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TACTICAL ADVICE

WAN Optimization Helps Businesses Do More with Less Bandwidth

Changing technology dynamics are requiring most organizations to jump-start network traffic.

by [Karen D. Schwartz \(/author/karen-d-schwartz\)](#) posted **Sep 04, 2013**

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Chances are organizations are calling upon their wide area network (WAN) to do more than ever. Applications like unified communications and video conferencing coupled with branch-office expansion, data center consolidation and increased Internet traffic mean more interest and focus on WAN capabilities.

Fortunately, there are technologies and products emerging that allow users to enhance WAN traffic. They do this by such techniques as removing redundant transmissions, compressing and prioritizing data, staging data in local caches and streamlining chatty protocols.

Improved backup, boosted data throughput and faster network response times are some of the benefits of WAN optimization. Coupling this with the prospect of saving money, often makes the case for WAN optimization nearly a no-brainer.

These days, the WAN is of constant concern for business as bandwidth demand climbs. WAN optimization solutions do more with what a company already has. It may also negate spending outlays. And that can mean a lot in a capricious economy.

Different World of Work

Today's workplace is much different that the workplace of even five years ago. More organizations sanction telecommuting, and more employees are accessing files and applications while on the go from any number of devices. Some of which are organization-owned, but many are owned by the employees themselves.

At the same time, entities have made great strides in streamlining their operations and their technology. They've consolidated and reduced the number of data centers and are increasingly moving to cloud computing models for some of their applications and infrastructure.

While these changes have improved the efficiency and pace of business, they have taken a large toll on enterprise networks. An employee working from home or from a branch office, for example, still needs to be able to access files and applications quickly, even though those files and applications reside either at a corporate data center or in the cloud — far away from the employee's device.

All of these factors have created challenges for organizations that want to keep the flow of business moving quickly. While a branch



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That introduces latency and puts a lot of stress on protocols like Message Application Programming Interface (MAPI) and Common Internet Protocol System (CIFS). These were not designed to work over large distances, says Dormain Drewitz, senior marketing manager for solutions and verticals at Riverbed.

The result has been less than optimum access to vital information, which frustrates employees and slows the pace of operations to unacceptable levels. WANs are experiencing high degrees of latency and sluggish performance. And WAN links are expensive. Applications and multimedia files can slow to a crawl.

"This has resulted in latency and packet loss, because applications and files are fighting for a finite amount of bandwidth," explains Dawn Parzych, a product manager at F5 Networks. "When everybody was local, there was no need for a lot of bandwidth because everybody was accessing applications from the LAN," Parzych says. "Now companies are trying to serve the same content with the same amount of bandwidth, but over distances."

More Bandwidth? Maybe Not

While some IT shops try to fix the issue by increasing bandwidth, that approach can be very costly and may not solve latency issues. "A lot of organizations have run up against the reality that you can only increase bandwidth so much before the cost becomes prohibitive," says Henry Svendblad, a principal research analyst at Nemertes, a technology consultancy.

For many, the solution is WAN optimization technology, which optimizes network traffic to take advantage of traffic conditions and various connections. The right WAN optimization solution can make a big difference in improving performance, and can greatly improve productivity.

A 2013 report from Nemertes found that large businesses that employed WAN optimization had a median revenue per employee of \$314,107, versus \$127,833 for companies that didn't use it.

WAN optimization is an umbrella term that consists of a group of technologies including compression, byte caching, deduplication, application and protocol optimization, and proxy services. Every vendor takes a slightly different approach, but the result is always better application performance.

Riverbed Technology's Steelhead product line, for example, offers both virtual, software-based solutions and appliances. The variety of form factors and deployment models it offers can support mobile workers, branch offices, virtual infrastructures and cloud-based solutions.

F5, which comes at WAN optimization from a secure application perspective, includes forward error correction, compression and TCP windowing. This helps minimize Transmission Control Protocol (TCP) re-transmissions by better understanding how to reassemble content.

Blue Coat's approach is to address both traditional WAN optimization between branch offices and data centers, and newer products that work with caching Internet content. In the latter case, the same device can be pointed at the Internet to help accelerate cloud applications, video/audio streaming and mobile traffic in addition to providing bandwidth management.

Nuts and Bolts

WAN optimization is designed to do three basic tasks:

1. Reduce the amount of data on the wire
2. Prioritize traffic based on an enterprise's needs
3. Accelerate inefficient protocols

Data Reduction: Reducing the amount of data on the wire requires three technologies: compression, byte caching and deduplication.

Compression consists of reducing the size of data by converting it to a format that requires fewer bits. As the data size is reduced, more bandwidth becomes available, which leads to faster transmission times. Once the compressed data arrives at its endpoint, it is transformed back to its original size.

Byte caching is a method of replacing repetitive streams of raw application with truncated "tokens" before they traverse the network. It

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Deduplication works at the byte level to reduce the amount of data sent across the WAN. It's an effective way of decreasing storage needs by eliminating redundant data. For example, instead of backing up all 50 instances of an application server, it would store only one instance, with additional instances just referencing back to the original saved copy.

Traffic prioritization: This specifies which traffic gets priority over other traffic. For example, it can be set up so that if a link is congested, Voice over IP (VoIP) gets priority over web traffic. With this technology, networks can prioritize time-sensitive and mission-critical traffic, or services that are sensitive to latency, such as real-time video.

Protocol acceleration: This helps speed up inefficient protocols like MAPI and CIFS.

"You have these inefficient protocols that are very chatty, which means they have hundreds of back and forths to accomplish a task," says Mark Urban, senior director of product marketing for WAN optimization solutions at Blue Coat. "With protocol optimization, instead of making those inefficient protocols work over the WAN, let's replace them with more streamlined and efficient protocols between two WAN optimization boxes."

Optimization Choices

WAN optimization solutions come in two basic form factors — either a physical appliance with ports or a virtual appliance installed on a server. In either case, the solutions work symmetrically, which means that a device or software-based solution must be installed on either end. In the case of mobile devices, that would be a mobile software client running on a notebook, smartphone or tablet.

Both are managed by the WAN optimization controller, which controls the optimization by modifying content, compressing and analyzing packets to determine which type of optimization is best suited for the request and response. It can be centrally managed through a web interface.

Although the solutions differ, there is something for everybody, depending on the needs.

"It depends on so many factors," Svendblad says. "If it's a university with three large campuses all connected with high-speed links that serve all of its applications from a data center, that's one set of criteria and solutions that are more data center-centric and not as concerned about optimizing connections over a slow WAN. If you're talking about a bank with thousands of branches that wants to accelerate traffic between those locations, then you are looking at something different."

The solution chosen also should take into account the types of applications that need to be accelerated. Heavy users of legacy file-based applications, that require access to Windows file services or traditional file-sharing protocols, may steer toward a solution that can cache and optimize traffic between the two. An organization that needs to optimize the network for video traffic might go down a different path.

As organizations continue to decentralize and technology continues to change, the need for WAN optimization will only grow. "It will become more mainstream as organizations struggle with how to optimize content," Parzych says.

As next-generation technologies and protocols become reality, the need will grow stronger. She points to HTTP 2.0 as a good example. The new version of the HTTP network protocol is expected to include enhancements like asynchronous connection multiplexing, header compression and request-response pipelining — capabilities that, Parzych says, will require organizations to be able to optimize content and address challenges presented by the new transport mechanism.

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