

## Optimizing Web Applications

BUILDING AN APPLICATION DELIVERY INFRASTRUCTURE THAT OPTIMIZES  
APPLICATION PERFORMANCE AND REDUCES THE COST OF OPERATIONS

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## The Challenges of Application Delivery

### IT ISN'T EASY

Today's enterprises rely heavily on their business applications. Inventory, customer relations, sales, accounting and other applications are the lifeblood of a company's operations, and delivering these applications to users is a major challenge for businesses today. In order to be most productive, employees, telecommuters, business partners, customers and remote office workers must all have unimpeded access to their critical applications. Any shortcomings in usability, security or availability will cause productivity and profitability to suffer.

There are many obstacles to delivering applications efficiently. Low-bandwidth, high-latency WAN and dial-up connections result in low throughput and long wait times. Incomplete security leaves holes through which private data can be intercepted or applications can be brought down. Server resource constraints produce poor response times for all users. A large user base strains infrastructure and causes outages. Slow or difficult-to-use remote access causes lost productivity when traveling. These obstacles must all be overcome in order to provide productive, usable access to applications.

## Addressing the Challenges with Traditional Products

### TREATING THE SYMPTOMS IS NOT A CURE

When application deployment is complete, it is assumed that the months of planning and trials will yield a successful application rollout. However, oftentimes, everything goes according to plan until the application is made available to the entire user community. This can often cause dramatic problems including poor performance—reducing overall usability that will affect the entire application and overall success. While many application issues are not easily quantifiable (i.e., poor application performance), there are a number of technologies and products available designed to address individual symptoms (see Table 1).

SYMPTOM	TREATMENT
Poor Web application performance	Load balancer
Poor SSL application performance	SSL acceleration
Poor Web application performance	Content caching
Poor server scalability	TCP optimization
Poor performance over WAN	Content compression

**Table 1.** Symptom vs. Treatment

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For many application deployments, there is a combination of the symptoms identified in Table 1, and many more not described in this document. Addressing each of these symptoms would require a multifaceted appliance approach. While each symptom can be treated, the combination of treatments may not provide the best results. In fact, the combination of multiple treatments can cause unwanted and potentially disastrous side effects.

Consider an enterprise-wide deployment of Oracle financials. While the application is customized to optimize the business processes and increase productivity, application performance issues may hinder user productivity.

Almost instinctively, many performance-related issues seem to be identified as a “network” fault, even if the network infrastructure is performing flawlessly for all other applications. Only after an exhaustive investigation and proof of a network’s validity will the problem fall back on the application and its behavior within the infrastructure.

The next approach to solving these problems often consist of adding network-based “treatments” to each of the symptoms. This is a costly exercise which may not solve the overall problem, but temporarily relieves individually identified symptoms.

While incremental performance gains can be realized with each individual treatment, there may be a reduced or negative gain overall when combining all of these treatments in a single application infrastructure. For example, management complexity and support costs are tremendously increased with the addition of each device, because different management interfaces for each appliance require additional administration training, and support contracts must be maintained for each appliance.



**Figure 1.** Multiproduct Solution

While the point products deployed in Figure 1 above are designed to treat individual symptoms, they do not address the larger issue—how to optimize and accelerate applications while minimizing network complexity and cost.

## Citrix NetScaler Solutions Address the Complete Challenge

### THE CURE FOR APPLICATION CHALLENGES

Citrix® NetScaler® Application Delivery systems herald a new category of application networking infrastructures, harnessing the combination of performance, security, availability and cost savings needed for enterprises and eBusinesses to confidently deploy critical applications over IP-based networks. Citrix NetScaler systems unify all of the capabilities of conventional load balancers, traffic managers and remote access systems with advanced, application-based functionality.

By combining the features of application delivery and security into a single unified platform, Citrix NetScaler Application Delivery system is able to deliver the incremental benefits of each technology, unlike the point solution approach discussed previously.

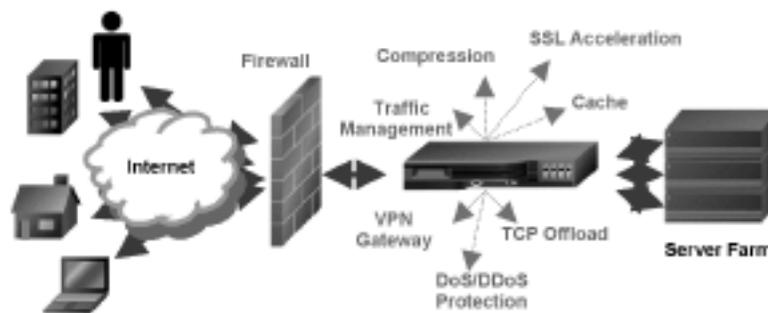
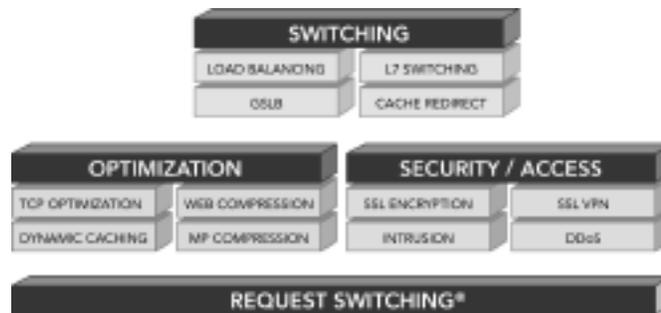


Figure 2. Citrix NetScaler Application Delivery System

NetScaler Application Delivery solution incorporates three key capabilities, all fueled by Citrix® Request Switching® engine which allows complex Layer 7 technologies to be integrated into a high-performance architecture. These technology areas include:

- **Optimization**—Ensuring optimal application performance and scalability.
- **Security**—Ensuring application content is secure and servers are protected from Denial of Service (DoS)/Distributed DoS (DDoS) attacks.
- **Switching**—Providing reliable application performance, as well as application high availability.



**Figure 3.** Citrix NetScaler Technology Areas and Discrete Features

## OPTIMIZATION

### DRAMATIC PERFORMANCE GAINS WITH MINIMAL EFFORT

All too often, problems with application performance are deemed to be a function of server hardware after network infrastructure has been ruled out. Although the server has a direct impact on server performance, it is not necessarily directly related to application performance. There needs to be a distinction between processing and application performance. Simply increasing processing power in a server may have little or no affect on application performance and scalability. The same may be said for adding load-balanced servers to cope with increased load.

Application-specific optimization features can often off-load tedious processes from application servers, freeing them to perform their main functions of serving content. This process offload allows servers to scale beyond their original capacity while accelerating content delivery.

NetScaler Application Delivery systems implement a range of application optimization features, yielding dramatically improved application performance, while increasing server capacity. These results are achieved without requiring any modifications to either the server or client systems. NetScaler Application Delivery optimization features include:

- **TCP Optimization**—Reduces the number of client connections each application server has to deal with while optimizing server responses. The result is a server that can support an increased number of application users, extending the life of existing hardware investment, while delivering application content with much better performance.
- **AppCompress™**—AppCompress is a set of advanced compression capabilities that speed the delivery of all application data, including traditional Web-based applications. By reducing the amount of transmitted data, AppCompress eliminates bandwidth bottlenecks and improves overall application performance.

- **AppCompress for HTTP**—AppCompress for HTTP provides advanced HTTP compression to speed the delivery of Web-based application data to all users. It accelerates application delivery by two to four times for standard Web pages, and up to seven times for some enterprise application data, while requiring no additional client-side technology. It also off-loads Web servers from performing compute-expensive compression operations enabling organizations to serve much larger user populations with no additional infrastructure investment.
- **AppCompress MP™**—AppCompress MP is a multiprotocol compression technology that accelerates performance for users accessing applications via full, rich clients (like Microsoft® Outlook), non-Web thin clients (such as those launched by popular enterprise applications like Oracle, SAP and Siebel), and even mobile clients (such as the Pocket PC).
- **AppCompress Extreme™**—AppCompress Extreme technology improves upon standards-based HTTP compression by eliminating the redundancy in HTTP content. It provides a powerful, policy-driven compression engine that instantly computes the differences in application data and sends only that data which has changed to the user.
- **Content Caching**—Allows static and dynamic applications content to be served from the NetScaler system, dramatically reducing resource and latency requirements for application content re-creation. The result is a dramatic improvement in application performance.

## SECURITY

### MAINTAINING APPLICATION AVAILABILITY

NetScaler Application Delivery systems provide comprehensive attack protection from Denial of Service (DoS) attacks, Distributed DoS (DDoS) attacks, network-based worms/viruses and application-specific vulnerabilities. At the heart of each NetScaler system is Request Switching, a multipatented technology that enables a unique, high-performance Layer 7 feature set. This technology allows NetScaler Application Delivery Systems to inspect application requests and identify malicious content, stopping it before it reaches the application server(s).

NetScaler Application Delivery security features include:

- **DDoS Protection**—Identifies and protects application infrastructures from DoS/DDoS attacks. This protection goes beyond the traditional SYN cookie technologies employed by other vendors (see the NetScaler SYN protection white paper for more details).
- **Intrusion Filtering**—Protects application servers from malicious worms and viruses by identifying and denying them before they reach the application servers. The unique packet inspection and filtering capability (including inspection of encrypted traffic) within the NetScaler system allows administrators to define policies to protect against these types of attacks. Some common attacks that NetScaler can protect against include Nimda and Code Red.

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- **SSL Encryption**—Allows application content to be encrypted on the fly, maximizing application throughput by off-loading the server from complex encryption tasks. This ability allows administrators to secure sensitive application content from potential eavesdropping and information misuse.
  - **SSL VPN**—Provides a comprehensive, secure remote access technology for remote users without the use of additional remote client software, but instead uses common client technology and industry-standard SSL for content privacy. NetScaler SSL VPN technology allows end users to remotely access any application, including non-Web client/server applications.

## **SWITCHING**

### **MORE THAN JUST A BALANCING ACT**

To ensure application availability, NetScaler Application Delivery systems provide complete application switching functions to allow the distribution of traffic among multiple application servers and/or data centers. Traffic distribution provides higher throughput for client requests and ensures fault-tolerance in the face of server or application outages.

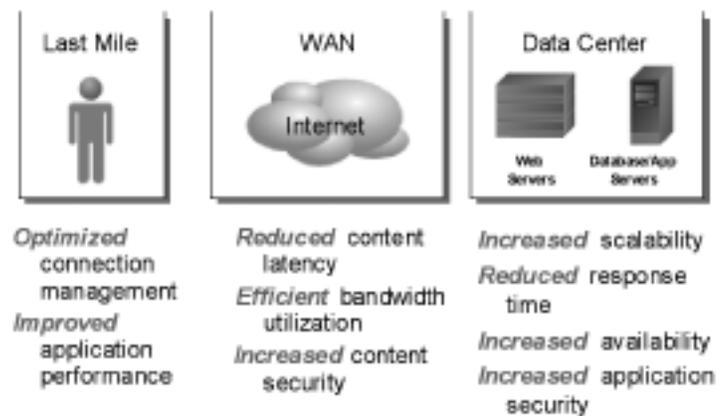
The problem imposed by legacy switching (load balancing) solutions is that they are developed to inspect and switch traffic at Layer 4 (connection layer), and have limited application content knowledge or capabilities. With this approach, it is impossible to force users to request the same amount of application data per connection. In reality, some clients will be more demanding than others, resulting in uneven traffic distribution among servers, which minimizes the distribution benefits gained by load balancing.

In contrast, NetScaler's switching technology is based on Request Switching, which provides a way to identify and act on discrete application requests per user. By switching at the request level instead of at the connection level, NetScaler is able to offer the industry's leading solution for application traffic distribution with the highest performance. NetScaler Application Delivery switching features include:

- **Load Balancing**—Provides application content distribution among multiple application servers, ensuring increased application performance with fail-over support for business continuity. Request Switching ensures even traffic distribution irrespective of individual user demands.
- **Layer 7 Switching**—Provides content-based traffic distribution. This allows administrators to deploy application-specific resources (i.e., image servers, XML servers, HTML servers) tuned to individual content.
- **Global Server Load Balancing (GSLB)**—Provides geographic and network proximity-based content distribution, ensuring remote users are transparently switched to localized content for their specific region, or proximity switched to a local resource for optimal performance.
- **Cache Redirection**—Provides integration with existing cache infrastructures by forwarding application content to preconfigured caches.

## Summary

It is essential that applications and network infrastructures be considered together as a common “application infrastructure” that supports strategic business objectives. NetScaler Application Delivery systems are designed to ensure application success using existing network infrastructures with minimal disruption. The unique features of NetScaler Application Delivery systems are designed to optimize application communications and resources, secure data center assets, and ensure continued application availability. By deploying NetScaler Application Delivery systems within an enterprise or eBusiness infrastructure, an organization can realize immediate cost benefits. The following figure identifies three distinct areas of focus for network and application administrators that affect the application infrastructure ecosystem.



**Figure 4.** Citrix NetScaler End-to-End Application Solution

NetScaler Application Delivery system is the industry’s first solution that bridges the gap between network infrastructures and applications, optimizing application communications while increasing overall performance. The combination of NetScaler’s innovative features working in unison at wire-speed in a single platform, provides dramatic reductions in operational costs and network complexity.

## Optimize your applications

Find out how Citrix NetScaler application delivery solutions can make your Web applications run up to 15 times faster, while enhancing application security and dramatically reducing operational expenses.

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