreme in the heyday of the circuit-switched network, today software plays an ever- increasing role as service providers continue to decentralize their networks and push out services from the core and closer to end-users.

Representative IMS Network
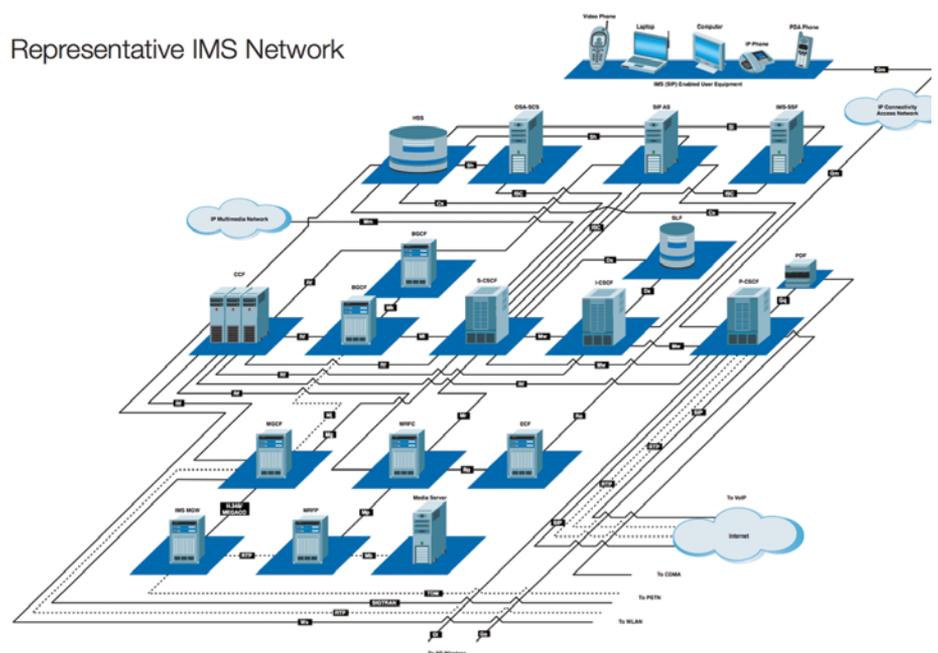
To meet the demands of this decentralized environment, NEPs need to find new ways to help service providers ease the porting of existing applications while preparing for a steady rollout of new services. A readily available solution is integrated IMS protocol software, which delivers to NEPs complete sets of IMS protocol stacks, along with flexible deployment options and application migration kits that reduce costs and deployment complexities.

The fact that wireline, wireless and cable networks are converging only makes software's role in signaling and routing more complicated. NEPs looking for IMS market share must continually offer solutions that help service providers keep track of features and applications as well as network handoffs and billing challenges. The answer is finding integrated software solutions and network service-ready platforms that support all IMS elements, interfaces and key protocols as well as multiple standards and various country variants.

Essential components of any NEPs' software portfolio are:

- *Home Subscriber Server (HSS)*— distributed database that contains valuable subscriber profile data

- *Call State Control Function (CSCF)*—the heart of IMS; provides intelligence for handling and routing calls

Key IMS protocols include:

- *Session Initiation Protocol (SIP)*—the underlying IMS protocol that is easily scalable and extensible

- *Diameter*—needed in more than 60 percent of IMS network elements; critical to the authentication, authorization and accounting (AAA) services provided by the core IMS network elements

- *Common Open Policy Service (COPS)*— plays a key role in Proxy Call State Control Function (P-CSCF) and Policy Decision Function (PDF) within IMS networks

In several cases, these new elements, such as the HSS, will require higher computing capabilities and larger disk arrays. Additionally, NEPs will need scalable platforms for incorporating new network elements over time, including various gateways that provide the necessary routing capabilities between IMS and other wireline, wireless and VoIP networks. Software designed with an architecture that distributes the processing burden across multiple processors offers NEPs the best advantage for performance and extensibility while minimizing upgrade challenges.

In securing these capabilities, NEPs can leapfrog competitors still holding onto the legacy "in-house build" approach by outsourcing development of the upper- and lower-layer protocol stacks, along with management software and high availability middleware. Additionally, purchasing pre-integrated protocols stacks will afford NEPs more time and resources to focus on applications, ensuring scalability as subscriber demand grows and working with third-party developers to enhance new user-driven applications.

The approach to leveraging outside expertise for software development can include source code versions, which permit full view into the software; pre-integrated products with line cards and software developer kits; as well as integrated component solutions with highly adaptable application processing blades.

Regardless of approach, NEPs should be especially diligent about ensuring their software partners keep up with current protocol stack versions, which are being released with increased frequency. Finally, NEPs should be aware that claims of standardization don't always guarantee interoperability. While software is playing an increasing role as the "glue" that holds together today's complex networks, NEPs need to realize that no two network architectures are exactly the same. Variations abound, according to countries, legacy equipment and future direction. Software developed for broad interoperability will facilitate the rapid application integration necessary for accelerated service deployment.

Time-To-Market Mantra

- The following considerations will assist NEPs in fine-tuning their IMS integration strategies:

- Work with service providers to understand what goes into cost of service delivery.

- Build and refine cost-to-revenue service profiles.

- Phase in IMS as a network overlay by first leveraging existing signaling and voice investments to deploy services powered by SIP.

- Start at the IMS control layer (e.g., CSCF and HSS), then add other network elements (e.g., video, multimedia, etc.) as applications and new services dictate.

- Avoid in-house platform builds; pre-integrated solutions lower costs and risks while speeding delivery.

- Examine cost of ownership issues; avoid "cap ex vs. op ex" pitfalls.

- Seek economies of scale by leveraging open architectures and re-usable standards-based software to ease bridging to IMS.

- Continually focus on applications, innovation and quality of service.

Critical Success Factors: COTS And ATCA

At the core of the network, NEPs are striving to deliver flexible elements that can seamlessly integrate with existing and future equipment. Some of the requirements for hardware include providing more computing power and larger storage capacity for scaling platforms to accommodate millions of users and billions of transactions.

An advancement that aids this effort is Advanced Telecom Computing Architecture (ATCA), which provides significant enhancements for enabling the delivery of high-density, high-performance telecommunications applications. ATCA products have a packet-based, redundant architecture that leverages the latest PCI Industrial Computer Manufacturers' Group (PICMG) standards with Service Availability Forum interfaces for both control and data plane applications. NEPs should insist on ATCA-compliant hardware for its ability to deliver more capacity and power in a small form factor while also offering robust shelf management and standardized serviceability.

- Some of the advantages of ATCA hardware combined with high availability software include:

- Fault-tolerant platforms that enable service providers to deliver with 99.999 percent ("five nines") availability

- The ability to flexibly adapt and scale the network

- Application processing blades can be optimized for specific functionality

- Smaller footprints reducing hardware real estate requirements substantially

- The opportunity to evolve products over time while avoiding "forklift upgrades"

- The ability to deliver the latest "service of the month" quickly, easily and cost effectively

In leveraging commodity, standards-based platforms and COTS components, NEPs will have more freedom and flexibility to deploy systems tailored to individual networking requirements. Still, the commodization of telecom equipment is not the panacea. NEPs should not sacrifice a commitment to COTS to use the cheapest "box" available. Telecom platforms remain much more complex than their computing counterparts, with redundancy and five nines availability as must-haves.

NEPs must avoid the Cap Ex / Op Ex pitfall: buying a box that best fits today's immediate budget constraints could end up costing more in the long run once operating costs are factored in. NEPs also need to be cautious about the lure of "plug and play" solutions. These claims should be thoroughly scrutinized as simple implementation typically is not as easy--or rewarding--as it sounds. While plug and play solutions can facilitate rapid network deployments, many lack the sophisticated functionality to support crucial five nines network availability or stringent standards for reliability and quality. The best way to reduce Op Ex and lower overall total cost of ownership is deploying extensible, network service-ready platforms that capitalize on ATCA and pre-integrated IMS software to accommodate existing and future network requirements.

Getting Started With An Integrated IMS Approach

The IMS evolution requires a series of measured, pragmatic steps. Adopting a layered approach for new hardware and software represents the best shot at building a solid IMS foundation. Phasing in IMS as an overlay to existing network elements will offer the smoothest path to a well-planned migration. Infuse IMS at the control layer, with the CSCF and HSS, and then build around it, adding video and media and other exciting innovations as appropriate to aid with service differentiation. To ease IMS migration, NEPs should leverage existing

signaling and voice investments to deploy services powered by SIP. Of course, keeping up to date on the latest SIP advancements also is critical as it remains the essential protocol for IMS.

At every step, NEPs must maintain an acute awareness of the price and cost of service delivery— taking into consideration the number of users involved, performance factors, interoperability issues and potential network bottlenecks. Developing a deep understanding of service providers' deployment plans and timetables will prove invaluable in staying ahead of the curve with future product developments. The optimal method for keeping pace involves pre-integrated solutions, combining binary protocols, standards-based line cards and integrated management software in field-tested configurations. Solutions that take advantage of open, standards-based architectures and powerful ATCA hardware platforms will deliver the additional computing power required. Such combined offerings provide NEPs with the fastest path from application development to network deployment while enabling them to focus on areas of true competitive advantage: application innovation and quality of service.

As time to market remains essential, NEPs will be best aided by seeking a technology partnership to reduce costs and lower overall risks. The number of such arrangements has grown exponentially in the telecom industry over the past several years. Finding a specialist with real-world expertise in hardware, software and implementation services liberates NEPs to stay focused on their "secret sauce" and whole end-product while offloading the development of building blocks that are below the application level to a trusted third- party. This ensures the most rapid build process while letting all involved concentrate on their individual core competencies and collective competitive strengths.

Summary

The introduction of network service-ready platforms—featuring integrated protocol stacks, high availability middleware, databases and powerful computing platforms—will help NEPs jumpstart their IMS network transformations while maximizing existing investments. As the longest journey begins with a single step, transforming network architectures with an integrated IMS approach provides the best opportunity for NEPs to grow their business in leaps and bounds.

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