Application
Delivery Challenge

JULY 2007

Application
Delivery Challenge

Introduction

Solutions for the Data Center

Welcome to the 2007 edition of the Application Delivery Challenge: Solutions for the Data Center. You have come to the right place if you are looking for the best networking solution for servers and applications. The leading solution providers – Foundry Networks, Cisco Systems, Juniper Networks and Citrix Systems – have all come together to explain why they have the best overall solution.

This networking solution for the data center goes by many names: Application Switch, Application Delivery Controller (ADC) or Application Front End (AFE). It's the next evolution of Server Load Balancers or Layer 4-7 switches. While we have not decided on a name, and we didn't even settle on one in the past, let's call it an application switch since it is one less word. Regardless, it plays a critical role in the network.

It sits in front of our servers and appliances. There are web servers, client/server application servers, presentation servers, database servers, DNS servers, RAS servers and the list goes on. Appliances have also wildly propagated. It is getting rare to have only one appliance for a function. Security appliances are plentiful enough to create their own farm with multiple firewalls, IPSes and other new security appliances constantly being added. Install the wrong application switch and your network and you will suffer.

What makes the "right" application switch? The answer is the one that makes all the parties that depend on it happy. They include the application owners, the end-users, the security people, the people who take care of your building and the networking group.

The application owners want high availability. When one of their servers goes down they want the application switch to seamlessly move the traffic to the other servers. If one of their servers is slow, they want the application switch to recognize it and lessen the slow server's load. They also want it to tell them when it happens and to provide management information to help prevent it in the future. They want it to understand their servers without a lot of work on their part. Persistence and sophisticated routing to the best

server based on that application values such as information in the cookie or on the SIP ID is viewed as valuable. When they implement a new server or application they want the process of connecting to the application switch to go fast and smooth. Taking down all the servers connected to the application switch is not acceptable. The application group may even want virtual control of the application switch. For example, if one group needs to change the application switch, other groups don't want the change to affect them. They want to be able to have their own unique policies that apply to their servers/applications and not have to accept a general purpose set of policies.

The end users just want the application switch to make their application appear as if it is always there. When their server goes down, they don't want to know about it, they expect the application switch to quickly and seamlessly move them to another one. They don't care if the next one is sitting in the same rack, room or in another data center. They also want fast and even faster response time and expect the application switch to apply application acceleration techniques such as caching and compression to their traffic. In fact, end users don't even care whether an application switch is present. They just want a network that "works."

Security people want to know that no one, except themselves and maybe a select few, can access and configure the application switch. Since it plays a critical role in directing application traffic, any solution needs to be hardened against hackers. They also want it to help protect the server and appliance farms and to help implement the "defense in depth" strategy. It should stop DDoS attacks, and it would be nice if it could protect web servers from hackers and stop other "bad" activities. It should also protect the applications from zero day attacks and should perform deep packet inspections to prevent attacks embedded in applications payloads. It may also help prevent leakage of sensitive data.

The people who maintain the building would for once like something that does not turn the building into a sauna. It would be nice if the application switch was energy efficient

and did not run up the electrical bill. Plus it would be helpful if it did not take up much space because many times there just isn't any with the growing number of servers, storage and appliances they must fit in.

Network people have their own wish list. First it needs to never fail and when it does the other application switches around it must quickly and seamlessly take over. An application switch solution should be able to scale from a small number of ports to a large number without have to perform major surgery any time more capacity needs to be added. High throughput with good cost performance is always desired. Any solution needs to be a cost effective solution for both small and large configurations. It would sure help sell the idea to management if the application switch could reduce the number or cost of the servers by off-loading tasks from the servers such as SSL and TCP processing. But most importantly, they would like a solution that makes all those other people happy.

Does a solution exists that can make everyone happy? Well, there may be no perfect solution but these vendors have come close. They did it by packaging a combination of features that work together in the application switch. The key features include:

- Server and appliance load balancing
- Server and appliance awareness
- Server off-loading
- Security
- Application acceleration

The vendors have also addressed the issue of managing the application switch, providing a scalable solution for small to large implementations; providing high performance; reducing heat, power, space requirements; and having hardened their equipment to keep them running and keep the bad guys out.

The Challenge

All the vendors have been screened to make sure they provide the basics of an application switch. The challenge is for them to explain what is different about their solution; what makes it better than their competitors. As anyone who buys networking equipment knows when building a check list of features, most boxes are checked for every vendor. What I have asked to vendors to do is focus in on the dif-

ferences. Some have important acceleration feature, others have added Web application firewalls while still others have useful virtualization features. That does not mean that you should ignore the common features. I have also asked them to talk about what improvements they have made in the feature that they all get a check mark for. These differences can make all the difference between a successful application switch implementation and a so-so implementation. The challenge we as consumers of their equipment face is to find and understand these differences, and this is the reason this challenge is so helpful.

I did not ask the vendors to spend time explaining the importance of application switch in the data center, so you will not see the normal "marketing" position on the importance of application acceleration. Additionally, I did not ask them to spend time talking about common features. If they don't spend time on a capability or feature that I mentioned above that doesn't mean they don't have it. Rather, it just means that they do not think it is the capability that differentiates them from the others in the challenge.

The challenge can only give you a taste of all the capability the participants have to make your data center run smoothly. At the end of each section, the vendor's contact information is provided. I encourage you to talk with them to learn more about their data center solutions.

If you would like to learn more about the technology and issues involved in providing robust data center solutions, the second portion of the challenge provides more information. I will be talking with each vendor about key technologies and examples of how they have solved business problems. Each interview is 15 to 20 minutes and includes slides to help demonstrate their points. I strongly encourage you to listen to the interviews after you have read their answers to gain an even better understanding of their solutions.
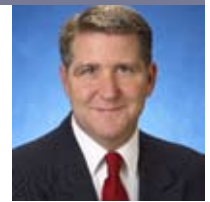
If you have any comments about this Challenge you can contact me at Robin@Layland.com.

Delivering Advanced Application Acceleration & Security

by Gary Hemminger
Director of Product Marketing
Foundry Networks

Foundry has been a leader in the Application Delivery Controller (ADC) space for nearly a decade, with many of the industries largest and most successful customers relying on Foundry ADC products for the core of their business application traffic management, security, and optimization needs. These customers span a wide range of industries, including: Content & Service Providers, Trading, Financial, Government, Defense, Entertainment, Telecom, Technology, Insurance, and Education. Many of our key customers have very large Foundry installations that provide ADC solutions for critical business applications and infrastructure. With over 2,500 total ADC customers, Foundry also has many smaller and medium sized organizations that have come to rely on our ability to deliver fairly priced, high performance application management and optimization solutions.

Foundry pioneered the ADC market with the introduction of the ServerIron in 1998, winning Network Worlds' Infrastructure Product of the Year in the following year. Foundry has continued to innovate in this important product segment with specific focus on performance, application intelligence, security and reliability. Some industry firsts include:

- First modular and integrated L2-3 and L4-7 application delivery product

- First wire-speed Gigabit & 10 Gigabit Denial-of-Service (DoS) security

- First to market with compact 2U modular ADC platform

- First ADC platform with integrated Global Server Load Balancing (GSLB)

- First to market with L7 based cache switching support

Foundry is now in a new phase in the development of the ServerIron platform. We are now focusing on what the industry terms "advanced platform ADC" features and solutions. Foundry's just released TrafficWorks 10.0 software is the industry's highest performing, scalable, and reliable advanced platform ADC product. This new software platform will provide the engine of growth for our continued leadership in the market.

Foundry TrafficWorks 10.0 - Advanced Platform Application Delivery Controller

Foundry's TrafficWorks 10.0 software provides a wide range of AP ADC features that meets the needs of small, medium, and large organizations that require application traffic management and optimization. TrafficWorks 10.0 includes a number of advanced application features, including a sophisticated web application firewall capability, HTTP compression, policy definitions for content transformation and manipulation, rules support through our modular content switching framework, and HTTP optimization through TCP offload. ServerIron is able to maintain as many as 8 million IP prefixes in local memory to filter email using black and white address lists. In contrast, most competing products rely on remote list look-ups introducing significant delay for spam protection.

Continuing our commitment to innovation and maximum customer satisfaction, Foundry has added the following functionality to its ADC platforms over the span of the last 18 to 24 months:

- Hardware Based SSL Acceleration

- Total Content Analysis for Intelligent Load Balancing of any IP based application

- Web Application Firewall for Server Security

- SPAM Mitigation

- SIP Proxy/Registrar Server Load Balancing

- Rate Limiting for Enhanced Application Security

- HTTP Compression

- Dynamic Predictor for Load Balancing Based on Server Resource Utilizations

Additionally, Foundry has added a number of new platforms to the ServerIron Family, including

- Compact, Modular 3-Slot Switches

- Stackable, Compact and Feature-Rich 4G Family

- Higher Performing Web Switching Modules

Foundry customers are taking advantage of the ServerIron AP ADC solutions to deliver enhanced services to their internal and external customers. The ServerIron solution enables our customers to enhance the delivery and performance of their key applications and services, and maintain the high service availability that is required in today's information-driven economy.

Application Traffic Management & Optimization Solutions

Foundry has demonstrated its strength in the application delivery market by providing seamless integration with leading business services applications, such as Oracle Application Server 10g, Microsoft Live Communication Server, BEA WebLogicand SIP Proxy/Registrar Servers. Foundry is also accelerating and securing some of the World's largest DNS services implementations. Additionally, the application focused features of TrafficWorks software have helped Foundry customers ensure optimal delivery of their FIX, Windows Terminal Server, and Web hosting applications.

Foundry ServerIron and Oracle

Foundry's ServerIron product line provides a rich set of fea-

tures to work with Highly Available Oracle Application Infrastructure. Together, Oracle and Foundry have partnered to insure not only local and global high availability, but also provide integrated SSL acceleration via Foundry's ServerIron SSL offload capability. The ServerIron acts as an SSL proxy for HTTPS based connections for Single Sign On and DAS to accelerate performance. With a pair of ServerIron's, Oracle application availability is ensured with a hitless session failover capability.

Highly Available IP Telephony Solutions

Foundry's ServerIron platform provides traffic management solutions for SIP based IP telephony solutions, including both SIP Proxy and SIP Registrar service. These SIP services and servers are extremely critical and fundamental to delivering any SIP-based IP communication service (such as voice, video, messaging, streaming, and data). Five 9's availability is a must, and scalability is a key factor in large organizations and service provider environments.

Figure 1 below provides an example configuration showing Foundry's ServerIron switches configured to provide load balancing and high availability to multiple SIP Servers. Note that this capability also applies to Microsoft's Live Communication Server infrastructure. This solution allows smaller, low cost servers to be clustered to provide SIP service, while still retaining the performance and reliability that are demanded of telephony solutions. In a Service Provider,
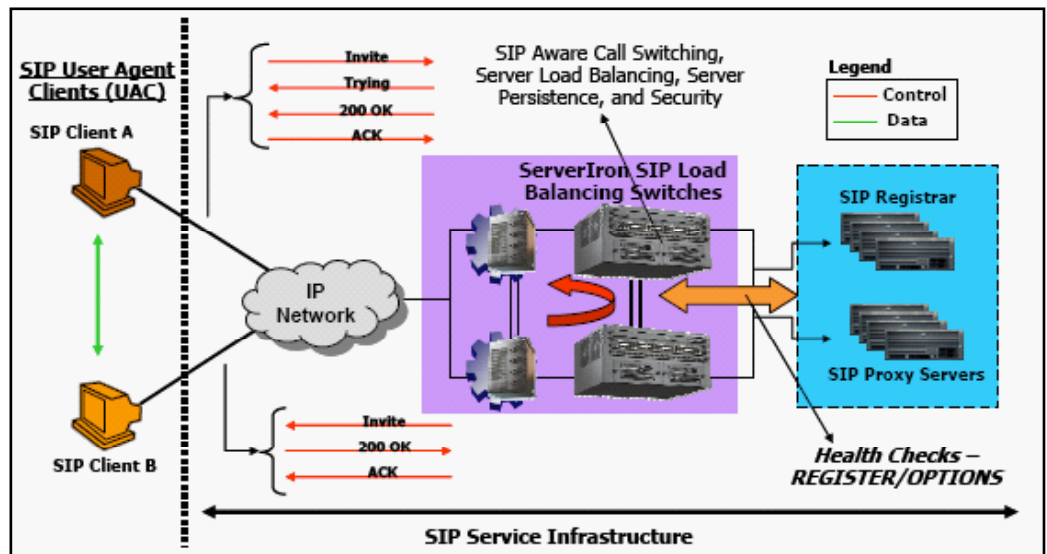

Figure 1: High Performance, Highly Available SIP Infrastructure with Foundry ServerIron

Softswitch environment, this same technique could be used to support higher end clustering, and provide much higher scalability for support of tens or hundreds of thousands of simultaneous communication streams.

Global Highly Available Application Traffic Management

With growing reliance on IP based applications, many organizations are concerned about building always-available network infrastructures to ensure uninterrupted application access to their end-users. Foundry's Global Server Load Balancing (GSLB) solution is helping organizations achieve this goal and build fault tolerant networks that provide protection against data center failures. Empowered with Foundry's GSLB, many businesses have architected high availability in their networks by creating distributed server farms that are spread all over the world. In such designs, the end user requests are directed to the closest available server farm for optimal response time and best user experience and in the event of site failures, these requests are transparently redirected to the next available server farm. Foundry believes that multi-site redundancy and high availability are critical to business success and hence offers it as an on-box integrated solution unlike some of the other vendors in the market.

Summary

Foundry Networks helped pioneer the application switch and delivery market nearly a decade ago. We have introduced industry-leading innovations that have enabled our customers to successfully scale their applications, as well as securing the infrastructure with hardware-based SSL and denial of service technologies. The ServerIron delivers a rich set of security and application level features and is being used by some of the largest data center operators in the world for advanced and highly reliable application and content delivery. Foundry has a unique set of advanced platform features, including compression, web firewall, advanced layer-7 content rewrite, SIP server load balancing, rate limiting, policy based load balancing, and the industry's most scalable, integrated Global Server Load Balancing.

Foundry will continue to work with application vendors, including Oracle, BEA, SAP and Microsoft to optimize its solutions for the new and emerging applications that will power tomorrow's enterprise organizations. We are committed to our customers' satisfaction and will continue to enhance and develop our ServerIron products to support our customers' future growth and application needs.

For more information about Foundry Networks, visit http://www.foundrynet.com/

Cisco Data Center Application Delivery Solution

Cisco portfolio of application switching solutions delivers measurable improvements in application provisioning times, availability and security for today's data centers

by Kash Shaikh
Senior Manager,
Market Management
Cisco

IT professionals managing data centers for enterprises and service providers face continuous pressure to reduce data center cost, streamline application deployment, reduce power and cooling requirements, improve response times and protect their applications and web services.

A comprehensive application switching solution for data centers must address a broad set of challenges involved in managing the deployment and delivery of applications from the data center to local and remote users:

- Need to maximize application and Web services availability and uptime, while being able to dynamically scale resources as business requirements grow

- Support for data center consolidation by reducing the utilization of servers and load balancers as well as lowering needed power and cooling

- Ability to optimize performance of data center applications and XML (Extensible Markup Language) traffic delivered to remote users

- Improved application and overall data center security including XML application and Web services security.

- Ability to speed up application deployment cycles and reduce interdependency between IT organizations; ability to reduce ongoing time required to manage application and Web services infrastructure

Another challenge for IT professionals is the growing XML traffic in data centers. XML traffic accounted for 15% of network traffic in 2005 and by 2008 XML is expected to account for 50% of network traffic (according to 451 Group). An XML message is usually a high valued transaction such as purchase orders, complex to process and the XML message is usually is 3 to 10 times larger than an equivalent 'binary' message, which makes servers and infrastructure overloaded with XML traffic processing. General purpose server resources should not be used to support computationally extensive XML functions. Hence, a key feature for any application switching solution should able to switch, accelerate and secure XML application and web services.

Solution

The Cisco ACE family of products represents the state-of-the-art in application switches for maximizing availability, acceleration, and protection of data center applications and web services. It provides a comprehensive end-to-end solution to address the application switching challenges.

The Cisco Application Control Engine (ACE) module for the Cisco Catalyst® 6500 Series and Cisco 7600 Series Router maximizes the availability, performance and security of data center applications. Through a broad set of application delivery capabilities, coupled with unique virtualized architecture and granular user access control, ACE provides industry-leading levels of time and cost reduction for application deployments, and performance improvements.

Other components of Cisco application switching solution include the Cisco ACE Global Site Selector (GSS). GSS distributes application load across data centers and automatically sends application requests to a backup disaster recovery site if the primary site experiences an outage. It also provides full DNS and DDoS functionalities to protect from DNS-specific malicious attacks or spikes of requests.

A key differentiator of the Cisco ACE family of products as compared to other solutions in the market is the ability to switch, secure and accelerate XML applications and Web services. This cutting edge functionality is provided by the ACE XML Gateway appliance.

Business Benefits

Using the Cisco ACE application switching solution, with their high performance, unique virtualized architecture and XML support, organizations can achieve the following business goals:

Cost-Effective Data Center Consolidation

The Cisco ACE application switches are used on the front end of server farms in data center to optimally manage application traffic and improve data center operations. Cisco ACE supports an industry-unique virtualized architecture, which allows IT managers to configure up to 250 virtual devices on a single physical platform.

Virtualization reduces the number of individual application switches needed in consolidated data centers. Operating with fewer physical devices reduces capital costs, and having fewer devices in the data center frees up rack space and reduces power and cooling requirements by up to 90 percent.

By using Cisco ACE virtual devices, any service can be delivered (for instance, server load balancing, acceleration, or security) across any application or department on a virtual device basis; for example, one enterprise IT administrator may want to allocate a virtual device for every application deployed. Another administrator may want to allocate a virtual device for each department's use, even for multiple applications. A service provider can allocate a virtual device for each customer.

Cisco ACE provides virtualization implementation at the device level, allowing all aspects of the physical device to be virtualized. Those few vendors who claim to offer virtualization limit their support to limited access-control capabilities and do not offer true device and service-level virtualization with complete resource portioning.

Faster Application Deployment and Improved Scalability

Cisco application switching solution speeds up application deployment cycles and reduces interdependency between IT organizations. Cisco ACE application switches achieve these improvements through device virtualization, roles-based administration and a capability called software configuration rollback. Virtualization and roles-based administration reduces application deployment times by allowing application instances to be used and managed independently in parallel by multiple departmental stakeholders.

Cisco makes scalability easy. The Cisco ACE virtualization capabilities allow IT departments to simply create additional virtual device instances on the existing Cisco ACE platform. This is done by simply copying and pasting application module images to a new instance on the device, which can be done in a matter of minutes. Using Cisco ACE application switching solution enterprises and service providers get the capability to scale the device's throughput capacity from entry level to highest performance in the industry (up to 64 Gbps in a Catalyst 6500 Chassis) with simple software license upgrades. This solution avoids the need to purchase, install, and test new hardware or forklift upgrade the entire system, which in addition to being costly, can take weeks to accomplish. With software license based scalable ACE solution, organizations can also avoid application downtime and degradation associated with hardware-centric capacity upgrades.

Application Acceleration: More Speed, Less Traffic

Since Web-based applications, XML applications and web-services are communications intensive, providing LAN-like service over the Web can be a challenge. To meet this challenge, Cisco application switching products use a range of acceleration capabilities to boost remote end-user application response times. Among them are compression, flash-forward and delta encoding. These functions minimize distance-imposed latency when application requests are served to remote users across a WAN and reduce the number of round-trip data transfers and messages required by any HTTP-based application. Cisco customers using these acceleration technologies have achieved up to 300 percent improvement in response times.

In addition, given the increasing XML load on the network, Cisco ACE provides XML application and web-services acceleration for the remote users using cutting edge features such as stream-based event driven XML processing feature to reduce the response times.

Optimized Server Operations Lead to Lower Capital Expenditures

Cisco ACE family of products offload multiple functions such as TCP communications management functions, SSL

encryption and XML processing from application servers so that the servers can devote their computing cycles entirely to their primary mission: quickly fulfilling user requests for application content. Using this offloading capability, Cisco ACE installations have resulted in up to 80 percent additional application-request processing capacity.

Security

The Cisco Application switching solution provides an additional layer of security and acts as the last line of defense for the servers in the data center.

The Cisco ACE application switching solution provides an integrated data center firewall that protects against protocol and denial-of-service (DoS) attacks and encrypts mission-critical content. The Cisco application switching solution also provides an application-layer firewall to prevent attacks embedded in application payloads, including zero-day attacks, performing deep packet inspection.

As XML traffic increases in data centers, it is imperative that an application switching solution should also provide XML security. Cisco ACE also secures XML applications, web-services and intra-applications communications.

End-to-End Professional Services and Support

Increasingly, business application delivery requires not only the best features and performance but also a strategic partner that can advise about, install, and support its solution throughout the entire product lifecycle for end-to-end solu-

tion. Cisco offers enterprises and service providers global support 24 hours a day, every day, and also offers award-winning solution advanced services, including planning, design, implementation, operating, and optimization services.

Conclusion

To meet the challenges of IT professionals in enterprises and service providers, the Cisco application switching solution for data centers provides the following benefits:

- Maximized application availability and scalability

- Accelerated application and web service response times

- Support for data center consolidation, as well as lower power, cooling and space requirements

- Increased security for data center servers, applications, XML traffic

- Increased efficiency of server resources through load balancing/content switching, as well as server offloading of XML, SSL and TCP.

**For more information about
Cisco ACE application switching solution,
please visit www.cisco.com/go/ace**

Evolving the Data Center

with the Juniper DX Load Balancing and Application Acceleration Platform

by DJ Skillman
Manager, Technical Marketing
Application Acceleration/
Load Balancing
Juniper Networks, Inc

In today's business environment, the web is more than just a communications medium — it's also a strategic business tool.

This trend is placing considerable demands on centralized application servers in the data center, where web-based business applications are deployed. Server load balancers play a critical role in relieving this burden, adding redundancy and scalability to web-based applications by creating clusters of Web servers over which incoming requests are evenly distributed to avoid overloading any single device.

However, load balancers alone are not enough to ensure long-term success for this emerging environment. That's because, as their popularity grows, Web-based operations place a tremendous strain on the entire data center, not just the web and application servers tasked with supporting the distributed workforce — a group that includes partners and customers with extranet access. While load balancers will offer temporary relief, as demands continue to escalate, users will pay the price with poor application response times and declining productivity.

Faced with this dilemma, many organizations elect to build out their web tier by adding multiple point products that address specific needs as they arise. In addition to load balancers, businesses deploy additional servers to handle increasing workloads. Compression devices are added to reduce outgoing data volume and make web pages more WAN-friendly, improving performance and providing a more LAN-like experience.

As more sensitive business is conducted over the WAN, new devices are added to perform SSL termination, ensure web security, and enforce accounting, authentication and authorization (AAA) rules. Web caches and HTTP proxies are deployed to serve up frequently requested pages to offload the overworked servers.

This piecemeal approach, while effective, adds tremendous complexity to the data center, creating support and management issues that contradict the original goals of simplicity and control. And as demands continue to grow, more equipment will be deployed, adding more cost and complexity, creating a vicious cycle.

Vision Required

Juniper Networks maintains that it doesn't have to be this way. Instead, IT organizations can anticipate these developments and adopt an evolutionary strategy that not only satisfies today's needs, but provides a platform for satisfying future requirements as well.

Such a solution is available from Juniper today: the DX load balancing and application acceleration platform, which embraces the concept that consolidation is the best way to improve the delivery of web-enabled applications while reducing complexity and cost.

The DX platform dramatically simplifies the web tier by integrating multiple functions currently performed by point products — including load balancing, caching, security, SSL acceleration, compression, and content transformation — into a single, high-performance device. Because individual features can be enabled through simple license upgrades, businesses can cost-effectively deploy a single DX platform as a server load balancer today and then introduce new capabilities as needed in the future — without adding any new hardware. The DX platform streamlines the web-based application delivery process, enabling organizations to do more with less — a cost-cutting, easy-to-manage solution that honors the spirit of data center consolidation.

Spreading the Wealth: Server Load Balancing

To ensure continuous availability and guarantee servers are performing at optimum levels, the DX platform's patented

Fewest Outstanding Requests load-balancing algorithm equitably distributes incoming requests among available resources. Unlike legacy TCP-focused load-balancing techniques, the DX platform is the only solution that distributes requests at the HTTP application layer; as a result, the fastest and most available resources are efficiently utilized without overloading them, ensuring requests are filled quickly and avoiding workflow delays.

The DX platforms can also load-balance non-HTTP server farms that handle e-mail, FTP and all TCP/UDP traffic while performing application-level health checking. In addition, a global server load balancing (GSLB) feature, available as a separate license option that can be added at any time, enables the DX platform to load-balance between different geographical locations, providing more efficient performance as well as superior disaster recovery capabilities.

Relieving Server Burden

As demands on the data center grow, with more and more users accessing centralized web-enabled applications, the DX platform can activate additional features — including transport connection multiplexing, SSL termination, ultra-fast object caching, adaptive compression, and TCP slow-start mitigation, among others — to ease the stress on back-end resources and accelerate the delivery of web-enabled applications.

By multiplexing TCP connections, the DX platform reduces thousands of incoming client requests down to just a few, relieving the connection-management burden on back-end servers. By taking over resource-intensive tasks such as session set-up and tear-down and SSL termination, the DX platform frees up valuable CPU cycles on the servers, allowing them to process four times the normal number of incoming requests.

Quick Response

Full support for standard GZIP and Deflate compression standards enable the DX platforms to make the most efficient use of available bandwidth, reducing congestion and accelerating content-rich downloads. The DX compresses all application flows, from standard HTTP objects to Microsoft Office documents, and can even detect the type of browser being used and impose the best compression

technique for that particular software to further streamline downloads. The DX platform also supports "chunking" — allowing a browser to display new objects as they are received, rather than waiting for the entire page to download — to speed displays.

The DX further accelerates response times through a unique 3G caching feature, which stores commonly-requested objects locally on the DX platform's fast DRAM so those requests never reach the server and, therefore, don't consume valuable cycles. The DX platform can also force browsers to cache frequently-requested static objects, accelerating response times for applications that rely on content-rich interfaces by up to 50 percent.
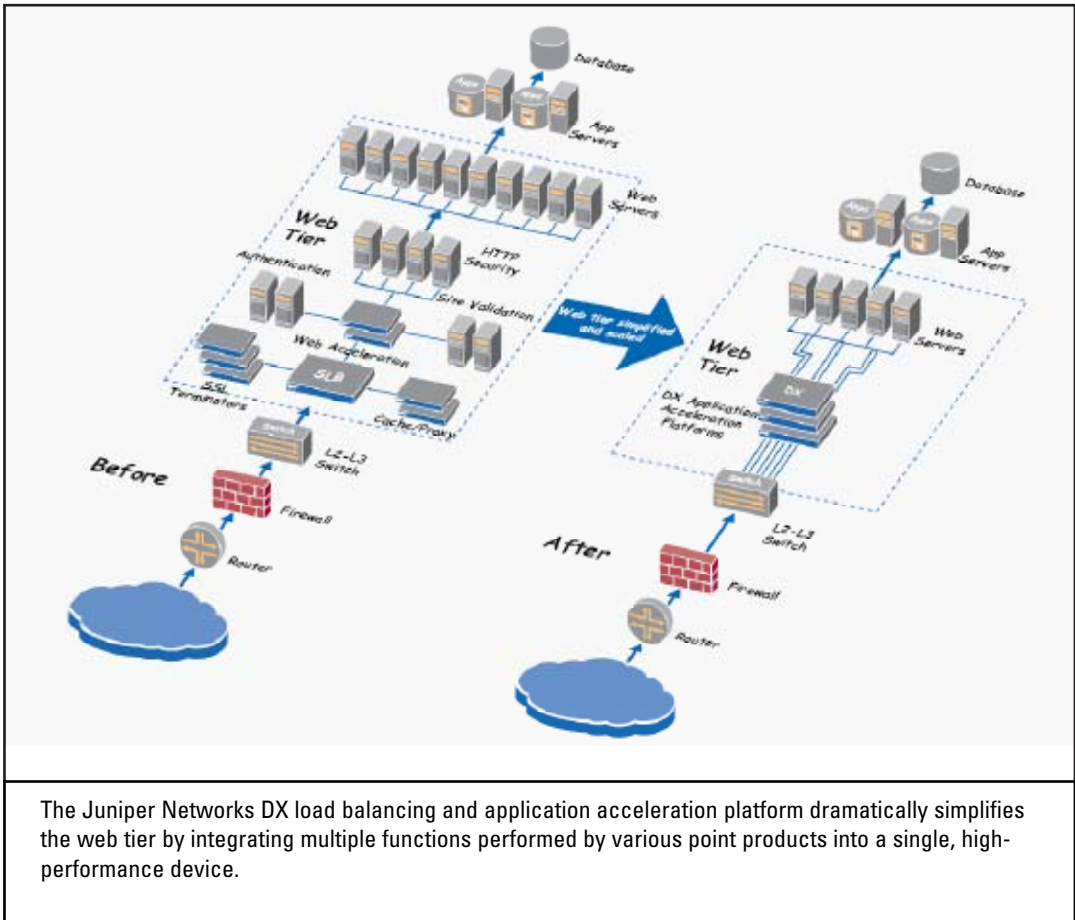
To keep operations moving smoothly, the DX platform optimizes TCP by eliminating much of the back-and-forth required to establish connections and complete the "slow-start" process. Brief periods of user idle time can cause a TCP connection to lapse, forcing the browser to initiate a new connection with the user's next mouse-click or keystroke. As a full proxy, the DX platform keeps all TCP connections alive until the SSL session is terminated, so no time is wasted re-establishing connections.

In addition, the DX platform offers customers an invest-as-you-grow model that allows them to add additional capacity as needs escalate. This ActiveN™ scalability feature, which enables up to 64 DX platforms to perform as a single unit, protects existing investments and eliminates the dreaded forklift upgrade when performance requirements grow.

Secure and Assured Application Delivery

The universal accessibility of web-enabled applications presents certain security risks. The DX platform addresses those risks by acting as a full HTTP proxy that protects back-end resources from external threats.

The DX platform terminates and reinitiates all incoming requests so outside sources never gain direct access to the servers themselves. By providing a buffer between clients and servers, the DX platform validates all requests and responses to ensure only proper HTTP is allowed through. Through its easy-to-use and extensible Sentry rules, the DX platform protects against an ever-growing list of common attacks.

The Juniper Networks DX load balancing and application acceleration platform dramatically simplifies the web tier by integrating multiple functions performed by various point products into a single, high-performance device.

a web-based application accelerated by a DX platform will notice a dramatic improvement in application performance, transaction response times and page downloads, resulting in a much more satisfying experience and restoring productivity to earlier client-server levels.

Yet as powerful as the stand-alone DX platform is, its true power is derived from being part of the larger Juniper product portfolio. Working with the Juniper WX and WXC application acceleration platforms, for instance, the DX platform delivers even greater value to branch-office users accessing centralized applications by accelerating and extending support to client-server-based and other types of applications

Likewise, working with the Juniper SSL/VPN solutions, the DX platform contributes to a complete secure and assured application delivery system, providing unprecedented levels of security and access to protect sensitive data and business-critical resources.

Finally, the transaction-based DX platform is "application fluent," not just application aware, enabling the device to transform content to improve application performance, modify workflows, and reduce or eliminate errors. That application fluency is enabled by the DX platform's AppRules™ network programming language, which gives IT a level of business agility that they never had before. The AppRules feature enables users to easily fix application errors and compensate for inherent limitations, eliminating the costly process of rewriting applications in an active enterprise.

The Juniper products — the DX and WX platforms, combined with the SSL VPN and IPsec VPN/Firewall platforms — deliver a complete, compatible, end-to-end application delivery solution, all from a single vendor.

The Power of Juniper

The DX platform features — load balancing, TCP multiplexing, caching and compression — accelerate web-enabled applications for all users, whether they are located in corporate headquarters, a branch office, a hotel room, or even dialing in from home over a 56k modem. All users accessing

For more information about the Juniper application acceleration platforms, visit http://www.juniper.net/products/appaccel/ or call Juniper at 866.298.6428 (inside the U.S.) or 978.589.0500 (outside the U.S.).

Web Application Delivery

Accelerating, securing and ensuring the availability of critical business

by Morgan Gerhart
Group Manager, Product Marketing
Citrix

Businesses cannot function without their applications. For an application switch to bring value to the business, it must bring value to the applications the business and its customers, partners and employees depend upon. Merely sitting in the network and directing network packets isn't enough. To deliver true business value, an application switch must:

- make the applications perform faster

- enhance the applications' security

- improve the applications' availability

At the same time, an application switch should not increase the business's costs. In fact, an application switch should aid in infrastructure consolidation and reduce costs.

While application switches are deployed within the network, meeting these acceleration, security and availability goals requires an understanding of more than just network and server behavior. An application switch must understand the behavior of the applications themselves. Bridging the gap between the business's applications and the underlying network/infrastructure – in essence directing network behavior based upon an application's behavior – is at the core of an application switch's responsibility. This is, of course, impossible if the applications' behavior is opaque to the application switch. The proliferation of new, advanced web application development techniques and associated new protocols and formats makes understanding applications even more important.

Citrix Systems, the global leader in application delivery infrastructure, provides web application delivery appliances that combine complete web application awareness with a high degree of networking savvy. Since their release in 2000, Citrix NetScaler appliances have been proven in the toughest environments in the world. With over 7000 deployments worldwide, Citrix NetScaler appliances are proven in the most demanding networks in the world, with an estimated 75 percent of Internet users accessing Web-based applications via a Citrix NetScaler appliance on any given day.

Comprehensive Application Delivery Functionality

Citrix NetScaler's success is based on its ability to integrate multiple acceleration, availability and security functions – at both the networking and the application layers – into a single, integrated appliance. Only Citrix NetScaler provides all of the following into a single, integrated appliance:

Accelerated Application Performance

Citrix NetScaler can increase application performance by up to five times. Citrix® AppCompress™ improves end-user performance and reduces bandwidth consumption by compressing Web application data, regardless of whether it is encrypted or unencrypted, before it is sent to the client. Citrix® AppCache® speeds content delivery to users by providing fast, in-memory caching of both static and dynamically generated HTTP application content. In addition, Citrix NetScaler delivers multiple TCP optimizations to improve the performance of the network and server infrastructure. NetScaler TCP optimizations are transparent to clients and servers, accelerating the delivery of any enterprise or Web-based application while requiring little or no configuration.

Intelligent Load Balancing and Content Switching

Deployed in front of application servers, NetScaler delivers fine-grained direction of client requests to ensure optimal distribution of traffic. In addition to layer 4 information (protocol and port number), traffic management policies for TCP applications can be based upon any application-layer content. Administrators can granularly segment application traffic based upon information contained within an HTTP request

body or TCP payload, as well as L4-7 header information such as URL, application data type or cookie. Numerous load balancing algorithms and extensive server health checks provide greater application availability by ensuring client requests are directed only to correctly behaving servers.

Comprehensive Application Security

Citrix NetScaler appliances integrate comprehensive Web application firewall inspections that protect Web applications from application-layer attacks such as SQL injection, cross-site scripting, forceful browsing and cookie poisoning. By inspecting both requests and responses at the application layer, Citrix NetScaler blocks attacks that are not even detected by traditional network security products. Application-layer security prevents theft and leakage of valuable corporate and customer data, and aids in complying with regulatory mandates such as the Payment Card Industry Data Security Standard (PCI-DSS).

In addition, Citrix NetScaler appliances include high-performance, built-in defenses against denial of service (DoS) attacks. Content inspection capabilities enable Citrix NetScaler to identify and block application-based attacks such as GET floods and site-scraping attacks. However, not all increases in traffic are DoS attacks. Legitimate surges in application traffic that would otherwise overwhelm application servers are automatically handled with configurable Surge Protection and Priority Queuing features.

End-user Experience Visibility

Citrix NetScaler integrates Citrix EdgeSight™ for NetScaler end-user experience monitoring, providing page-level visibility of Web application performance. EdgeSight for NetScaler transparently instrument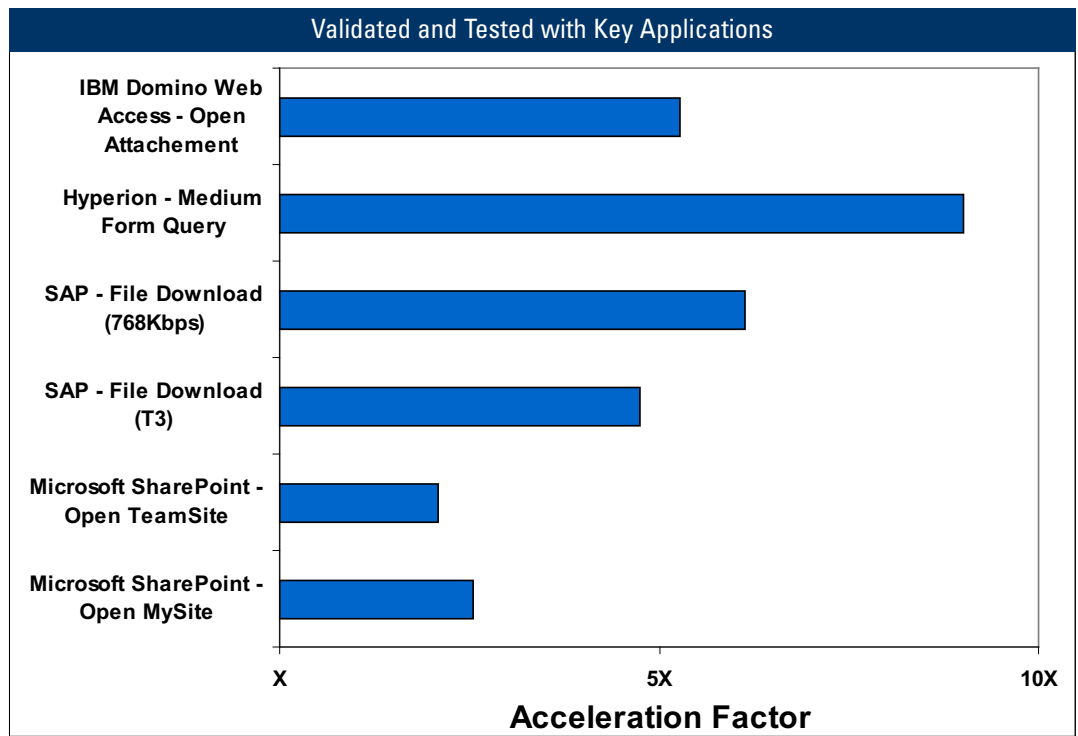s HTML pages, monitoring Web page response time from the application users' perspective. Response time measurements are combined with detailed statistics on the trip durations of requests and responses across the Web site infrastructure, providing granular visibility into how Web applications are behaving from the end user's perspective.

SSL Acceleration

NetScaler integrates hardware-based SSL acceleration to offload the compute-intensive processes of SSL connection set-up and bulk encryption from Web servers. SSL acceleration reduces CPU utilization on servers, freeing server resources for other tasks. Citrix NetScaler is also available in a FIPS-compliant model that provides secure key generation and storage.

Reduced Deployment and Operating Costs

Citrix NetScaler cuts application delivery costs by reducing the number of required servers and by optimizing usage of available network bandwidth. The intuitive AppExpert Visual Policy Builder enables application delivery policies to be created without the need for coding complex programs or

Validated and Tested with Key Applications

Application	Acceleration Factor
IBM Domino Web Access - Open Attachment	~5.2X
Hyperion - Medium Form Query	~9X
SAP - File Download (768Kbps)	~6X
SAP - File Download (T3)	~4.8X
Microsoft SharePoint - Open TeamSite	~2.2X
Microsoft SharePoint - Open MySite	~2.5X

Acceleration Factor: X — 5X — 10X

Working with its key application partners in the partners labs, Citrix tests NetScaler configurations and validates application performance gains. NetScaler typically accelerates Web application performance by up to 5X. When advanced optimizations such as dynamic caching are used, or when network latency or packet loss are extreme, performance gains can be significantly higher.

scripts. In addition, NetScaler reduces ongoing operational expenses by consolidating multiple capabilities such as content compression, content caching, application security and SSL offload into a single integrated solution. For managing multiple NetScaler appliances, the separately available Citrix Command Center provides centralized administration of multiple NetScaler Appliances enabling more efficient system configuration, event management, performance management and SSL certificate administration.

Fully Integrated Architecture

Citrix NetScaler application delivery solutions are purpose-built using an advanced, multi-layered system architecture. At the core of this architecture is the AppExpert Policy Engine, which provides full, bi-directional visibility of Web application traffic and a common policy framework used by all NetScaler functional modules.

The AppExpert Policy Engine is a common, leveraged mechanism enabling all NetScaler functional modules (e.g., AppCache, AppCompress) to interact with application traffic. This AppExpert Policy Framework enables:

- Administrators to use a single environment — the AppExpert Visual Policy Builder to define and manage application policies, regardless of what NetScaler functionality is being invoked. Regardless of what function is needed, look and feel remains the same.

- Commonality and reusability of application policy expressions across all NetScaler functional modules.

- Encapsulation and abstraction of much of the infrastructure associated with writing policies. Administrators can focus on the applications, without having to worry about underlying object models, API calls or complex programming or scripting language syntax.

- Different NetScaler functional modules to interoperate on the same application flow without conflict (e.g., ability to compress encrypted content, ability to cache compressed content)

Summary

Citrix NetScaler appliances enable the network to bring direct business value to the business's application portfolio. Citrix NetScaler appliances are purpose-built to speed Web application performance by up to 5 times or more. NetScaler tightly integrates proven protection for Web applications against today's most dangerous security threats, protecting against the theft and leakage of valuable corporate and customer information and aiding in compliance with security regulations such as PCI-DSS. NetScaler enables IT organizations to improve resource efficiencies and simplify management while consolidating data center infrastructure. The Citrix NetScaler family of Web application delivery systems is a comprehensive approach to optimizing the delivery of business resources in a fully integrated solution.

For more information, see www.citrix.com or contact us at: 1.800.393.1888 toll free 1.954.267.3000 main