

Application

Acceleration Challenge

JANUARY 2009

Produced by
Layland Consulting and Webtorials



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THE CHALLENGE SERIES

Produced By
Layland Consulting and
Webtorials, a venture of
Distributed Networking
Associates, Inc.
Greensboro, N.C.
www.webtorials.com

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Acceleration and Optimization are Keys to Getting by in Hard Times



By Robin Layland
President
Layland Consulting



The downturn in the economy means downturns in budgets. Senior management asked IT to come up with ideas on how to save money and increase the business's productivity. The good news is that several ideas have been proposed. The bad news is that every one of them impacts the WAN.

The first idea is a server consolidation project. The proposal is to consolidate servers from the branch offices to the data center. Consolidating servers combined with server virtualization translates into fewer servers. Three servers averaging 20% utilization can be combined into one physical server in the data center and with room for growth. The project reduces hardware, software licensing and maintenance cost. It's a good idea and the networking group needs to support it but there is a problem. Consolidating servers uses more WAN bandwidth because all the traffic that was local now crosses the WAN. It also means response time for the branch office users will increase. There is no money in the project funding for increasing WAN bandwidth. The networking group needs to come up with a plan to make server consolidation work.

The group responsible for PC hardware and software has proposed moving to the latest Virtual Desktop Infrastructure (VDI) solution. With VDI the users have a stripped down PC, a thin client, and the operating system, applications and data are all stored in a data center server. When the user starts up the PC only the parts of the OS and applications along with the data they need then are sent to the PC. When they start up another application, that application and its data is sent down. Only what is needed is sent to the PC. VDI will allow for lower cost desktop solutions while reducing the cost of maintenance and support. It will also guarantee that the desktops have the latest version of the software and provide better security. It's a winner for the business but it puts new strain on the WAN. Supporting a VDI solution means that a large amount of data has to be moved quickly over the WAN. Again, it is up to the networking group to figure out how to make this project a success without an increase in the WAN budget.

The application group has its own cost saving project. They are moving more applications to a Web based interface. Users love the newer Web interface and the application developers say it will allow them to roll out applications faster and make changes easier. The problem is that Web applications generate more data than the older client/server applications. HTTP is also an inefficient protocol compared to the older client/server protocol. This all means slower response time with the users blaming the network.

The final project is coming from senior management. A major vendor has convinced them that video and TelePresence collaboration will increase productivity and pay for itself by reducing travel. Everyone is excited about the project because everyone was getting tired of jumping on and off airplanes for meetings. Luckily the vendor knew there would have to be an increase in WAN bandwidth and put that in the proposal. The problem is that all that video traffic will compete with the normal business traffic and the concern is that it will impact response time.

Besides having to support all these projects there is the added problem of having to support the normal growth in WAN traffic without a budget increase. The question is how to support these projects at a reasonable cost. The answer to this riddle is an Application Acceleration. There are two sides to application acceleration solutions – accelerating response time and reducing the amount of bandwidth needed.

The bandwidth reduction or optimization side can reduce bandwidth by 5 to 10 times with reduction rates as high as 20 or 30. Line utilization running at 75% is reduced to 10% or less. This is not hype; independent industry tests along with early adopters have all confirmed that these reductions are possible. Application acceleration solutions can eliminate the need for expensive upgrades and provide the bandwidth needed to support the cost saving projects such as server consolidation, VDI or the move to Web based applications.

The optimization is primarily achieved by using advanced compression techniques commonly referred to as dictionary compression. Dictionary compression magic is achieved by learning patterns in the data and substituting a reference number for the patterns. The accelerator automatically breaks the data into a series of patterns and then stores it, creating a dictionary of patterns. When another message comes through it checks if there are any of the patterns it has already stored in the message. If it is a stored pattern it removes it and substitutes a reference number. The accelerator on the other end removes the reference number and replaces it with the copy of the data pattern it has in its dictionary. For example, if a user retrieves a file and then only changes a small section of it when they send the file back the accelerator reduces the entire file to a series of reference numbers and the parts that changed. Dictionary compression is the key to keeping projects such as server consolidation and VDI from busting the WAN.

Application acceleration is just as important a part of the equation. Acceleration can significantly reduce “normal” response time over the WAN. Two examples demonstrate how an accelerator works. One of the problems with server consolidation is that the application level protocol used by Microsoft, CIFS, can significantly increase response time. When the user requests a file, it is sent in blocks of data. When the server sends a block it waits for an acknowledgement before sending the next block. Over a local LAN this start/stop process was not noticeable but over the WAN it can introduce significant delays. Microsoft has recently improved CIFS so that it sends multiple blocks before requiring an acknowledgement but it still is not as efficient as an accelerator can make it over the WAN. Accelerators reduce the latency with CIFS by spoofing the protocol at each end. For example instead of having the application waiting for acknowledgements to traverse the WAN, the local accelerator responds as the end station, allowing the application to immediately ask for the next data block. The accelerator keeps the data flowing by anticipating the request and getting the next data block. Without an acceleration solution, even with large and fast amounts of bandwidth, the server consolidation project may run into problems with users complaining about response time because of CIFS.

Acceleration also speeds up Web applications. The accelerator caches objects and can pre-fetch objects based on past usage. When a page requests a common object there is a good chance that the accelerator already has a copy. This allows the accelerator to immediately send the object cutting out the WAN entirely.

These examples show just a few ways acceleration can speed up applications; reduce their bandwidth needs and save money. There are many additional techniques that accelerators can use to reduce bandwidth requirements and improve response time. Additional information on acceleration and optimization techniques can be found in the Webtorials library. You should also challenge the vendors with the particulars of your network and have them detail how they can help.

Accelerating and optimizing are not the only reason to implement an acceleration solution. An acceleration solution provides an important level of control over the WAN to make sure everything runs smoothly. For example, video and voice traffic can't be accelerated or optimized, it is already compressed. Bandwidth management techniques in accelerators can ensure that other traffic does not negatively impact voice traffic. Implementing a TelePresence project with its high bandwidth requirements can crowd out other traffic resulting in poor response time. Accelerators can address this problem by effectively controlling which traffic uses the WAN through bandwidth management and prioritization. It can also make sure that non-business traffic, such as iTunes or YouTube, doesn't destroy response time.

Selecting a Solution

The key question is not if you should implement an acceleration solution but whose acceleration solution to use. The acceleration and optimization market has matured over the last few years with clear market leaders emerging. I have gathered together the industry leading application acceleration vendors – Cisco Systems, Citrix Systems, Blue Coat Systems and Riverbed Technology - to present their case for why they should be your acceleration and optimization vendor. The goal is to help you select the right vendor.

Just as the vendors have matured, the key issues in selecting a vendor have also changed. In past years the focus has been on which vendor could optimize Microsoft's CIFS protocol and HTTP/Web applications. I am glad to say that all the vendors in the challenge provide solutions for these two protocols. That doesn't mean their solutions are all the same, there are still differences but as they have done a good job covering the basics the reasons for selecting one vendor over another have changed. This is good news because it means they are doing more than just covering the minimum.

Key Issues

- **Solution for Mobile Workers**
- **Microsoft server function Application**
- **Visibility and Monitoring**
- **Accelerate your specific applications**
- **Certification by application vendors**
- **Bandwidth Management**
- **Total Cost of Ownership**
- **Security**

The key issues are:

Mobility: Acceleration focused first on solving the branch office problem but not all the workers are in the branch office. Mobile workers or telecommuters have an even greater need for acceleration since they are often connected by lower bandwidth links. Vendors are increasingly providing acceleration solutions for Windows PC. Like any solution for a PC the solution needs to address how it fits into the existing support, maintenance and security schemes.

Server functions at the branch office: Consolidating servers from the branch office to the data center makes economic sense. Some of the administrative functions provided by the local server are still best kept local such as local print, DHCP, Active Directory and DNS. Without a server these functions move to the data center and that can result in problems. For

example, sending something to the local printer and having it loop up to the data center is a waste. Not having DHCP can present availability problems if the link to the data center is down. Many acceleration vendors have added functionality to ensure that these functions are kept local always. Each vendor's implementation is different so make sure you understand what they are offering.

Accelerate and optimize your specific applications: Vendors are different in how they handle some applications. Additional differences can occur in whether the application vendor has certified their implementations. Make sure to understand what the acceleration vendor can do for your particular set of applications.

Visibility: Does the solution give you visibility into what applications are running over the network. If you don't know what applications are running over the network then you may not get the maximum effectiveness out of the accelerator. For example, if users are viewing a lot of YouTube videos that are clogging up the WAN without good application visibility you may not know this. Once you know what applications are being used you can set the accelerator up to control the WAN. It is important to remember that finding out what is running over the WAN is not a one time task. New applications - some good, some bad – are constantly being created and having good visibility is a plus.

Bandwidth Management: Can the solution ensure that video traffic doesn't overwhelm the network? Can it protect voice from latency problems? Can it limit the effect of non-business applications? This is the role of bandwidth management features in accelerators and may be critical to ensure a smoothly functioning WAN.

Total Cost of Ownership: How easy is it to configure and maintain the accelerators? This is important since accelerators are located at the remote branch making them harder to maintain. Additionally, since accelerators are at the remote office the number of accelerators can be large. It is important to check out how easy the vendor makes maintaining a large number of accelerators. Also how well does the solution fit into your existing networking scheme.

Security: Can the solution handle SSL traffic? Some vendors are packaging security features with their accelerator so make sure to check out what additional services come with the accelerators.

I now invite you to compare the leading acceleration vendors as they present their case to become your acceleration vendor. I urge to you contact each of the vendors to gain a better understanding of how their solution can help you through 2009. You can contact me at Robin@layland.com

Cisco Wide Area Application Services: Delivers a Total WAN Optimization Solution



By Michael Leonard
Marketing Manager
Cisco



Since launching the Cisco® Wide Area Applications Services (WAAS) solution in September 2006 and Cisco WAAS Mobile in January 2008, Cisco has seen broad adoption of these solutions across multiple industries, including financial services, government, healthcare, manufacturing, and retail. With more than 3000 customers, Cisco has been acknowledged as the market share leader for Q1CY08 and Q2CY08 according to Gartner and Infonetics Research.

Beyond WAN optimization and application acceleration, Cisco WAAS offers three unique advantages to organizations:

- **Application vendor validated solutions:** Cisco WAAS has been tested and validated by major application vendors such as Microsoft, Oracle, and SAP to facilitate interoperability and reduce risk. Cisco and these partners' proven designs provide a joint escalation path for addressing any cross-vendor issues that may arise.
- **Network integration:** Cisco WAAS offers proven transparent integration with enterprise network topologies to preserve existing network services and ease operations and management. Cisco WAAS integrates with Cisco IOS® Software security services including firewalls and intrusion prevention, quality-of-service (QoS) architectures for better integration with unified communications, and third-party network management solutions such as NetQoS for application performance management.
- **Low total cost of ownership (TCO):** Cisco WAAS not only enables branch server and storage centralization which reduces branch office footprint, but it also offers a highly successful router integrated solution to further reduce networking operating costs, and the Windows Server on WAAS (WoW) solution to deliver Windows services locally further reducing the branch office footprint and service delivery costs.

The Cisco WAAS solution has evolved to meet changing customer requirements; it supports a mobile work force, allows organizations to deliver essential branch-office services, to deliver video content efficiently, and support delivery of virtualized desktops.

Serving the Small-Office and Mobile Work Force

Mobile users present a different set of challenges to IT administrators. Often mobile users use dial-up connections or satellite links or wireless networks with high-latency time-slicing delay as with cellular wireless connections. Mobile users often access applications with chatty behavior requiring many round-trips to complete transactions. Deploying an optimization solution for mobile users requires a different architecture than for acceleration of WAN appliances. A mobile solution must be designed like a remote access VPN solution, with the gateway at the same point of access; in contrast, WAN acceleration appliance requirements are similar to those for site-to-site VPN solutions.

The Cisco WAAS mobile solution is optimized for the open Microsoft Windows environment rather than a controlled appliance environment, which results in reliability and stability for mobile users. The solution is optimized for low-bandwidth, high-congestion links and the inefficiencies of TCP connections on networks with high packet loss. It is designed similarly to Cisco's VPN client, delivering industry-leading performance with compression algorithms well-suited for accelerating VPN connections and special encoders designed to improve first-time downloads. Other

innovations include link modeling to optimize flow control and persistence of the byte cache across client reboots and different types of links to achieve significantly higher throughput and better application performance across a wide range of links as well as troubleshooting tools to reduce support costs and centralized policy-based management and integration with software distribution tools to reduce deployment costs.

Delivering Network Services Local to the Branch Office

Even as organizations centralize their branch-office resources, they still have a need for network services delivered locally in the branch office to maintain availability and performance. As organizations deploy these network services, they need to control costs by reducing device counts and management overhead.

Cisco has addressed this problem with the Cisco WAAS virtual blade technology. Virtual blades allow organizations to run certain applications locally at the branch office without having to deploy a dedicated server. The first of these applications is Windows Server Core 2008, called Windows Server on WAAS. Jointly developed by Cisco and Microsoft, this virtual blade solution provides locally provisioned Windows network services, such as Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), Microsoft Active Directory, and Microsoft print services. This solution allows customers to avoid the need to run connection- and transaction-intensive applications over the WAN.

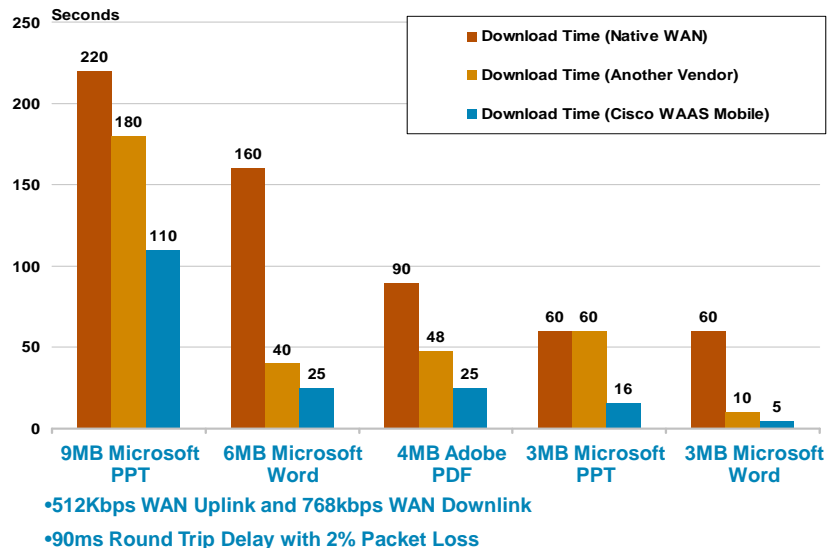
To ease deployment, Windows Server Core 2008 can be ordered preinstalled on Cisco WAAS and ready to run. Windows Server on WAAS works with existing server management tools, including Microsoft System Center, simplifying policy enforcement and infrastructure optimization. As new branch-office locations are opened or upgraded with new IT capabilities, Windows Server on WAAS saves time, effort, and expense by eliminating the need for site visits because it is remotely managed. By using Windows Server on WAAS, customers decrease deployment complexity, increase employee productivity, and reduce IT infrastructure and technical support costs.

Delivering Video with High Performance and Low Impact on the Network

Video traffic is increasing rapidly and represents a serious burden for conventional networks. Organizations face either having their bandwidth overrun by video or having to deploy expensive and complex content delivery systems. When video is delivered from the data center to the branch office, a unique video stream is created across the WAN, consuming scarce bandwidth. Cisco WAAS implements video capabilities that reduce the effects of video on the network and increase the performance of video over the WAN.

The Cisco solution delivers video to the branch office with just one stream over the WAN and provides for multiple streams split at edge. Cisco WAAS both caches content locally and provides acceleration for video across the WAN, so users in the branch office can transparently share video content at LAN-like speeds. As a result, Cisco WAAS frees bandwidth for other applications and offloads content servers in the data center. Cisco WAAS supports Microsoft Windows Media and has licensed the Microsoft video streaming API to help ensure full compatibility. To further ease deployment and reduce management costs, no per-event configuration is required because Cisco WAAS auto detects live streaming media. The Cisco WAAS solution provides an easy-to-deploy and scalable system for delivery of high-quality live video streaming and recorded video, providing better interoperability with the existing network infrastructure and investment protection for customers.

Download Time Comparison – WAAS Mobile



Optimizing Virtual Desktops Across the WAN

Organizations increasingly want to use desktop virtualization solutions such as VMware Virtual Desktop Infrastructure (VDI) to replace traditional PCs to reduce operating costs, increase control of desktop management, and extend business continuity and disaster recovery to enterprise desktops. VMware VDI offers significant benefits for desktop administration and reduces cost of ownership; however, performance and availability are critical to VMware VDI success. When desktop virtualization solutions are deployed over the WAN, latency and bandwidth constraints limit their effectiveness. A single enterprise virtual desktop user can consume more than 300 Kbps of bandwidth, increasing WAN costs and degrading the end-user experience. As users are added to a VMware VDI environment, response times increase, limiting the number of users that can be supported. Poor performance of centralized printing reduces productivity, and considerable time and bandwidth are required for backing up virtual desktop images, which affects business continuity. VMware VDI performance is dependent on both server-side scaling and WAN latency mitigation and throughput improvement.

As a part of the Cisco Data Center Assurance Program (DCAP) for Applications, Cisco works with application vendors to test and validate joint solutions. The Cisco and VMware jointly validated solution combines VMware VDI for virtualizing and centralizing desktops and Cisco WAAS for compressing and accelerating Microsoft Remote Desktop (RDP) and optimizing branch-office printing. This solution allows customers to achieve the benefits of desktop virtualization by improving WAN performance by 70 percent, increasing scalability of the number of VMware VDI clients supported by 2 to 4 times, providing a 60 to 70 percent reduction in WAN bandwidth, and optimizing printing by 70 percent and virtual image backup by up to 50 times.

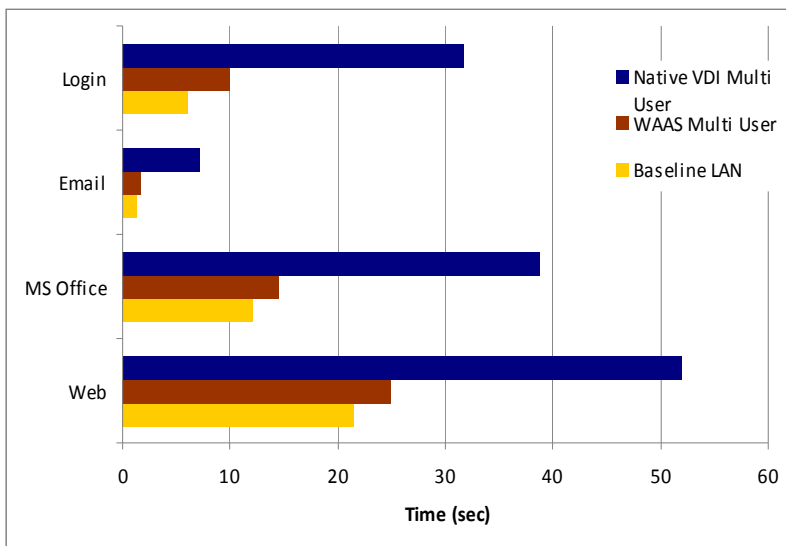
Conclusion

Cisco WAAS is a comprehensive WAN optimization solution that accelerates applications over the WAN, delivers video to the branch office, supports remote desktop deployments, and serves mobile users. Cisco WAAS allows IT departments to centralize applications and storage in the data center while maintaining LAN-like application performance and provide locally hosted IT services while reducing the branch-office device footprint.

Cisco WAAS allows organizations to accomplish IT objectives including:

- Application acceleration: Cisco WAAS accelerates application performance for TCP-based applications, including SAP, Oracle, Microsoft Exchange, Lotus Notes, and Microsoft Office, by a factor of 2 to 100 times compared to traditional WAN performance. Application acceleration allows organizations to offer LAN-like response times to all users, no matter where they are located, to improve productivity and the user experience.
- IT consolidation and WAN optimization: Cisco WAAS enables centralization of branch-office servers and storage and reduces WAN bandwidth expenses.
- Branch-office IT agility: With Windows Server on WAAS, Cisco WAAS gives organizations the flexibility to centralize some services and distribute other services, reducing the overall device footprint.
- Simplified data protection: Centralized data storage and backup positions customers to better protect data, streamline storage management, and speed up data recovery for improved regulatory compliance.

WAAS Accelerates RDP Performance by ~ 70%



WAN: T1, 100 msec RTT, 0% Packet Loss, 15 simultaneous users for multi-user test

For More information about Cisco’s solutions described here, please visit: <http://www.cisco.com/go/waas> or call Cisco at 408-526-4000



Accelerating Application Delivery to Branch & Mobile Users

By Ajay Kapase
Sr. Product Marketing Manager
Citrix Systems, Inc



Introduction

The Citrix Branch and WAN Optimization product suite consists of appliance and software solutions that increase productivity and reduce IT costs for branch, remote and mobile users by delivering LAN-like application performance over the WAN, improved use of existing network bandwidth, and consolidated branch IT infrastructure.

Citrix WANScaler

Citrix WANScaler solutions provide high-performance application delivery to branch office users. WANScalers accelerate application performance across wide area networks (WAN) by an average of 5x to 30x, and up to 300x at peak compression efficiency. With WANScalers in the network, End users in the branch office will experience LAN-line application performance over the WAN, which means accelerated application response time.

Accelerate ALL your applications over ANY WAN

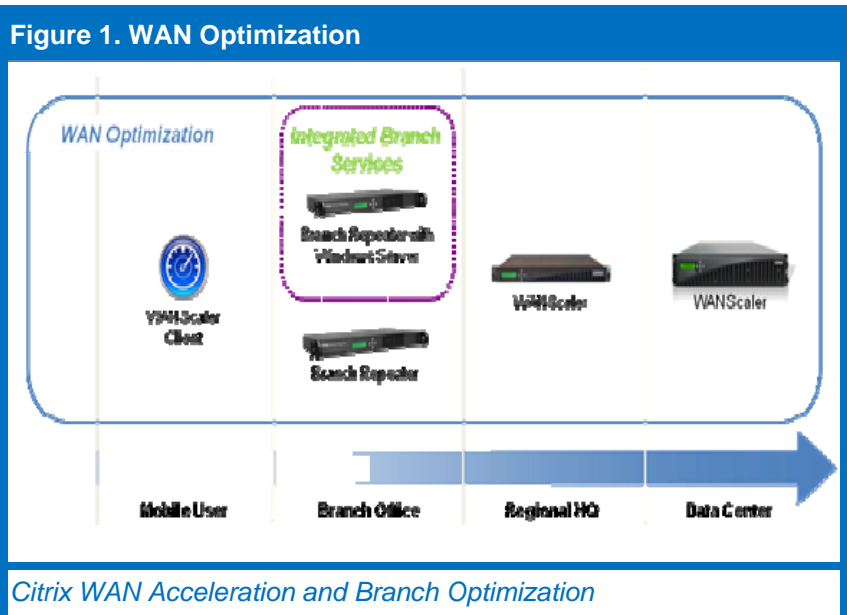
Citrix WANScaler offers a completely transparent, end-to-end WAN Optimization solution for all IP-based WANs (e.g. private leased lines, public Internet VPNs, satellite, and wireless WANs). Transparency eliminates the need for any changes to current network management tools, firewalls, network services, or applications. The solution supports hundreds of branch offices and WAN throughput up to 500 Mbps.

WANScaler solutions deliver increased WAN throughput and improved application response times for all applications. The system is built upon the AutoOptimizer Engine, which automatically and dynamically applies the best combination of WAN performance boosting techniques to each data flow depending on the application, the data and the network conditions. These techniques include:

- Adaptive TCP Flow control mechanisms which increase the throughput by making efficient use of bandwidth
- Mutli-Level Compression helps reduce the amount of data that is transmitted over the WAN
- Protocol-Specific Acceleration that provides the effect of mitigating latency by reducing chattiness of protocols (e.g. Common Internet File System or CIFS)
- Quality of Service that identifies and prioritizes application traffic in order to assure performance

A Simpler, Smarter, Approach to WAN Optimization

Citrix offers a truly network-transparent WAN Optimization solution that doesn't rely on



disruptive tunneling techniques. This means that your network monitoring tools, firewalls and applications don't need any reconfiguration or modification when the Citrix WANScaler solution is deployed. It just works. WANScaler appliances are auto-discovered, auto-configured, and auto-tuned - all in a few minutes - without disturbing your current infrastructure. The AutoOptimizer Engine automatically applies the right mix of WAN acceleration techniques based on network conditions, data flows, and application mix - and dynamically tunes the system as these variables change, ensuring optimal WAN performance at all times

Citrix Branch Repeater with Windows Server

A comprehensive branch-office-box designed to optimize branch application delivery while simultaneously providing key Windows services in the branch.

Accelerate WAN Application Performance

Paired with Citrix WANScaler™ appliances in the data center, Citrix Branch Repeater appliances provide proven WAN optimization technology that minimizes the impact of latency on application performance and maximizes WAN capacity. Citrix Branch Repeater automates all WAN acceleration mechanisms based on real-time application traffic and network conditions without complex manual or static configurations. Citrix offers true network-transparent WAN optimization that does not rely on disruptive tunneling techniques. Transparency makes deployment a snap and eliminates the need for any changes to current network infrastructure or monitoring tools.

Delivers Critical Branch IT Services

Citrix Branch Repeater with Windows Server can deliver required branch IT infrastructure services such as file, print, authentication, and core network services such as DHCP and DNS, all provided by the industry's most reliable and interoperable operating system: Microsoft® Windows Server®. This can eliminate the need for additional servers in the branch and allows branch users to remain fully productive at all times, even during WAN outages.

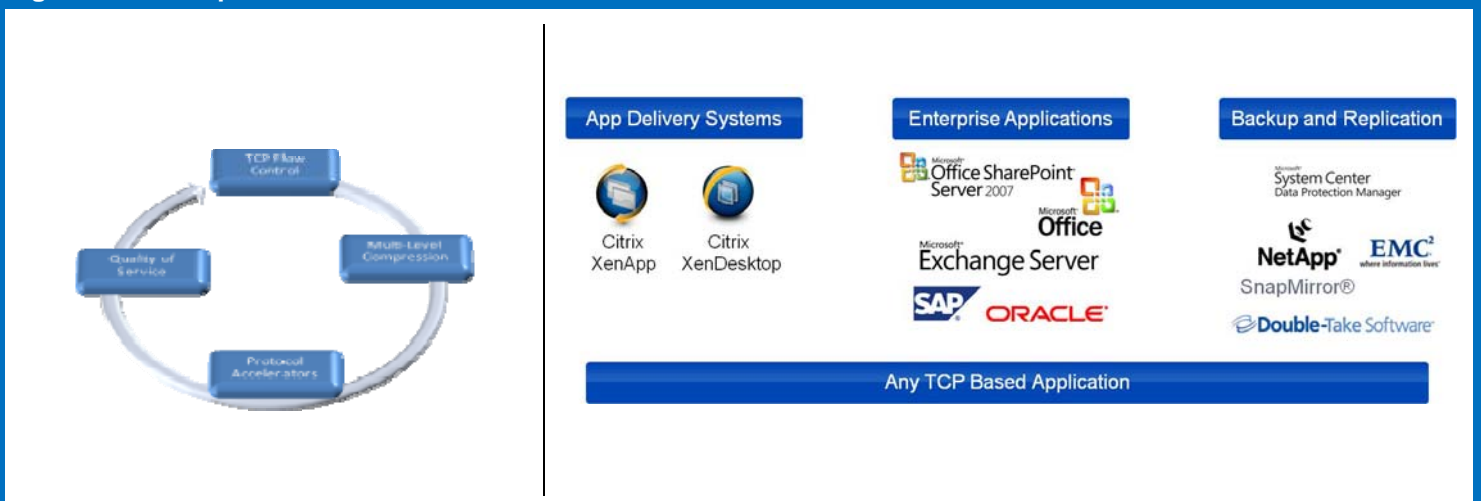
Stages Application Content Close to Branch Users

Citrix Branch Repeater with Windows Server can stage, or pre-position, applications streamed from Citrix XenApp™ in the branch, speeding application installation and maintenance. Citrix Branch Repeater with Windows Server can also cache Web content with optional Microsoft Internet Security and Acceleration (ISA) Server to reduce page load times for branch users.

Citrix WANScaler Client (Mobile Users)

The Citrix WANScaler client accelerates application delivery to remote users in home offices and on the road, while users

Figure 2. WAN Optimization and Acceleration



in larger branch offices continue to be supported with WANScaler appliances. The WANScaler client offers:

- Acceleration over for mobile or home users
- Supports any WAN connection (e.g. DSL, Cable Modem, WiFi Hotspots, Wireless 3G Cards etc.)
- Interoperates with leading VPN solutions including Access Gateway
- Requires a WANScaler in the datacenter or behind the VPN gateway
- Available for PC's running Windows 2000, XP or Vista

Accelerate Secure Access to the Datacenter

Given that most enterprise customers require VPN access to datacenter resources for remote users, the WANScaler client interoperates with most leading VPN clients including Citrix Access Gateway to provide the best user experience by optimizing and accelerating WAN traffic over the VPN. With Citrix Access Gateway and WANScaler products, IT administrators can also easily leverage the Citrix Command Center to centrally manage both products, thus further simplifying deployments and management.

Citrix and Microsoft

By collaborating with Microsoft and developing products using Windows Server OS, Citrix has launched the Citrix Branch Repeater for the Branch IO initiative. Microsoft's core technologies in Windows and ISA Server provide an ideal complement to Citrix's strengths in application acceleration and security. By combining the best from both companies, Citrix, Microsoft, customers, and partners will benefit from a unique offering that raises the standard for delivering cost-effective, scalable branch office IT services in a way that point product vendors simply cannot offer.



These products set the bar in the industry in several areas:

- Branch office simplicity – setting a new standard for ease of management and deployment, eliminating the need for multiple point products.
- Breadth of functionality – delivering a comprehensive solution for application security, optimization, and branch services functionality; an extensible platform to meet enterprise branch office needs for today and the future.
- Performance of applications for branch office uses – Citrix brings best-in-class WAN optimization that improves the performance of applications to branch users by up to 50 times, while substantially reducing the cost of bandwidth.
- Integration with an end-to-end application delivery network – intelligently integrating with enterprise-wide application delivery infrastructure, including Citrix NetScaler, Citrix XenApp and Citrix EdgeSight, to create a seamless, cost-effective, and unified solution for delivering any application, to any user, anywhere.
- Integration with Microsoft Management Infrastructure – Most customers are familiar with managing Windows-based infrastructures, and this solution will leverage customer's experience and existing skill set.

Conclusion

With a growing percentage of workers in branch offices, the biggest opportunity for WAN acceleration and branch optimization resides in solving user experience and productivity issues within these branch offices. With a clear focus on this opportunity, Citrix offers customers a "fit for purpose" solution that is easy to setup; provides the best optimization and user experience; allows easy implementation of Windows-integrated services; and most importantly, provides complete application delivery infrastructure. From the datacenter to the desktop, the Citrix solution allows organizations to easily consolidate IT services and work with a single vendor, rather than a silo'ed infrastructure that is rigid and plagued with compatibility and management issues.

For more information about Citrix Systems solutions described here, please visit:

<http://www.citrix.com/wanscaler> or call Citrix at 1-800-393-1888 toll free or 1-954-267-3000

Creating a Sustainable Business Advantage with an Application Delivery Network Infrastructure



By Mark Urban
Sr. Director Product Marketing
Blue Coat Systems, Inc.



Your business is driven by the demands of centralization, mobilization and globalization. But the IT initiatives to support these goals are playing havoc with the delivery of applications to users. Server consolidation and the convergence of voice, video and data can lead to disruptions in network performance, compromising your return on investment. And threats from malware, data loss and other security breaches are aggravated by efforts to reach out to remote users.

Yet your business depends on getting the right information to the right people on time. You have to ensure fast and responsive application delivery, while also protecting users and data from malicious threats. Are you supporting the delivery of information as reliably and safely as your business demands? Now is the time to look at the technologies you deploy to monitor application performance, optimize your WAN and secure your Web access. We believe you'll find that managing today's business drivers requires a new approach, one that helps you to:

- See your IT and business processes more clearly.
- Accelerate information and business results across the enterprise.
- Secure data and users wherever they are.

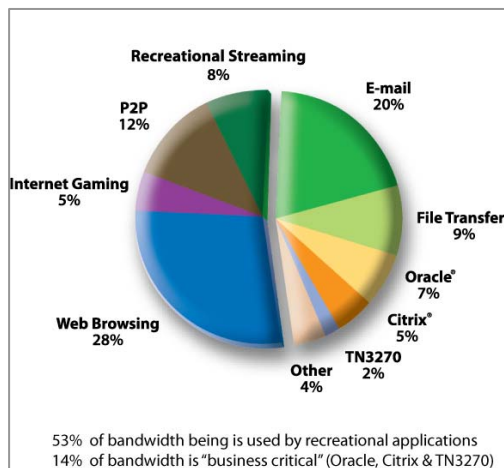
The Application Delivery Network: A new layer of intelligent control

To deliver applications precisely when and where they're needed your enterprise requires a critical layer of intelligence, an Application Delivery Network, which offers greater application mobility and security by helping you to:

- See applications and monitor their behavior across the network.
- Selectively accelerate the applications you define as important.
- Prevent malware intrusions and data leaks that degrade performance.
- Respond in real-time to assure the quality of user experience anytime, anywhere.

Visibility – See and Monitor Applications

Before you can assure the timely delivery of applications you need the ability to discover and classify them. There are hundreds of applications running on the typical enterprise network. They all require valuable bandwidth, and often the least important traffic is the most aggressive at dominating the limited bandwidth you have. Recreational applications such as iTunes, YouTube and peer-to-peer (P2P) are notorious for draining performance from important business applications. Having visibility into applications such as in the illustration means having the ability to distinguish between each one, and then identifying which are business-critical.



Beyond seeing every application, you need the ability to sub-classify complex business environments, such as Oracle and SAP, to prioritize the right operations effectively and assure reliable end user experiences. And accelerating all traffic indiscriminately or simply adding more bandwidth does not solve the underlying need to isolate and control malicious traffic that degrades the quality of mission-critical applications.

VISIBILITY
See Applications, Performance, and Problems

- Discover All Application Traffic**
650+ apps, good & bad, sub-classify within complex applications/HTTP
- Monitor User Experience**
Measure/alarm, SLA compliance, VoIP metrics, integrate with reporting
- Troubleshoot and Report**
Isolate delays, connections, host/application performance, capture, and analyze
- Resolve Issues**
Fix performance issues with acceleration and control - before users call

Monitor What the End-user Experiences

When your IT organization is successful, users rarely know how hard you're working. But to measure and alert about specific factors that impact user experience you need the right technology. Delivering acceptable voice, for instance, requires responsiveness to multiple performance factors that must be monitored for each session. When a problem occurs that might jeopardize call quality, you need the intelligence to know where the source of the problem is and the control to proactively fix it in real-time. Then, the ability to analyze the cause, whether from a spike in traffic or insufficient bandwidth, is essential to help fine-tune ongoing delivery.

An integrated solution is more scalable and cost-effective than a disparate group of tools that operate independently. To truly manage the user level experience of each application, you need to identify and resolve problems quickly. And that requires closely integrated service-level metrics that automatically monitor performance and guide resolution.

It's all summarized on the left – visibility is more than seeing – it's knowing, being pro-active, and having the tool kit to resolve issues.

Strategic Acceleration – Accelerating Files, Email – and All Your Mission Critical Applications

Once you have visibility into each application, you can speed up the ones that are important by accelerating them. As with visibility, acceleration must be intelligent, applying the right acceleration depending on the application. Blue Coat believes that strategic acceleration, as depicted on the right, goes beyond tactical acceleration of bulk data.

Bulk file applications require the awareness of protocols, such as CIFS, MAPI or TCP, to support storage consolidation, email, Internet, and data backup. Blue Coat speeds delivery of data and email 14-40x, up to 300x. But what about the applications that drive revenue?

Blue Coat is the leader in Web acceleration technologies – both HTTP and SSL. For 10 years we've built the technologies that make Web-enabled applications faster and more secure. Whether your internal Oracle

ACCELERATION
Faster Delivery To Any User, Anywhere

- Bulk Data Services**
Files, email, and backup
- Web & SSL Applications**
Enterprise applications, ERP/CRM, and Intranet
- Rich Media**
Live casts, training video, and streaming media
- External Applications**
SaaS/business Web, recreation, and malware
- Real Time Applications**
Voice, video conference, transaction, and thin client

deployment or your external Salesforce.com, only Blue Coat is able to securely accelerate the delivery across the enterprise.

New demands for Voice and Video conferencing are matched with our leading QOS capabilities and the ability to monitor MOS, Jitter, Latency and Loss.

Rich Media Acceleration is unique to Blue Coat's Acceleration offering, including application level intelligence to cache video streams and deliver locally AND the ability to split live streams to offload video servers and save massive amounts of bandwidth

Intelligence means the ability to apply policies to the traffic you have classified, allowing you to enforce corporate priorities, protect information, and minimize the impact of recreational and malicious traffic. Acceleration can then have its intended effect to reliably deliver mission-critical applications fast and efficiently.

SECURITY
Protect Users, Content, and Productivity

- Policy Control**
Filter URLs, control Web usage, and content
- Malware Protection**
Prevent Web-borne attacks, provide gateway antivirus
- Digital Leakage Prevention (DLP)**
Control outbound information flow by integrating leading DLP vendors
- Cloud Service Protection**
Real time malware updates, content analysis, ratings, and Reputation

Anticipate and Block Threats

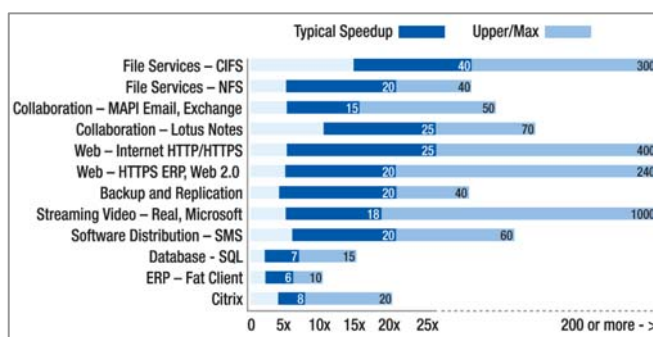
New forms of malware present constantly changing threats to your network every day. Once you classify and accelerate your important applications, you need to protect your users and data to assure the continued delivery of applications, as summarized at left. The challenge for large enterprises is to ensure global security without compromising global agility.

An intelligent Secure Web Gateway solution integrates leading anti-malware engines by McAfee and others, using real-time traffic filtering to prevent intrusions and reduce your exposure to malicious Web content. Enforcing corporate policies regarding use of recreational traffic and Web use are essential to maintaining productivity and reducing contention for bandwidth. And having the ability to validate trusted access to data, and monitor and alert against its loss help to limit the compromise of critical business information, whether accidental or intentional.

With Blue Coat, Control is Yours

You face a converging set of business drivers — centralization, mobilization and globalization. Blue Coat helps you tackle them head-on with Application Delivery Network solutions. By integrating application performance monitoring, WAN optimization and Secure Web Gateway, we provide the visibility and control to see, accelerate and secure your business applications.

Blue Coat provides the ability to identify and classify over 600 applications, monitor and troubleshoot performance, and resolve problems before they impact users.



BLUE COAT APPLICATION DELIVERY NETWORKS

- VISIBILITY**
 - Discover Applications
 - Assess and Monitor Performance
 - Troubleshoot and Report
 - Best in World Classification
- ACCELERATION**
 - WAN Optimization
 - Web Cache and Acceleration
 - Traffic Control
 - Magic Quadrant Leader
- SECURITY**
 - Web Content and URL Filtering
 - Malware Protection
 - Real-Time Cloud Protection Service
 - Magic Quadrant Leader

Blue Coat helps you accelerate business-critical applications, including bulk, internal, external and real-time applications with secure sessions, including SSL, which assures even remote users experience headquarters performance. The graphic to the right shows just a few examples of the gains you can receive.

And Blue Coat secures your Internet gateway to protect users and data with comprehensive malware scanning and filtering, centralized policy management, and in-depth reporting and logging.

With Blue Coat, you are ready to implement an Application Delivery Network that integrates visibility, acceleration and security. It delivers the intelligence you need to centralize, mobilize and globalize your entire IT infrastructure.

For More information about Blue Coat Systems described here, please visit: <http://www.bluecoat.com/acceleration> or call Blue Coat at 866.302.2628

Extreme Savings: Cutting Costs with Riverbed WAN Optimization

riverbed™

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With over 5000 customers, Riverbed is the market and technology leader in WAN optimization. Using Riverbed solutions, enterprises can improve application performance across the network typically by five to 50 times and in some cases up to 100 times, and can simultaneously reduce WAN bandwidth utilization by 65 to 95%. These dramatic results allow businesses to take advantage of networks, infrastructure, and applications in ways they had never imagined possible.

Riverbed takes an integrated approach to application performance across the WAN. Riverbed improves the performance of all applications running over TCP and also has application-specific modules that address chatty application protocols. This combination enables Riverbed to accelerate the applications that enterprises care about most, and provides the ability to easily add more functionality over time.

Riverbed products are architected to scale all the way from the largest data centers with clustered appliances down to software on a single user's laptop (or desktop). For organizations looking to optimize branch office operations, Riverbed offers a full line of Steelhead® appliances that can be easily integrated into a customer's network. To improve productivity of mobile workers, Riverbed also offers Steelhead Mobile software, which can be installed on a user's laptop to optimize that mobile user's communications with the data center.

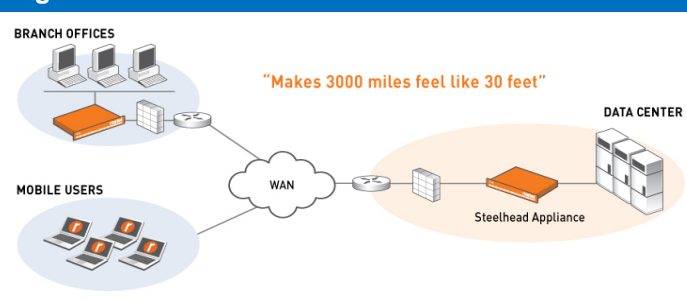
How Riverbed Helps Companies Cut Costs

Because Riverbed significantly enhances the performance of applications over WANs, enterprises can realize considerable cost savings in addition to productivity improvements. IDC found that the average payback period for a Riverbed implementation is 7.3 months.

Riverbed solutions can cut costs by helping organizations do the following:

- **Reduce bandwidth costs.** Using Riverbed to improve application performance over WANs, many organizations can defer bandwidth upgrades. WAN optimization projects can often be justified solely on bandwidth savings.
- **Consolidate infrastructure into the data center.** With Riverbed, enterprises can remove much of the IT infrastructure (such as file and email servers, SMS servers, SharePoint servers, tape auto-loaders, and so forth) that sit in branch offices—without impacting performance.
- **Simplify branch office infrastructure.** Riverbed offers the Riverbed Services Platform (RSP), which enables customers to run best-of-breed services on the Steelhead appliance (such as print, streaming media, and other services). This allows customers to consolidate IT even further, making a true “serverless” branch office a reality.
- **Optimize disaster recovery.** By improving the performance of a disaster recovery site, Riverbed can help organizations save money and backup their data in a more frequent and reliable manner.

Figure 1: Overview of Riverbed's Solutions



Accelerate applications to branch offices and mobile workers, cut bandwidth use by 60 – 95%, and grow your business strategically by eliminating the constraints of distance

Reduce Bandwidth and Facilities Costs

Steelhead appliances typically reduce WAN traffic by 65% to 95%. That means an office served by a T1 (1.5 Mbps) could deliver bandwidth equivalent to between three and 30 Mbps just by adding Steelhead appliances, without any additional investment in infrastructure. Many companies have justified a payback period of just a few months on bandwidth savings alone. For example, LG Electronics, a Riverbed customer, deployed Steelhead appliances globally and saves \$6M in annual bandwidth costs, generating a payback period of just five months.

In addition, Steelhead Mobile reduces by 50% the bandwidth required to support mobile users, which translates into immediate WAN cost savings. Steelhead Mobile also can help companies achieve more dramatic savings by reducing real estate and facilities costs. According to one estimate, “virtual” workers cost 60% less than those based at headquarters. One barrier for many organizations in making the workforce more mobile is the difficulty that mobile workers face in accessing key applications over the WAN. Steelhead Mobile removes this roadblock.

Enable Remote Site Consolidation

Riverbed solutions also enable consolidation of IT resources and equipment in branch offices and complement server virtualization initiatives in the data center. Centralizing servers at a data center delivers clear cost benefits, including:

- Fewer servers to buy, patch, and upgrade
- Less software to buy, maintain, and upgrade
- Lower electricity bills
- Elimination of off-site media storage and management, for organizations that consolidate tape backup
- Improved IT staff productivity, including less travel to remote sites for scheduled (or unscheduled) maintenance and repair

Although the benefits of centralization are clear, application performance over WANs has stalled adoption. With Riverbed, organizations no longer need servers at remote sites to provide acceptable performance to users. Rohm and Haas summed up the clear value proposition of their server consolidation effort: “With a Steelhead appliance at a remote site in North America, the Active Directory replications, the Notes replications, file backups, are fast enough that we don’t have to put a file server on location, which is saving us more money than the solution costs, so it reduces the payback period to virtually nil.”

Riverbed also complements server consolidation initiatives that leverage virtualization technology. Using Riverbed, enterprises can implement virtualization to consolidate many physical servers in branches down to just a few in a data center, with no performance hit for end-users. Riverbed also enables more flexibility when backing up or moving virtual machines from one location to another by dramatically reducing the time it takes to complete those tasks.

Enable Branch Office Simplification

In addition to consolidating remote office equipment into the data center, enterprises can further simplify IT in branch offices with the RSP, which enables “virtualized edge services.” While Riverbed enables organizations to pull servers from branch offices and instead rely on resources at the data center, branch offices often still need servers for basic services such as printing and IP address management.

The RSP brings the concept of a true “serverless” branch office one step closer, allowing enterprises to further consolidate IT equipment at the branch and reduce costs. With the RSP, customers can deploy best-of-breed software from other vendors on Steelhead appliances in a self-contained, protected partition. This means that organizations can run multiple branch services on a single Steelhead appliance, simplifying administration and streamlining infrastructure.

Fewer servers required to provide services at branch locations can lead to significant savings. For example, the list price of a server to supply IP address management in a branch office is about \$3200 for 75 – 200 users. And,

technology purchase costs can be as little as 20% of the total cost of ownership. So, the TCO of this server could be up to \$16,000. When added up across branch offices, the total cost to deploy and support servers just for IP address management ranges from about \$140K for a mid-size company to over \$1M for a larger company.

Instead, via the RSP, organizations can now deploy this functionality on a Steelhead appliance already sitting in a branch, and generate considerable savings. According to Justin Marthaler at Strand Associates, the RSP "will save us \$10,000 to \$15,000 in equipment costs for new offices, and that doesn't include the continued cost of maintaining additional servers."

Optimize Disaster Recovery

Enterprises can use Riverbed solutions to optimize their DR investments in several ways. First, Riverbed can reduce the cost of DR operations. Because WAN optimization effectively adds bandwidth capacity to the network, enterprises can spend less on bandwidth going to the DR site. In addition, with vastly improved data transfer speeds, many organizations can eliminate tape back up in remote offices and instead back up their data over the WAN.

A streamlined DR infrastructure can also drive significant productivity improvements in the IT department, as the IT staff no longer needs to manage tapes that are distributed throughout branch offices. WAN optimization also enables more frequent and reliable backup and replication. For many organizations, it takes hours to complete a full backup and replication cycle, which consumes network resources and also exposes an organization to significant risk. If there is a failure in the data center before a full backup is completed, an enterprise can lose a significant amount of data, which could lead to lost revenue and problems complying with regulations.

With Riverbed, the performance of a DR site can be improved significantly by increasing the WAN capacity to the site. With this improved performance, organizations can use the DR site for other purposes (dual-use DR), such as sharing a data center's workload in peak hours, and turn a previously idle asset into a productive use of resources.

Particularly for larger organizations that have made significant investments, dual-use DR is a way to leverage an existing asset and offset costs. For smaller organizations that are reluctant to invest heavily in DR, dual-use DR is a way to improve disaster preparedness in a cost-effective manner.

Finally, in the event of a disaster, WAN optimization would considerably improve the performance of a DR site. For many companies, slowdowns of even a few minutes can have a substantial impact on revenues. With Riverbed solutions at the DR site, organizations can ensure sufficient performance when they need it most.

Conclusion

Riverbed solutions are a smart investment for any organization, even in tough economic times, because they drive significant cost savings that often pay for the investment in a matter of months. In addition, customers achieve dramatic productivity improvements, enabling them to work in ways that were not previously possible. Files that used to take hours to access now take seconds, and workers around the globe can collaborate as if they were in the same office. With more than 5000 customers across every industry, Riverbed is the clear leader in the WAN optimization marketplace, helping customers cut costs today and prepare for growth in the future.

For More information about Riverbed's solutions described here, please visit:
<http://www.riverbed.com> or call Riverbed at 415-247-8800

