How WAN Optimization Helps Enterprises Reduce Costs

High-performance networks aid productivity and sharpen competitive edge

If you wanted to break down innovation into a tidy equation, it might go something like this: Technology + Connectivity = Productivity. Consider what's cutting-edge right now: mobility, cloud computing, unified communication and collaboration (UC&C), and virtualization. Each of these technologies brings its own special impact to the connectivity part of the equation — that is, the network.

Productivity comes in two forms: user experience and infrastructure efficiency. It also comes from system efficiency, such as server consolidation enabled by a single server running multiple virtual machines. And it comes from the ability to transmit services wherever they may be necessary. Because productivity enhances revenue, businesses are investing in technologies that boost it.

But it all relies on the network, and the network is being deluged with data. In a recent Gartner survey[1] of IT organizations, respondents cited data growth,

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system performance, and network congestion as their top three concerns.

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At the same time, both internal and external data demands are increasing. Internally, the demand comes from richer apps, virtual desktop infrastructure (VDI), streaming video, and voice-over-IP (VoIP) communications. Externally, globalization, cloud infrastructures, and increased mobile access stress the network. This makes it imperative to ensure that enterprises optimize their networks to accommodate this onslaught of both data and devices. In its May 2012 report, "Plan Now for the Hyperconverged Enterprise Network," Gartner estimates that, by 2014, 80% of end-user traffic will move to the WAN.

In addition to handling dramatically increased data traffic, optimizing the WAN helps enterprises save money in three key ways: first by reducing the overall cost of networking, then by ensuring optimal application performance, and finally by increasing user productivity.

How WAN Optimization Enables New Technology Deployments

Enterprises can drive further cost savings in multiple ways, such as through data center consolidation, virtualization, cloud computing, and automation. But each of these could adversely impact application performance over the network, further driving the need for WAN optimization.

For example, data center consolidation represents a major cost-saving effort in and of itself. Enterprises are looking at ways to consolidate their data centers — in some cases from hundreds to dozens. Their goal is to centralize and simplify management through standardization of their system and network configurations, and reduce infrastructure costs. Fewer data centers require fewer IT resources to monitor, and with less hardware to manage, IT can boost overall reliability and security.

Enterprises are also taking advantage of consolidation through server virtualization — the ability to utilize more capacity within a server by hosting multiple virtual machines, which in turn run more applications. As with data center consolidation, server virtualization reduces the number of physical machines IT needs to support. Server virtualization also supports cloud computing, because virtual machines can potentially run anywhere — in a public cloud, a private cloud, or a hybrid scenario.

But with fewer data centers and more cloud computing options, users may be farther removed from the data they need to do their jobs. That distance impacts application performance drastically, potentially causing network data traffic congestion, thereby increasing latency (delays that affect performance).

This is not solely a technical issue relating to systems and networking. With global companies relying more on collaboration tools, such as shared portals to store the latest versions of documents, and conferencing tools to set up impromptu audio-conferences, network performance is a productivity issue.

Many business activities, ranging from product development to account reconciliation, depend on collaboration. The better employees can share resources, the faster they can achieve results. For product releases, that means faster time-to-market. For troubleshooting, it means more uptime. For account reconciliation, it means higher levels of compliance. All those activities drive business revenue.

Moreover, if users try these services but encounter frustrations with low performance, they're likely to stop using them. That will result in failure to meet the business objective tied to the deployment of these collaboration and file-sharing applications.

One tactic enterprises may consider is simply to deploy more bandwidth. But that's like adding another lane to a freeway, which, as any transportation engineer can confirm, is an expensive and short-term solution, especially as network traffic grows at an alarming rate. In addition, adding more bandwidth does nothing to address network latency, especially over long distances. Network latency acts as a speed limit for application performance, even with abundant bandwidth. Realistically enterprises cannot adequately address exponential growth with linear solutions. Enterprises need to both add new lanes and make traffic move faster.

That's why more and more enterprises are deploying WAN optimization solutions. WAN optimization tackles issues of bandwidth, latency, and cost with a variety of techniques.

[1] www.computerworld.com/s/article/9194283/Data_growth_remains_IT_s_biggest_challenge_Gartner_says

In order to address bandwidth bottlenecks and network latency, IT needs to consider WAN optimization solutions that streamline data and ensure quality of service (QoS). From the data standpoint, WAN optimization solutions can apply deduplication techniques to reduce network traffic. To streamline the data, these solutions analyze data at the byte level and send only the new or changed bytes of data, drastically reducing the amount of traffic across the WAN.

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Another technique to optimize bandwidth is prioritization of data to ensure QoS. This involves using deep packet inspection to identify all of the critical applications on the network to determine which applications need to be protected, which should be contained, and how much bandwidth should be allocated to each. With this accurate classification, and by applying QoS policies, IT can ensure sufficient bandwidth to deliver performance for key applications such as VoIP, video, and desktop virtualization. This capability ensures that real-time data — for instance, from a video surveillance camera — is transmitted faster than asynchronous data, such as email or documents, where latency is less of an issue.

IT can also use WAN optimization tools to address the issue of latency. Network protocols periodically confirm the arrival of data as it travels in chunks, but transport protocols can get streamlined through repacking TCP packets into optimal payload sizes to enable more efficient transmission of data across the WAN. Similar to transport protocols, applications that are deemed "chatty" require a lot of back and forth between the client and server to operate. Latency on the WAN causes excessive round trips, which translates into a degraded user experience.

Some WAN optimization tools can substantially reduce chattiness by applying application streamlining technology. As soon as the tool gets the first signal from the user to access an application, it predicts the application behavior and notifies the server. The tool then ensures that the application transfer is completed between the server and WAN optimization appliance, and then transmits a single response to a second appliance closest to the user. That eliminates the back and forth chattiness between the server and user over the WAN.

The upshot: Enterprises can use the combination of these WAN optimization techniques to avoid the cost of deploying more bandwidth (which alone may not have even solved the problem) and the complexity of more network connections — and still achieve optimal performance. Enterprises can not only get more out of their current network infrastructure, but they can be better prepared for whatever demands might be placed on that infrastructure in the future. And these WAN optimization techniques succeed where bandwidth alone does not.

How a Consulting Engineering Firm Benefits from WAN Optimization

Some companies that rely on their networks for the exchange of high-bandwidth data among their locations are already taking advantage of WAN optimization solutions. One such company is Terracon, an Olathe, Kansas-based consulting engineering firm providing geotechnical, environmental, construction materials, and facilities services, with more than 2,800 employees and 130 offices nationwide. Terracon employees early on confronted issues of bandwidth and performance because they work with engineering and technical documents that are much larger than spreadsheets and text files.

In 2006, Terracon CIO Frank Milano created a highly distributed network with centralized storage for documents. His goal was to improve how Terracon provides clients with its engineering expertise through the availability of documents, no matter where Terracon employees might be located. Each Terracon office has a server used by employees to generate documents locally. Employees in each office have read-only access to documents from other offices. Milano wanted to be able to back up documents centrally for greater reliability and disaster recovery.

Says Milano: "Trying to transmit the files across the WAN, without optimization and without adding more bandwidth, was impossible." Backing up the files centrally was especially difficult because of the impact on the network.

Milano investigated WAN optimization as a way to solve the problem, consulting with other IT professionals in the engineering industry before eventually choosing Riverbed® Steelhead® WAN optimization solutions.

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CIO
TERRACON

The results have been impressive, to say the least.

"Implementing Riverbed Steelhead appliances meant we did not have to increase our bandwidth," says Milano, who estimates that Terracon gets anywhere from two to two-and-a-half times the amount of data through its network using Steelhead appliances than it did before.

"Without it, we would have had to double our bandwidth at an approximate cost of about $1 million," he says. "And even if we did double bandwidth, we'd still face the issue of latency in our distributed network. With Riverbed, our return on investment was approximately 18 months, including maintenance fees. Even with telecom prices coming down, it still makes sense to use WAN optimization technology."

Even so, Terracon does plan to significantly increase its bandwidth for two reasons: to provide centralized read/write access to documents for all its offices, and to support the deployment of video for viewing training and sales materials. Savings generated by Steelhead appliances, Milano says, enabled Terracon to consider these network enhancements.

There are other advantages, Milano adds: "Intangible things you can't measure."

For example, because documents are now centrally stored, engineers are always working on the most up-to-date version of a document. Thanks to their deduplication capabilities, Steelhead appliances significantly reduce latency on the large documents that are Terracon's primary deliverable. Terracon is now able to deliver better service to clients while improving employee productivity, collaboration, and satisfaction.

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Creating a More Optimized Network

Terracon's issues are emblematic of many of the challenges enterprises confront today when it comes to their network. On the technology side, it's seeing bigger files, more centralized systems, and the need for a more reliable infrastructure. On the operational side, it faces an increased need for employee productivity and the need to serve clients faster and more efficiently.

But for many enterprises, other potential demands loom over the WAN, whether from mobile devices, cloud computing, video, or unified communications (UC). That makes optimizing the network as important as having optimized servers or the fastest personal devices. The network is no longer a pipe to connect point A to point B; it has become a strategic asset that allows businesses to be more competitive, respond more quickly to customer and industry demands, and serve as a foundation for whatever innovations might evolve next.

Perhaps the greatest benefit of networks that have been "future-proofed" with WAN optimization technology is a much sought-after sense of IT control and preparedness. By deploying WAN optimization solutions such as those from Riverbed and by investing in making what they have better instead of bigger, enterprises can ensure that their networks are always ready to handle whatever demands the business throws at them.

Ultimately, WAN optimization can create a virtuous circle of capabilities that allow an enterprise to grow, rather than be saddled with an infrastructure that holds it back. Enterprises can deploy cloud computing, mobile computing, and unified communications without having to invest more money in their infrastructure. And they can ensure that these state-of-the-art technologies perform quickly and efficiently on their existing infrastructure. Efficient systems in turn spawn increased user productivity and competitive advantage.

The more global enterprises become, the more they consolidate their data centers, and the more they demand superior performance from their network, the more important WAN optimization will be as a strategic tool. ■