

Global Attorneys, Centralized IT

A New Approach to WAN Performance

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The legal industry has moved rapidly from small, fragmented firms to a model of consolidated organizations with many practice groups that serve a broad range of clients. Even firms with a just a few offices in one region regularly serve national and global clients. Practice groups are often located in one office, yet they must collaborate frequently with attorneys in different offices. Interoffice client teams are now the norm, yet the architecture of the IT systems that support these teams has not adapted to this new environment.

This dramatic shift in attorney collaboration is causing ripple effects in the utilization of the wide area network (WAN). In the past, the WAN was used for occasional file transfers and scheduled back office IT tasks. Now, however, the WAN is pushed to enable interoffice client teams to work together seamlessly, regardless of practice group or attorney location. For example, a tax attorney based in Seattle may partner with a real estate attorney in Shanghai in order to serve a London client. In a case like this, the professional staff expects the performance of key applications will be the same regardless of where the application is located.

In a collaborative work environment, sharing files and information over the corporate network becomes a critical

communication path. Attorneys spend a significant amount of time accessing research, client information and historical data stored throughout the company. When attorneys cannot access the information efficiently, they must work harder to give the client the level of service they deserve. Most organizations have recognized that the WAN has the potential to enable seamless, productive communication among offices but haven't been able to achieve the level of WAN performance necessary to make this ideal a reality.

Enabling better interoffice client teams via the WAN consists of two critical components: faster information access and centralized information, both of which depend on higher WAN performance. That's where the WAN optimization power of wide-area data services (WDS) comes into play.

Understanding Wide-Area Data Services

Before WDS, most law firms and law departments could only hope to accelerate the transfer of a few distinct types of data across the WAN. One approach, called file caching or wide area file services (WAFS), helped improve file sharing. But caching is limited in scope and requires significant amounts of remote infrastructure management. It was a good step toward a solution but not the end goal, because files are only one form of data used by attorneys. Another potential alternative, network compression appliances, reduced the amount of information moving over the network, but they did very little to reduce redundant data transfers or deal with latency.

Early in 2005, the analyst firm Taneja Group noted that a set of vendors were creating products that took a broader, holistic approach to solving the problem of poor network performance. The approach aimed to combine the power of WAFS with network compression and application acceleration. The Taneja group declared, "Wide-area Data Services (WDS) is about much more than file services across the WAN; it encompasses TCP optimization, data reduction for replication, e-mail caching and a range of application protocol optimizations" (*Wide Area Data Services: Optimizing the Branch*, May 2005, The Taneja Group).

The impact of WDS technology can reach across all IT responsibilities. In the same paper quoted above, the Taneja group laid out some of the impact of WDS on the organization:

Centralizing distributed infrastructure like file servers, mail servers, Network Attached Storage (NAS) and remote office backup systems — without affecting remote users

Sharing large files among colleagues on different continents — as if they were in the same building

Performing backup and replication over long distance WAN links — and completing them during small backup windows

Delivering significantly more services on existing WANs — without upgrading bandwidth

Technologies built on the WDS concept take a holistic approach to optimizing WANs, performing optimization activities across all applications. At the same time, these products are designed with the ability to plug in additional optimizations that are specific to certain protocols. For example, common inefficient protocols such as CIFS for Windows servers, MAPI for Microsoft Outlook or MS-SQL for database applications can get special help from WDS products. Customers typically see application performance improvement that ranges from five to 100 times faster than unoptimized performance and bandwidth reduction that ranges anywhere from 60 to 95 percent. The actual improvement will vary by customer based on the applications used and network characteristics.

WDS products are deployed on each end of a WAN connection, with one-to-many connectivity for a centralized device. WDS focuses on the three main problems in WANs: bandwidth limitations, TCP protocol inefficiency and application protocol inefficiency. These problems are addressed in different but complementary ways.

Bandwidth limitations are handled by taking as many bytes out of all types of data transfers as possible and optimizing the way the rest of the bytes are sent across the network. WDS technologies either compress data or take bytes “off the wire.” Compression is well understood, but the concept of eliminating data transfers deserves a detailed look.

The best WDS products break up files and data into small segments in an application-independent way and store them in memory or preferably on disk. Then, any time data tries to move across a WAN link, the devices look on a disk or in memory for repetitions across all applications to see if the bytes have been previously sent across the network by any other application. For bytes that have been sent before, the server-side device sends small references across the network instead of the actual bytes, typically saving 65 to 95 percent of data from transfers.

Bytes that are new are compressed, sent across the network and then stored on the client-side device for comparison against future transfers. Using a combination of references

and new data, the client-side device reconstructs the file and delivers it to the user. This method of storing bytes and checking for redundancy should ideally be implemented as a bi-directional service, meaning that if a user in a remote office downloads a file and then later uploads a modified version of the file, the WDS devices will recognize that the bulk of the bytes are redundant. Disk-based devices perform better because they have a larger data store against which to compare requested bytes.

For example, consider two attorneys collaborating on a contract across the network. The first attorney writes the contract and e-mails it to another attorney across the country. Since the contract is totally new, the WDS appliances compress the information and send it across the network, saving some bandwidth. The second attorney makes some changes, modifies the file name and posts it to a document management system based in the same office as the first attorney. This time, since the WDS appliances have seen the data, only the bytes that have changed in the second attorney’s version are sent across the network. This happens even though the attorney changed the file name and is using the document management system instead of e-mail. Therein lies the power of WDS — by working across all applications and examining data on the byte level, the technology can provide massive bandwidth reduction for all data.

Further Considerations

To take full advantage of available network capabilities, IT managers must address more than just bandwidth. Latency is a secret throughput killer on the WAN, especially when poorly behaved application protocols add overhead beyond TCP’s overhead. TCP as well as application protocols suffer from a problem called chattiness. In order to ensure reliable transport in sometimes unreliable environments, these protocols were designed to send very small amounts of data (16 to 64KB) and then wait for an acknowledgement from the receiver. Given that latency adds milliseconds to each trip of a packet across the network, the process of sending a file that is possibly multiple megabytes may take minutes upon minutes.

The best WDS technologies approach this problem by addressing TCP directly for all applications that run over the network, and also creating a platform that allows for plug-ins to address the quirks and inefficiencies of application protocols. Others are trying to partner with network compression vendors in an effort to match the performance gains of more complete WDS products. The most popular protocols are already often addressed, including CIFS for Windows servers, MAPI for Microsoft Exchange, HTTP and FTP. The most advanced products are aggressively adding other key protocols to their devices, such as MS-SQL.

Meeting the challenge of latency while maintaining the reliable nature of protocols is where WDS products really shine. While TCP may have trouble overcoming latency, it is a very “safe” protocol that will handle congested or “lossy” networks. WDS products aim to maintain the safe nature of the protocol while optimizing data flow. TCP optimizations in WDS products often include adaptive window scaling to send more information in each packet, faster packet loss detection, selective and delayed acknowledgements, and congestion window validation for bursty applications. Ideally, the product has implemented these features in compliance with IETF (Internet Engineering Task Force) standards. The most powerful impact of TCP optimization occurs in conjunction with how the WDS device handles bandwidth reduction. If the product eliminates data and sends references instead of actual data, then each TCP window can be packed with references. Each reference can point to an almost unlimited amount of data, essentially “scaling” the TCP packet from 64KB into hundreds or thousands of kilobytes. This functionality can eliminate a staggering 60 to 98 percent of the round trips needed to complete a file transfer, minimizing the effects of latency while maintaining the “safe” nature of TCP transmissions.

Application protocols are handled in a similar way by reducing the number of round trips generated by the application (separate from those required by TCP), but the actual optimizations vary for each protocol, its quirks and where it has significant inefficiencies. If the WDS product is designed from the ground up to handle all TCP-based applications, it will almost always provide performance improvements to the application even if it does not have an application protocol-specific module. However, if the application’s throughput is limited by the way the application itself works, then fixing TCP alone won’t solve the problem. With an application protocol-specific module, improvements delivered by optimizing bandwidth and TCP can be increased by a large multiple. By understanding the application protocol (such as HTTP, CIFS or MAPI), the WDS device can do the “heavy lifting” of file access or file saves on the LAN and then only send the optimized data over the WAN.

Benefits Across the Organization

WDS products are a type of IT infrastructure. They transparently facilitate the flow of information. While they are not visible to the organization in the same way that new applications are, WDS products will nonetheless affect all key stakeholders that use the WAN.

Attorneys and staff see dramatic changes in the performance of applications and transfers over the WAN. And the WAN is less of an impediment to the practice of law, eliminating frustrating, non-billable tasks that require everyone to spend

more time doing back-office activities that do not directly benefit the client or simply take more time than they should. The speed of activities such as collaborating on a contract or discovery does not need to be limited by the amount of time to send information back and forth.

In addition, IT managers will see a number of benefits to their internal operations and workflows. First, IT applications such as remote WAN backup and upgrade management will be accelerated dramatically, just as user applications are. More importantly, the performance enhancement of user applications means that applications and infrastructure can be centralized. File servers, backup equipment, applications and other tools that are difficult and expensive to deploy and manage remotely can be consolidated into the corporate data center with no degradation of performance. IT managers can eliminate significant hardware costs, simplify infrastructure deployment and management and focus their staff on forward looking IT projects instead of fire-fighting, fielding user complaints and manual maintenance.

Finally, partners of the organization will recognize this type of solution as good for business. Providing better client service will assist in maintaining good client relations, and eliminating non-billable tasks that impede attorney practice will create a better environment for everyone in the organization. And of course, the tangible cost savings behind consolidating IT infrastructure will be of interest to anyone who wants to make the company more successful.

In Practice: Allen Matkins Case Study

While understanding the mechanics of a technology is important, the true test is seeing how the technology fares in a real-world environment. Allen Matkins Leck Gamble & Mallory LLP has deployed WDS technology that has dramatically changed the way the firm does business. With more than 200 lawyers located in five major business centers in California, their practice is national and international in scope. The firm has developed 17 highly successful practice areas including Corporate and Securities, Litigation, Real Estate, and Technology.

The key driver for Frank Gillman, Director of IT at Allen Matkins, was to optimize the existing network infrastructure to support the way their attorneys collaborate across offices and across practice groups. Critical applications for Allen Matkins include Interaction CRM by LexisNexis and DOCS Open document management by Hummingbird.

Gillman and his team deployed one WDS appliance in each office. “We had considered adding more bandwidth and hardware, but the annual leasing expenditures made a bandwidth upgrade prohibitive.”

WDS technology has enabled the firm's attorneys to focus on delivering the best possible client experience without enduring frustrating downtime, lost hours and nonbillable overhead. Gillman estimated, "With our WDS solution, we have eliminated more than 20 nonbillable hours annually for the average attorney working in a remote office. Now we can provide our high-quality client experience while eliminating behind-the-scenes manual labor by our attorneys. That also translates into an estimated \$980,000 in annual productivity gains for Allen Matkins.

"Litigation case files, which took more than 22 minutes to download, can now be downloaded in two and a half minutes for a cold transfer. Edits followed by a transfer across the network take about eight seconds. No amount of added bandwidth could do that for us."

WDS products have also enabled consolidation of IT infrastructure. Because access to information is now accelerated, critical client data and documentation can be stored centrally, where all practices can access it. "Because of WDS, we no longer need to maintain as much remote IT infrastructure. We have changed the way we deploy remote infrastructure and backup remote data, for the better," concluded Gillman.

Summary

Law firms and law departments will find that WDS technology has a positive impact in a number of areas across their organizations, most importantly enabling attorneys to provide better client service while eliminating frustrating nonbillable tasks. IT managers can make the WAN more effective, reducing user complaints as well as simplifying standard IT tasks. Infrastructure consolidation is also feasible, as the Allen Matkins case study shows.

WDS technology complements existing IT infrastructure in firms and law departments that share information, data and files among offices. WDS vendors implement solutions from slightly different perspectives, but overall the technology provides a significant boost in network performance by attacking the root causes of network limitations.

Mainstream law firms and law departments that are local, national and even global in scope have rigorously tested and deployed WDS technology. Any organization that has a wide area network should consider WDS technology as an ally in the pursuit of optimum WAN performance.