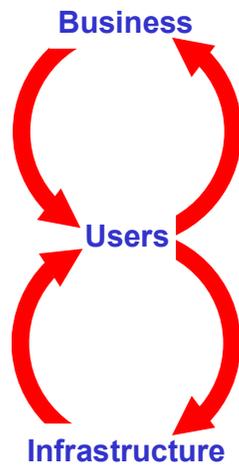# Business Value of Performance – The Juniper Experience

By Peter Sevcik and Rebecca Wetzel
April 2006

Many vendors claim to improve the performance of networked applications—but what does that really mean for your business? NetForecast's mission is to document the value of better application performance.

To justify a technology purchase, you must ensure the technology will deliver maximum business benefit. Although vendor-provided data is useful, there is no substitute for actual user experience. With this in mind, NetForecast interviewed six Juniper Networks customers to learn first hand how Juniper's DX and WX solutions deliver business value.

Business Value of Performance

Every day new business applications are unleashed onto wide area networks (WANs). Networked applications that perform well for users promote healthy, prosperous businesses. But often when applications that perform well over local area networks (LANs) are moved onto a WAN, application design characteristics and distance conspire against a satisfactory user experience. Such performance challenges frequently frustrate users, hobble efficiency, and compromise business goals.

Business

Users

Infrastructure

Improving networked application performance has business value, the nature and magnitude of which often varies based on who is doing the evaluation. While the users' experience is the best measure of performance, the business benefits that accrue from a good user experience are often perceived differently based on the evaluator's role within the organization.

A business manager is likely to view the business value of performance in terms of how it increases sales, improves competitiveness, and/or helps get work done faster. An IT manager on the other hand, is likely to perceive the business value of performance in terms of IT infrastructure cost savings, fewer help desk calls from disgruntled users, and improved IT staff productivity.

This study links application delivery performance with business goals for a variety of enterprises and perspectives—and documents the tangible business values experienced by customers using Juniper's application acceleration solutions.

Business Value Experienced by Juniper Customers

NetForecast's research identified different sets and rankings of primary business values experienced by enterprises using Juniper's DX and WX products to optimize application performance.

Top-ranked DX Benefits

1. Faster application response times
2. Improved user satisfaction
3. Improved global reach

Top-ranked WX Benefits

1. Faster application response times
2. Bandwidth savings
3. Improved user satisfaction

The Juniper Solutions

Juniper Networks supplies both a wide area network (WX) and a data center (DX) application acceleration solution. Juniper's WX product is a symmetrical (i.e., dual-ended) WAN application acceleration appliance that addresses performance problems introduced when applications operate over a WAN. The DX product is an asymmetrical (i.e., single-ended) appliance designed to overcome performance problems experienced by users accessing Web-based applications over the Internet or via a corporate WAN. Figure 1 shows how both products are commonly deployed within an enterprise.
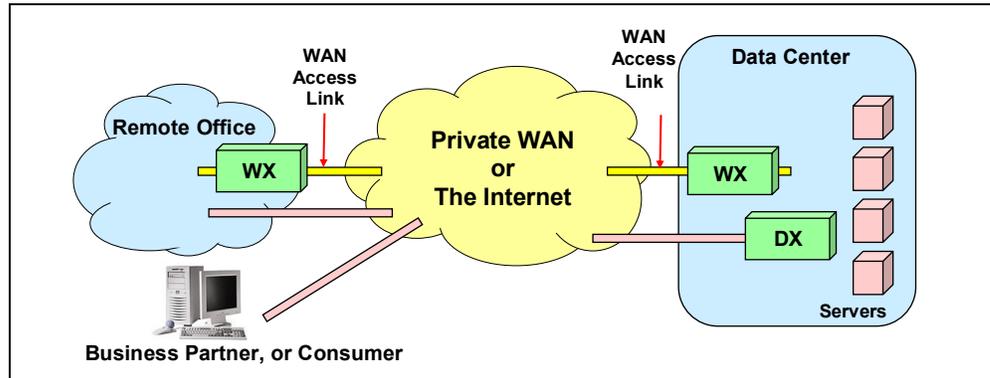

Figure 1 – Typical WX and DX Deployments

WX – Wide Area Acceleration

Juniper's WX dual-ended application acceleration solution optimizes traffic flows by applying compression and caching techniques, quality of service (QoS) enforcement, bandwidth management, path optimization, and TCP acceleration, as well as acceleration of HTTP, Microsoft CIFS and Microsoft MAPI-based applications.

The WX appliance uses sophisticated compression technology that captures data patterns of almost any size and catalogs them in a dictionary. When the WX recognizes subsequent instances of a pattern, it replaces the pattern with a reference to the dictionary. Even portions of files are recognized as a pattern—so if a file is a modified version of another file, large file "chunks" will be common and therefore will not be retransmitted across the WAN.

By reducing WAN bandwidth demand more users can share the same link, often alleviating the need for WAN link upgrades as traffic grows. In an office where the same data is viewed by multiple users, bandwidth savings and performance improvement can be dramatic.

Juniper's WX product also implements QoS that recognizes packet markings established by upstream sources, and prioritizes packets on out-bound queues accordingly. Implementing QoS ensures that real-time and interactive traffic experience low latency and perform reliably even if the network is congested.

The WX also supports a policy-based multi-path feature that allows multiple connections between two offices, one via leased lines and one via the Internet. The Internet can often provide high bandwidth inexpensively, but it may not be reliable enough for corporate needs. Policy-based multi-path allows an enterprise to capitalize on inexpensive Internet bandwidth for low priority traffic, while directing performance-sensitive traffic over leased infrastructure to lower bandwidth costs without sacrificing reliability. IPsec encryption secures traffic flowing across the Internet connection.

TCP acceleration overcomes traffic delays caused by long latency links. By strategically modifying the behavior of TCP, the WX can increase data throughput for each

application flow, shortening response times. The WX applies protocol-specific performance improvements to HTTP, CIFS and MAPI traffic by decoding the logic of these protocols to predict additional information that will be needed during a user task to operate turns more efficiently.

DX – Data Center Acceleration

The single-ended Juniper DX product provides data center acceleration for Web-enabled and IP-based business applications. Through a combination of compression, caching, server load balancing, global server load balancing, SSL encryption and termination, HTTP compression, and application security, the DX improves the end-user experience by delivering Web-based content more quickly, securely, cost effectively, and with higher availability.

The DX offloads core networking, I/O responsibilities, and SSL termination from Web and application servers to improve the performance of Web-based applications, thus increasing productivity of local, remote and mobile users. The DX also improves data center efficiency by incorporating the functionality of server load balancers, Web accelerators, cache servers, and proxy servers into a single platform.

The DX appliance's ability to understand and manipulate HTTP/S data streams with real-time performance achieves data center acceleration. The DX products natively speak and understand the intricacies of HTTP/S and function as full HTTP/1.1 proxies, enabling them to secure, optimize and rewrite every request and response. Neither packet-based, kernel-only nor "deep packet inspection" technologies employed by load-balancing products can provide such high throughput performance for Web-enabled applications.

Both devices improve resource efficiency, the WX by improving efficiency through increased effective bandwidth, and the DX by adding effective server processing.

Results from a Hypothetical Application Rollout Scenario

Table 1 shows end-user performance results for a hypothetical application rollout scenario. As the table illustrates, performance results often look promising enough during application development and trial for executives to give the green light for full WAN deployment. Unfortunately, after rollout the real-world effects of WAN latency and/or congestion often cause poor or even unacceptable end-user task response times.

In this hypothetical example, the total average task response time during the controlled trial was six seconds, degrading to 10 seconds when the application was released into a real-word environment. In this scenario, DX acceleration alone, and WX acceleration alone can lower end-user response time back to the desired six seconds.

Theoretically, when used in combination the DX and WX products could achieve even better performance results, although none of the Juniper customers we interviewed were using both the WX and DX products.

Table 1 Hypothetical DX and WX Results for an Application			
	Typical User Task Response Time Components (in seconds)		
Application Scenario	**Data Center**	**Network**	**Total**
Development & Trial	5	1	6
After WAN Rollout	5	5	10
With DX deployed	1	5	6
With WX deployed	5	1	6
Potential of WX+DX	*1*	*1*	*2*

The NetForecast Methodology

NetForecast performed primary research to gather information about the business benefits experienced by enterprises using Juniper's WX and DX technologies. We performed in-depth telephone interviews with employees responsible for application performance in six enterprises, three of which were WX product users, and the other three DX users. The WX customers interviewed were optimizing the performance of networked applications over fully private or virtual private networks, while the DX customers were optimizing Web application performance over the public Internet or corporate VPNs.

The Companies We Interviewed

The six companies interviewed included a global trading company, two international consulting firms, an engineering company, an industrial manufacturer, and a regional medical network service provider.

All of the DX users were employing Juniper's compression and caching technology as well as a mix of additional DX features to optimize Web-based applications. The WX users were using QoS enforcement and bandwidth management, TCP acceleration, HTTP acceleration, and a mix of other WX product functions to accelerate a variety of applications ranging from Peoplesoft, SQL, Novell, SAP, Lotus Notes, eMatrix, and Citrix to medical imaging, and a variety of custom applications.

Key Findings

Faster application response time topped the list as the most important business benefit experienced by both the WX and DX customers interviewed. Increased user satisfaction also was vitally important to DX and WX customers, ranking consistently among the top three business values.

Among the DX customers interviewed improved global reach ranked third in importance after application response time and improved customer satisfaction. The DX customers found that the DX product helped mitigate geographic restrictions and make applications more dynamic and responsive to business needs.

Overall, the WX customers ranked bandwidth savings second on the list of business benefits they experienced, and they also highly valued their WX-enabled ability to troubleshoot and solve WAN problems quickly.

Top-ranked DX Benefits	Top-ranked WX Benefits
1. Faster application response times	1. Faster application response times
2. Improved user satisfaction	2. Bandwidth savings
3. Improved global reach	3. Improved user satisfaction

Faster Application Response Times

Both DX and WX customers found the Juniper application acceleration products consistently provide them with faster application response times. DX customers routinely experienced application response time improvements in the 30 to 50 percent range, and WX customers experienced even better results—especially for large files, which were accelerated up to 12 times their original speed.

A network manager at an engineering firm interviewed found that Juniper's WX technology enabled an up to 12-fold performance improvement for FTP. According to

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the firm, this acceleration has been a tremendous benefit: "Because we are an engineering company, a ton of engineering drawings go back and forth between our sites. Our engineering drawing management program uses FTP to transfer back and forth between sites, and these drawings are constantly flying back and forth. With molecular sequence reduction and sequence mirroring, a lot or part of these files may not change, so sometimes we see a 12x factor because it's seen it before."

In addition to the FTP improvements, the engineering firm has also seen response time improvements for applications such as Peoplesoft, eMatrix, AS400, SQL, Novell and VoIP. According to the network manager, a range of applications have benefited from WX-enabled acceleration. "A traditional big corporate mix of stuff [has benefited]. It's not just the new-age Web applications, it's everything."

An IS manager for the global trading company we interviewed experienced 43 percent faster response times on average using Juniper's DX products, and that improvement more than justified the company's DX purchase. The company also found that faster response times increased the volume of inquiries suppliers received from prospective buyers, and this improved the success of the business. In addition, the IS manager told us that faster response times also improved internal productivity, especially for bandwidth-constrained offices in China, and the company discovered it was able to deploy new, strategically important Web-based applications that it couldn't deploy before installing the DX product.

The IT manager for an international business consulting firm using DX appliances described a 50 percent improvement in page download times (from 20 to 10 seconds). Before DX deployment users of a global CRM contact database application important to the firm's sales and marketing function were frustrated and reluctant to update the database. The DX "fixed" the performance problems, causing employees to use the application as hoped. This was strategically important to the firm because when used consistently, the CRM application helps increase sales.

The IT director for another international DX-enabled business consulting firm experienced 30 percent average application performance improvements. The DX was originally purchased to improve the performance of a Web-based HR application, and now the firm uses it to improve the performance of all Web-based applications. "When we bring up a new Web-based application, we just point it through the DX because we'll get some benefit from it. It does improve performance, and why not, it's there."

Improved User Satisfaction

For one of the international business consulting firms we interviewed, the primary purchase justification for Juniper's DX product was to encourage employees to use an HR system they were avoiding because of long Java applet loading times. As the company's IT director explained, "We were not going to save money, but we wanted to make employees happier so they were not calling and complaining, or calling [the] benefits [department] and asking them to enter data because they can't get the application to work over dialup."

He went on to explain: "It's about the whole job experience. Our consultants are special kinds of people who want to travel a lot and be on the road, and since this is no longer the '90s, there aren't the perks that were around to entice people to stay in our line of business. So it has to be a nice place to work. People have to want to stay, and there have to be reasons for it. If a core application—something that people have to use even if it's infrequently—and it's a pain in the neck, that's something we don't want if we can avoid it."

The other DX-enabled consulting firm experienced similar user satisfaction benefits that facilitated application adoption. Before the DX units were installed, users were frustrated and reluctant to update a global CRM contact database application to support sales and marketing, and after the application was DX enhanced, users used it as needed.

The network service provider we interviewed provides a network service that connects medical facilities in remote rural communities served only by satellite links. Since deploying the WX appliances, customer retention has been 100 percent. Application traffic such as Citrix, video, voice, digital imaging/radiology, a medical cart application and patient record exchange traverses C-band and Ku band satellite connections, which seriously impair application performance. Juniper's WX products made the applications run well over the satellite links, resulting in satisfied and loyal customers, which in turn has ensured ongoing service revenue in the face of increasing competition.

According to the network service provider's operations director: "[Medical CIOs] are always looking for ways to do things better and more efficiently, and since usually their only pathway for communication is via satellite, having the applications that work in a healthcare environment in California also work between a small hospital and rural clinics in Alaska is really important. When you put them over satellite links they are challenged."

He added: "If you can take out the difference caused by latency, you can turn their network into something that feels and operates more like a terrestrial network that the rest of the world is used to. That has great value. It's very hard for somebody on the East Coast or California to relate to this, but when you [visit] here you realize how remote things are. All [our customers] are trying to do is level the playing field for the quality of care they are able to provide to their beneficiary population."

One of the business consulting firms interviewed experienced a secondary customer satisfaction benefit: "Because of [the DX's] redirect capability, all of the applications running through it are secure HTTPS. But we had an education problem getting our end users to type HTTPS instead of HTTP. The old HTTP just wouldn't work. Now we can allow it and just redirect them to the HTTPS. It eliminates calls to the helpdesk asking why it doesn't work."

Several of the companies interviewed experienced fewer help desk calls from disgruntled users, and the engineering firm experienced a marked improvement in its ability to troubleshoot WAN problems that could adversely affect user satisfaction.

Bandwidth Savings

Most of the Juniper WX customers we interviewed experienced substantial bandwidth savings. The engineering firm, which has 70 remote offices around the world in places as diverse as Angola, Brazil, Scotland, Indonesia and Australia, averaged a 40 percent overall bandwidth savings.

The WX manufacturing customer decreased bandwidth use by half between offices in Austin, Texas and Bangalore, India, resulting in very welcome telecommunications savings.

Improved Global Reach

Juniper customers found that the DX product improves global reach, allowing applications to be used anywhere in the world. Removing geographic restrictions has helped make the companies more dynamic and responsive to global business opportunities. For the global trading company in particular, improved global reach translated into increased revenue.

The network service provider found that Juniper's WX product enabled the company to offer excellent user experiences even in extremely remote, infrastructure-challenged rural areas. Given the extreme nature of these circumstances and the magnitude of the Juniper-enabled improvement, the WX technology shows great promise for companies facing daunting geographic and network infrastructure hurdles.

Summary of Benefits

Our research shows that Juniper's application acceleration solutions facilitate—and in some cases enable—user adoption of critical new business applications, and improve users' satisfaction with existing applications. This is true not only in locations with robust network infrastructure, but even in the most challenging of remote locations. Juniper's DX and WX products make supported applications easier and faster to use, which not only benefits users, it is also good for business.

Juniper's application acceleration capabilities led to more business and improved business opportunities for many of the firms we interviewed. Companies reported more inquiries, greater sales, and stronger customer retention specifically attributable to Juniper's solutions.

IT departments also benefited from bandwidth savings of as much as 50 percent and they found Juniper's solutions make it easier to troubleshoot application performance problems. In addition, improving the user's application performance experience reduced help desk call volumes and eased the burden on other IT support resources.

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NetForecast helps enterprises and vendors understand and improve the performance of networked applications.

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