

## Solution Brief

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# **Improving Global Data Availability: How Juniper Networks Optimizes Network Appliance SnapMirror<sup>®</sup>**

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Global data availability tops many enterprises' IT agendas, with business resilience and regulatory compliance for electronic record retention now imperative. As IT organizations optimize operations by centralizing key business applications and consolidating servers, they have the opportunity to increase data availability and security as well as gain control over application data residing in remote offices.

Global data availability and business continuity planning are driving the need for efficient data backup and replication strategies. With replication, companies can guarantee that data is readily available not only at headquarters but also in remote locations. Many companies struggle to ensure data backup, accessibility, and recovery for remote offices. A lack of skilled IT support in remote locations adds yet another layer of complexity. This problem is particularly acute for highly distributed or global companies.

## The Path to Faster, More Frequent Replications

To meet their data replication needs, many companies have turned to Network Appliance, which offers a comprehensive solution for remote-office data protection that simplifies information management operations; enhances data security and availability; and delivers rapid backup, restore, and recovery.

Companies use Network Appliance's SnapMirror® software to ensure high data availability and recovery.

SnapMirror provides two-way data replication to one or more network file servers, providing an efficient way to distribute data to remote locations and provide data protection and recovery in the event of a disaster. SnapMirror continually updates

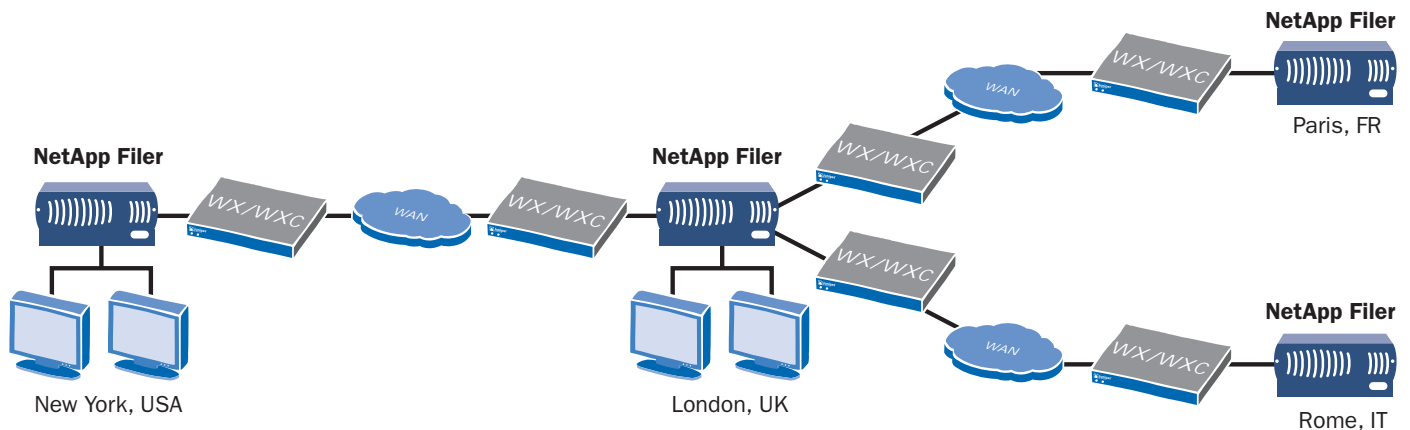
mirrored data, keeping it current and available. SnapMirror can be configured to replicate only a subset of data, significantly reducing network bandwidth requirements.

*WAN expenses account for 28 to 40 percent of IT budgets.*

**Nemertes Research**

For distributed networks, WAN capacity often limits overall application performance, including data replication processes. IT organizations suffer from conflicting objectives – they need to both deploy new applications and ensure global data availability but still contain costs. With network expenses accounting for 28 percent to 40 percent of IT budgets, according to Nemertes Research, increasing WAN capacity is typically not an option. By deploying replication in conjunction with a WAN optimization solution from Juniper Networks, companies get the best of both worlds – new applications and global data availability with cost savings. Juniper Networks' WAN optimization platforms – part of a larger family of application acceleration platforms – instantly increase WAN capacity as much as 10-fold, eliminating the expense of WAN upgrades, and limiting the impact that WAN latency has on applications such as data replication.

Together, Network Appliance and Juniper Networks enable organizations to deliver high data availability and more consistent application performance while ensuring business continuity and avoiding costly purchases of additional WAN bandwidth or complex WAN rollouts.



A Sample Peribit/NetApp Deployment

## Today's Requirements for Efficient Replication

WAN optimization provides for speedy replications and improved application response times. The most effective approach demands that several business and technical requirements are met, including:

### Increase WAN performance of data replication

Compression is a significant contributor to optimizing performance over WAN links. Fast replication times are essential for completing data backup in a reasonable timeframe and for getting backup sites up and running quickly in a disaster-recovery scenario. IT is under increasing pressure to minimize backup windows to accommodate ever-increasing data volumes and to reduce backup error rates and "restarts."

### Ensure bandwidth availability for critical enterprise applications

There's no point in optimizing WAN links if they are immediately clogged with peer-to-peer traffic or other non-essential communications. With QoS, IT can prioritize application traffic and allocate the WAN bandwidth so that key applications perform consistently without being impacted by sudden bursty replication and backup traffic. Time-sensitive applications like voice over IP (VoIP), for example, need to run smoothly even when they're sharing the WAN link with backup applications. Also, as businesses operate more globally, the notion of a "quiet" time on the WAN has disappeared, so IT needs to run the data replication/backup applications continuously to ensure data integrity and complete backups.

### Accelerate applications

Optimizing TCP/IP flows allows for more frequent replications with optimal application performance across the WAN. Fast setup of TCP sessions, dynamically adjusting TCP's window size for older systems, substituting a more reliable and bandwidth-efficient transport, and streamlining inherently inefficient protocols can significantly reduce the amount of time it takes to complete WAN transmissions and improve application performance.

### Simplify initial full-volume transfers

Enabling data replication to take place over the WAN, rather than requiring the use of tapes, can dramatically reduce the time needed to migrate a large database from one location to another. Using the WAN for this transfer also eliminates the problems presented by having incompatible tape-based systems in two locations.

### Monitor WAN performance

Real-time WAN monitoring and reporting is essential so IT can gain instant visibility into network performance. Reports of top talkers and the ability to capture packets can assist in understanding the root cause of problems and address them in a timely manner.

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*"By making it practical to take frequent, unobtrusive backups, together the NetApp and Juniper Networks solution has eliminated more than 450 hours of annual downtime."*

Dale Defilippi  
Systems Technology and Hardware Engineering Supervisor  
IGT

### Simplify deployment

With today's focus on operational efficiency, it's a given that WAN optimization and application acceleration platforms must be easy to configure and deploy. Remote-office locations often lack on-site IT support, so deploying WAN optimization cannot require changes to existing applications, networks, routers, or WAN interfaces. WAN optimization devices must also work transparently with IPsec VPNs and MPLS.

### Enable flexible, reliable deployment

WAN optimization devices should offer multiple deployment options. Some sites, for example, have a link between LAN backbone equipment and the WAN router, while other locations use a collapsed backbone, with one device supporting both the backbone connections and the WAN interfaces. WAN optimization platforms must be able to operate in either scenario. They also need to support the range of data replication models, including one-to-one (1:1) and cascading deployments.

## Juniper Networks Instantly Optimizes SnapMirror Replications

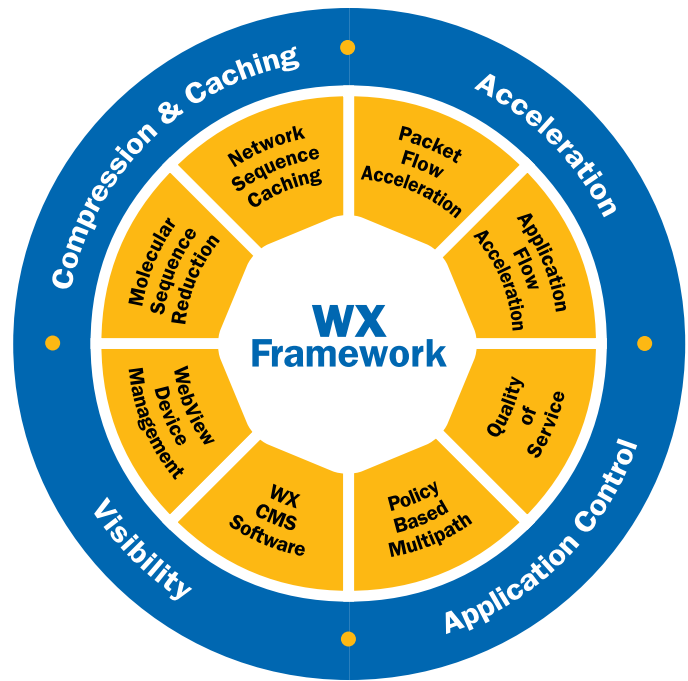
The WX™ and WXC™ application acceleration platforms from Juniper Networks instantly increase WAN capacity, enabling IT to deploy SnapMirror leveraging their existing WAN infrastructure, prioritizing network traffic, and accelerating applications.

The WX and WXC platforms are based on the WX Framework™, which integrates a comprehensive and interdependent set of technologies to accelerate application performance over wide-area links, delivering the ideal solution for improving and streamlining data replication.

The WX Framework defines specific attributes that a WAN optimization and application acceleration platform must have to overcome the bandwidth, latency, congestion and manageability issues that impede application performance over the WAN. Each element of the WX Framework addresses a specific challenge that prevents applications from running efficiently over the WAN, organized into four categories: compression and caching; acceleration; application control; and visibility.

The compression and caching component of the WX Framework includes Molecular Sequence Reduction™ (MSR™) compression, which frees up WAN capacity by eliminating repeated data patterns, and Network Sequence Caching, which uses hard disks to store and recognize large repeated patterns, even if they were sent days or weeks earlier.

The acceleration component includes Packet Flow Acceleration™ (PFA™) techniques, which combat the effects of latency on the TCP protocol, and Application Flow Acceleration™ (AppFlow™) technology, which provides protocol-specific acceleration for applications such as Exchange, Microsoft file services, and web.



The WX Framework integrates key technologies that work together and influence each other, providing IT with distributed stateful intelligence about their WAN links and applications.

## Customer Success Story:

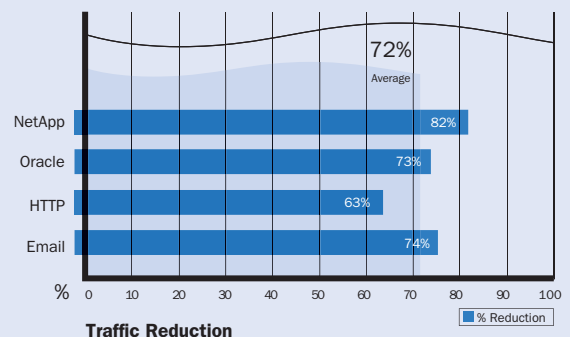
### Large Financial Institution

Business Benefits:

- Overall traffic reduced 70 %
- Snap Mirror traffic reduced 53 %
- 3x increase in WAN capacity
- Enabled support of new applications

Timely backups, teller application performance, and access to check images were becoming increasingly problematic for this large bank. The bank has more than 100 branches connected on 128 Kbps frame relay links, and the cost to upgrade those links to improve application and backup performance was prohibitive. By deploying two WX application acceleration platforms from Juniper Networks – a WX 50 and a WX 20 – the bank eliminated its WAN capacity and latency problems without needing a costly upgrade.

This financial institution experienced an overall reduction in data traffic of 70 percent, with SnapMirror traffic dropping by 53 percent. Plus, the bank experienced a three-fold capacity gain, enabling it to roll out new applications over the existing WAN infrastructure.



The application control segment includes Policy-Based Multipath™ (Multipath™) optimization technology, which allows IT to direct application flows to a specific WAN link when multiple links are available; and Quality of Service (QoS) and bandwidth-management tools for prioritizing critical application traffic and ensuring bandwidth availability.

Finally, the visibility components of the WX Framework include WebView device management for configuring and managing individual WX and WXC platforms, and WX Central Management System™ (CMS™) software for gaining visibility into and centralized control over platforms distributed throughout an organization.

Each of these technologies work together seamlessly and transparently to meet the challenges associated with data replication over the WAN.

### **Instantly increase WAN capacity to accelerate data replication**

With the WX and WXC platforms, IT can instantly increase existing network link capacity up to 10 times. The MSR and sequence caching technologies reduce the amount of traffic traversing the WAN link. MSR compression identifies variable-sized, repeating patterns in the data stream across multiple packets, applications, or sessions and replaces those patterns with a label, reducing the traffic flow. The labels and their associated data patterns are stored in memory in dictionaries in the WX or WXC devices on both ends of the WAN link.

Sequence caching is similar to MSR compression in its use of labels, but with sequence caching – available only with the WXC application acceleration platforms – the stored pattern sequences reside on hard disks, increasing the size of the patterns stored as well as the time between repeated patterns. The combination of both MSR and sequence caching technologies provides optimum data reduction, and because up to 90 percent of network traffic is repetitive, eliminating this data redundancy generates significant efficiencies in WAN transmissions.

By pairing the WX and WXC devices with SnapMirror, IT can reduce their SnapMirror data transmissions by up to 75 percent, yielding a four-fold increase in WAN capacity. As a result, scheduled SnapMirror replications complete within the allotted time, and disaster-recovery operations are improved, with backup sites up and running much faster.

### **Ensure bandwidth availability for critical enterprise applications**

The bandwidth-management tools defined by the WX Framework, including QoS and bandwidth allocation, enable IT to prioritize applications across the WAN and allocate bandwidth among applications. With these tools, IT can readily define minimum and/or maximum throughput levels for the data-replication processes as well as the other business applications. So when SnapMirror traffic crosses a WAN link with other high-priority applications such as VoIP, these tools ensure that

the more sensitive and “bursty” phone traffic is not impacted by backup traffic. Also, IT can set data replication to run continuously, allocated to a small percentage of the WAN link to not overrun other business applications, so that backups can complete and data integrity remains high.

### **Accelerate applications**

The WX and WXC platforms dramatically improve application response times by optimizing TCP/IP flows as well as higher-layer protocols for specific applications. The innovative PFA techniques minimize the impact of WAN latency, enabling TCP/IP traffic to flow faster and optimizing frequent replications. PFA operates transparently to applications and network equipment, simplifying its implementation. PFA techniques can also dynamically adjust the window size of older TCP clients, sending 64 KB window sizes between the WX and WXC devices, even though the sender or receiver may support only 16 KB. Local buffering in the WX/WXC platforms ensures the TCP hosts are not overrun.

A more recent PFA addition, Active Flow Pipelining™, uses its own reliable transport protocol in lieu of TCP on high-latency links to utilize more of the WAN link and accelerate application response times by eliminating the need to wait for acknowledgements on TCP. These PFA techniques allow IT to maximize utilization across the WAN, transparent to the applications and network equipment.

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*Together NetApp and Juniper Networks have enabled real-time backups that can work while systems are running.*

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For higher-layer support, the AppFlow technology accelerates applications that are constrained by their own protocol behavior, specifically Microsoft Exchange, which uses the Messaging Application Programming Interface (MAPI), Microsoft file services, which uses the Common Internet File System (CIFS) protocol, and web-based applications using HTTP. For MAPI and CIFS, which break files into multiple blocks that must be individually sent, received and acknowledged before the next block can be forwarded, the AppFlow technique pipelines the data, simultaneously sending as many data blocks as needed to fill the available WAN capacity. The process eliminates the hundreds or even thousands of round-trip times (RTTs) required to complete a single transmission, enabling messages and files to be downloaded at LAN speeds.

For web traffic, the AppFlow technique enables WX and WXC devices to learn and cache objects associated with URLs, which are typically sent one at a time when a web page is requested. The WX and WXC platforms confirm the freshness of each object or pre-fetch them when new or updated versions are available, in advance of the client’s request, allowing browsers to display web pages much faster.

## Simplify initial full-volume transfers

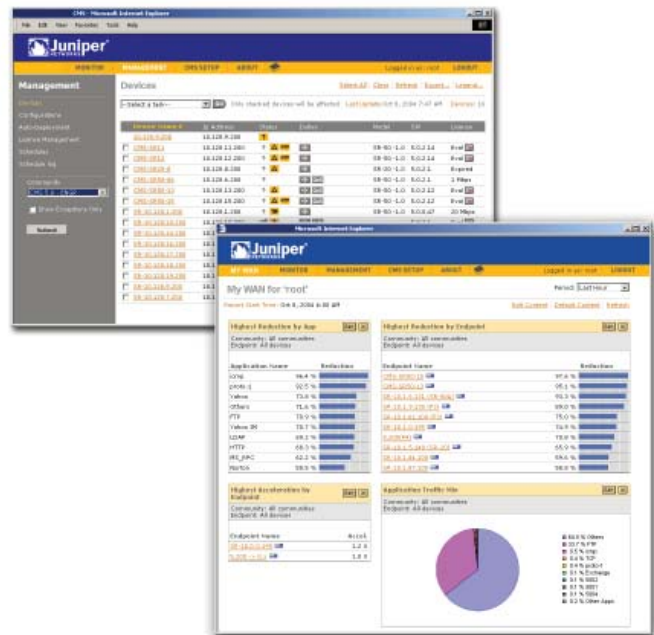
The WAN capacity increases from MSR and sequence caching technologies, the QoS capabilities, and the PFA and AppFlow techniques make it possible for IT to use the WAN link to transfer very large databases. Traditionally, IT has relied on sending tapes around to initialize a replicated data store, since the time window needed to perform this task over a non-optimized WAN would be prohibitive. However, enterprises sometimes have incompatible tape systems in different locations, and they would like the convenience of transferring this data over the WAN provided they could avoid impacting business operations. The WX and WXC platforms enable this option.

## Monitor WAN performance

Powerful real-time WAN monitoring and reporting capabilities available with the WX and WXC platforms provide IT with packet capture, top talker, and other WAN and application statistics critical for maximizing wide-area resources. An intuitive GUI provides IT managers with instant visibility into network performance, and the WX and WXC devices also support exporting data to third-party tools. As a result, IT could, for example, export NetFlow statistics to any NetFlow platform (such as Concord or Micromuse) to perform traffic analysis.

## Easy to deploy

The WX and WXC application acceleration platforms are easy to install and configure. Installation of hub devices is typically a 10-minute process, and IT can automate deployment in branch offices that have no local IT staff. IT simply defines a configuration in the WX CMS software for the remote locations; upon booting up, remote devices will automatically request a temporary address, look up the central WX CMS server, download the configuration, and begin operation.



## Networkwide Visibility

The WX Central Management System (CMS) software provides unified, intelligent insight into application acceleration, compression performance, WAN utilization, QoS, and bandwidth allocation across the distributed enterprise.

In addition to supporting this automated deployment, the WX and WXC platforms also operate transparently to existing applications, networks, routers, and WAN interfaces. The platforms also work transparently with IPsec VPNs, MPLS, and firewalls.

## Customer Success Story:

### Major Government Agency

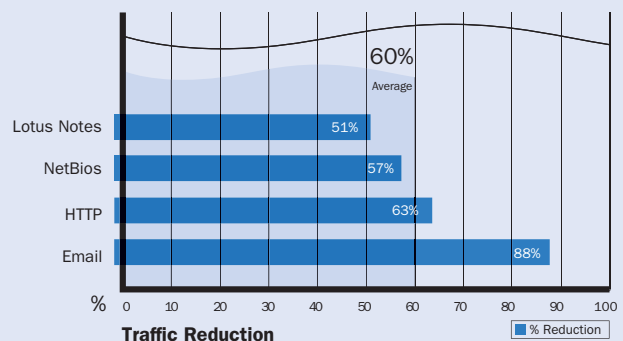
Business Benefits:

- Ability to complete backups within allotted time
- Up to 85% reduction in traffic
- 5x peak increase in WAN capacity
- Additional capacity available for future applications

Replicating large images over international, high-speed satellite links was putting a stranglehold on key security information flows at this large U.S. government agency. Backups, particularly of large image files, would not complete within the available time window.

After deploying WX 50 and WX 20 application acceleration platforms from Juniper Networks, this major government

agency experienced a 60 percent to 85 percent traffic reduction with a corresponding two-and-a-half- to five-fold capacity increase. Backups now complete within the allotted time, with plenty of capacity left on these costly, precious international satellite links for other business applications.



### Flexible, reliable deployment

The WX and WXC devices are rack-mountable network appliances that interface to the network as two-port LAN switches, sitting inline between a LAN backbone switch and a WAN router or off-path attached to a WAN router serving as a collapsed backbone. They support 10/100/1000 Ethernet interfaces and are installed behind external firewalls and encryption devices, processing corporate data before it's sent to WAN transmission devices.

The platforms are also highly reliable and integrate seamlessly with high-availability environments and load-balanced networks. In the event of a traffic overload, the platforms pass through the excess traffic; in the event of a failure, they automatically switch to pass-through mode, allowing all traffic to flow through the device and across the WAN.

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*Juniper Networks enables the deployment of SnapMirror and other backup and disaster-recovery solutions over the existing WAN without expensive and time-consuming network upgrades.*

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### NetApp and Juniper Networks: A Powerful Partnership

Network Appliance provides businesses with the data-replication features essential to data center consolidation and disaster-recovery architectures. With WX and WXC platforms from Juniper Networks, deployed in conjunction with SnapMirror, enterprises can deploy more filers, replicate their files more often with SnapMirror, and have backups occur within the designated timeframes – all while leveraging their existing WAN infrastructure and capacity. Faster, more reliable backups, improved application support, and optimized WAN throughput – NetApp and Juniper Networks deliver it all.



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