



OPTIMIZING THE HYBRID CLOUD

IN A WORLD OF RAPIDLY ADVANCING DEPLOYMENT CHOICES, ENTERPRISES NEED TO HAVE THE FLEXIBILITY OF A HYBRID CLOUD WHILE STILL BEING ABLE TO MANAGE THEIR INFRASTRUCTURE.

The landscape of the IT enterprise is changing faster than ever. Not since the days when client/server computing shattered the walls of the glass house has IT faced so many new options for infrastructure.

In a way, those shattered walls have just kept dispersing outward. There seem to be no boundaries, with enterprises uploading and downloading data anywhere – from campus to campus, from stores to headquarters, even from offshore oil rigs to onshore data centers. Nor is it just data. Users are everywhere now too, whether they're employees, partners, suppliers or customers. Adding to the complexity is the fact that IT has gone to great effort to break down the silos of operational processes and integrate data as much as possible.

The result of this dispersion is a highly challenging infrastructure matrix, one that requires IT to maintain a harrowing balance. CIOs must offer flexibility to the lines of business, which need a network that makes the most sense for their business processes. But at the same time, CIOs must oversee infrastructure strategy and ensure the security, availability and reliability of the network. Together, CIOs and line-of-business owners must focus on ways to support both business outcomes and IT productivity.

In search of this goal, enterprises are increasingly going hybrid – creating an infrastructure that aggregates both internal data centers and external cloud-based data sources. The key question for IT then becomes: How can it optimize this hybrid infrastructure to achieve business goals without straining IT resources?



/// THE JOURNEY TO THE CLOUD

Cloud computing is inarguably one of the biggest developments in IT. In late 2014, IDC estimated spending on public cloud services would be \$56.6 billion in 2014 and grow to more than \$127 billion in 2018, representing a five-year compound annual growth rate of 22.8 percent — and that didn't even take into account private cloud spending.

Part of the reason for this boom has to do with the numerous options for cloud computing that IT has at its disposal. It can deploy clouds in a variety of permutations, based on business need.

For instance, private clouds, managed by either customers or service providers, take advantage of virtualized resources to offer processing and storage on demand, for the height of elasticity and scale. This scenario works well for a variety of businesses, especially those with seasonal demand.

With hosted private clouds, service providers manage the cloud on the customer's own premises. This scenario can be used for important, even mission-critical applications, because while customers maintain control through strict service-level agreements, they also get the efficiency and scalability that service providers offer.

The advantages of private clouds, whether managed or hosted, are numerous. They give customers high levels of connectivity and security because they are private. But customers also benefit from application scalability and interoperability.

A hosted public cloud, whether offering infrastructure (IaaS), development platforms (PaaS) or applications (SaaS) as a service, provides even more scalability, flexibility and economy. The latter benefit is especially true for SaaS, which works well for fundamental applications that need little customization, such as email or office productivity tools.

Hosted clouds, whether public or private, deliver a number of advantages as well: They provide a high level of application functionality as well as data integrity. Why? Because in most cases, service providers can apply higher levels of security and

availability than customers may be able to afford on their own.

/// THE CLOUD CONTINUUM BRINGS CONTINUING CHALLENGES

Together, these cloud options create a continuum across which IT can create a hybrid cloud infrastructure. But choice can also be confusing. Before discerning the optimal infrastructure, IT must navigate a number of issues relating to the applications and where they're being used.

With an increasingly global workforce, IT must grapple with understanding where data is located, where applications reside and where users are. Data itself may not be resident in a single location, due to compliance issues, and there is no one-size-fits-all rule about where data is stored and for how long. And, of course, users are accessing data from a variety of devices, from smartphones to tablets to laptops to desktops.

As if those issues weren't enough, other challenges remain. Lines of business themselves, for instance, can take advantage of the simplicity of deploying SaaS applications, subjecting IT to "shadow IT" and application sprawl. But even without shadow applications, IT has other concerns.

Perhaps the worst is the feeling of an overall loss of control, the inability to know what's going on with the network and the applications as in the "old days." With no visibility into the experience of end users — Is the application's performance adequate? Are users facing productivity losses from slow or nonresponsive applications? — IT can unintentionally sow the seeds of frustration and dissatisfaction. Worse, without visibility or control, IT can't see which applications or network bottlenecks are causing problems. That, in turn, translates into loss of IT productivity.

/// WHAT'S NECESSARY FOR ENTERPRISES TO MANAGE THE HYBRID CLOUD

So given this advantageous yet potentially confusing mix of infrastructure options, what's necessary for infrastructure management? How can enterprises

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achieve their goal of serving distributed workforces and applications through a mix of on-premises and cloud apps, and through a variety of network connections — usually co-existing Internet and MPLS links? How can they do this while providing the utmost in service to the lines of business — that is, ensuring data availability and workload prioritization no matter where data resides, where users access the data and where the applications are delivered?

IT needs three capabilities: visibility, optimization and control. Naturally, these overlap in many areas, which is why all of them are necessary for managing a hybrid cloud infrastructure.

REQUIREMENT NO. 1: VISIBILITY. In a hybrid infrastructure, visibility into network links that aren't under the immediate control of IT is crucial. It's not just a question of seeing what's going on with the network for the sake of user performance. It's also a question of using deep packet inspection capabilities to identify ancillary issues. These issues become increasingly important in the context of the cloud, where applications may be developed, delivered and hosted by a third party. For instance, visibility is key in identifying where rogue IT applications might be running on the network.

Visibility is also key in supporting the user experience. If some users are reporting delays, what's the issue? Is it the Internet link? The MPLS link? The SaaS application? IT needs to be able to analyze specific transactions and data flows between clients and servers, no matter where those servers might be.

REQUIREMENT NO. 2: OPTIMIZATION. Though lines of business might argue the point, not all applications are created equal. Some simply have higher levels of urgency than others. Case in point: The importance of reduced latency for a videoconference is higher than that of, say, email, which is by nature asynchronous. So IT must be able to optimize network traffic across the infrastructure. This involves locating data as close as possible to the users who access it the most, not only to reduce latency but to take advantage of available bandwidth as rationally as possible.

But IT can also take advantage of deeper levels of

optimization by deploying solutions and tools that have a strong understanding of exactly how network protocols work. For instance, some solutions can transmit only the data that has changed, rather than replicate the entire stream of bits in a send-acknowledge-resend cycle. The result: far better utilization of network resources.

REQUIREMENT NO. 3: CONTROL. Once IT has the visibility, it needs to apply control. With centralized management, IT can easily conduct end-user response monitoring as well as provide multipath encryption and configure VPNs for specific groups. IT should consider solutions and tools that allow a high level of automated setup and administration.

At the same time, though, control can be just another facet of optimization. For instance, consider the scenario where an enterprise runs data over an MPLS link, but also maintains an Internet link for the same connection. With higher levels of control, IT can configure the two links not as active-passive links when traffic clogs the first link, but as active-active links so that data is automatically rerouted as necessary without manual IT intervention.

Control also denotes a high degree of granularity when it comes to serving users and ensuring performance. For instance, IT can set general rules that deprioritize applications such as LinkedIn and YouTube, but it can also rescind those rules for certain departmental subnets or LANs, so that human resources can easily access LinkedIn, and sales or other departments can access YouTube for training purposes.

/// BENEFITS DERIVED IN COST AND PERFORMANCE

It's not always easy for IT to translate performance benefits into cost benefits, but in the case of hybrid cloud infrastructure, the metrics are strong and reliable. For instance, enterprises traditionally wrestle with the cost of bandwidth, but with the ability to know exactly how much bandwidth specific applications need — no matter where they are on the network — it's much easier to create the most economical network possible, without either overpaying or suffering underperformance.

The ability to ensure that sensitive data remains protected over VPNs or encrypted networks provides peace of mind, if not payback.

Similarly, the ability to ensure that users have access to the data over the shortest possible link improves both latency and productivity; the formula for calculating wasted time for expensive employees is readily available, so the faster they can get data, the more efficiently they can complete their work.

The benefits of improved performance may be less tangible when it comes to customers, although there are statistics showing how quickly they will click away from an e-commerce site when faced with substandard performance. Customers may not notice snappy performance, but they'll definitely notice poor performance—and disappear quickly.

Also somewhat difficult to measure is the question of security, but the value of ensuring that data is transmitted safely is high, especially when it comes to reputation management after breaches. The ability to ensure that sensitive data remains protected over VPNs or encrypted networks provides peace of mind, if not payback.

Perhaps most important but least calculable is the benefit of agility: the ability to deploy new applications on whatever infrastructure makes the most sense for an enterprise, whether private, hosted or public. Both the business and IT benefit when together they can respond to opportunities and maintain global competitive advantage without delay, but also without sacrificing visibility, optimization and control.

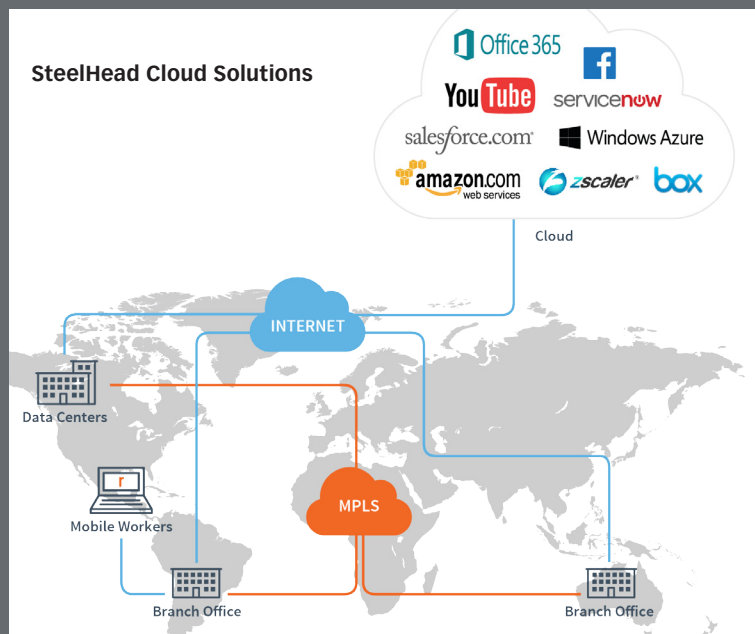
For more information on optimization and management tools that Riverbed SteelHead can offer, visit www.riverbed.com/cloud.

For more on Riverbed's other network optimization tools, visit www.riverbed.com.

How Riverbed Helps

To accommodate the need for optimizing hybrid cloud infrastructures, Riverbed has developed tools specifically for ensuring the highest levels of management and monitoring. Its goal: to give enterprises the ability to manage even widespread and dispersed cloud-based WANs as easily as they currently manage LANs.

Riverbed's SteelHead SaaS solution offers optimization of both application and network traffic through application location awareness and other capabilities. Just as with SaaS applications, enterprises can license SteelHead SaaS per user, which lets them purchase the capability on an operating-expense basis rather than a capital-expense basis.



Riverbed's SteelHead solution is optimized for IaaS providers and customers. It optimizes the performance of all applications, including on-premises, cloud and SaaS applications, across a wide variety of networks (MPLS, private VPN and public Internet). Not only has Riverbed designed its solutions for scalable performance, visibility and optimization, but the company has also optimized its tools to accommodate the protocols of the major IaaS providers.

Both SteelHead options offer multiple layers of security to ensure that data flows are secure. SteelHead appliances can only "talk to" other SteelHead appliances, in order to ensure the highest level of security.