WAN OPTIMIZATION MADE EASY

Executive Summary

Mobile computing, branch offices, and software as a service (Saas), among other applications, are stressing the security and performance of business WANs. To squeeze the most benefit from these costly connections, companies must carefully choose WAN optimization products not only on a cost basis but also on potential security, manageability, and flexibility benefits. Most importantly, implementing WAN optimization should not require a major overhaul to a company's existing network nor should it require extensive retraining of IT personnel. Successful WAN optimization should easy to implement yet provide a solid infrastructure for continued growth. This paper discusses optimization challenges and proposes cost-effective and secure solutions.

Introduction

WANs are now an essential part of most companies' computing infrastructures. WANs connect remote offices to central offices, allowing a major physical presence in multiple locations without sacrificing corporate computing power; WANs directly connect smaller branch offices with headquarters, enabling them to perform big-office tasks with more cost-effective staff; and the next-generation WANs enable mobile workers to become highly productive in the field by tapping into the main corporate office.

While the benefits of WANs are indisputable and essential for most corporations, the cost and complexity of optimizing new or existing WANs may seem too complicated and expensive to consider. As a result, many WANs perform at sub-standard speed, with a consummate loss in productivity. If leased lines are used, these un-optimized WANs are costing businesses far more money than necessary.

The need for WAN optimization

As companies spread workforces across the country and the world, fast, secure remote access to centralized corporate facilities is the key to increased productivity and profit. These regional, branch and mobile workforces require increasingly sophisticated applications and services to perform productively. Some or all of this remote access should travel over public networks. As computing continues to expand beyond the comfortable confines of the corporate firewall, a number of security, performance, and productivity issues should be addressed if corporations are to achieve a secure and demonstrable return on their WAN investments. These WAN connections, due to the increasing complexity and bandwidth demands of software applications, will become more and more crowded over time. The trend is toward more traffic and more congestion. Today, it is estimated that 31 percent of business communications costs are consumed by WANs (Newman 2006).

Performance and productivity

Of perennial concern to corporate WAN administrators looking to contain costs is the issue of network and application performance. Without performance enhancements, the latency and traffic inherent in WAN connections can drag remote connections to a crawl in some instances. When remote applications are response-dependent, optimized WAN connections from end-to-end are crucial to prevent applications from timing out, corrupting data, or frustrating workers at the remote sites. New applications such as video, virtualized server applications, and SaaS (software-as-a-service) require more bandwidth than traditional text-based data files and database records. As a result, just a few years after deployment WAN connections may already be showing signs of severe bandwidth constraints. First and foremost, WANs need to be optimized for performance to maintain remote-access users' productivity and help applications function smoothly. Businesses need to squeeze all the bandwidth they can from expensive leased lines.

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Security

As the number of workers outside the main facility increases, so too does the number of applications that need access to sensitive data. Therefore, WAN optimization schemes should address not only issues of performance but also the security of data from end-to-end. Companies that rely on segments of the public network for some or all of their WAN connectivity should be especially concerned about exposing data at risk. Regulatory and legal concerns may mandate that these WANs are impervious to outside attacks, theft, or intrusion. Regardless, WAN optimization without increased security is not a prudent business or IT infrastructure decision. Many companies may be reluctant to approach the WAN security problem due to cost and complexity, but ignoring security issues is a long-term risk corporations cannot afford.

Introducing additional security measures, however, often frustrates or even eliminates gains in optimizing performance. Companies need to choose products carefully to ensure that security enhancements do not degrade performance. Ideally, WAN acceleration should also accommodate greater data security, not only between WAN routers, but from end-to-end.

Flexibility

One of the chief obstacles in implementing WAN optimization is incorporating performance acceleration and application enhancement for systems that are already deployed in the field. Even completely new WAN segments should be integrated into the existing central office infrastructure, hopefully at little cost and with minor

reconfiguration. Ideally, businesses should view WAN optimization as a feature enhancement to their existing computing architecture—not as a major IT overhaul.

In addition, businesses may attempt to deploy WAN optimization in stages, testing the effectiveness of the technology on selected network segments and software applications before large-scale roll-out. On the other hand, some businesses may have only a targeted use for WAN optimization, confined to one remote office or to one mobile application, for example. In these cases all-or-nothing optimization may not be an appropriate fit.

Management

Regardless of the scale of the WAN acceleration project, IT administrators should be able to manage and monitor the performance and security of the connection. If more WAN applications and segments are added to the infrastructure, the management capacity of the optimization product should scale as well. Ideally, managers should be able to easily configure and deploy new connections and applications. Similarly, with the rise in virtualization of servers and storage, managing acceleration should be an integral part of realizing the best performance on these platforms. Reducing the complexity of WAN optimization management in these environments will involve secure access management functions from a number of locations.

Optimization Pitfalls

With a myriad of WAN optimization products on the market, businesses should be aware of potential pitfalls in implementing any given solution. Whether it is a hardware or software solution, WAN optimization products should be easy to install and maintain, provide consistent performance and manageability, and secure data from end-to-end.

Cost and complexity

Hardware solutions are the most costly. Furthermore, typical WAN acceleration devices should be configured and tuned properly when dropped into an existing LAN or WAN to ensure the best performance. With most of these products, this is not a simple project. Qualities of service and traffic priorities on both WAN end points and internal LANs have to be reconfigured in many cases. Most of the major WAN acceleration switch providers recommend anywhere from one to five days of administrator training to get the most out of the equipment. Some switch vendors offer acceleration blade add-ons to their hardware, but businesses need to have that vendor's product installed to use them. Further configuration and retuning may be necessary as applications are added to the WAN traffic mix. In addition, hardware-only solutions do not provide end-to-end application acceleration. Mobile applications realize little or no performance or security improvements as a result. Similarly, traffic along the local segment may gain little in performance unless further LAN tuning occurs. Optimization stops at WAN acceleration hardware. In short, many WAN acceleration products require major reconfigurations of both the WAN and resident LAN routings. Some may require moves and changes to existing switches and routers.

Software-only solutions may solve some mobile application requirements, but do little for security. Software solutions, too, may require extensive testing and configuration to be effective. Additionally, software-only

solutions may need large amounts of server and client resources, making them impractical or too costly for enterprise-wide deployment. Some may only address a limited platform, such as Windows, or only laptop computers, leaving smartphones and PDAs un-optimized.

"With the rapid growth in the number of distributed knowledge workers who are working from home, from the road, or from small remote branch offices, fast access to business applications over the WAN is critical," said Matthias Machowinsi, directing analyst for Campbell, Calif.-based Infonetics Research. "Current WAN acceleration solutions have focused on site-to-site optimization for large sites only, leaving much of the remote user base underserved." (Hickey 2006)

As a result, some businesses are forced to 'mix-and-match' WAN acceleration products, as some cover mobile or specific mobile devices, while others cover edge-to-edge performance. Management of these multiple solutions is difficult and introduces potential instabilities into the infrastructure.

Lastly, many WAN optimization products duplicate services already in place in existing network switches and routers. This only compounds problems with configuration and maintenance of the WAN (Siegel 2008). Beyond the issue of complexity, companies may pay for these features when they already exist within the network.

Limited or erratic performance increases

Many products require static configurations that are set to the properties of the WAN connection at the time of installation. If the WAN connection is stable this may be acceptable. Most WANs experience peaks in traffic and fluctuating conditions over a period of time, however. Tuning them for a range of connection conditions, again, requires thoughtful reconsideration of a number of properties including TCP window size, compression type, transport flow, quality of service (QoS), and many other options. If the WAN connection sees wildly fluctuating traffic conditions, performance may not be increased at all on average unless these conditions are specifically addressed by proper configuration. Remote laptop computers may have to install heavy client software as well to realize any improvement in performance. If SSL or IPSEC security options are not configured properly, performance deceases significantly. In addition, each application, SaaS, or end device may require individual attention for peak performance. A worst case scenario of extreme congestion or a denial-of-service attack somewhere on the network will also severely degrade most optimization devices.

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Potential security gaps

WAN optimization products may include additional security features, but most need to be carefully configured as mentioned previously. In addition, these extra security measures do not protect data after it is at rest at the network's edge on a server. Once the data has made its trip through WAN acceleration, it is unpacked and delivered to the network without security. The same situation applies to data delivered, regardless of whether it is transmitted over public or private WAN networks. Mobile applications are especially vulnerable.

WAN optimization made easy

Circadence offers a suite of WARP WAN optimization products that require far less configuration than existing solutions on the market. Because the WARP solution does not depend on specific network devices to achieve acceleration and security, it requires virtually no configuration. The WARP product line is available as a software-only client-server solution, as a hardware-based appliance, and as an embedded add-on to virtualization applications. Regardless of the WARP solution, the product dynamically adjusts to changing conditions on the WAN to provide peak performance, with no complex settings or parameters to set. WARP also offers solutions for smartphone and PDA users connecting to the WAN. All products work together. Customers can choose the solution that fits their WAN optimization requirements, and no reconfiguration of existing LAN or WAN equipment is ever needed.

Intuitive set up

Circadence has worked closely with its customers to produce an easy-to-install solution. WARP installations require no prior training, and most companies require less than ten minutes to set up a WARP appliance, for example. Server software consumes only one MB of space, while the 200 KB Windows client software for desktop and laptop computers installs in minutes with no configuration necessary. Client users are completely unaware of the software, and no intervention is required on their part.

Performance

WARP acceleration technology improves WAN performance at least 50 percent, depending on the application and connection type. In independent testing by a major U.S. cellular carrier, some remote applications experienced an increase in performance ranging from 100 to 1000 percent over a CDMA network.

WARP performance is achieved through its Transport Morphing Protocol (TMP) that tunnels through network congestion. Because WARP does not depend on the native network devices for provisioning, TMP achieves superior speeds regardless of switch equipment brand or type. An independent testing lab compared TMP to TCP protocols in a highly congested Internet environment to 27 disparate geographic locations.
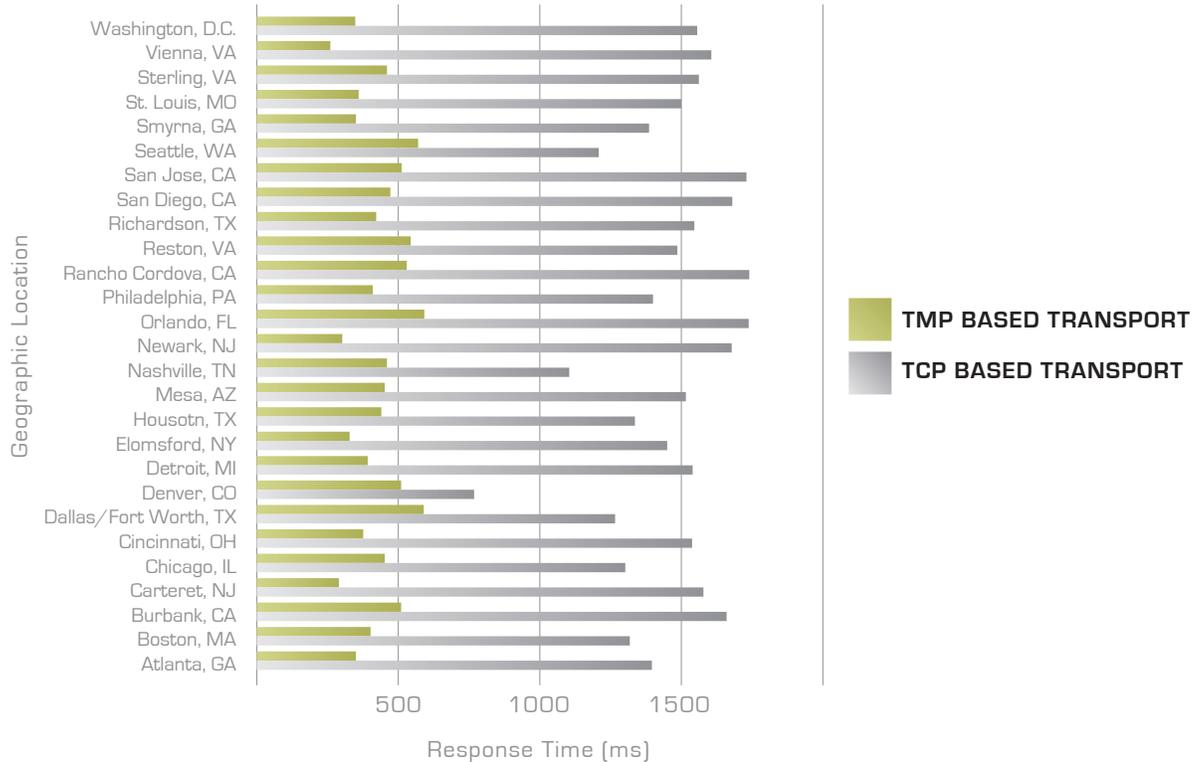
Figure 1: WARP TMP versus TCP

WARP TMP performed better than TCP to each geographical location. Analysts recorded increased performance using TMP that ranged from 51 to 555 percent.

Security

WARP acceleration algorithms also provide default data security from end-to-end with no configuration needed. Because WARP maintains protection directly to the client, data at rest on the edge server is not an issue. WARP security, in fact, has withstood the scrutiny of customers such as the U.S. government and Department of Defense (DoD).

Ease of management

All WARP products are managed through an intuitive Web interface. Regardless of which WARP product is installed, the management console provides a unified view of all software and hardware agents that are installed. Administrators can access the WARP management console from any location.
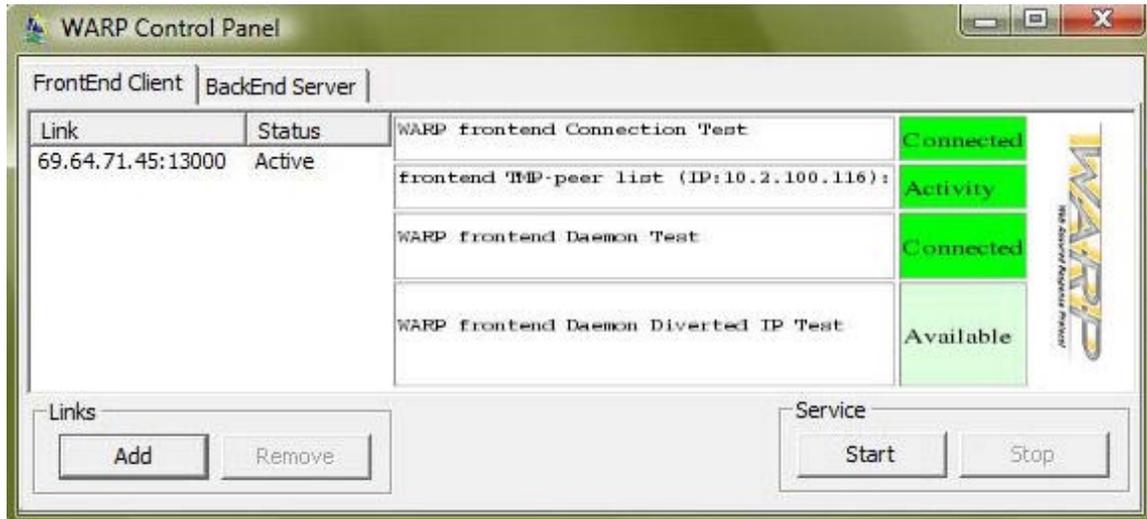
Figure 2. The WARP management console.

Resilient connection

WARP provides the additional benefit of a resilient connection. In extremely congested or intermittent WAN carrier conditions, WARP keeps endpoints connected. Mobile applications in particular require this resiliency to avoid time outs and data retransmissions. Resilient connections maintain user productivity and minimize the risk of missing or corrupted data.

WARP solutions

WARP components can be mixed and matched to provide a complete WAN optimization infrastructure without reconfiguring existing networks. Because all components are modular, the system can adapt as business needs grow. The WARP solution is available in the following products:

- **WARP Enterprise Suite** – This software package supports Windows and Linux, and is portable to almost any POSIX compliant operating system.

- **WARP Appliance** – This hardware solution not only centralizes WARP connections, but also ensures survivability during denial-of-service attacks. The WARP Appliance is DoD certified for classified installations.

- **Virtual WARP** – This solution provides support for Oracle VM, VMWare, MS Virtual Server, Xen, and other virtualization solutions and can serve as a virtual gateway.

- **WARP SDK** – Embedding WARP technology in applications is an option for customers with the WARP SDK development kit.

Conclusion

WAN optimization customers need solutions that fit their existing networks but can accommodate future expansion. WAN optimization should not require days of training, nor should it cause reconfiguration of existing networks. Customers should choose the type and extent of WAN optimization needed rather than be bound by vendors' requirements. Secure, reliable WAN acceleration should cover the entire WAN—from handheld devices, to servers, and to individual desktops if necessary. Finally, WAN optimization should dynamically handle any WAN condition without the need for complex configuration. The Circadence suite of WARP products are an affordable, flexible solution for businesses that need to maximize their WAN investments.

About Circadence

Circadence Corporation, founded in 1993 as VR-1, Inc., has its origins in the massive multi-user online simulations industry. Based in Boulder, Colorado, Circadence grew through several acquisitions, successful product launches and the formation of strategic partnerships including Microsoft, Deutsche Telekom, and Hewlett Packard. The Company's proven and patented Transport Morphing Protocol (TMP), built into the Company's Web Assured Response Protocol (WARP) solution, provides WAN optimization through the efficient use of bandwidth, while providing additional data transport speed, reliability, and consistency.

References

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Newman, David. "WAN acceleration offers huge payoff." *Information Age*, October 23, 2007.

Siegel, Eric. "WAN optimization: a market update." *Tech Target*, June 23, 2008.