

White Paper

Policy-based Multipath

Avoiding the High Costs of Private Leased-line WANs



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Introduction	3
WX Framework: Foundation of WAN Optimization.....	3
Building Hybrid Public/Private WAN with Policy-based Multipath	4
Migrate to New WAN Transports While Minimizing the Risk	5
Business Policies Specify Which Applications Run on Each WAN Transport	5
Measure WAN Performance in Real Time.....	6
Three Real-world Deployment Scenarios	6
Scenario 1: Private/Public Hybrid: Frame Relay and DSL Internet.....	6
Scenario 2: Public/Public Networks: Two DSL Links.....	7
Scenario 3: Private/Private Networks: Frame Relay and Satellite	7
Deploying Multipath is Safe and Easy	8
Summary	8

Introduction

Business reliance on the WAN is reaching record levels. Remote access of critical business applications steadily increases as companies continue the trend of consolidating their data centers. However, these enterprise and “Webified” applications were originally designed for speedy local area networks, and remote employees’ hearty appetite for WAN bandwidth to access these applications is creating unpredictable network performance and user frustration. At the same time, companies are looking to deploy new applications such as voice over IP (VoIP), which can save a company a considerable amount of money, but is highly sensitive to latency over the WAN. And frequent remote backups and replications, as required by new compliance regulations and business continuity plans, add additional stresses to the over-taxed WAN.

While IT managers are trying to solve the dual constraints of WAN bandwidth and increased latency caused by geographical distance, a third factor has emerged – the need to mitigate the risk of relying on a single link between locations. Building a fully redundant WAN everywhere is rarely an option. Instead, IT managers are now building hybrid public/private WANs, which enable them to mitigate their business-continuity risks and avoid the high costs of building private, leased-line WANs. This strategy enables IT organizations to effectively leverage their existing WAN assets while taking full advantage of inexpensive and abundant DSL Internet links.

The Policy-based Multipath feature, available on Juniper Networks WX™ and WXC™ application acceleration platforms, enables companies to safely exploit low-cost WAN transports like DSL while leveraging their legacy WANs, allowing IT managers to implement hybrid public/private WAN solutions.

WX Framework: Foundation of WAN Optimization

The Policy-based Multipath feature is a component of Juniper Networks’ unique WX Framework™. Incorporated into each WX and WXC platform – two members of a larger family of solutions designed to improve application response times within central sites, to branch offices, and for remote users – the WX Framework defines specific attributes that an 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. Those elements are organized into the following four categories:

Compression and Caching:

The WX Framework includes Molecular Sequence Reduction™ (MSR™) technology, next-generation, memory-based compression that frees up WAN capacity by eliminating repeated data patterns. The MSR feature is complemented by Network Sequence Caching technology, which uses hard disks to store and recognize large repeated patterns, so it can eliminate them across the WAN even if they were previously sent days or weeks earlier.

Acceleration:

The acceleration component of the WX Framework includes Packet Flow Acceleration™ (PFA™) techniques, which combat the effects of latency on the TCP protocol. The Application Flow Acceleration™ (AppFlow™) technology augments that TCP acceleration with protocol-specific acceleration for applications such as Exchange, Microsoft file services, and web-based applications. The AppFlow feature pipelines multiple data blocks and web objects across the WAN simultaneously, improving user productivity by reducing their wait times.

Application Control:

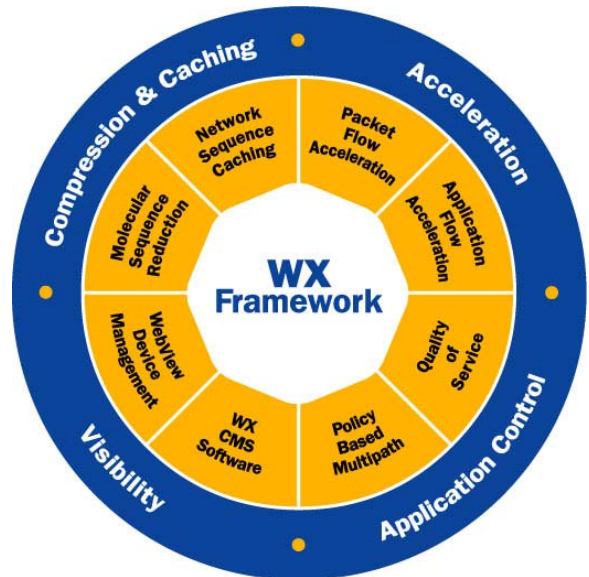
In addition to the Policy-based Multipath technology, which allows IT to direct application flows to a specific WAN link when multiple links are available, application control also includes Quality of Service (QoS) and bandwidth-management tools for prioritizing critical application traffic and ensuring bandwidth availability.

Visibility:

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

Each of these elements interacts with one another to dynamically adjust and improve their respective capabilities. Working in concert, these features provide IT with the greatest degree of application acceleration and WAN optimization.

The Multipath feature of the WX Framework helps IT managers overcome the limitations of the WAN for interactive and delay-sensitive transmissions by allowing them to reliably, predictably and cost-effectively use both public Internet and private WAN transports for business-critical applications. IT managers can now choose which applications run over which WAN transport based on user-defined, application-based business policies. If one WAN transport becomes unavailable or does not meet the specified performance requirements, the Multipath technology automatically and transparently moves the application traffic to the other available WAN link, ensuring that application traffic continues to flow as it should – effectively and reliably.



The Integrated WX Framework

Building Hybrid Public/Private WAN with Policy-based Multipath

IT managers have traditionally relied on safe, proven and predictable leased lines to interconnect remote sites. Unfortunately, that sense of security comes at a cost: limited bandwidth, high recurring costs, and long, inflexible circuit provisioning cycles. DSL Internet connections offer robust bandwidth, attractive pricing and quick provisioning, but the reliability issues have hampered wide-scale implementations. Until now.

Migrate to New WAN Transports While Minimizing the Risk

The Multipath feature enables IT managers to exploit lower-cost WAN transports, such as the DSL Internet for business-critical traffic in conjunction with their time-tested leased lines. IT organizations can leverage all available bandwidth and assess the impact on application quality as they migrate to less expensive Internet links under their full control. The Multipath technology works with the complete range of WAN transports, including OC-3, T-1, frame relay, DSL, satellite, ISDN and others.

With the Multipath feature, IT can confidently deploy applications such as e-mail, Web and storage replication over public Internet connections, since these applications are vital but not delay-sensitive. This subsequently frees up bandwidth on more costly leased lines for interactive applications such as SAP, Oracle or Citrix, or delay-sensitive applications such as VoIP. Additionally, all Internet-bound traffic is safely encrypted.

Leveraging both leased lines and Internet connections can significantly increase the enterprise WAN's overall availability. While frame relay enjoys 99.99 percent reliability, Internet connections are inherently less reliable. By building a hybrid private/public WAN, overall predictability and availability can be better than either transport alone. If one link fails, application traffic simply moves to the backup link.

The Multipath feature provides the ability to run production traffic over previously acquired but under-utilized links. For instance, a company currently using ISDN for disaster recovery can now replace the rarely used ISDN line with a DSL connection that is used all the time instead of just when disaster strikes.

Business Policies Specify Which Applications Run on Each WAN Transport

A multitude of corporate applications, all with varying bandwidth appetites and tolerance for delays, share the same WAN. Highly interactive applications such as Citrix, SAP and Oracle must be responsive to users while maintaining low consumption. On the other hand, e-mail, ftp file transfers and storage replication all consume a great deal of bandwidth, but do not suffer from delay issues. And of course, VoIP is highly sensitive to latency and jitter on the WAN.

With the Multipath technology, determining which applications run over which WAN link is as simple as setting an application-based business policy. The IT manager simply defines the bandwidth, latency and packet-loss policies for each application class; if performance on a WAN link degrades past a pre-set threshold, the WX or WXC instantly and transparently directs the application traffic to another transport without disrupting user sessions or QoS policies.

Granular performance parameters can be easily set for the Multipath technology. For instance, a business policy can be established to specify that if latency on the DSL link surpasses 200 milliseconds (ms) for three minutes, then the SAP and Citrix traffic is re-routed from the DSL Internet link to the frame relay.

The WX and WXC platforms continually monitor WAN links so that when link performance is restored, the application traffic can then be dynamically converted back from frame relay to the Internet link, as determined by the application-based business policy.

The Multipath technology honors both Juniper WX- and WXC-specific Essential QoS as well as industry-standard QoS schemes. All existing QoS policies are enforced as the traffic is directed to a different transport, ensuring that each application continues to get its fair share of bandwidth. For example, a policy can be set to allow VoIP and SAP to run over the frame

relay, while e-mail, Web and storage replication run over DSL. However, if performance on the DSL link becomes unacceptable, the application traffic will be moved to the frame relay. The existing frame relay QoS policy is honored, guaranteeing that VoIP and SAP maintain priority access to the WAN bandwidth while e-mail, Web traffic and replication go “bulk” class.

Measure WAN Performance in Real Time

The WX and WXC platforms offer powerful monitoring and reporting capabilities to give IT managers continuous visibility into public and private WAN link performance. WX and/or WXC platforms at each end of the WAN link provide real-time performance monitoring, including latency and packet loss information. Armed with this data, IT organizations have a historical record of network events, providing evidence of service-level compliance to their business users – while ensuring service providers are delivering on theirs.

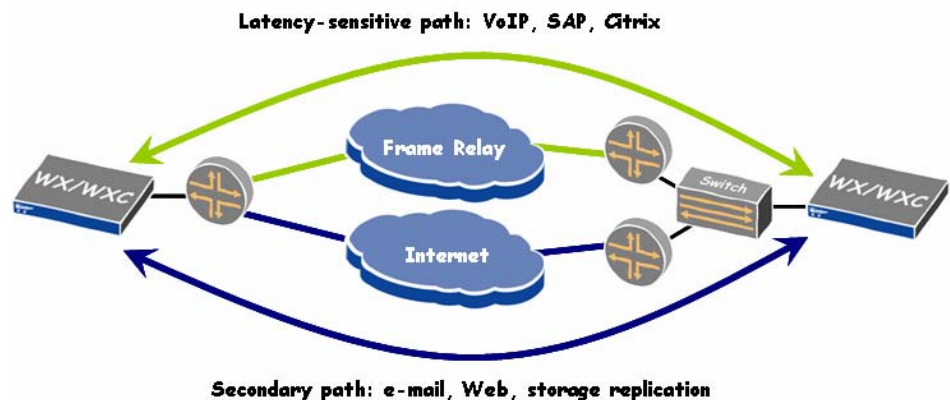
While complete outages are rare, the Internet is susceptible to occasional “brownouts.” Comprehensive reporting features built into every WX and WXC platform make this type of problem easier to identify, locate and manage. For example, latency may spike from 50 ms to 200 ms, so while the link is still up, application performance is seriously compromised. Since the WX and WXC platforms measure WAN performance in real time, any slowdowns can be quickly and identified and resolved.

Three Real-world Deployment Scenarios

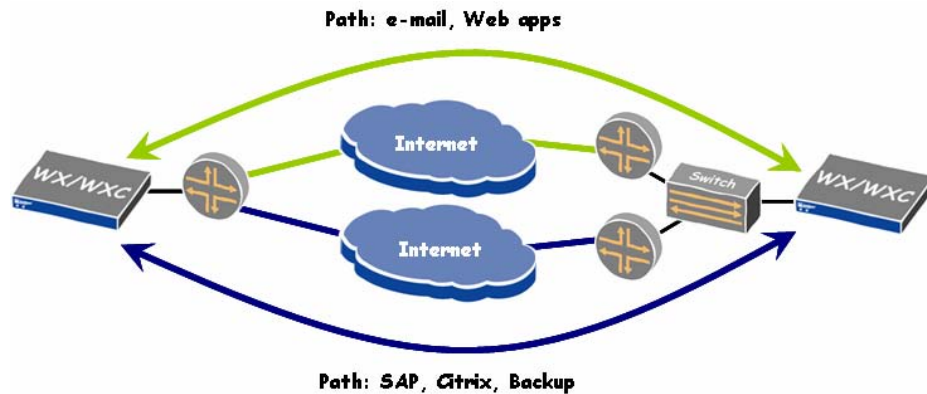
Policy-based Multipath can be deployed in various ways, enabling IT managers to leverage both existing and new WAN transports.

Scenario 1: Private/Public Hybrid: Frame Relay and DSL Internet

Many organizations continue to rely on expensive leased lines. Policy-based Multipath provides the ability to run business traffic over Internet connections – while mitigating the risk. An IT manager can deploy WX or WXC platforms with the Multipath feature on the frame relay and DSL Internet links. In this scenario, business-critical or latency-sensitive applications such as SAP, Citrix and VoIP traffic ride over the frame relay, while important but less delay-sensitive traffic such as Web, e-mail and storage replications travels encrypted and secure over public Internet connections.

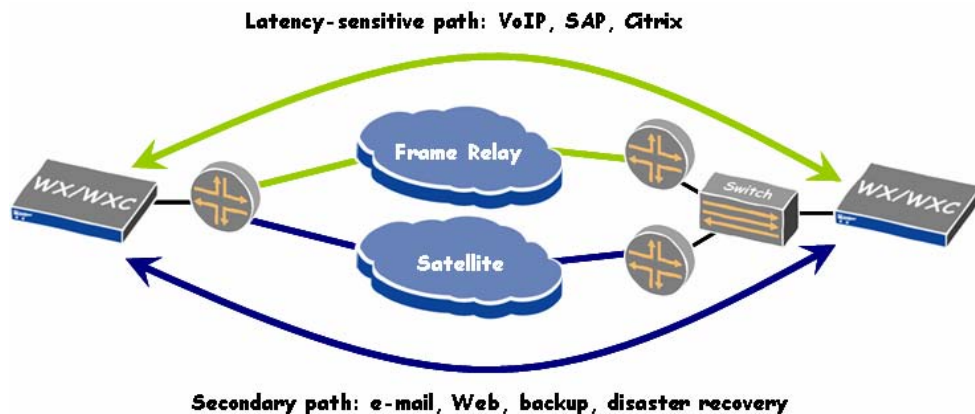


Scenario 2: Public/Public Networks: Two DSL Links



Policy-Based Multipath can be used with multiple DSL Internet links, such as in areas where leased lines take too long to provision or are too costly to procure. For instance, an architectural/engineering firm may need to quickly set up field offices at construction sites, where provisioning of leased lines is simply cost- and time-prohibitive. Deploying WX and/or WXC platforms with the Multipath feature allows IT managers to instantly deliver a highly resilient WAN, allocating the traffic mix as desired.

Scenario 3: Private/Private Networks: Frame Relay and Satellite



Satellite continues to play a key role for organizations located in obscure or far-reaching geographies. Unfortunately, satellite offers extremely limited bandwidth. Organizations can now migrate their satellite links to frame relay or even DSL. Using the Multipath feature enables businesses to completely leverage existing frame relay and satellite investments by using both links for production traffic, stemming the need to increase costly satellite time.

Deploying Multipath is Safe and Easy

Using the Internet to transport business-critical data often carries a very real concern for IT managers—security. Using the Internet for such traffic requires encryption to secure data privacy and integrity.

The WX and WXC platforms come with built-in IPsec encryption to ensure robust security, saving IT from the unnecessary deployment and management of yet another box in remote locations. The WX and WXC platforms support IPsec with 3DES or Advanced Encryption Standard (AES), which is the strongest exportable encryption available. The platforms also work with existing IPsec VPN appliances in the network.

Establishing business policies for Policy-based Multipath is as intuitive as setting Essential QoS. Using the WX or WXC wizard, the IT manager defines the classes, assigns applications to these classes, and sets the QoS behavior for each application class, using one of three policies:

- ***Always take the specified path.*** Highly sensitive or critical data, such as a company's core financial and customer relationship applications, can be set to always run over a specific transport (i.e. frame relay) without exception.
- ***Move on link failure only.*** Traffic running on one transport (such as e-mail and Web traffic over DSL) can be directed to move to a different transport only if the primary link fails completely.
- ***Move on performance degradation.*** Performance limits or thresholds can be defined for each path so that application traffic moves to a different transport only when performance drops below a certain level. For example, e-mail and Web traffic running over the Internet will move to a T1 line if latency crosses a certain threshold.

WX and WXC deployment is a simple, automated, plug-and-play operation, enabling the devices to be easily installed in branch offices without dedicated IT staff. Configuration is performed centrally using the WX CMS software so that local configuration is not required—just plug in the cable and go.

Summary

WX and WXC application acceleration platforms equipped with the Multipath feature enable IT managers to significantly improve application performance and predictability, increase WAN bandwidth without increasing costs, gain visibility and control into WAN performance and behavior, and enable low-risk deployments of new transports. Migrating to a public/private hybrid network, such as frame relay and Internet, enables organizations to confidently exploit untapped bandwidth and lower cost of network ownership.