

Innovation Returns to the Enterprise Network

Net Forecasts – Peter J. Sevcik

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A little more than two years ago, I discussed the then-emerging contest in edge services between enterprise customer premises solutions versus carrier central office solutions (see *BCR*, November 1999, pp. 10-12). The battle is over – enterprise solutions won.

The heady days, when “every new idea must be good for emerging carriers,” are going the way of the emerging carriers themselves – into that great Chapter 11 in the sky. The poster child for carrier value-add solutions is Cosine Communications, whose stock price is down 98 percent from the day it started trading; more importantly, half of the stock analysts that tracked the company no longer do.

The pendulum is swinging back to the enterprise for market growth and innovation in network technology. And the place for new ideas is on the edge of the network, long the domain of enterprise WAN routers.

Each new idea has spawned about a half-dozen vendors that make an appliance that attaches to the network near the enterprise edge router. Some work within the actual data flow, while others sit off on the side and watch the traffic go by to perform their function. Each function could be performed by software running on a server, but that approach carries all the baggage of a server and a general-purpose operating system – configuration, software integration, security risks and the need for a higher-priced computer. Appliances are the winning approach, at least for now.

Constellation of Functions

It makes sense that more complex functions (above pure transport) should be performed at the enterprise. All of the functions solve an end-to-end or close-to-the-user requirement, and the number and variety of functions are impressive:

Firewall: This was the first device that *had* to be independent of the router, because of the

architecture required to really make them secure and the complex filters that must be processed on every packet at wire speed.

QOS: QOS appliances help keep users happy in the face of an uncertain WAN and likely congestion in the access line. The menu includes traffic classification, class-based queuing, rate shaping, TCP flow acceleration and TCP connection off-loading.

VPN: These are required by enterprises that are serious about securing access to/from telecommuters and business partners. The technology can range from IP-sec encryption tunnels to dynamic token systems for specific user authentication and authorization.

Route Controller: If, in order to have redundancy, an enterprise connects to the Internet with more than one carrier, it faces the problem of choice. Route controllers dynamically choose the best carrier for each destination (see this issue of *BCR*, pp. 22-28).

Caching: You’d be amazed at how often the same data is duplicated for transmittal across a WAN. If content is delivered in the form of a web page, the components can be cached and retransmitted for subsequent inquires. This offloads servers for outgoing traffic and/or the WAN access line for incoming traffic.

Load Balancer: As soon as an enterprise location has more than one web server that needs to be accessed by the same user community, it has a web load-balancing problem. Load balancers are really Layer 4 to 7-“aware” switches, that direct traffic based on policy and dynamic assessment of the load and/or specific content on each server.

Many More: This list can go on as you reduce the variety of applications to pure web traffic and move closer to the web servers. Some of the other functions for which appliances exist are SSL-Acceleration, CDN service direction, proxies and congestion detection and avoidance.

Alternative Evolution Paths for the Edge

But is an enterprise that buys edge appliances building a constellation of best-in-breed services or building a train wreck? There are various ways in which these appliances can evolve to support target markets.

Integration: Whenever an engineer sees two simple functions being performed side-by-side, he or she thinks it could be done better if performed at the same time. Integration has the appeal of efficiency; one box should be cheaper than two and, because the two functions could share information, they could perform each role better.

Sounds good in theory, but it hardly ever works in practice, and this case is no exception. First, the integration players never want to take on the routing function. Routing is too hard, it must be performed at wire speed and the routing business is owned by Cisco. Moreover, since each single-function appliance vendor is solving an equally hard problem, none is eager to take on becoming “best-in-breed” at seven or more functions. Each appliance performs optimally for the traffic load it is trying to support, and it’s not likely that an all-in-one box can be optimized for each function.

Second, there is a market leader in each function. Each enterprise wants the option to choose which function they need and which vendor they want. An integrated solution removes the beauty of choice.

The one play that exists is to integrate some functions into an edge router, but only if the device is targeted at small businesses/offices that rely on low-speed lines. Here at NetForecast, we connect to the Internet via a nice little box that is a router, firewall, local DHCP server and network address translator. It operates at ADSL line rates and supports up to 100 IP end stations. I doubt that it could really keep up with 100 simultaneous users, but it works just fine for the few of us. Here integration works, because it performs four – and only four – functions, and costs less than \$100. By the way, it is *not* made by the industry-leading router vendor.

Appliances Surround the Router: As tempting as integration seems, it’s not likely to succeed in the major enterprise market. Instead, expect each function to be delivered in an appliance, and there’ll be a limited number of successful vendors supporting each function.

By off-loading functions into purpose-built appliances, the router gets to do what it does best – route. In fact, we are seeing routers evolve into basic packet-forwarding engines, that are surrounded by specialized processors, each performing their part of the overall job. Someday, in the far future, all of these functions will be commodities, and network processors will be inexpensive enough to put common and, by then, standardized functions, into a single box.

Someday, but not today. Enterprises buy separate edge appliances, because each vendor can, through software and or management, supply vastly differing value. It’s sadly ironic that vendors often tout the most commodity-like element of their product -- huge, complex, fast ASICs --- instead of focusing on what really matters to buyers: software, software and software. Whichever vendor can get the lead in software automation (read: ease of use) and/or policy software (read: management), is going to wind up with the leading market share.

Moreover, enterprises have vastly different edge requirements. There is a market for each combination of appliance function. The Fortune 5000 market is best served by unique edge services built from a customer-selected constellation of star appliances.

However, there are limits to the constellation approach; in particular, it does not scale to very large enterprises, such as the Fortune 500, or to high-traffic web commerce sites (the “Web 50”). At a certain size, the constellation approach becomes too complex – too many routers in the network that need edge services, more throughput than the appliances can handle and the need for more reliability than most appliances were designed to deliver. Serious sites need a serious edge processing platform.

Next Generation Edge Platform: Enter a new level of platform, which today is best represented by the Network Application Concentrator from

Crossbeam Systems. It is an extremely high-performance, reliable (fully hot-swappable) chassis, into which you can add Crossbeam's application processing modules (APMs), which are, essentially, an appliance on a card. The APMs are very high-performance processors onto which any appliance vendor can port their high-value software. Functions like deep, stateful packet inspection and scheduling packets to the proper APMs are built into the architecture.

This is the best of both worlds – a single box with all the engineering required to operate in a high-performance location, but software from best-in-breed appliance vendors. Remember when enterprises were overwhelmed with LAN alternatives? People were buying unique boxes for Token Ring, Ethernet, FDDI, LocalTalk, etc. Then along came the LAN hub as a multipurpose chassis solution. What Chipcom and Synoptics did for Layers 1 and 2, Crossbeam will do for Layers 3 and above.

This is *not* another form of failed high-end integration solution. Crossbeam differs from Cosine in one extremely important way: The platform is open to other appliance companies. Think of the Crossbeam platform as a shopping mall. The mall owner does not operate any store; instead, the mall attracts anchor tenants who then attract smaller players. Crossbeam's first "anchor

tenant" is the Checkpoint firewall; others are sure to follow.

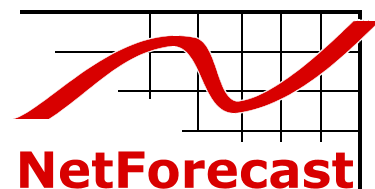
Conclusion

The renewed interest in developing solutions for the enterprise market should lead to the emergence of some very interesting products. Remember, the Internet and the Web were first built from products targeted at enterprises.

Moreover, there is a larger variety of requirements and business opportunities in the enterprise market than in the service provider market. That variety feeds innovation, just like genetic variety feeds biological innovation. Biodiversity is a good thing. Get ready for exciting times; interesting new functions are being bred.

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