

Application

Acceleration Challenge

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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.

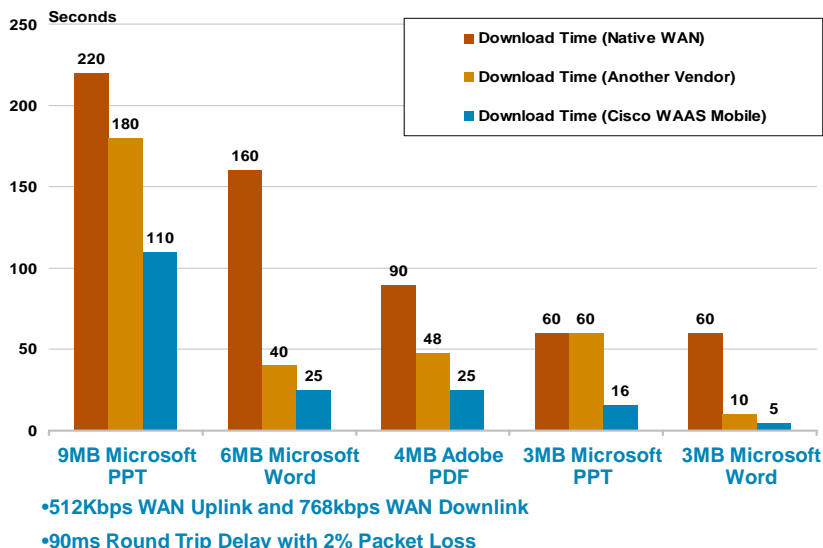
To ease deployment, Windows Server Core 2008 can be ordered preinstalled on Cisco WAAS and ready to run. Windows Server on WAAS works with existing server management tools, including Microsoft System Center, simplifying policy enforcement and infrastructure optimization. As new branch-office locations 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.

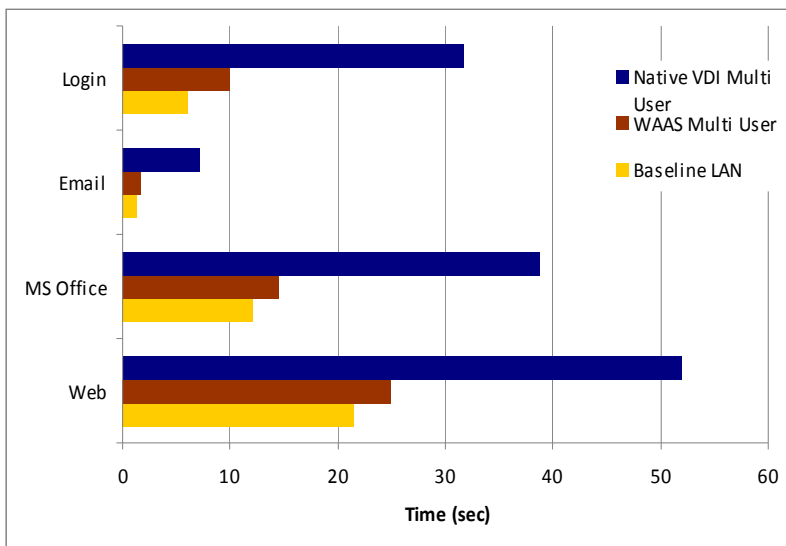
Conclusion

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