

# 6 Common Pitfalls to Avoid When Migrating Applications to the Cloud

Business leaders are increasingly relying on cloud technologies to earn a competitive edge in today's global markets. In fact, 81% of companies expect to leverage the cloud to deliver business-critical applications and services in the next two years<sup>1</sup>, spurred by the need to be more efficient, find better ways to engage and understand their customers, and continuously enhance their operations.

CIOs and other IT leaders are tasked with delivering these expected benefits quickly and reliably, while also increasing their own speed and capacity to deliver projects of value to the business.

But while cloud adoption has hit the mainstream, IT leaders still encounter several challenges when moving legacy workloads to the cloud. This is partially due to the complex nature of today's hybrid enterprise (Figure 1), where organizations are managing a mix of on-premises, cloud, and SaaS apps, running across a combination of private MPLS links and public Internet transport. A CIO's ability to navigate these architectural complexities is crucial to ensuring a smooth migration and harnessing the powerful benefits the cloud offers.

<sup>1</sup>"Simplify and Innovate the way you Consume the Cloud," Forrester Research, Commissioned by Infosys, October 2014

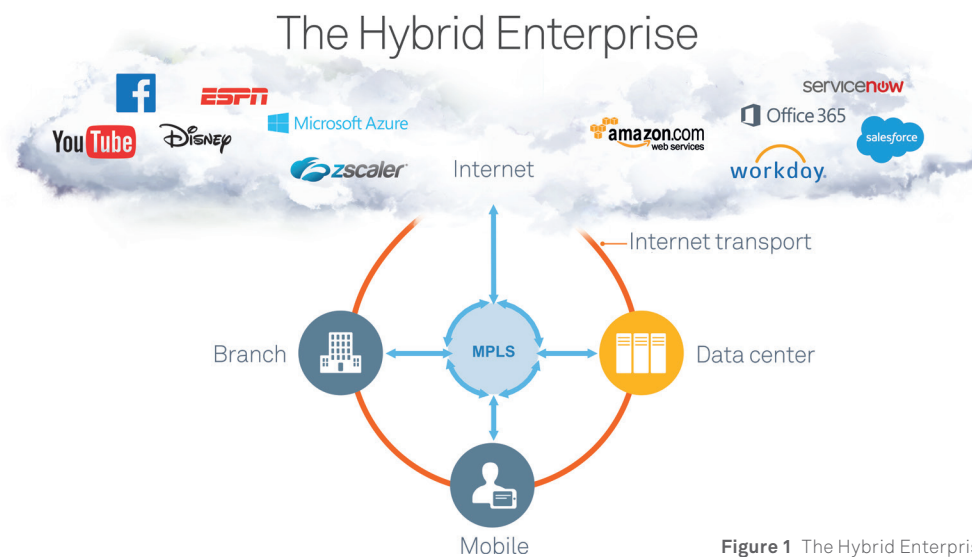


Figure 1 The Hybrid Enterprise

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## Here are 6 Common Pitfalls that Hinder an Organization's Ability to Successfully Migrate Applications to the Cloud

1. Having an incomplete or outdated view of the infrastructure
2. Network bandwidth and latency constraints aren't known or understood
3. No visibility into how the application is performing throughout the migration process and beyond
4. The proper adoption tracking and performance criteria haven't been identified
5. Not enough time has been allocated for the migration to take place
6. Application, network, and security teams continue to operate in silos

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### Pitfall 1: Having an Incomplete or Outdated View of the Infrastructure

#### The situation

Lifting and shifting on-premises applications and getting them properly designed, mapped, and then migrated to the cloud is a complex scenario. The to-be-migrated applications may consist of hundreds of microservices, make calls to multiple databases, and integrate with components from several different third parties.

IT needs to know these components inside and out, and understand what services communicate with one another. Otherwise, the application delivery chain will break and some associated services may experience unexpected downtime or performance degradation. Yet many IT organizations lack a current view of their application architectures, often the result of a sprawling, dynamic infrastructure where applications and services are continually added or modified, servers that are decommissioned or consolidated, and other changes and moves that aren't always clearly documented.

#### Recommended actions

Relying on a clipboard audit and interviewing application stakeholders isn't enough. To mitigate risk and prevent unwanted outages, IT leaders must understand these critical, hidden dependencies and validate how application components actually talk before they start the migration process.

Take principles and lessons learned from data center migrations and other consolidation efforts, and apply them to cloud projects. Introducing application dependency mapping software can significantly streamline the discovery and planning phase while providing IT leaders with a complete and accurate view of the entire application landscape, as well as visibility into performance issues during and after the migration.

#### Riverbed's solution

**Riverbed® SteelCentral™ NetProfiler** is a centralized reporting and analysis console that combines network flow data with packet-based performance metrics. It includes a discovery wizard that creates application dashboards to automate the process of mapping transactions to their underlying infrastructure so that application definitions and interdependencies are accurate. NetProfiler can also create service maps, further accelerating the planning process for cloud-based migrations.

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## Pitfall 2: Network Bandwidth and Latency Constraints Aren't Known or Understood

### The situation

Moving applications and data to the cloud imposes new demands on the corporate network and impacts two performance constraints: bandwidth and latency. Not understanding the true ramifications on these two constraints can easily offset the expected business value of moving to the cloud in the first place.

During and after the migration, bandwidth utilization increases and traffic patterns begin to vary significantly. Quite often, network links become saturated, which can degrade the end-user experience of both existing applications and the newly deployed cloud application.

Hybrid networking, which combines reliable MPLS and fast Internet links, has emerged as a cost-effective way to maintain the appropriate amount of bandwidth while ensuring optimal performance for companies leveraging a mix of cloud and on-premises applications. As a result, customers now have options to send a portion of their traffic over the public Internet as an alternative to upgrading their MPLS links. Using IPSec technology, they can backhaul the less critical traffic to the data center and, therefore, make room for business-critical applications over the MPLS links.

But in traditional network architectures, where the traffic is backhauled to a central gateway located in the corporate data center, cloud-based applications end up traveling a longer distance to reach users when compared to their on-premises equivalents. Therefore, the time it takes to complete a business transaction may increase, sometimes dramatically, due to the added latency.

This problem can be alleviated by using local Internet breakouts, enabling direct connections from branches to the Internet instead of backhauling traffic to a central location. At the expense of additional security costs, the performance of the cloud application can significantly improve as the latency decreases.

However, this does not mean that latency completely goes away. As with traditional on-premises applications, a cloud-based application is hosted in a specific location. And in a distributed organization, that location, by definition, cannot be close to every user.

### Recommended actions

Start the cloud migration project with an assessment phase. Visualize and quantify these end-to-end network constraints by testing key business transactions on a pre-migration basis. Using predictive analysis and network modeling tools can help evaluate current performance and determine areas for improvement by pinpointing where excessive time and bandwidth are spent within the infrastructure as the transactions are tested.

Once those baselines are completed, explore alternatives to buying more bandwidth when addressing overtaxed links. WAN optimization controllers, for instance, can streamline the movement of large chunks of data, reducing network utilization and associated costs while accelerating applications and increasing business transaction throughput.

Next, consider ways to maximize the usage and flexibility of today's hybrid networks. While hybrid networking can be complex, there are solutions that mitigate that complexity by using dynamic and application-aware path selection and quality of service (QoS).

When appropriate, take cloud-destined traffic direct to the Internet, eliminating extra hops between the cloud and employees.

For latency-sensitive applications, such as Microsoft Office 365, or custom applications running in Amazon Web Services or Microsoft Azure, consider WAN optimization technologies that specifically address the needs of cloud-based applications.

## Riverbed's solutions

**Riverbed® SteelCentral™ Transaction Analyzer** is the industry-leading solution for application network readiness testing. By running “what-if” scenarios, you can test critical business transactions to predict the impact of change on application response times before you migrate to the cloud and validate proposed solutions—including WAN optimization—before deployment by assessing the effects of adjustments made to network and application parameters.

**Riverbed® SteelHead™** is the industry's #1 optimization solution that accelerates delivery of all applications across the hybrid enterprise. With SteelHead™ SaaS, you can optimize cloud-based services and SaaS applications, including Microsoft Office 365 and Salesforce.com, by providing up to 33 times faster performance and reducing bandwidth by up to 97%. And with integrated quality of service (QoS) and business-intent path selection, SteelHead provides CIOs the ability to control network consumption, as well as what cloud applications use which network, by prioritizing business-critical and latency-sensitive applications over recreational apps. Lastly, the solution secures optimized and non-optimized traffic over hybrid networks with standards-based encryption for added security and regulatory compliance.

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## Pitfall 3: No Visibility into How the Application is Performing Throughout the Migration Process and Beyond

### The situation

When performance problems do occur—whether as a result of the previously covered pitfalls or another underlying cause—IT leaders need the ability to quickly pinpoint and resolve the issue. However, the cloud introduces an order-of-magnitude increase in complexity when trying to mitigate the impact of performance problems.

Why? Because now that the application has been migrated or is in the process of being moved to a cloud or SaaS provider's environment, IT is relinquishing some administrative control. The enterprise no longer owns or has direct access to the infrastructure upon which its application is now hosted. Yet, IT is still responsible for the performance and security of those services.

Making matters more difficult is that IT loses visibility into application performance. The question of whether a problem stems from the network or the application itself now extends to the cloud—perhaps the provider's services are experiencing issues. If it's on the cloud provider's end, internal staff members no longer have quick access to the personnel who can directly troubleshoot the anomaly.

### Recommended actions

Bringing back some level of visibility and control is critical to maintaining performance and a consistent user experience in the cloud—throughout the migration process and beyond. Having the proper application and network monitoring tools in place allows IT organizations to decrease mean time to resolution (MTTR), reducing support tickets and cutting technical costs related to migrating and supporting the cloud application. And when performance issues stem from cloud providers' services, it allows IT to quickly escalate and hold the providers accountable for agreed-upon service-level agreements (SLAs).

In today's highly distributed enterprises, where branches and other remote sites are often the frontline, revenue-generating portions of the business, having end-to-end visibility is even more imperative when delivering cloud-based applications and services. These “eyes at the branches” allow IT to stitch the entire picture together across infrastructure components—WAN optimizers, load balancers, firewalls, SDN protocols, etc.—increasing the reliability of critical IT services.

## Riverbed's solutions

**Riverbed® SteelCentral™ AppInternals** empowers you to take control of applications running on and off the cloud with end-to-end performance visibility. Installed in just minutes, AppInternals can query and analyze billions of transactions to discover bugs, draw business insights, and help deliver a superior experience in the cloud.

**Riverbed® SteelCentral™ AppResponse** extends performance monitoring into applications running in SaaS environments by integrating with SteelHead appliances to provide end-to-end visibility across the entire network at the lowest cost. AppResponse is the only solution to measure end-user experience for both SteelHead-optimized and non-optimized enterprise web and SaaS applications for faster, more effective monitoring and troubleshooting.

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## Pitfall 4: The Proper Adoption Tracking and Performance Metrics Haven't Been Identified

### The situation

When IT leaders make a significant investment in migrating an application to the cloud, they should be able to tie end-user adoption and performance back to the business story. How many users are leveraging the cloud-based application? What does their usage profile look like? Or are they still using the legacy or on-premises version of the application?

Defining key user adoption and performance metrics helps IT measure the success of the migration and the new application. And for organizations that are in the first stages of their cloud adoption strategy, such data points are critical for validating or adjusting strategies and justifying future cloud spend.

The problem, however, is that many organizations fail to establish clear metrics and usage policies before the rollout begins. As a result, they only define these metrics on a reactive basis, when it's time to report back to key stakeholders. And even when those metrics are defined, the proper instrumentation to collect actionable intelligence is often still missing, as point monitoring or management solutions only tell part of the story.

### Recommended actions

Meet with project stakeholders—from both the business and IT—and clearly define usage requirements, expectations, and success criteria as part of the migration-planning phase. Next, evaluate what tools are available for collecting the adoption- and performance-based metrics, and determine what gaps in monitoring and reporting exist.

With that assessment in place, finish instrumenting the infrastructure with the right network and application management tools that can provide actionable insights. This is particularly important for organizations using public cloud to burst from a private data center, where measuring performance across both environments with a single source of truth is critical for situational awareness.

### Riverbed's solution

**Riverbed® SteelCentral™ Portal** integrates data from SteelCentral and SteelHead solutions to create a centralized, dynamic view of an application performance environment. This holistic view gives operational teams a single source of truth for application performance, accelerating troubleshooting and providing meaningful data for stakeholders throughout the enterprise. Ultimately, IT is able to efficiently control and optimize applications, data, and traffic across the entire hybrid network—including in the cloud—keeping key resources focused on strategic projects.

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## Pitfall 5: Not Enough Time Has Been Allocated for the Migration to Take Place

### The situation

Migrating a critical workload to the cloud won't take place overnight. In fact, when organizations start moving data, they often find that it moves slower than expected. That data migration, in essence, becomes the bottleneck to the entire project.

A perfect example is migrating from legacy email systems to a more collaborative platform like Office 365. Here, migrating the mailboxes alone can consume significant network resources. In one customer's case, Riverbed found that an initial inbox synchronization for just 10 pilot users ate up 10% of the Internet link<sup>2</sup>. So imagine what happened when 1,000+ users migrated a few days later.

Also, keep in mind that as users are exposed to feature-rich capabilities—such as Lync for voice, video, and desktop sharing—more bandwidth will be consumed, as all applications compete for a finite amount of WAN resources. This means that constraints are intensified, timelines are thrown off, costs increase, and IT struggles to deliver the intended business value on schedule.

### Recommendations actions

As previously mentioned, understanding bandwidth and delay constraints before the migration starts will provide critical insights for successfully estimating timelines, allocating resources, projecting costs, and forecasting risks. So build more than adequate time into project timelines. Also, consider conducting pre-migration studies to analyze delay and bandwidth constraints when migrating the data and workloads themselves.

Next, prioritize your limited WAN resources accordingly—upgrading circuits and hoping things go well isn't a strategy. Bring some reliability and predictability to the project by factoring in a WAN optimization component to help migrate data faster, and reduce the load on the WAN path by around 75% or more. And tune QoS strategies so that batch migrations can take place during the workday without affecting critical business traffic or congesting the network.

That way, cutovers aren't confined to nights or other non-peak times, thereby expediting the migration. Lastly, identifying, marking, and shaping appropriate cloud applications is key for ensuring a great user experience, gaining adoption, and reducing help desk calls as users are cut over.

### Riverbed's solutions

Enterprises worldwide rely on Riverbed Professional Services (RPS) when moving critical applications to the cloud. With the **Cloud Migration Assessment**, organizations gain a full view of their application infrastructures before they migrate to reduce costs, minimize risk, and eliminate business disruption. The service combines application discovery, dependency mapping, and risk assessments so IT can confidently move complex applications to the cloud while ensuring performance demands are met and business objectives are achieved.

Understanding that Office 365 is a mission-critical platform for most enterprises today, RPS also offers a full suite of consulting solutions to support customers throughout the migration process—from planning into production and beyond. Delivered using Riverbed products and proven methodologies, **Riverbed Consulting Solutions for Office 365** ensure a smooth transition to the cloud—accelerating projects and reducing risk, costs, and bandwidth usage.

<sup>2</sup>"How to Avoid Saturated Links and Performance Problems During Office 365 Migrations," Riverbed, July 7, 2014



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## Pitfall 6: Application, Network, and Security Teams Continue to Operate in Silos

### The situation

Moving a workload to the cloud must be considered a real IT transformation and requires disparate IT teams to work as a cohesive unit for sustained success. But all too often, application, network, and security teams only focus on their individual domains:

- The application team leaders are concerned with maintaining productivity and a consistent, superior user experience
- The network side is responsible for managing one of the key constraints in the end-to-end enterprise architecture; that application must not break everything else in the mix
- The security team ensures application and network usage policies coincide within the established framework that was put in place to protect sensitive company information

However, the cloud is driving many considerations for revamping the enterprise architecture and, as a result, responsibilities become blended efforts. For example, what team is charged with troubleshooting issues? In some cases, it's the network team, even if the impacted service is a SaaS application.

As a result, the war room scenario becomes more complex. And instead of finger pointing within a single "country," stakeholders from multiple countries must have seats at the table, which introduces more politics and policy.

The implication here is that completing a cloud migration project, and then maintaining a superior end-user experience moving forward, is a shared effort. When it comes to forming and executing a successful enterprise-wide cloud adoption strategy, unity across IT becomes even more imperative.

### Recommended actions

Tearing down these silos and developing a cross-functional taskforce helps organizations become more prepared and ensures a smoother rollout. Take what's been successful in DevOps with regard to collaboration, speed of improvement, and a culture of efficient responsibility and apply it across all of IT.

Think about the manufacturing process of continuous improvement. While manufacturers have different teams working within a plant, they have an extremely efficient and effective strategy that focuses on maximizing end-to-end business productivity and profitability.

Separate IT teams become aligned when their collective focus is on delivering business value and efficiency as a team, rather than just focusing on their technical project as the end result. Remember, the cloud is not a magic panacea. It's part of an end-to-end system that impacts all teams and is a means to deliver transformational business results.

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## Take the Uncertainty Out of Cloud Migrations with the Riverbed Application Performance Platform™

### Mitigate risk, ensure superior performance, and deliver predictable business results

The cloud promises compelling value propositions for the modern enterprise. But to capitalize on its value, CIOs and other technical leaders must navigate the complexities imposed by the hybrid IT era.

Riverbed, The Application Performance Company™, is uniquely positioned to help IT leaders rapidly and consistently deliver value to the business through the cloud. The Riverbed Application Performance Platform increases enterprise agility by enabling companies to seamlessly move workloads to the cloud while controlling costs, maintaining or improving the performance of mission-critical cloud applications, and defending the network from security threats.

Through the Riverbed platform, CIOs receive the unparalleled visibility, optimization, and control they need to provide their businesses a competitive advantage through increased business velocity.

- **Visibility** enables enterprises to migrate applications, monitor and optimize their performance, and troubleshoot application performance and availability problems

- **Optimization** delivers higher business transaction throughput by accelerating application performance, and also reduces costs by minimizing WAN bandwidth consumption
- **Control** enables enterprises to map, and predictably ensure, business priorities across their hybrid WAN

## What are Customers Saying about Riverbed's Ability to Deliver Value in Cloud Environments?

“We have accelerated application delivery up to 300 percent, resulting in sub-second response time for Office 365. We have also been able to reduce bandwidth upgrade costs by two-thirds.”

Branko Ceran, CIO, MTC Australia

“With all our apps in the cloud, we get high-quality products to market faster. Riverbed makes it possible.”

Tim Weaver, CIO, Del Monte Foods

“Delivering business-critical apps over the Internet saves us millions without sacrificing performance. Riverbed makes it possible.”

Edward Wagoner, CIO, Americas, JLL

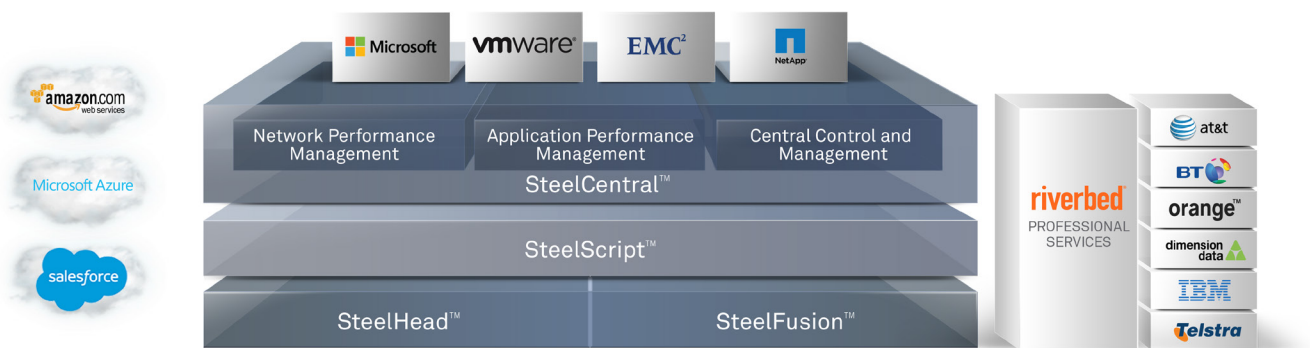


Figure 2 The Riverbed Application Performance Platform™

### About Riverbed

Riverbed Technology, the leader in application performance infrastructure, provides the most complete platform for the hybrid enterprise to ensure applications perform as expected, data is always available when needed, and performance issues can be proactively detected and resolved before impacting business performance. Learn more at [riverbed.com](http://riverbed.com).

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