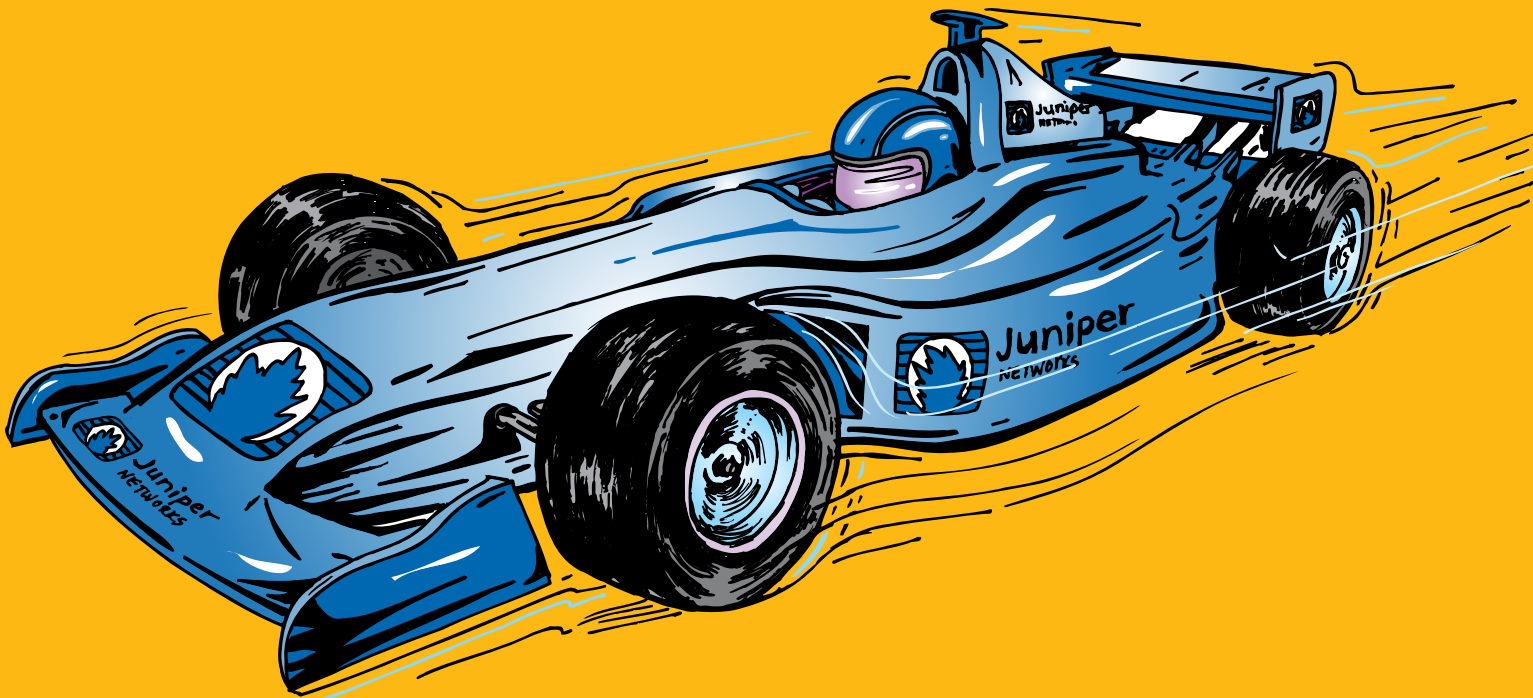


Accelerating Application Delivery in the Distributed Enterprise



Secure & Assured Application Delivery

As an IT manager, you have every right to be worried.

After all, you're responsible for two seemingly contradictory goals: increasing employee productivity and reducing the cost of running the business. On the one hand, you're expected to provide consistent application performance across your geographically dispersed business for all employees – headquarters, branch-office and remote. Your business runs on these applications, and by improving overall performance, you help the people who use them every day – including suppliers, manufacturers, and contractors – do more meaningful work in less time, improving productivity and making your business more competitive.

The Distributed Enterprise Dilemma

At the same time, you're also expected to implement strategic cost-cutting initiatives such as centralizing servers as well as web-enabling existing client-server applications. By consolidating these resources in a single data center, these initiatives greatly simplify system administration, management and regulatory compliance, dramatically reducing costs.

Therein lies the dilemma. While these initiatives achieve the cost-cutting goal, they do so at the expense of application performance by placing more pressure on existing data center and wide-area network (WAN) resources.

For instance, while web-enabling applications reduces client software support costs, it also creates a capacity crunch on the WAN because web-based applications are nowhere near as bandwidth-efficient as their client-server counterparts. Buying more bandwidth is an option, but even that won't fix all your problems.

That's because the distance between the data center and remote and branch-office users imposes application-killing latency – a fact that all the bandwidth in the world can't erase. Any global business that has extended their centralized business applications to distributed branch-office and remote users has learned that latency is the number one cause of poor application performance.

Regulatory compliance adds another dimension to the challenge. Making sure that e-mail, file and other data are retained isn't going to be easy, given the disparate devices currently installed at far-flung locations. While centralizing and standardizing this equipment solves one problem, it creates a performance issue. And you're stuck right in the middle.

You're faced with an application performance challenge that requires a strategic, proven and straightforward solution that gives remote and branch-office users the same response times they get from local servers. You also deserve a set of tools that provide a holistic view of the distributed enterprise and the applications running over it. These WAN services and application licenses cost a lot of money, so understanding exactly how these strategic assets are performing is absolutely critical.

Juniper Networks: Accelerating Applications in the Distributed Enterprise

Juniper Networks delivers the industry's most complete application acceleration solution with its data center acceleration (DX) and wide-area acceleration (WX) platforms. By simultaneously targeting both the data center and the wide-area network (WAN), Juniper addresses all the impediments to delivering LAN-like application performance throughout the distributed enterprise. Working together, the Juniper solutions enable IT managers to make the most efficient use of existing resources while radically simplifying the data center and branch-office architectures, streamlining applications and delivering unprecedented visibility into network performance.

The Juniper Networks DX and WX platforms deliver secure and assured application delivery across the distributed enterprise, giving IT managers like you a lot less to worry about – and restoring global networks to their rightful place as a strategic business tool.

Recentralizing Decentralized Applications, Servers and Data

A number of trends and environmental changes are threatening to transform the distributed enterprise from a strategic asset into a potential liability. These trends and changes – legitimate responses to evolving business needs – have occurred over time, resulting in a patchwork of solutions that add complexity to the environment.

Globalization and Distributed Applications

One significant trend is globalization. To remain competitive in an increasingly global business environment, organizations have established branch offices in locations around the world. In order to give their branch-office staffs the same level of application performance as corporate headquarters, companies have created mini data centers at each branch, deploying application, file and e-mail servers at these remote sites.

While this resource proliferation gets the job done, it also has several serious drawbacks. First, it drives capital costs through the roof. In such an environment, the only way to keep pace with corporate expansion is to buy and deploy servers on an as-needed basis, making it impossible to leverage economies of scale.

Second, deploying equipment at remote locations requires IT personnel to maintain and support it, increasing headcount and adding operational costs.

Third, deploying applications in this distributed manner makes end-to-end management, backup and recovery virtually impossible. A lack of visibility into remote locations makes troubleshooting and problem resolution more difficult, affecting both availability and productivity. Security also is an issue; as device counts climb, so does the potential for a security breach.

Web-enabling Business Operations

Similar resource proliferation is occurring in the data center, though for different reasons. As the Internet became a strategic corporate productivity tool, IT execs added a “web tier” – initially consisting of web servers – in front of their centralized application servers to support web-based versions of their business applications. These web-based applications not only provide universal access to all employees, they also reduce costs by centralizing operations and eliminating the need to install and support client software on individual user desktops.

As dependence on these web-enabled applications grew, however, the web tier expanded to include server load balancers (SLBs), SSL accelerators, cache appliances, authentication servers and other equipment to keep the applications running smoothly for the swelling ranks of users.

With each successive web application deployment, complexity grew, driving costs up and performance down. Management became difficult, and the initial benefits of web-based applications – universal access, centralized maintenance and support – were compromised.



"Okay, Jerry, I'm going to put you down as a No, under 'Happy with the network's current performance.'"

The New Challenge: Data Center Consolidation and Application Acceleration

On the heels of these changes, IT is now being tasked with a number of new initiatives to curb costs and regain control over the ever-expanding enterprise.

To satisfy this objective, many organizations are eliminating the distributed branch-office data centers and centralizing those servers in one or two locations. This centralization saves considerable costs by reducing the number of servers required to support the workforce, eliminating the need for local IT personnel and simplifying system management.

Unfortunately, these solutions also subject the distributed enterprise to even greater stress by forcing application sessions to run over notoriously slow wide-area links. The result is poor application performance and response times for remote, mobile and branch-office users – the very problem the distributed data centers were designed to avoid. Data center consolidation and server centralization has presented IT managers with a whole new set of challenges, including:

- **WAN Capacity:** WAN links offer limited bandwidth. This is a considerable handicap as users attempt to send more rich content such as Web objects, multimedia and other large files across the distributed enterprise. Web-enabling conventional applications exacerbates the problem by consuming at least 10 times more bandwidth than traditional client-server applications. New application rollouts – inevitable in any large organization – will consume even more. With the pressure on to constrain costs, IT managers can't expect to buy their way out of this problem with additional bandwidth.
- **Latency:** Latency is the silent killer of applications. Chatty protocols such as TCP, HTTP and HTTPS, as well as delay-sensitive solutions such as VoIP and the protocols used by applications such as Microsoft Exchange and Microsoft file services, are significantly impacted by even modest latency on wide-area links. The result: poor response times for users.
- **Availability:** Without a connection to the data center and the rest of the enterprise, work simply stops. Creating an application-fluent infrastructure, which understands the content and transactions at Layers 4 through 7, is an absolute necessity to deliver transaction completeness. Equally necessary in the always-on workplace are multiple paths connecting branch-office and remote users to ensure business processes continue uninterrupted.
- **Contention:** According to a recent survey, enterprise IT managers are running more than 100 applications across their WAN connections. Approximately one-quarter of these applications are considered business-critical. When these applications compete for a fixed amount of bandwidth, all of them suffer.
- **Security:** Nearly 60 percent of today's workforce resides outside corporate headquarters. These employees need secure access to business-critical applications and other centralized resources. In many cases, secure access must also be extended to "outsiders" such as customers and business partners.
- **Manageability:** You can't manage what you can't see. If IT managers don't know what's happening on the distributed enterprise, they won't have a clear idea how to improve performance. Historically, monitoring and reporting application performance on the WAN has been difficult to do on a corporate IT budget. With application licenses, WAN services and headcount consuming most of the budget, this needs to change.

Addressing Enterprise Initiatives

Each of these challenges will impact the major initiatives facing IT managers today. These initiatives, which essentially define the evolving enterprise, include the following:

- **Web-enabling** off-the-shelf (SAP, Oracle) and custom-developed client-server business applications to lower branch-office management costs and simplify connections by replacing private lines with virtual private networks (VPNs).

This application migration, however, raises a number of security, bandwidth and transaction completion issues. While client-server applications use proven methods to ensure transactions have been completed successfully, the web-enabled versions lack any such technique. Plus, they may be accessed over the public Internet, presenting security and capacity problems.

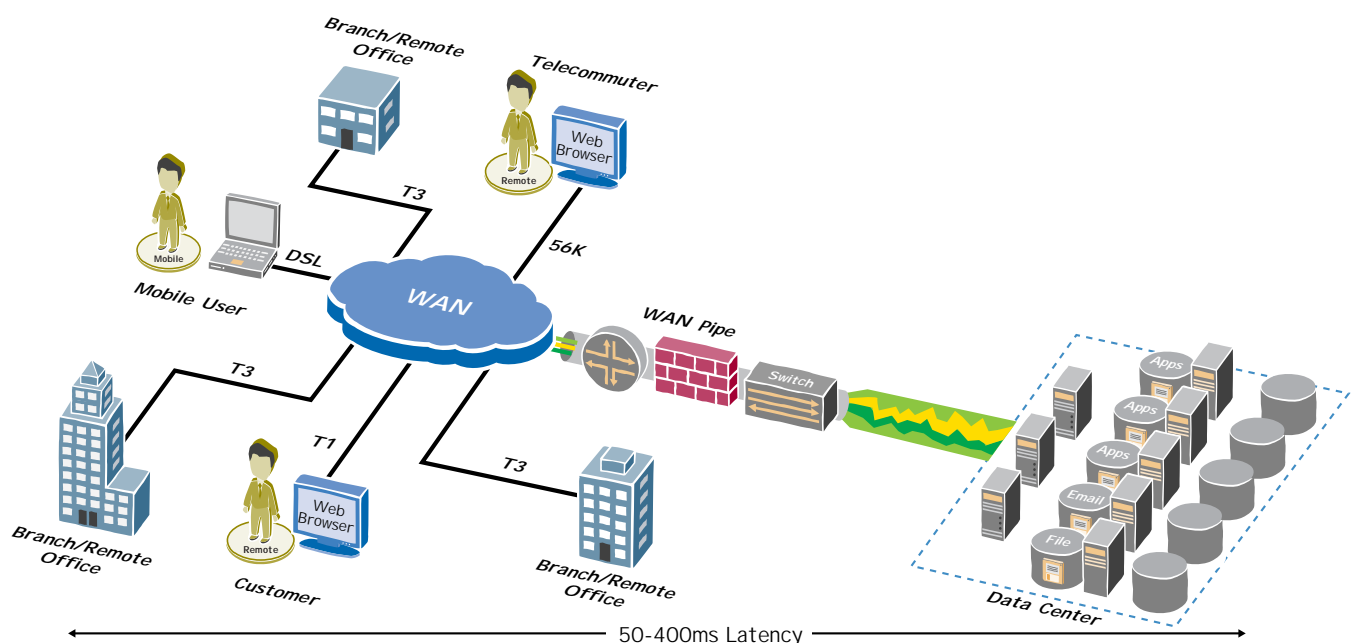
- **New applications** are being deployed both to reduce costs and to deliver new capabilities to end users. VoIP, for example, represents a cost-effective communication tool, while Microsoft's SharePoint and converged applications like combined voice/Instant Messenger (IM) are being used to enhance collaboration.

Applications like VoIP, however, have special requirements such as extremely low latency, jitter, and loss. As congestion grows, VoIP calls could be dropped, making it absolutely critical for IT to set and enforce QoS policies and closely monitor activity on WAN connections.

- **Server centralization**, while an effective cost-cutting initiative, also presents performance issues for users accessing centralized applications from remote sites. IT must be able to guarantee sufficient performance for remote users, and understanding how WAN links behave, and how applications perform over these links, is critical.
- **Regulatory compliance** is essential. Simply put, it's difficult for IT to gather and retain e-mail and data for the required length of time if the enterprise is a patchwork of diverse devices and point products distributed around the globe.
- **Data replication** is critical to disaster recovery and high availability. As businesses establish backup data centers farther away from the primary location, they are typically unable to deliver the high-bandwidth, low-latency services that permit continuous replication of data and fail to meet their recovery-point objective. Enterprises must overcome this obstacle to avoid data loss and enable smooth cutover in the event of a calamity.

Juniper Networks: Addressing the Application Acceleration Challenge

Juniper Networks' data center (DX) and wide-area (WX) application acceleration platforms give IT managers a holistic solution to problems in the data center and on WAN links, as well as a cost-effective way to comply with new corporate initiatives – without sacrificing performance across the distributed enterprise.



Remote, branch office and mobile users accessing centralized applications suffer from poor response times and congested WAN links where traffic competes for a limited amount of bandwidth.

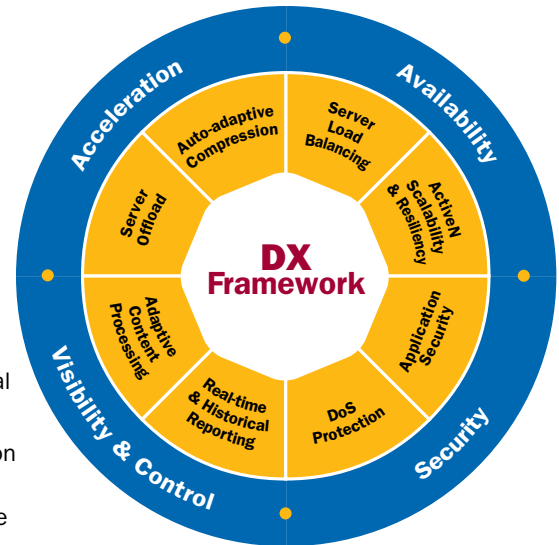
The DX Family: Streamlining the Data Center

Juniper Networks DX application acceleration platforms dramatically simplify the data center architecture, improving the performance of web-based applications while reducing their impact on data center resources.

In Focus: The DX Framework

The DX platforms are based on the unique DX Framework™, an architecture that integrates the capabilities required by any comprehensive web-application delivery system:

- **Acceleration** technologies improve response times for remote users accessing web-based applications, whether at corporate headquarters, in a branch office, at home or in a hotel room.
- **Availability** techniques dramatically reduce data-center hardware and operational expenses while eliminating single points of failure and ensuring reliable access.
- **Security** protects both transactions and data center resources from external threats, including malicious denial-of-service attacks and hacking attempts.
- **Visibility and control** capabilities enable end-to-end monitoring of application performance for troubleshooting and problem resolution, as well as the ability to easily modify application behavior “on the fly” to correct immediate performance problems or inefficiencies.



By integrating the elements of the DX Framework, the DX platforms reduce device proliferation in the data center, offload servers from time-consuming and process-intensive tasks such as TCP termination, compression, and SSL session setup and encryption, and decreases the number of servers needed to support current operations.

That's just the beginning. The DX platforms also increase application availability by implementing failover mechanisms that enable web sessions to survive server outages and other errors. Equally impressive, the DX platforms enable IT to “rewrite” application code to redirect application flows, speed access to specific content, and shield users from frustrating 404 and “page not found” errors. Best of all, the DX platforms accelerate web download times by a factor of two, dramatically improving application performance – and productivity – for remote and mobile users.

Dealing with Data Center Challenges

The DX application acceleration platforms overcome the data center challenges that prevent IT from maximizing its investment in a global enterprise infrastructure. The DX platforms:

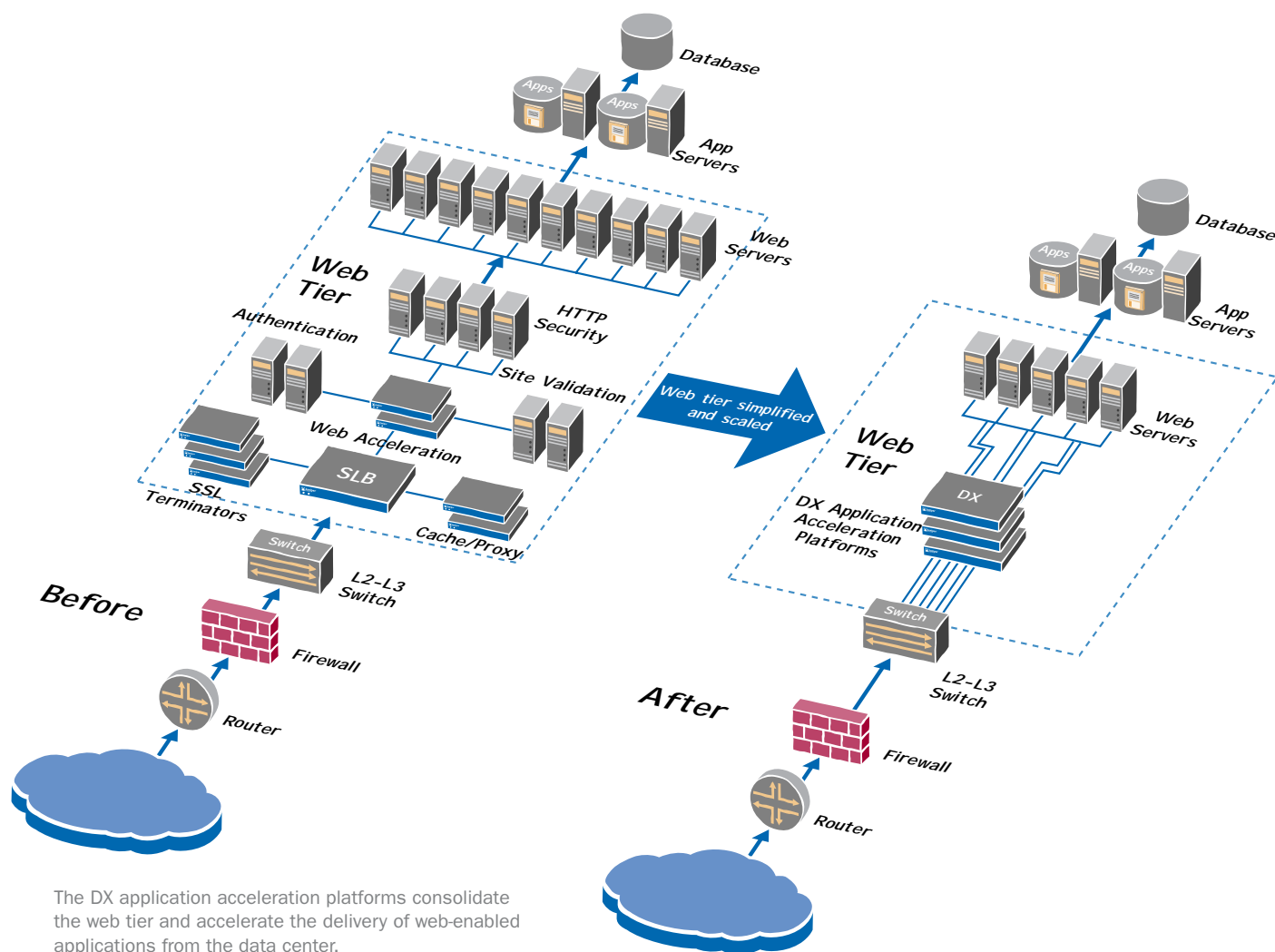
- **Simplify the data center architecture** by incorporating the functionality of SSL accelerators, server load balancers, cache servers, and other point products currently required to support web-based applications. By providing all that functionality in a single, powerful, easy-to-manage device, the DX platform puts an end to point-product proliferation, enabling IT managers to restore order in the data center while cutting expenses.
- **Optimize server resources** by assuming responsibility for repetitive and time-consuming tasks such as TCP termination, SSL session management and encryption, data compression, request/response validation and the like, letting the servers do what they do best – serve content. The DX server offload feature effectively doubles the capacity of existing server resources, allowing IT to support twice the user population with the current server count or cut the number of current servers in half. Either way, IT can reduce both capital expenditures and operational costs, since far fewer personnel are needed to manage and maintain the data center.



The DX application acceleration platform family

- **Increase data center scalability** with the Juniper ActiveN™ technology, which enables as many as 64 DX platforms to operate as a single device in a mesh topology, processing traffic for the same or for different virtual IP addresses. ActiveN technology makes it possible to incrementally add one DX platform at a time, as needed, simplifying scalability and maximizing investments. Further, if any device in the mesh goes down, ActiveN technology transparently redirects application flows to a fully functioning unit, increasing failover protection.
- **Transform content “on the fly”** with the Juniper AppRules™ capability. The AppRules feature delivers application fluency which enables the DX platform to alter application flows in flight to redirect requests, compensate for known inefficiencies, and even prevent time-wasting 404 errors from being returned to end-users – all without manually rewriting the applications themselves. IT managers can choose from a set of preconfigured scripts that address known issues, or they can write, revise and enforce their own custom rules to modify application behavior under given conditions, all without manually rewriting the application itself. Thanks to the AppRules feature, IT managers can respond immediately to changing conditions with fast, effective application adaptation.

Armed with these critical capabilities, the DX platforms streamline today’s overcrowded data centers while implementing the features needed to help web-enabled applications achieve peak performance, enabling companies to maximize ROI and productivity.



The WX Family: Overcoming WAN Limitations

Server centralization leaves branch office employees at the mercy of the WAN when it comes to application performance. The WX and WXC application acceleration platforms accelerate mission-critical applications over wide-area links, making branch office users feel local again.

The WX platforms are based on the WX Framework, which – like the DX Framework – defines an architecture for overcoming the limitations of the WAN to make the most effective use of existing resources and restore application performance to LAN-like levels.

In Focus: The WX Framework

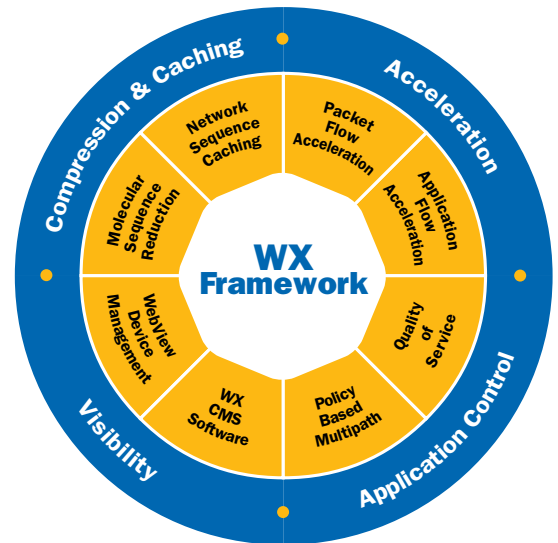
The WX Framework is unique in that it delivers the full complement of capabilities needed to enhance every aspect of a global enterprise:

- **Compression and caching** reduce the amount of data actually flowing across wide-area links by eliminating redundant data patterns, boosting connection capacity to accommodate a greater volume of traffic.
- **Acceleration** techniques speed the performance of TCP-based and other applications over the WAN, cutting response times to deliver a more LAN-like experience for remote office users.
- **Application control** is furnished by QoS, bandwidth management, and Policy-based Multipath features which ensure applications make the most efficient use of available links and bandwidth to optimize performance and prioritize mission-critical data traffic.
- **Visibility** into WAN links and application performance enable IT to understand how all the endpoints of the WAN are performing, providing the information needed to make informed capacity planning and configuration decisions, as well as to quickly detect, isolate and resolve performance problems.

These capabilities help IT professionals overcome their toughest wide-area challenges. Molecular Sequence Reduction™ (MSR™) compression technology, for instance, reduces application data flows across WAN links by 60 to 75 percent, which translates into a capacity increase of up to four times. This “extra” capacity can be used for new application rollouts without having to invest in additional bandwidth. Network Sequence Caching technology, which uses hard disks (available only on the WXC) to store larger data patterns for longer periods of time, reduces traffic flows up to 99 percent – a 50x to 100x capacity increase – again, without having to re-provision a single link.

Acceleration techniques boost TCP-based application response times at branch offices by 5 to 10 times on average. Working with specific applications such as Microsoft Exchange and Microsoft file services, performance gains of up to 100 times are possible – more than sufficient to justify the centralization of these critical servers.

QoS assures application delivery by effectively managing bandwidth and establishing and enforcing prioritization policies. Business-critical and delay-sensitive applications always get the bandwidth they need, without interfering with other applications. What’s more, Juniper’s Multipath technology lets IT assign application traffic to specific links when more than one is available, providing an additional level of control to assure effective application delivery.

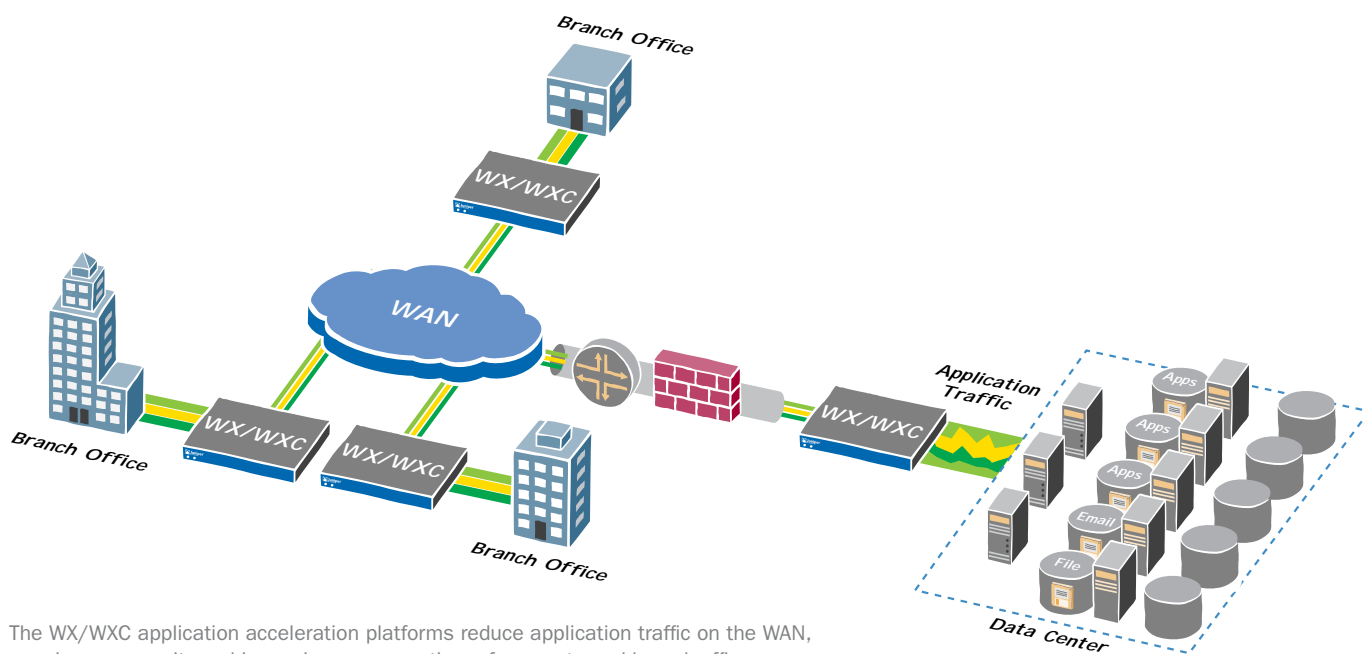


The WX/WXC application acceleration platform family

Integration Advantages

The WX Framework integrates each of these advanced capabilities into the WX and WXC platforms, enabling IT to proceed with server centralization and data center consolidation initiatives to simplify network architecture and reduce capital outlays. WX and WXC platform deployment is completely automated, so no IT expertise is required at the branch office when a new platform is installed. Local users simply power the device and connect it to the network; the platform takes it from there, downloading and installing the necessary configuration data from a WX Central Management System™ (WX CMS™) server at the central location.

Finally, because the WX and WXC platforms are deployed symmetrically, with one at each end of the wide-area link, they are in a perfect position to monitor and assess exactly how applications are performing over the WAN. IT managers gain full visibility into WAN links between the data center and branch offices; in some cases, the IT staff can take advantage of monitoring functions at the branch office that would be otherwise unavailable.



The WX/WXC application acceleration platforms reduce application traffic on the WAN, opening up capacity and improving response times for remote and branch-office users.

WX CMS: Monitoring and Centralized Management

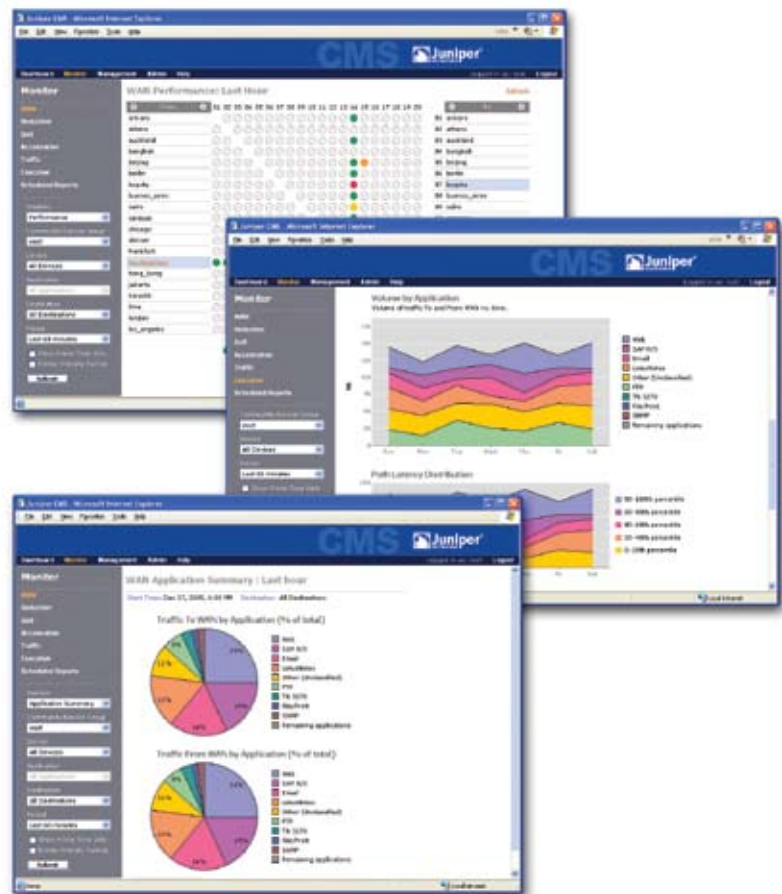
One important element of the WX Framework is visibility into WAN performance. This visibility is provided by the WX Central Management System (WX CMS) software, a powerful management tool that leverages data gathered by distributed WX and WXC platforms to keep tabs on and centrally manage up to 2,000 sites. This multifaceted software suite reports on bandwidth consumption, top talkers and the effect that QoS policies are having on overall application throughput, making it easy for IT to identify hot spots and quickly determine the root cause of problems.

In addition, the WX CMS software enables IT to fully exploit capacity freed up by compression and sequence caching, selectively allocate bandwidth, set QoS prioritization, direct traffic over multiple WAN links and determine the impact acceleration technologies are having on application performance.

Effortless Interpretation

The WX CMS software doesn't just deliver a wealth of valuable data, it also takes the effort out of interpreting it. Executive summaries supply at-a-glance views of key traffic and performance statistics. The My WAN™ portal lets IT staff create customized views of applications and sites, while drill-down reports provide in-depth analysis of any aspect of WAN and application performance on a site, device or individual link basis.

The WX CMS software suite also simplifies and centralizes configuration, upgrades and other management chores. IT can employ the software to manage and modify global configuration settings, as well as monitor the health, status, and compression and acceleration statistics of all deployed WX and WXC platforms.



The WX CMS software provides unprecedented visibility into application performance over the WAN, allowing IT to identify and resolve performance problems and make informed capacity planning decisions.

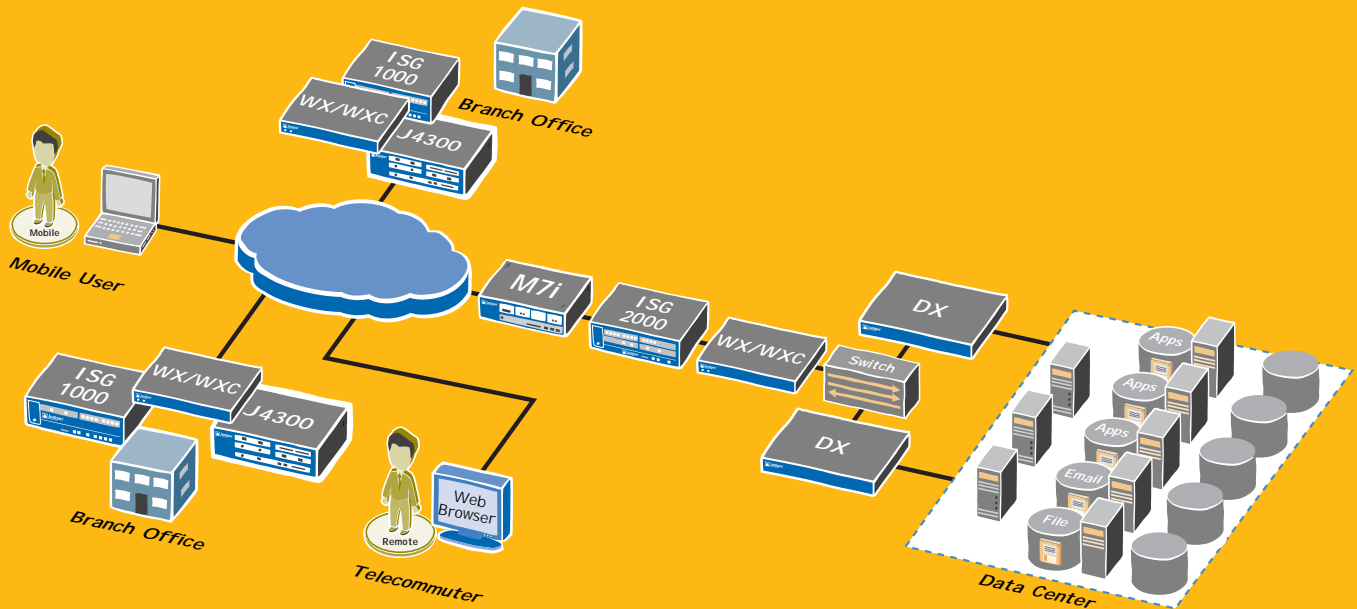
Juniper Networks: Reinventing the LAN and the WAN

Evaluated on their own merits, the DX and WX/WXC application accelerations platforms are powerful products that bring a new level of performance to global enterprises while enabling unprecedented savings.

As part of the larger Juniper product portfolio, however, the DX and WX/WXC platforms contribute to something even more substantial: a complete secure and assured application delivery system for today's distributed enterprise. Working with Juniper's high-speed, high-availability core and edge routers, as well as its SSL VPN and firewall/VPN solutions to provide secure remote access, the DX and WX/WXC platforms deliver the critical application acceleration component that enables businesses to build secure, high-performance global networks that meet their constantly escalating demands.

It's the power of integration – all part of Juniper's Enterprise Infranet architecture, which defines a comprehensive set of products, tools, and technologies that optimize TCO and deliver high-performance, high-availability voice, data, and multimedia solutions. It's technology that is actively transforming both the enterprise and the wide area – only from Juniper Networks.

For more information on our application acceleration solutions, visit <http://www.juniper.net/products/appaccel/>.



The WX/WXC and DX application acceleration platforms are part of a broader Juniper product portfolio that provides secure and assured application delivery in today's distributed enterprise.

Juniper your Net™



**CORPORATE HEADQUARTERS
AND SALES HEADQUARTERS
FOR NORTH AND SOUTH AMERICA**

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, CA 94089 USA
Phone: 888-JUNIPER (888-586-4737)
or 408-745-2000
Fax: 408-745-2100

www.juniper.net

Copyright 2005, Juniper Networks, Inc. All rights reserved.

Juniper Networks and the Juniper Networks logo are registered trademarks of Juniper Networks, Inc. in the United States and other countries. All other trademarks, service marks, registered trademarks, or registered service marks in this document are the property of Juniper Networks or their respective owners. All specifications are subject to change without notice. Juniper Networks assumes no responsibility for any inaccuracies in this document or for any obligation to update information in this document. Juniper Networks reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

150033-001 Dec 2005

EAST COAST OFFICE

Juniper Networks, Inc.
10 Technology Park Drive
Westford, MA 01886-3146 USA
Phone: 978-589-5800
Fax: 978-589-0800

**ASIA PACIFIC REGIONAL
SALES HEADQUARTERS**

Juniper Networks (Hong Kong) Ltd.
Suite 2507-11, Asia Pacific Finance Tower
Citibank Plaza, 3 Garden Road
Central, Hong Kong
Phone: 852-2332-3636
Fax: 852-2574-7803

**EUROPE, MIDDLE EAST, AFRICA
REGIONAL SALES HEADQUARTERS**

Juniper Networks (UK) Limited
Juniper House
Guildford Road
Leatherhead
Surrey, KT22 9JH, U. K.
Phone: 44(0)-1372-385500
Fax: 44(0)-1372-385501