WAN Optimization:
The key to effective private clouds

Addressing any network limitations can make the difference between success or failure of a cloud-based system, which, in turn, can impact an organization's effectiveness and competitive advantage in its market.

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Organizations of all shapes and sizes are looking to private cloud implementations to increase IT efficiency and help end users collaborate more easily. They're after benefits that include lower costs, easier management of IT resources, improved disaster recovery and employee productivity gains. But organizations are also finding out that such advantages can only be achieved when they ensure their wide-area networks can offer speedy access to centralized IT resources for faraway users.

Addressing any network limitations can make the difference between success or failure of a cloud-based system, which, in turn, can impact an organization's effectiveness and competitive advantage in its market. WAN optimization solutions, like those Riverbed Technology offers, can accelerate private cloud implementations and add a layer of visibility and intelligence to enable users to be productive, while helping to deliver the cost and management efficiencies businesses require.

Riverbed Technology solutions were the key to one organization's successful private cloud deployment. When David van den Berg joined the Australian-based construction and contract mining firm Macmahon as CIO in late 2008, he found a user base practically in revolt, complaining of slow application response times for the firm's Citrix XenApp applications due to inadequte WAN performance. This was shortly after the company had centralized some 200 servers at its data center in Perth and created a private cloud.

"The project was failing, and there was massive pushback from the business," van den Berg recalls. "The only way we could make it work was to deploy WAN optimization infrastructure."

Van den Berg was already familiar with WAN optimization technology from his experience at a previous company that deployed Riverbed Steelhead appliances. He quickly put the Steelhead products on his short list, ran a pilot test, and began deploying them to the company's 30-plus sites.

With their ability to not only compress traffic, but also optimize specific applications and protocols - including the Citrix ICA protocol - the Steelhead appliances gave users the performance they were after, improving user productivity by about 20 percent. What's more, the appliances enabled Macmahon to reduce the size of many of its WAN links by half or more. Given the savings in bandwidth, "the return on investment was about nine months," van den Berg says.

Your own private cloud

WAN optimization enables companies to realize the benefits they hope to get from private cloud implementations, which are essentially consolidated groups of virtual servers and storage systems housing applications that users can access from wherever they may be. Private clouds are different from public cloud services in that the IT resources are owned and operated as a utility by the end-user organization, rather than provided as a service by a third party.

Private clouds can often dramatically lower IT operations costs versus a distributed server infrastructure, due to the increased utilization and simplified management.

The private cloud concept was born out of two major trends in IT in recent years: centralization and virtualization. Centralizing servers enables IT to more easily manage and control resources, as opposed to trying to manage servers in remote locations with little or no IT staff. Virtualization enables far greater utilization of servers, storage and other IT resources, along with greater flexibility in where applications run.

Together, centralization and virtualization enable improved security because most resources are in one physical location and it's simpler to standardize security patches and updates. Virtualization also makes it far easier for IT to keep up with business demands, with the ability to spin up new servers much more quickly. Disaster recovery is likewise improved, as companies can more easily create snapshots of their environments at any point in time, replicate them to off-site servers, and fail over to them if need be with just a few clicks—with little to no business disruption.

It all adds up to a simplified, more nimble IT environment, where IT can more readily meet changing business requirements. Further, private clouds can often dramatically lower IT operations costs versus a distributed server infrastructure, due to the increased utilization and simplified management.

Getting the WAN right

A crucial element to any private cloud, however, is the ability to provide good, reliable application performance and data transfers over the WAN. As organizations centralize IT resources in a private cloud, they increase the distance between those resources and end users. Increased distance naturally means additional latency, which slows performance. Buying more bandwidth may seem the obvious solution, but it can be so expensive as to thwart the private cloud business case. What's more, additional bandwidth won't solve performance problems caused by latency or issues related to the behavior of certain protocols and applications.

As the Macmahon example shows, it takes WAN optimization to ensure the success of a private cloud implementation. And the WAN optimization solution must be able to address each of three distinct issues that can all lead to performance problems:

- Insufficient WAN bandwidth
- Inefficient network transport protocols
- Inefficient application protocols

Riverbed Steelhead

Riverbed Steelhead products address each of those issues. Customers can choose from three versions of Steelhead products:

- The Steelhead appliance that's known for its ease of installation and manageability
- Steelhead client software for desktops and laptops, which brings WAN optimization capabilities to mobile users
- The Virtual Steelhead, a new software-only format that brings new flexibility in how users deploy the product (see sidebar)

DATA STREAMLINING

Steelhead products incorporate numerous technologies to address all aspects of WAN optimization. At the most basic level is data streamlining, which eliminates most redundant data going across the network. Data the appliance has seen before is stored locally, so only changes need to travel over the WAN. If a user retrieves a PowerPoint presentation from a remote server, for example, the file may be compressed but transferred in its entirety the first time. Subsequently, only changes need to be sent across the WAN, thus dramatically reducing the amount of bandwidth required.

TRANSPORT STREAMLINING

Riverbed also streamlines "chatty" transport protocols such as TCP by providing many acknowledgments locally, thus limiting the number of roundtrips that packets require and reducing the impact of latency over long-distance WAN links. The appliance can also expand the amount of data referenced in each packet and ensure packets don't suffer delays in the face of congestion.

APPLICATION STREAMLINING

Similarly, Steelhead products provide specific optimization techniques with deep understanding of more than a dozen application protocols (see chart)—far more than most other WAN optimization vendors. Here again, the Steelhead family takes steps to eliminate unnecessary roundtrips, perform more tasks locally, and reduce the performance problems caused by high latency.

QoS

While data, transport and application streamlining will often be enough to deliver great performance, in some instances—especially where bandwidth is scarce—users will also want to be able to prioritize certain traffic. Steelhead products have their own built-in quality of service (QoS) features and are also fully compatible with

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—KRISH MANI,
EXECUTIVE VICE PRESIDENT & CIO, MASTERBRAND

other QoS tools to ensure the most important applications always get the bandwidth they require when they need it.

MANAGEMENT STREAMLINING

Steelhead products are also exceptionally easy to deploy and to manage, another differentiator. Most customers deploy the device directly in the network path, with one wire coming into the Steelhead appliance from the router, and another going out to a switch. The products auto-discover each other across the WAN, collect information about the type of traffic that's running, and immediately take steps to optimize it. There's no need to configure tunnels between devices. The Riverbed Central Management Console (CMC) makes it simple to manage all Steelhead products centrally.

SCALE AND HIGH AVAILABILITY

Large enterprises will appreciate the ability of the Steelhead product family to scale, both in terms of high throughput and the ability to handle large numbers of locations and users. A single Steelhead appliance can handle some 100,000 connections, which may translate to roughly 20,000 users. Using the Riverbed Interceptor, up to 25 Steelhead appliances can be clustered to scale up for even more users and provide for high availability, enabling customers to support hundreds of thousands of users—significant scalability in a private cloud environment.

BRANCH OFFICE BOX

And while the initial thrust behind private cloud initiatives is to centralize as many resources as possible, companies often require some servers in branch locations to handle edge services such as printing, Web filtering and security applications. The Riverbed Services Platform (RSP) is a VMware-based platform on which users can run all such services, providing a "branch office box" solution that supports many best-of-breed offerings from vendors such as Microsoft, Infoblox, McAfee, Websense and others.

VIDEO SUPPORT

Video puts a big strain on any network, but Riverbed can deal with it using QoS capabilities as well as through its partnerships with video solution providers such as Microsoft, Polycom and Accordent. When multiple users in an office want to watch the same video, for example, one stream is sent across the WAN and then split up locally, thus conserving WAN bandwidth.

Customer views

The ability to address not only data compression and deduplication, but also transport and application protocol streamlining, made the Riverbed Steelhead appliance attractive to MasterBrand Cabinets, says Krish Mani, executive vice president and CIO for the firm. MasterBrand is in the midst of an ongoing consolidation project as it tries to centralize IT resources after a series of acquisitions and move to a shared services model of IT.

An experiment in 2007 with another WAN optimization vendor left MasterBrand skeptical because the product was not able to scale to handle its main data center and some 35 remote locations. But a Riverbed Steelhead pilot for a Web-based ERP application used for scheduling and transportation applications delivered a dramatic performance improvement and made believers of MasterBrand.

"We found an immediate 450 percent bandwidth improvement," says Jadd Miller, senior network engineer for MasterBrand. That translates into significant business benefits.

"In applications where we've enabled WAN optimization, it has increased user productivity between 20 percent and 40 percent," Mani says. At the same time, the Steelhead appliances have decreased the time it takes to run routine system chores, including backups and batch jobs such as scheduling, by 30 percent to 50 percent, conservatively.

"Reducing the window for those jobs using WAN optimization means we are able to provide more availability of the systems for the manufacturing plants," Mani notes. "It's a direct correlation to the business to have those systems up and enable shifts to increase operations in the plants."

SCALABILITY

As with MasterBrand, scalability issues hindered Philip Morris' initial attempt at WAN optimization some five years ago—a significant issue when an organization has 680 locations. The company had been pursuing a strategy of application centralization for nearly a decade, but ran into performance problems for some key applications in areas including Asia Pacific, Latin America and some parts of Eastern Europe, says Nigel Larkin, manager of IS and telecommunications strategy at Philip Morris.

Best in class for application optimization

Riverbed currently streamlines more application protocols than any other WAN optimization vendor, including the following:

- CIFS
- CIFS Print
- Citrix ICA
- EMC SRDF
- Encrypted MAPI/ Exchange 2010
- FCIP
- HTTP
- Lotus Notes
- Mac CIFS
- MS-SQL
- NFS
- Oracle
- SharePoint
- SSL

For more information, go to: **www.Riverbed.com**

After evaluating five products, the company conducted pilot tests with Cisco and Riverbed. The Riverbed Steelhead product family got the nod, in part because of its ability to scale, thanks to the Riverbed Interceptor.

Today, the company has Steelhead appliances deployed in about 130 locations across Europe, Asia and Latin America. The products are delivering a roughly 50 percent bandwidth reduction overall, which translates into greatly improved application performance.

At one of those locations—a Philip Morris site in Brazil – lagging performance could not be solved simply by adding bandwidth, so the company deployed Riverbed Steelhead appliances. It immediately achieved a 50 percent reduction in WAN bandwidth and application performance improved dramatically—so much so that users began using centralized applications far more than they had before, prompting the need for more bandwidth. "With the increase in performance and the improved visibility of the traffic, we could easily demonstrate the ROI of the Steelhead appliances and the line upgrade," Larkin says.

In a nutshell, the Steelhead appliances have played a key role in the success of the company's strategy to consolidate its three major data centers into one single data center in Switzerland. "The consolidation of many services would not have been possible without this type of [WAN optimization] technology," Larkin says.

EASE OF USE

Another attribute that initially attracted Larkin to Riverbed was the product's ease of deployment. "There's limited configuration to be done," he says, whereas a competing product from Cisco "was very difficult to deploy." Additionally, the CMC enables him to manage all his Steelhead devices from the Swiss data center.

MasterBrand's Miller was likewise influenced by how easy it is to install Steelhead products.

"I'm the only one of me in the organization," he says. "It would be cost-prohibitive for me to have to travel to each of the remote sites to install the appliance." Instead, Miller preconfigures each Steelhead appliance himself, ships it to a contact at the remote location, and walks that person through the installation process. "We're done in 15 minutes," Miller says, even though the remote person is not an IT staffer.

RAPID ROI

These benefits not only help companies deliver on the promise of their private cloud implementations, but—as Macmahon's nine-month ROI indicates—they add up to an attractive business case for Riverbed Steelhead products.

Medi-Clinic, a private hospital group based in South Africa, installed some 58 Steelhead appliances to support its private cloud initiative. The devices enabled a 300 percent increase in bandwidth utilization, enabling the company to avoid expensive bandwidth upgrades. "We recovered our investment in the Steelhead products within 11 months," says Deon Myburgh, group IT operations manager for Medi-Clinic. That figure is based on bandwidth alone, and doesn't factor in user productivity gains, which are significant given that the company is enjoying an average 80 percent improvement in file download speeds.

MasterBrand's Mani says his company avoided spending $105,000 per month to buy the same amount of bandwidth the Steelhead appliances delivered by optimizing existing links. "That translates to a very rapid ROI," he says, noting that much of the benefit his company derives is from employee productivity gains achieved due to the increased application performance.

Based on his experience, in order to deliver the performance users require in a private cloud environment, Mani says, "WAN optimization is not an option for companies. It's a necessity."

This just in: Virtual Steelhead

Riverbed has recently delivered the Virtual Steelhead, a VMware-based version of its Steelhead WAN optimization technology. Virtual Steelhead runs on virtual servers alongside other applications, enabling companies to further consolidate their environments. It can also run on ruggedized platforms, extending the WAN optimization technology to harsh environments such as the military and space-constrained locations where an appliance wouldn't easily fit. In joining the existing Steelhead appliance and Steelhead Mobile software for laptops and desktops, the Virtual Steelhead gives users another option for WAN optimization technology deployment.