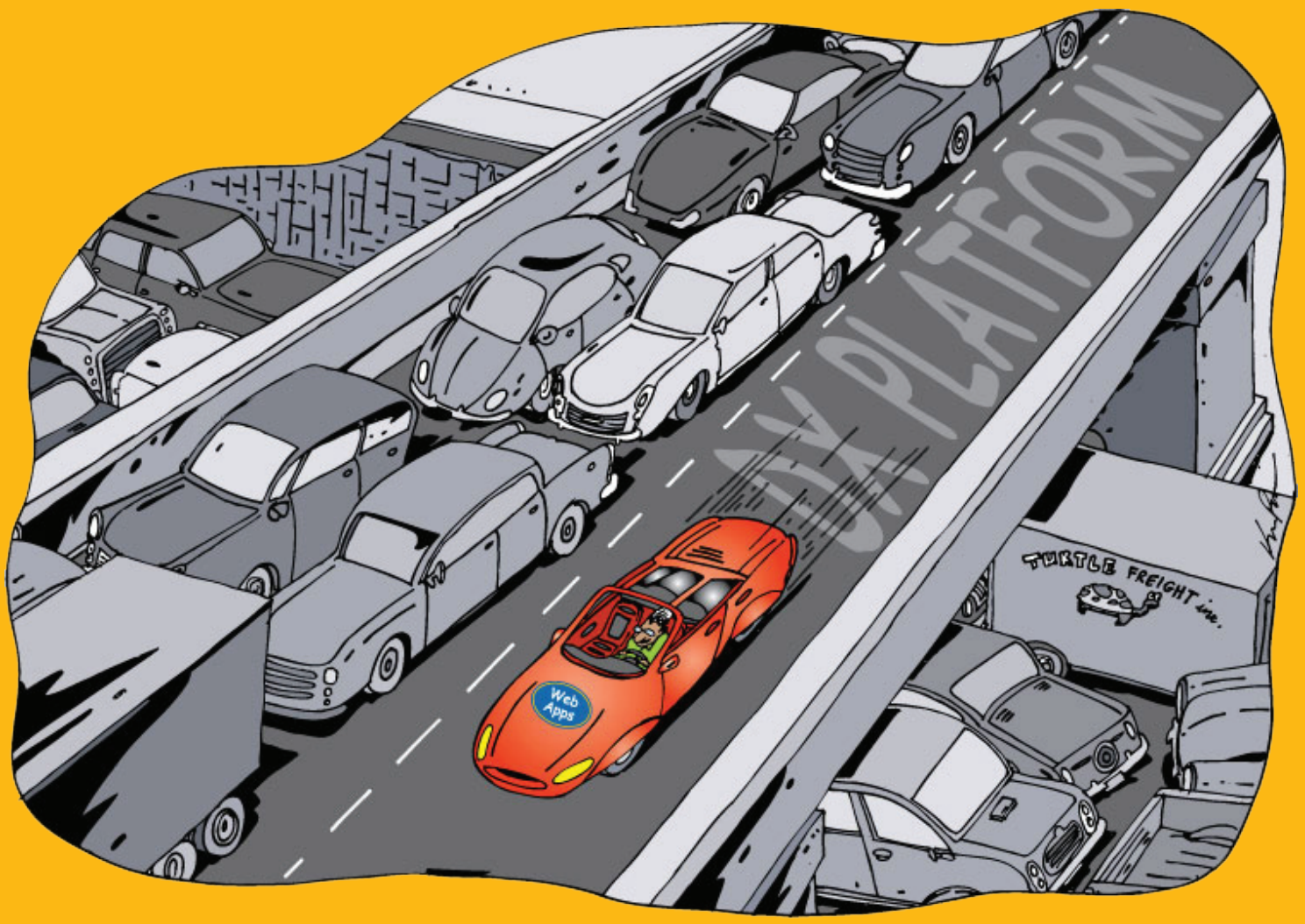
Juniper NETWORKS

Solution Brochure

Improving Application Delivery in the Data Center

DX Application Load Balancing and Acceleration Platform System Overview



Improving Application Delivery in the Data Center

The worldwide web is more than just a communications medium – it is a strategic business tool.

It's no surprise then that many organizations today are "webifying" their business operations – implementing web-based versions of client/server applications such as PeopleSoft, SAP, Oracle, Siebel, Outlook and homegrown solutions to leverage the cost savings and global reach of the Internet.

It's a logical evolutionary step. Since more than 58 percent of employees reside outside corporate headquarters, web enablement provides all users – local, remote and mobile – with universal access to centralized applications while eliminating the need to install and support client software on distributed desktops. As a result, the application infrastructure becomes significantly easier to manage, maintain and upgrade, reducing operational costs.

But such a transition comes at a cost. Web-enabled applications consume at least 10 times the bandwidth of their client-server counterparts, creating performance problems for users accessing applications over a wide-area link. Web-based operations also place a tremendous strain on the data center and, in particular, the web tier – the web and application servers tasked with supporting the distributed workforce, as well as partners and customers with extranet access. The result: poor response times and declining productivity as too many users compete for too few resources.

As applications are web enabled and more critical data such as credit card information and social security information is on the web, corporations become increasingly vulnerable to hacker attacks and identity theft. With corporations being attacked on a daily basis, it becomes extremely important for corporations to protect against loss of sensitive information, revenue as well as credibility.

Building Out the Web Tier

To compensate, many organizations build out their web tier by adding multiple point products that address specific needs. Additional servers are deployed to handle escalating demands. As the traffic load increases, server load balancers (SLBs) distribute incoming requests among available servers. Compression devices reduce outgoing data to 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 serve up frequently requested pages to offload the overworked servers.

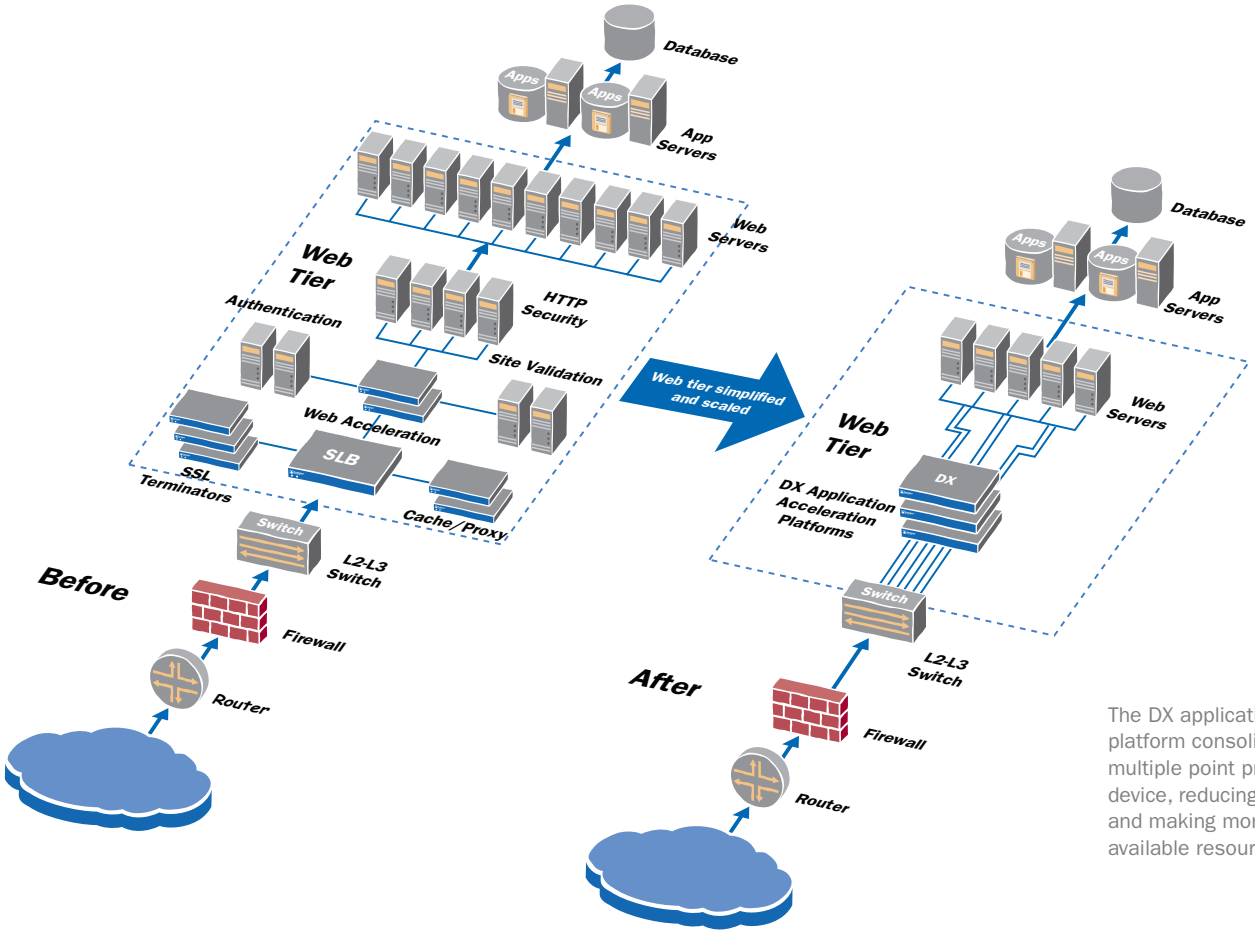
While these myriad point solutions do what they were designed to do – and do it well – they also add tremendous complexity to the data center, contradicting the original goals of simplicity and control. Plus, point products don't offer a very scalable solution. Growing demands mean more equipment, which adds more complexity and cost – and the cycle begins again.

Juniper Networks: Accelerating the Data Center

Businesses deploying web-enabled applications want a secure, scalable and reliable solution that delivers LAN-like performance for their local, remote, mobile and branch-office users.

Juniper Networks understands these requirements. And Juniper offers a solution that simplifies the web tier by optimizing traffic flows for web-enabled applications.

The DX application acceleration platform integrates multiple web-tier functions into a single platform, delivering a powerful, scalable, application-fluent solution that replaces the point products cluttering up the data center.



The DX application acceleration platform consolidates functionality from multiple point products into a single device, reducing data center complexity and making more efficient use of available resources.

Residing in front of critical web servers, the DX platforms perform critical server offload and load balancing, SSL termination, AAA enforcement, compression, HTTP security, caching/proxy, and a variety of other data center services. By serving as a front end to web-based applications, the DX platforms terminate, rewrite and distribute all incoming requests, multiplexing thousands of connections down to just a few, freeing up critical CPU cycles on back-end servers to let them focus on serving content.

The DX platform also serves as a full bidirectional HTTP proxy, appearing as a server to clients and as a client to servers, shielding data center resources from a full range of malicious attacks. Back-end servers are completely invisible to external sources, virtually eliminating the ability to compromise performance or hack into the system to obtain confidential data.

DXOS: The Power Behind the Solution

The DX application acceleration platforms are powered by the DX operating system (DXOS™) – sophisticated software that provides the foundation for delivering the key features of the DX solution.

Integrated with every model of the DX platform – including the DX 3200/3280 and DX 3600/3680 – the DXOS software supports the core functionality enabling DX platforms to accelerate web-enabled applications. By tightly integrating server offload, compression, encryption, load balancing and adaptive-content processing capabilities in a single platform, the DXOS software provides the cornerstone of a powerful data-center acceleration solution.

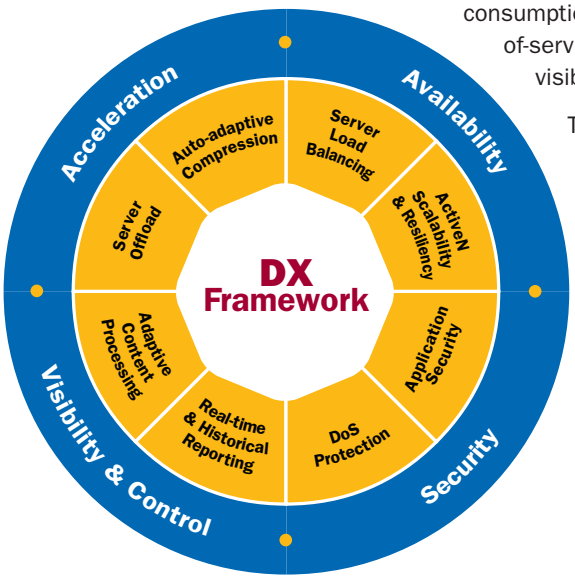
Increasing Performance, Reducing Costs

The DX platforms deliver the ideal application acceleration solution for the data center. By offloading repetitive, CPU-intensive tasks and relieving the burden on back-end resources, the DX platform increases server capacity three to four times while reducing server costs up to 80 percent – dramatically improving the performance of web-based applications.

Conversely, the DX platform enables businesses to do more with the equipment they already have, maximizing existing investments by delivering the performance, security, availability, manageability and flexibility that organizations demand from their data center solutions.

The DX Framework

A number of issues impede effective delivery of web-enabled applications from the data center. Poor performance due to an overburdened web tier, inefficient protocols and excessive bandwidth consumption. Lack of access to critical resources. External threats in the form of denial-of-service (DoS) and other malicious attacks. The absence of tools that provide the visibility and control IT managers need to restore and maintain efficient operation.



The DX Framework – a unique architecture upon which all DX application acceleration platforms are built – addresses these issues by defining specific attributes required to overcome these obstacles and provide a comprehensive data center application acceleration solution.

Defining Application Delivery

These attributes, delivered in the form of specific features on the DX platform, are organized into four categories – Acceleration, Availability, Security, and Visibility and Control. Each category addresses one of the four primary obstacles, providing a blueprint for building the ideal application front-end controller.

The **Acceleration** functions include server offload and auto-adaptive compression capabilities designed to double the performance of web-based applications for remote, branch-office and mobile users. The Acceleration functions produce faster page downloads and application response times for users, which translates into greater productivity.

The **Availability** component provides scalability and resiliency functions that improve overall application availability and ensure the highest success rate of content delivery to fulfill requests. Accomplished through local and global server load balancing and the DX-specific ActiveN™ scaling features, the DX platform equally distributes requests across all available resources, providing a highly versatile solution that scales well beyond traditional active-standby models.

The **Security** functions protect data center resources from external threats by terminating all incoming and outgoing sessions, preventing outside sources from identifying or accessing the servers, and developing full knowledge of the application transactions between the client and servers. By providing a buffer between outside clients and back-end servers, the DX platform offers an extra layer of protection that ensures more secure transactions and higher reliability.

Finally, the **Visibility and Control** functions provide IT with actionable data and tools for maintaining system availability and performance. Real-time and historical reports provide insight into the performance of web-based applications, enabling quick identification and resolution of problems, as well as informed capacity planning and deployment decisions. Adaptive content processing allows IT to transform content and modify application performance in real-time to compensate for inefficiencies, prevent errors, and change workflows, providing unprecedented agility for maintaining maximum performance and reliability.

Secure & Assured Application Delivery

Working together, the components of the DX Framework contribute to the industry's most complete and versatile data-center application delivery solution. Armed with the DX platform, IT can provide secure and assured web-based application delivery from the data center to users around the world.

DX Application Acceleration Platforms

The DX application acceleration platforms incorporate all the components of the DX Framework, integrating powerful, complementary and interdependent functions to provide a complete data center application delivery solution. By incorporating these capabilities in a single device, the DX platform replaces the multiple point products currently deployed in the web tier, simplifying the data center architecture to improve performance and reduce administration.

Acceleration: Relieving the Server Bottleneck

Two factors are responsible for the poor performance of web-enabled applications: overworked servers and inherent inefficiencies of the applications themselves, particularly over the WAN.

Servers, tasked with processing all incoming requests, are overwhelmed by process-intensive tasks that consume inordinate amounts of CPU cycles, leaving scant resources to perform the most important job of all: serving content. The DX platform's powerful multiplexing engine relieves the server bottleneck by offloading repetitive operations such as TCP connection management and SSL encryption and termination, freeing resources to focus on fulfilling user requests. The DX platform multiplexes thousands of TCP connection requests, dramatically reducing the number of sessions bombarding servers.

To further ease the burden and improve response times, the DX platform's 3G caching feature maintains frequently requested objects in fast DRAM, quickly filling those requests before they ever reach the server. And a response buffering capability enables the DX platform to pull objects and pages from the server at LAN speeds and feed the response to client, relieving servers of this time-consuming chore.

The DX application acceleration platform product family.

Acceleration: Overcoming WAN Limitations

The wide-area network (WAN) imposes its own limitations that hinder web-enabled application performance. The DX platform compensates for these limitations to accelerate page downloads.

A connection keep-alive feature maintains tunnels between the user and the data center, allowing users to bypass the time-consuming TCP handshake and slow-start processes required by opening new sessions. SSL acceleration speeds SSL session set-ups and offloads key management tasks, as well as encryption, from the server.

The DX platform can even enforce client-side browser caching to locally store and serve commonly requested items on individual desktops, ensuring even faster response times by eliminating the need to download objects over the WAN.

To efficiently utilize available bandwidth, the DX platforms also employ industry-standard compression techniques to reduce the data flowing across WAN links. All major protocols are supported, including HTML, SHTML, DHTML, JHTML, PHTML, Javascript, J2EE, JSP, CSS stylesheets, WebDay, XML, and SOAP. The DX compression techniques apply to all Microsoft Office documents, which constitute the bulk of large file transfers in most business environments. Since there is no limitation on window size, file size or compression ratios, the DX platform accelerates every transaction, making it 25 percent more efficient than comparable solutions – and ensuring a more LAN-like experience for all users, everywhere.

Availability: Distributing the Load

To ensure maximum availability during peak loads, many organizations over-provision the web servers in their data center. The resulting product proliferation contributes greatly to data center clutter and complexity – and still doesn't ensure reliable application performance.

The DX platform delivers full Layer 4-7 server load balancing (SLB) functionality, enabling organizations to maximize available resources and reduce operational overhead. A patented Fewest Outstanding Requests algorithm provides efficient HTTP load balancing, ensuring the most equitable distribution of incoming requests to prevent overloading any single server. Unlike round-robin and other common load-balancing techniques, the Fewest Outstanding Requests approach operates at the Application layer by knowing exactly how many HTTP requests are pending for each server. New traffic is then intelligently distributed to the servers best equipped to handle it, ensuring each server is working at optimal levels.

In addition, a Global SLB feature allows the DX platforms to load balance between multiple data centers, not just servers, providing better overall performance and far more resilient disaster recovery. When current load and CPU utilization allow, requests are forwarded to the data center closest to where they originated, improving overall response times.

The DX platforms also dramatically improve page retrieval success rates by correcting "page not found (404)" and "server busy (500)" errors. Acting as a full HTTP proxy, the device intercepts error messages before they reach the user and automatically retries failed attempts, shielding clients from unsuccessful downloads.

To maintain maximum availability, the DX platforms also support a powerful ActiveN scaling feature, which allows IT to add new DX platforms incrementally to meet growing demands. Up to 64 units can be clustered in a mesh topology to act as a single device. Unlike other high-availability solutions, performance scales as well, delivering unprecedented performance. All units are always active, making efficient use of available DX resources, and a cascading failover feature ensures that, if a DX platform fails, the workload is equally distributed among the remaining devices to provide superior disaster recovery.

Securing the Web Tier – Application Layer Security

In addition to Network layer security such as defending against SYN floods and other types of DoS attacks, the DX platform acts as a buffer between users and servers, providing a layer of application security that protects the hardware from application external threats. All users are authenticated, and per-request authorization can be implemented using the platform's existing RADIUS and LDAP infrastructure. Full HTTP protocol scrubbing identifies and blocks Application Layer attacks, while secure outbound access protects servers by masking their identity, preventing outside sources from targeting those devices.

By virtue of being a full proxy device, the DX can provide "application firewall" functionality. This includes content scrubbing capabilities such as scrubbing credit card numbers, social security numbers and account numbers. Other capabilities include cloaking and removing server, OS and protocol specific information to prevent web and OS fingerprinting used commonly by hackers.

The DX can also provide protection against common application attacks such as buffer overflow, cross side scripting, SQL/OS injection etc. All user sessions can be protected through Secure Sockets Layer (SSL) encryption; Auto SSL functions automatically secure non-secure operations to provide an additional level of protection.

Visibility and Control: Managing the Web-enabled Data Center

You can't manage what you can't see. The DX platform provides IT with complete visibility into servers and transactions, including at-a-glance views into the health of the data center.

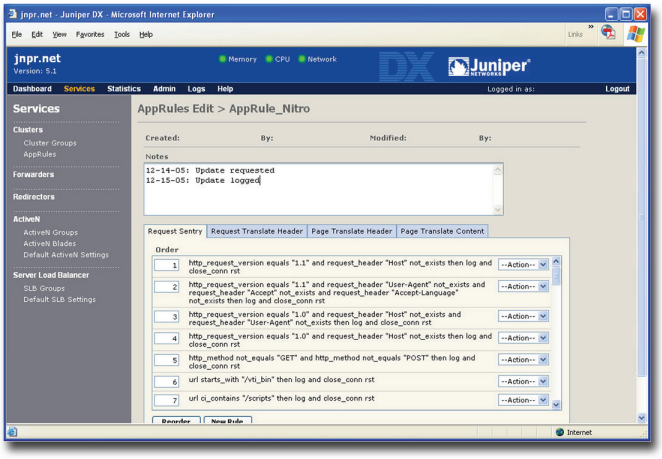
A reporting "dashboard" displays more than 200 real-time performance statistics on both incoming and outgoing traffic, enabling IT managers to quickly assess current conditions. Historical data stretching back for years can be displayed in online graphs in increments down to the second, providing critical information for detecting performance trends, finding and isolating recurring problems, or capacity planning purposes. All performance statistics are exportable for viewing in other formats or for integrating with other data to provide a more complete picture of data center performance.

AppRules: Improving Performance at the Web Tier

When an extra level of control is required, the optional DX AppRules™ feature delivers a powerful suite of tools that makes it possible to transform application content and behavior in real-time.

The key to the AppRules feature is Adaptive Content Processing, which delivers application fluency by allowing IT to define and implement application changes "on the fly" to correct errors and alter performance characteristics to meet the needs of an evolving user community.

Typically, optimizing HTTP requires a web application developer to manually change actual code. Through the AppRules interface, users simply select from a list of predefined scripts or create new, customized "if-then" rules that support virtually unlimited content processing actions based on any combination of factors for both incoming client requests and outgoing server responses. For instance, IT could implement a rule that automatically secures application requests and responses with SSL, enabling instant security with no performance degradation or costly application rewrites.



The AppRules feature allows IT to transform application content and behavior through a simple rules-based interface without rewriting any actual code.

The AppRules feature supports all major web-based applications, including SAP, Oracle, Outlook Web Access (OWA), PeopleSoft, Siebel, SharePoint and others. The template-based wizard means support is also available for both off-the-shelf and custom applications, satisfying the needs of virtually every application environment.

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The Complete Data Center Solution

With all the elements working together, the DX application acceleration platform delivers a complete solution that accelerates web browser sessions for remote, branch-office and mobile users while securing the web tier and relieving the burden on data center servers.

By offloading connection and session management functions from web and application servers, the DX platforms reduce overhead in the web tier by allowing the servers to do what they were designed to do: serve content. And by consolidating multiple functions into a single device, the DX platforms eliminate point-product proliferation and dramatically simplify the data center architecture.

Working with the Juniper WX and WXC application acceleration platforms, the DX platforms also contribute to the industry's most comprehensive optimization solution for today's extended enterprise. The WX and WXC platforms optimize and accelerate application performance over the WAN to improve the productivity of branch-office users. Combined with the data center optimization capabilities of the DX platform, Juniper Networks is the acknowledged leader in secure and assured application delivery in today's distributed enterprise.

For more information about the Juniper application acceleration solutions, visit http://www.juniper.net/products/appaccel/

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.

To purchase Juniper Networks solutions, please contact your Juniper Networks sales representative at 1-866-298-6428 or authorized reseller.