Advisory Report

Product Watch: Introducing the Fixed Mobile Convergence Gateway

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Summary

Issue

While a concrete definition of fixed-mobile convergence (FMC) even years after the concept's introduction – remains elusive, a generally accepted goal of the FMC movement is to enable operators to deliver the same applications or services to subscribers regardless of the device or access network they happen to be attached to at any given time. Yet, despite the flurry of "anywhere, anytime" promises coming from equipment vendors and operators alike, delivering services in an access-agnostic manner is no trivial task and the few commercial FMC services already in the market are rudimentary in comparison to those that could be delivered over a thoroughly converged infrastructure. This potential, however, will remain untapped until operators fully optimize their networks and service delivery environments to deliver IP-based subscriber services that can seamlessly bridge access network and device boundaries.

The starting point for most FMC overhaul projects is the core of the network, at the application and services layers. Carriers, though at a measured rate, are rebuilding their networks based on next-generation architectures, such as IMS. Both mobile and fixed operators have seized on IMS and service delivery platforms (SDP) as future frameworks for developing and deploying services that can run over any network type without requiring connection-specific modifications or dedicated resources. With a common set of services and enablers in place, operators can then start to extend services across the various access technologies, such as cellular (2G and 3G), WiFi, WiMAX, DSL, cable, fiber and, eventually, femto/picocells, that surround – in spiderweb fashion – a carrier's core network.

The major stumbling block still in the path of sophisticated FMC services is that each of these distinct access technologies differ in some manner (such as encryption and authentication technologies) and require dedicated access gear to manage the sessions that flow over these connections. While carriers can overcome this hurdle by dedicating signaling- and traffic-handling equipment for each type of access network, a potentially attractive alternative

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is a unified solution that can provide carriers with a multi-function anchor point in their network for managing sessions coming from any and all types of access networks. Betting that such a device will be attractive to operators in the near future, several vendors are shifting product development in this direction and the concept of a universal, multi-function gateway – more colloquially known as a convergence gateway – has begun to materialize.

As with the early strains of any potential product class, the convergence gateway category is currently weighted down by multiple question marks. Will participants in this product class come from the fixed or mobile side of the equipment market? What are the requirements or the functions that should be included in a convergence gateway? What are the potential adoption scenarios available to carriers? What are the alternatives to an integrated multi-function device?

Current Perspective

Among the most confounding issues facing the telecommunications industry in 2008 is traversing the sizeable gap that exists between the intentions of service providers to offer sophisticated, access-agnostic services and the readiness of those same operators' service delivery infrastructures to provide those services. Increasing the difficulty of surmounting this gap is the general failure of the operator community to acknowledge its existence. For more than a year now, operators have been promising a world of "anywhere, anytime, any device" communications and entertainment services as if simply wishing them into existence or the creation of splashy marketing campaigns would magically render their networks suitable for such ambitious capabilities. The reality, of course, is that the delivery of compelling FMC services – in any scalable fashion – requires an almost complete overhaul of existing network and service delivery infrastructures. While carriers have definitely started down this path, it's going to take millions of additional dollars in investment and more than a year of infrastructure evolution before operators even get within shouting distance of their final destinations.

Most past discussions around FMC-inspired service delivery infrastructure overhauls have focused on the core of the network, where SDPs, IMS and other frameworks and technologies are supposed to serve as building blocks for horizontally-oriented application, control and services layers. With an infrastructure in place that allows for the creation of applications that are completely independent of the network's control, transport and operational planes, carriers can presumably launch services that use a set of common enablers and are compatible with any type of access conduit to the subscriber: 2G/3G, WiFi, DSL, fiber, WiMax, femtocell or an access technology yet to be invented. Though operators are far from completing the overhaul of the core of their networks, many service providers – along with a growing number of equipment makers – are looking toward the next step in the FMC-inspired transformation of their networks. Shifting attention from the inside of the network toward its edges, carriers are confronting the reality that each type of access network – mobile or fixed – flowing into the core of their network requires a dedicated subsystem of session management equipment and software. This creates a counterproductive relationship between network flexibility and complexity. In other words, the closer service providers move toward accommodating the "anywhere, anytime" expectations of subscribers by supporting multiple types of access networks, the more complex their networks grow. If operators learned anything in the post-bubble years it is that the key to building flexible

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and efficient networks in the 21st century is through simplification and consolidation of the service delivery infrastructure.

Heeding those lessons of the past, operators are beginning to recognize the need for technology consolidation in the access portion of their core networks. As a result, a murmur of interest is bubbling up around a potential new product class, which serves as an anchor point stationed at the subscriber side of the network for securing, authorizing and conditioning real-time (and near-real-time) traffic, as well as managing the seamless handoff between all those different networks. Though a universally-embraced name for this product class has yet to emerge, some measure of consensus has attached itself to the glaringly obvious moniker: multi-access convergence gateways.

The major supporting argument for convergence gateways is network consolidation and simplification. Instead of operators dedicating termination and session management equipment to match each flavor of access technology, a convergence gateway would be able to oversee traffic flowing into the network from all different types of access devices and conduits, as well as serve as a single point in the network for providing security, policy enforcement, deep packet inspection, SIP registration, mobility management and other related functions. The following chart provides a laundry list of potential functions that have been, at one point or another, associated with a convergence gateway.

Convergence Gateway Functions

Function	Description
Authentication	Platform's ability to ensure that only authorized user enter the network
Encryption	Ability to support various encryption technologies, including IPsec
Deep Packet Inspection	Platform's ability to examine packets to make real-time decisions regarding authenticity and QoS requirements
Mobility Management	The ability to oversee the seamless handover of a lower-layer connection between different types of access networks, using technologies such as MOBIKE and Mobile IP
Multi-Access Support	Ability to support multiple types of access technologies, including cellular, WiFi, WiMax, fiber, pico/femto cells, DSL and cable
Packet Data Gateway	3GPP standard for terminating mobile data traffic traversing public network, often includes combination of GGSN and Tunnel Terminating Gateway (TTG)
Policy Enforcement	Platform's ability to enforce policy decisions, most often through interaction with a policy decision function or policy manager
Security Gateway	Ability to encrypt traffic traversing broadband access network into mobile core, supporting both UMA and IWLAN technologies.
SBC	Ability to provide all of the SIP-based services of a traditional SBC, such as NAT/Firewall traversal, QoS assurance, lawful intercept, DoS attack prevention and other functions
Tunnel Terminating Gateway	A 3GPP-compliant TTG terminates mobile traffic diverted over a public network
Voice Call Continuity	Ability to support 3GPP-specification for seamless handoff of voice traffic between macro cellular network and IP network

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While there is little disagreement over the number and types of features that will be required to deliver compelling FMC services, significant differences exist among equipment makers and operators regarding the packaging of those functions. In these very early days of FMC services, approaches to packaging session management functionally fall along a spectrum that plots discrete platforms for all functions on one end and an integrated platform at the other. Not surprisingly, those favoring a single-system integrated solution have already been tagged with the pejorative "godbox" label. Advocates of multi-service convergence gateways, however, defend their approaches by pointing out that the nature of FMC services actually dictates the need for an integrated device. Only a unified system with awareness of all the different devices and networks attached to the infrastructure core, they argue, would be capable of performing the high-tech acrobatics required to delivery real time communications services in a blended and personalized manner – and with no loss of quality.

The majority of equipment makers, however, are proposing function-packaging scenarios that fall somewhere in between a one-box-per-function solution and a godbox. SBC maker Acme Packet, for example, draws the line at combining the overarching functions of a 3GPP security gateway and a session border controller, which actually covers a number of separate session management functions, including IPsec tunnel termination, NAT/firewall traversal, security and SIP registration management. Others, however, are throwing the kitchen sink – and a couple of kits and caboodles – into their integrated FMC gateways. Authentication, virus protection, deep packet inspection, voice call continuity and several other functions, they argue, can best be coordinated when they are governed by a single platform and a single management system.

The field of contenders in the nascent convergence gateway product category includes competitors, as one might expect, from both the fixed and mobile sides of the industry. SBC and security gateway manufacturers are logically extending their platforms to play a more prominent role in the session management of FMC services. Router makers, such as Cisco, Juniper and Redback, which have been building up SBC credentials for the past couple of years, are looking to add even more functionality, leveraging their strategic positioning at the edge of a service provider's infrastructure. Even newcomers, such as Stoke, which claims to be the only purpose-built platform in the market, have seized on the potential demand for FMC convergence gateways. The expected demand for a multi-purpose session management device has also led to at least one corporate merger. In January of 2008, SBC maker NexTone and security gateway maker Reef Point, merged into a combined entity – NextPoint – which is set to announce the availability of an integrated product, a result of a year-old joint development project, later this quarter. NextPoint, a case of two companies being pulled together through the inertia of an FMC-inspired product development, serves as a metaphor for the consolidation operators are planning for the edge of their networks. Look for additional competitors to acquire products – or whole companies – to add complementary functions to existing products or to bulk up the capabilities of a budding convergence gateway.

Of course, the future fortunes of would-be convergence gateway suppliers are riding on the preferences of service providers for either discrete, single-function solutions, or a godbox-like integrated approach. It's likely going to take most of 2008 to get a good read on which way the majority of carriers are leaning – if, indeed, operators actually start to acknowledge the difficulties of delivering FMC and the deficiencies in their networks to do so. Equipment makers developing products that fall closer to the godbox side of the spectrum, however, say that they are fielding RFPs from major operators, as well as actually moving equipment into carrier trials. One thing that equipment makers can count on – with a fair degree of certainty – is that the demand for FMC-capable session management equipment

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is only going to increase in the future. Whether its through 4G installations of radio access network infrastructure or the leveraging of fixed-oriented broadband connections to reach centralized applications, mobile operators are rapidly migrating toward end-to-end packet infrastructures and millions – if not billions – of mobile end devices will soon become IP aware. On top of that, operators are constantly adding additional flavors of access technology – WiMAX, femto/picocells – to satisfy user expectations of having access to the same applications regardless of where they may be or the type of device they may be using at any given time. This combination of millions of new IP sessions, which all require Internet-like session management functionality, and an ever-expanding roster of access technology alternatives screams out for an integrated solution at the edge of the network. Equipment makers, primarily in the SBC and security gateway space, will spend much of 2008 trying to figure out how best to respond to those screams.

Recommended Actions

Recommended Vendor Actions

• Makers of security gateway and other mobile-oriented data-handling equipment, such as Airvana, Azaire Networks, Starent and Stoke should look to infuse their products with functionality akin to SBCs, which are primarily designed to handle SIP traffic. Equipment makers that have yet to seriously initiate internal developments in this area should strongly consider accelerating their objectives through partnerships or acquisitions.

• Makers of SBCs, such as Acme Packet, Covergence, NextPoint and AudioCodes, should continue to strengthen their products for FMC deployments through the addition of support for mobile-oriented technology and standards, such as IPsec tunnel support and the Tunnel Termination Gateway (TTG).

• Network equipment makers that offer both security gateway and SBC technology, such as Acme Packet, AudioCodes and NextPoint, should work toward tightening the integration of those products, while at the same time giving carriers the flexibility to deploy the system in a variety of configurations. These companies should also work toward broadening support for various access technologies, including WiMax, femtocells and picocells.

• All competitors in the nascent FMC convergence gateway market should optimize their software for ATCA platform environments. ATCA and other blade server approaches provide service providers with the flexibility to deploy discrete session management functionality in a single chassis, eliminating some of the integration issues normally associated with a best-of-breed approach.

• Makers of traditional mobile packet data equipment, such as SGSNs and GGSNs, should consider the advantages of augmenting those systems with additional session management technology. This would enable mobile operators to co-locate session management functionality into an existing and familiar network infrastructure component. Starent, for example has bundled P-CSCF functionality with its GGSN.

• All potential suppliers of convergence gateways should work closely with operators to get an educated perspective on the type and number of functions that operators will be looking to locate in a single device. Once equipment makers have a better idea of what carriers are looking for, they can better shape their products to meet those requirements. Early collaboration with carriers will also give vendors the opportunity to influence the operators that have yet to formulate convergence gateway plans.

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Recommended User Actions

• Mobile operators that are looking to extend coverage and leverage broadband fixed lines, as opposed to building out radio access networks, need to track the evolution of security gateways and related equipment in this space closely. As operators increasingly rely on data-oriented services for revenue generation, mobile operators will require access equipment that is optimized to secure and manage that traffic.

• Operators with both fixed and mobile assets looking to consolidate around a common set of voice and data applications/services, should intensely evaluate equipment that offers them the ability to consolidate their access infrastructures. These carriers should work with prospective equipment suppliers to calculate the potential operating and capital expense savings connected to deploying a multi-service, integrated access gateway.

• All operators need to figure out the best approach for packaging session management technology. Carriers need to figure out what types of session management functions need to be co-located in a single device in order to provide subscribers with the "anywhere, anytime" services they have been promised cost effectively.

• Operators must make a decision on the best host for session management functionality among multiple candidates, including security gateways, SBCs, routers, purpose-build equipment or SGSN/GGSNs. Carriers should first look to leverage existing equipment before considering the introduction of a new platform in their networks.