

I D C T E C H N O L O G Y S P O T L I G H T

Extending the Benefits of Virtualization to Load Balancers in the Datacenter

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Adapted from *Worldwide Datacenter Layer 4–7 Switch 2009–2013 Forecast and Analysis* by Lucinda Borovick and Petr Jirovsky, IDC #217334

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Recent IDC research shows that the datacenter has been a key area for investments in new technologies, including virtualization infrastructure for servers, storage, and networks needed to support a more dense computing environment and energy-efficient networking equipment–related investments needed to reduce power and cooling costs. Survey data indicates that investment in the datacenter will continue in spite of the economic slowdown. In addition, new factors will drive datacenter investment during the next one to three years.

Datacenter reliability remains the most important factor driving datacenter investments. This is witnessed in the success of datacenter suppliers that are known for delivering high-performance resilient infrastructure. Additionally, in the past few years, we have witnessed continued investment in an end-to-end virtualization strategy. Despite these uncertain economic times, IDC believes datacenter Layer 4–7 switching — or server load balancers — will remain a strategic resource in the datacenter. Virtualized load balancers can provide organizations with benefits related to consolidation, security, cost savings, flexibility, and ease of management.

Reliability and disaster recovery are important investment-driving factors for companies of all sizes; application performance is also an important investment driver for companies. This Technology Spotlight explores trends in datacenter equipment and discusses how virtualization — when deployed in Layer 4–7 switching — also known as load balancing — can lead to operating and capital cost, IT productivity, and application security benefits. This paper also discusses the role that Cisco Systems and its use of virtualization technology play in the market for Layer 4–7 switches or server load balancers.

Increasing Demands on the Datacenter

At many organizations, datacenters are under increasing pressure. As the amount of data grows exponentially, organizations need to find ways to accommodate such data growth, often within the confines of shrinking budgets and existing facilities. Even if organizations could financially handle the prospect of adding more servers and bandwidth, power considerations due to heating and cooling issues often make such an expansion untenable, to say nothing of the significant administrative headaches required to manage more servers and devices. Another factor that is stressing datacenters is application performance and delivery. As organizations come to rely more heavily on highly distributed mission-critical applications, datacenters can struggle with providing end users with consistent and reliable service over the network.

As a result, organizations are looking to increase the utilization of their existing datacenter assets, and virtualization technology is at the forefront of their strategies. As virtualization is deployed in areas such as servers, storage, and networks, the datacenter is in the midst of unprecedented change.

The following major trends are shaping the evolution of datacenter networks:

- Organizations are striving to gain greater utilization out of the IT assets that have already been deployed in their datacenters. This is true across the spectrum of IT assets including servers, storage, and networking.
- For organizations, the total cost of ownership (TCO) analysis has become a mandate for all new and future purchasing decisions. TCO is creating opportunities for new application networking IT investments that are built on a virtualized foundation.
- There is continued investment in bread-and-butter datacenter requirements such as reliability, availability, and security.

The key requirement for IT today is to find ways to gain greater utilization out of the IT assets that have already been deployed. The area where most companies have seen the most dramatic and tangible utilization benefits is the use of server virtualization for x86 systems. By enabling datacenters to consolidate servers, virtualization has delivered on its promise to increase server utilization rates. Other areas of the datacenter now stand to benefit from the implementation of virtualization technology as well. In particular, virtualization when applied to important functions such as load balancing is a natural extension of virtualization use cases in the datacenter.

Organizations deploy datacenter Layer 4–7 switching — or server load balancers — in their datacenters to stand between the mission-critical industry-standard servers and the global network of end users. Increasingly, organizations will seek to deploy load balancers that feature higher efficiency and security capabilities. As with servers, virtualizing load balancers will enable organizations to consolidate devices and at the same time improve IT agility and resource efficiency (due to more dynamic provisioning of virtualizable systems) and increase security.

Benefits of Virtualized Load Balancers

Today, more than ever, datacenters need a network architecture that can fluidly meet the needs of adapting to business requirements. To fully leverage the benefits of hosting datacenters, cloud services, and a global workforce, IT will need to invest in a robust, resilient datacenter network with Layer 4–7 switching that can be easily provisioned, managed, and secured. In effect, many datacenters need to extend virtualization from the server to the switch. As organizations seek to improve application performance and load balancing across multiple servers in an increasingly distributed network, the flexibility and the consolidation that virtualization affords make both operational sense and financial sense. With the shift to a virtual infrastructure in the datacenter, the importance of the network increases and the ways in which organizations depend on the network expand as well.

Like other virtualization use cases, virtualized load balancers can provide organizations with benefits related to consolidation, security, cost savings, flexibility, and ease of management.

Specifically, virtualized load balancing can provide organizations with the following capabilities:

- Higher resiliency, security, and control without appliance sprawl — virtual devices per application
- Ability to deploy new services applications faster (In a virtual environment, new applications and workloads can be added efficiently.)
- Reduced operational costs associated with fewer physical appliances; lower power and cooling requirements; fewer staff needed for administration

Market Trends

As IT organizations continue the journey to the virtualization-enabled dynamic datacenter, the importance of the network increases. The physical changes driving form factors will continue to shift demand toward new top of rack and blade server switching. The demand to lower the total cost of ownership of networking is driving demand for new virtual networking services. The need to support virtual machine mobility is driving innovation in virtual switching. These shifts will create opportunities for new and emerging suppliers to capture the \$9 billion datacenter networking opportunity.

The total worldwide market for datacenter Layer 4–7 switching achieved \$1.3 billion in revenue for the full year 2008, up 8.5% from \$1.2 billion for 2007. IDC believes that datacenter Layer 4–7 switches are integral to creating the next-generation datacenter, yet the recent economic crisis is creating problems for sales of these switches as well as many infrastructure products. IDC is forecasting negative growth of 1.8% in 2009 due to the slowdown of sales in x86 systems and recent reports of prolonged datacenter sales cycles. IDC believes that datacenter Layer 4–7 switching will continue to weather the economic storm better than other IT products.

IDC expects the worldwide datacenter Layer 4–7 switch market to achieve a CAGR of 3.6% over the five-year forecast period, reaching \$1.5 billion by 2013. We believe there are several structural reasons the datacenter networking market will continue to grow faster than the rest of the IT market for at least the next five years. They include the expansion of network-based businesses, support for cloud services, convergence of storage on the Ethernet network, support for virtual network services, and the overall need to support mission-critical workloads on x86 platforms. Specifically, the datacenter Layer 4–7 switching market will continue to grow based on the following:

- Ongoing investments in new consolidated datacenters and associated infrastructure
- Ability to meet the growing real-time enterprise need of increased speed, performance, and security of enterprise applications
- Ability to enable mission-critical service delivery in service provider datacenters (This includes support in running the service provider internal IT datacenters and supporting revenue-generating network services.)
- Ability to be an arms supplier to new emerging cloud providers, thereby enabling a consistent user experience while off-loading and protecting the server infrastructure
- Support for new virtual server form factors

Fundamental drivers of the market remain, and vendors are continually innovating with packaging, features, and platforms that enable customers to deploy the technology in support of the datacenter of the future. In 2009, suppliers will deliver new innovation in support of Web 2.0 applications and a new virtual infrastructure.

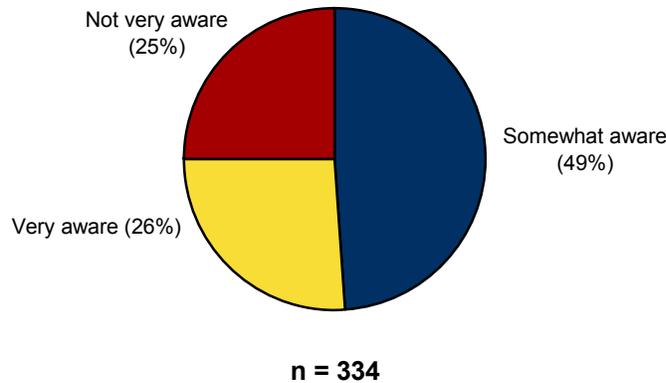
Application Performance and Delivery Market Trends

The application networking market has already reached over \$2 billion in 2009, so it is not surprising that one-quarter of the respondents to a recent IDC survey believe that their networks are very application aware (see Figure 1). When asked about the application awareness of their datacenter networks, 26.0% of respondents indicated that their datacenter networks are "very aware." A good sign of continued growth in the market is that of the 26.5% respondents, 17.7% noted that there is a need for change/improvement in this area. Just about half (49.0%) of the respondents reported that their datacenter networks are "somewhat aware." Of this 49.0% respondents, 30.2% of respondents noted that there is a need for change/improvement. Although 25.0% of respondents responded that their datacenter networks are "not very aware," only 10.8% of these respondents noted that there is a need for change/improvement.

Perhaps more telling in terms of future direction is that 59.0% of the respondents reported that they believe it is necessary to improve the application awareness of their network regardless of which level they have already achieved.

Figure 1

Application Awareness



Source: IDC and Computerworld's Datacenter Study, January 2009

The distinction between application awareness and performance is important. Whereas application awareness can consist of a range of solutions including security and quality of service for disaster recovery, application performance relates to the end-user experience. Over two-thirds (68%) of respondents agreed that application performance has become an important component of their companies' datacenter strategies.

Product Profile

Cisco Systems is a San Jose, California–based provider of networking hardware and software products and is known for its core routing and switching technologies as well as its advanced technologies such as application networking, storage networking, unified communications, and virtualization. Additionally, Cisco announced its Unified Computing System for integrated datacenter computing and networking.

According to the company, the Cisco Application Control Engine (ACE) is a next-generation load balancer and application delivery platform with the industry's only virtualized architecture. Cisco ACE has been designed to enable enterprises and service providers to securely isolate applications for department and customer environments and accelerate application deployments while reducing overall capex and opex associated with application delivery infrastructure.

As a virtualized load balancing and application delivery solution, Cisco ACE is designed to meet the requirements of the virtual datacenter. According to Cisco, the benefits that can be gained from the deployment of a virtualized load balancer solution are similar to those that can be realized from server virtualization. Cisco ACE allows IT teams to partition a physical ACE load balancing and application delivery device into multiple isolated virtual devices, each with the capabilities of the physical device. This virtualization capability allows users to reduce the number of physical devices deployed in the datacenter. The distinct virtualization capabilities of Cisco ACE allow customers to reduce both physical and environmental datacenter resources, resulting in significant overall cost savings associated with application delivery.

Cisco ACE is designed to provide IT departments with several benefits, including the following:

- Flexibility through the complete isolation of applications, departments, and customers
- Agility through accelerated and lower-cost application rollouts and upgrades
- Reduced datacenter resource requirements
- Improved workflow

Challenges

Cisco does face market challenges, however. First and foremost, in a tightening economy, the company must help IT managers justify the costs of implementing a new generation of datacenter Layer 4–7 switching. This includes demonstrating immediate benefits of a virtualized architecture while ensuring long-term return on investment. From a technology perspective, Cisco has aggressively focused on a virtualized infrastructure.

Additionally, since Cisco is the only provider in the market with a virtualized platform, it needs to continue to educate customers about the TCO benefits of deploying a virtualized platform. Also, Cisco needs to focus on expanding the functionality specifically needed to accelerate for new and emerging datacenter applications.

Conclusion

Many organizations are making real and lasting changes in their datacenter architecture. The changes encompass a spectrum including the physical (building, floor layout of IT equipment, and containers) and the virtual (servers, storage, network, and applications). The underlying motivation for IT is to build a dynamic datacenter — an environment where the datacenter can be responsive to business within cost structures that enable an efficient use of resources. This vision likely includes the deployment of various virtualization technologies for consolidation, production, green IT, and mobility.

Virtualization dramatically improves the efficiency and availability of resources and applications in the datacenter. To fully realize the benefits of virtualization across all datacenter infrastructure, organizations can replace traditional, physical load balancers with next-generation virtualized load balancers and application delivery platforms that provide scalable, reliable, and cost-effective application delivery services in the datacenter.

IDC believes that if Cisco does not rest on its accomplishments in datacenter networking and meets enterprise needs for a new, emerging virtualized datacenter, Cisco ACE will continue to be a leading technology in IDC's predicted growth of the datacenter Layer 4–7 switching market — despite tough economic times.

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