Technical Validation

Riverbed Cloud Accelerator

Accelerating App Migration to IaaS and Providing Fast, Reliable Access to Users Anywhere

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Contents

ESG Technical Validations

The goal of ESG Technical Validations is to educate IT professionals about information technology solutions for companies of all types and sizes. ESG Technical Validations are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objectives are to explore some of the more valuable features and functions of IT solutions, show how they can be used to solve real customer problems, and identify any areas needing improvement. The ESG Validation Team's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments.
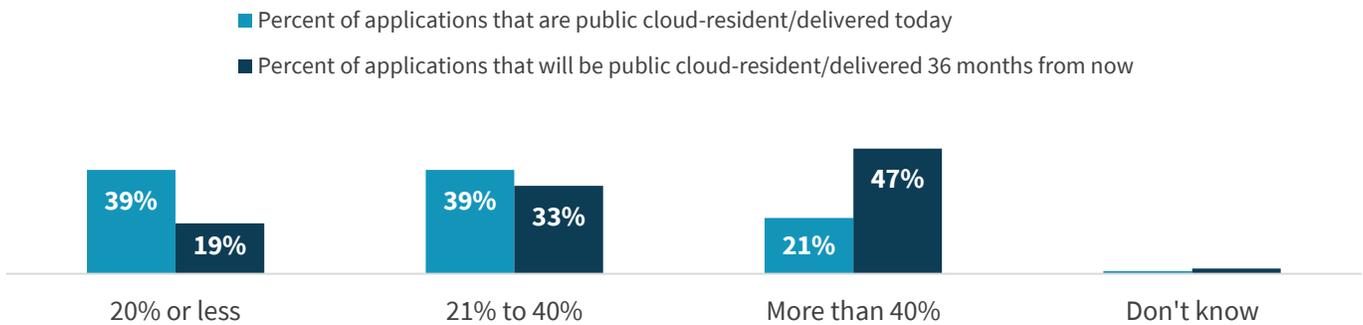
Introduction

ESG evaluated Riverbed Cloud Accelerator for enterprise apps running on public cloud infrastructure as a service (IaaS) in Microsoft Azure and Client Accelerator for desktop and mobile clients to validate how this end-to-end solution accelerates SaaS application performance while overcoming the limitations of application latency, bandwidth constraints, and network congestion.

Background

Digital transformation efforts are driving organizations to leverage public cloud IaaS to enable their businesses to run more efficiently and deliver better experiences for their employees and customers. ESG research has documented the steady growth of public cloud adoption by enterprises and mid-market organizations, and this year, nearly two-thirds of organizations (60%) indicated that more than 20% of their applications are currently public-cloud resident. Even more telling is that four-fifths (80%) of respondents stated that, within three years, more than 20% of their applications would be hosted on IaaS. In fact, nearly half (47%) believe that more than 40% of their applications will live in the public cloud in the next three years (see Figure 1).[1] These aggressive plans to move more of their apps and workloads to the cloud puts the onus on them to solve the challenges of migrating large amounts of data and making legacy apps more user-accessible on cloud platforms.

Figure 1. Public Cloud Adoption

Of all the business applications used by your organization, approximately what percentage is currently public cloud-resident? How do you expect this to change – if at all – over the next 36 months? (Percent of respondents, N=664)

- ■ Percent of applications that are public cloud-resident/delivered today
- ■ Percent of applications that will be public cloud-resident/delivered 36 months from now

	20% or less	21% to 40%	More than 40%	Don't know
Today	39%	39%	21%	
36 months	19%	33%	47%	

Source: Enterprise Strategy Group

Migrating on-premises applications—and their data—can be problematic, especially when moving large, frequently updated data sets. Once the applications are in a public cloud, employees need to connect to them over WAN links and home/public internet connections, which can introduce multiple, often unpredictable network challenges with latency, bandwidth, and congestion, and provide a distinctly less than perfect experience. This new and highly distributed application environment provides numerous benefits for organizations, such as converting applications to an operational expense, avoiding the need to host applications in organizations' expensive raised floor data centers, and not having to worry about patching and upgrading applications. However, it also creates multiple challenges for many organizations.

In an attempt to address these issues, organizations have increased bandwidth to these cloud sites from their data centers and branch offices and deployed SD-WAN solutions to enable some remote locations to go direct to the cloud instead of making a hairpin turn through the data center. While these solutions can assist in using the networks more efficiently, they

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[1] Source: ESG Research Report, *2021 Technology Spending Intentions Survey*, January 2021.

may not help optimize or accelerate the movement of large or frequently accessed files from these sites, resulting in lost productivity and a poor experience.

Organizations need to find solutions to help them keep up with their accelerating pace of migrations to the cloud, while enabling employees to access applications while away from the office. ESG research indicates that 70% of workers expect to be productive from anywhere—at the office, home, or while traveling.[2] This issue has quickly become even more prominent, with the global pandemic forcing employees to work from home.

To enable IT to quickly move legacy apps to the cloud with all their data while enabling employees to work from home and be productive when using those applications, organizations need to consider technology that can be quickly and easily deployed in the cloud and on employee machines. Solutions like Riverbed Cloud Accelerator can accelerate migrations to the cloud while also enabling IT to increase workforce productivity at scale and deliver a better user experience.

Riverbed Acceleration Services

Riverbed Cloud Accelerator is an infrastructure-as-a-service (IaaS) environment designed for modern, dynamic organizations and engineered to accelerate application migration to the cloud and ensure consistent performance of homegrown and commercial applications in the cloud for anyone connecting from anywhere. The solution leverages Riverbed's years of experience optimizing application performance regardless of network latency, bandwidth constraints, or application contention—all without requiring any changes to the organization's or cloud provider's infrastructure. Acceleration for cloud applications is implemented with a simple license activation. Any physical, virtual, or mobile SteelHead product can get paired with an organization's dedicated Cloud Accelerator instance(s). Delivered as a virtual form factor of SteelHead CX on leading IaaS platforms, Cloud Accelerator enables customers to speed migrations, increase performance, save on operational costs, and ensure service level agreements.

Figure 2. Riverbed Acceleration Services
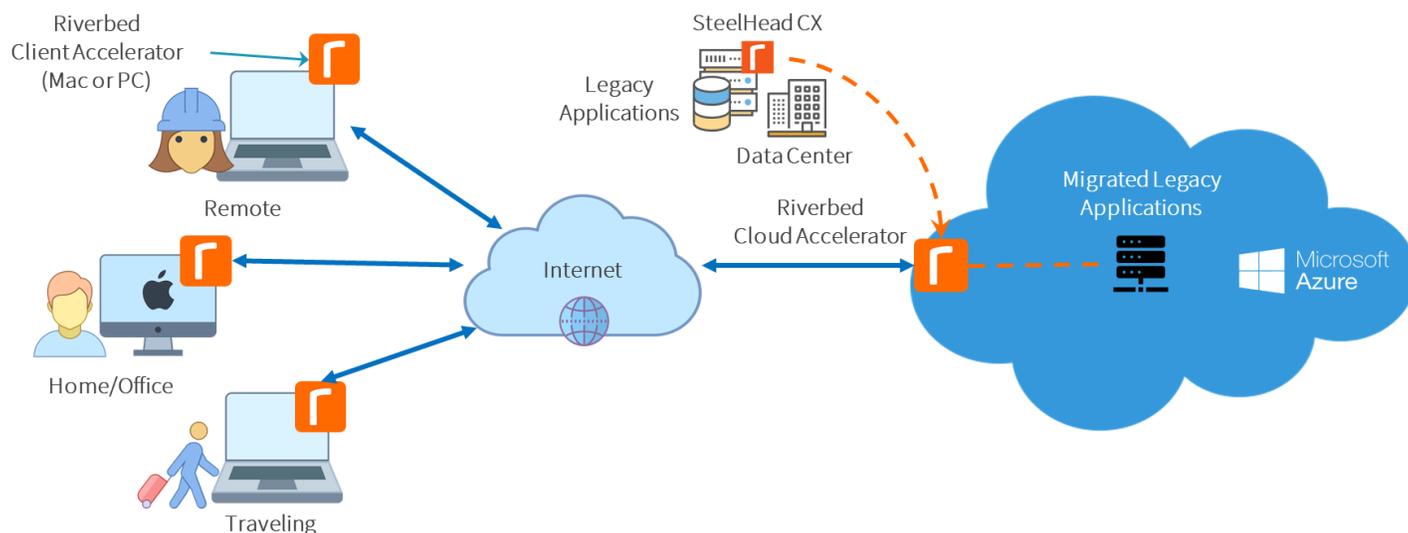
Source: Enterprise Strategy Group

Riverbed Client Accelerator is designed to deliver application acceleration to mobile workers anywhere with a minimal footprint software agent installed transparently on laptops or desktops. Extending the functionality of Riverbed's WAN Optimization and Application Acceleration services and solutions, Client Accelerator interacts directly with any server-side SteelHead or Riverbed Cloud Accelerator solution to optimize and accelerate on-premises SaaS applications or cloud-based

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[2] Source: ESG Master Survey Results, 2019 *Digital Work Trends Survey*, November 2019.

workloads. The Client Accelerator Controller helps IT teams manage client licenses and controls deployment, management, and reporting for software clients.

ESG Technical Validation

Testing of Riverbed acceleration services was designed to emulate a modern, distributed organization providing core services via IaaS and legacy applications on-premises with a plan to migrate to the cloud to provide access to employees across the globe. ESG personnel conducted testing from locations in the United States, Europe, the Middle East, and Asia. We looked specifically at three key metrics: data transfer times for migration and application usage, data reduction specific to network efficiency, and productivity savings.

Migrating Applications to the Cloud

First, ESG looked at application and data migration from an on-premises data center to Azure. Organizations' cloud usage has become nearly universal, with 94% of organizations currently leveraging public cloud application and/or infrastructure services. Nearly half (45%) of organizations have shifted to a cloud-first policy for new application deployment using public cloud services in 2021, compared to 38% last year and only 29% in 2018. More than four in ten organizations have significantly accelerated the number of remaining on-premises applications and workloads that are public cloud candidates as a result of COVID-19.[3] Ensuring that these migrations happen quickly and smoothly is key.

The environment to be migrated consisted of a custom content repository and a database to manage it. The total data footprint of the environment when we began the exercise was 111 GB. We added data and content between refreshes, and by the final refresh and cutover, the data footprint had grown to nearly 120 GB. Migrations were executed using a PowerShell script to ensure that the process was identical for each run. Clients used the SMB 3.0 protocol with digital signatures and encryption enabled. To simulate real migration activity, we executed multiple migrations to emulate the test runs, data refreshes and final refresh and cutover of an app. We tested the full cycle without Cloud Accelerator, then we enabled Cloud Accelerator and executed the migrations again. The duration of each migration activity was recorded.

**Figure 3. Accelerating Application Migration—Examining Data Reduction in Real Time**

Source: Enterprise Strategy Group

While the optimized migrations were running, we used the Cloud Accelerator web console to monitor data reduction and bandwidth utilization. Figure 3 shows the optimization during the final refresh before cutover to the cloud. Riverbed Cloud Accelerator was able to reduce the amount of data transferred by 99.2% on average, meaning that of the total of nearly 120 GB of data that traversed the LAN, less than 1 GB of data had to be transferred across the WAN. Looking at data transfers from a time saved perspective (Figure 4), we see that even for this relatively small migration exercise, we saw a reduction in time required for data transfer from 7.9 hours for the unoptimized migration to 3.3 hours for the migration with Riverbed Cloud Accelerator.

Figure 4. Accelerating Application Migration—Data Transfer Time Savings
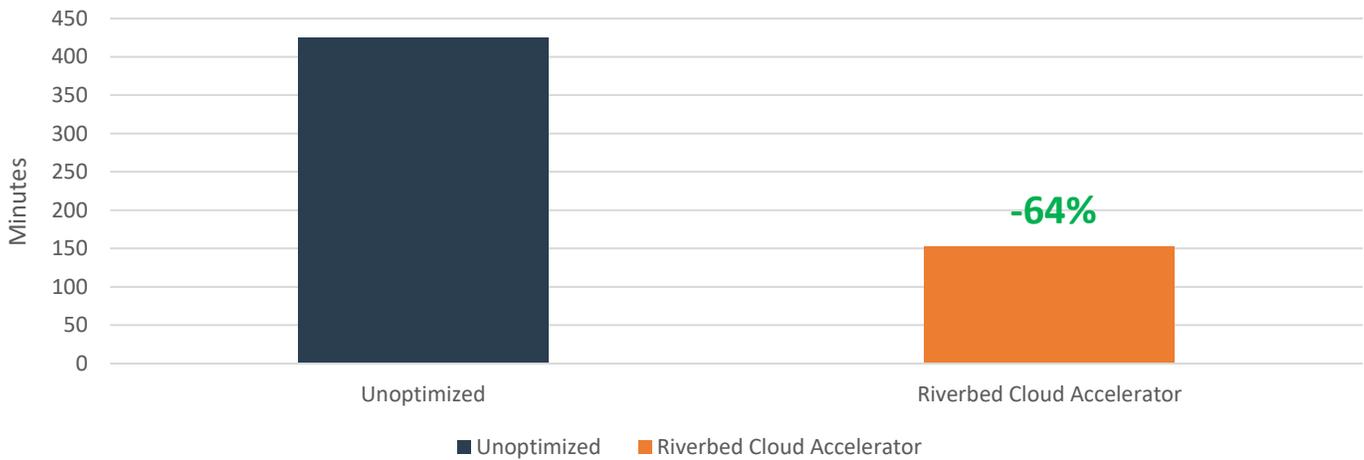
Source: Enterprise Strategy Group

That's more than 4.5 hours saved, or a 64% reduction in data transfer time. For a larger project with one terabyte of data, this would translate to about 45 hours, more than a full work week. It's important to note that the chart in Figure 4 only tracks data transfer time; elements of the migration that did not change between tests, like making local copies of the database, were excluded.

File Transfer Optimization

Next, ESG tested access to the now cloud-based app from eight locations[4] across seven countries (Figure 5). Testers accessed a legacy asset management application over an encrypted VPN connection, a common use case. They viewed a streaming video, then uploaded and downloaded multiple large files. Testing locations were selected based on multiple criteria, including distance from the Azure data center hosting the app and network bandwidth. Home offices were the most common testing locations, along with a public, shared WiFi hotspot. Latency between each location and Azure North Central US was measured as well as the actual upload and download bandwidth available.

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[4] Testing was conducted in Northern California and Virginia in the US, the UK, France, Germany, the UAE, India, Japan, and Australia.

**Figure 5. Riverbed Cloud Accelerator Testing Locations**

ESG Testing

Testers' machines used the SMB 3.0 protocol with digital signatures and encryption enabled to perform uploads and downloads of a set of files of varying sizes in specified order and combinations, with a consistent method for measuring elapsed times to ensure an apples-to-apples comparison across testing sites. File transfer times were recorded pre- and post-optimization. Figure 6 shows the average file transfer time pre- and post-optimization across five global regions for the same set of files. The files totaled 500-800 MB and our testers performed 50% uploads and 50% downloads. ESG saw significant reductions in file transfer times in every location we tested, regardless of available bandwidth or network latency.

Figure 6. Reduction in File Transfer Times by Location
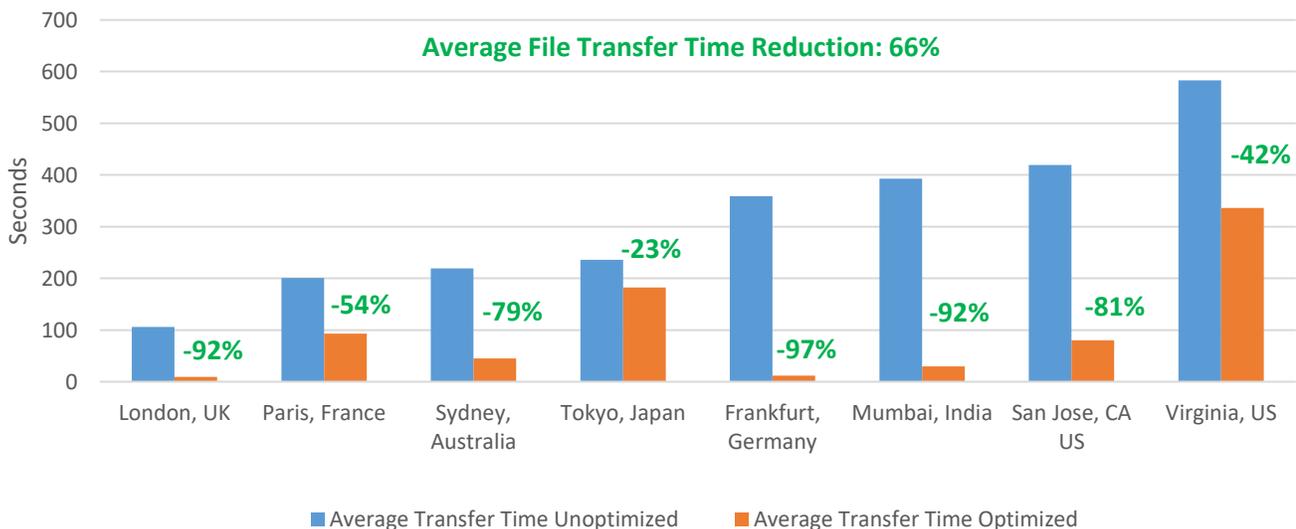
Next, testers viewed a 90 second video hosted in Azure with our content management application. The video was streamed using the HTTP/2 protocol. Testers streamed the video from start to finish multiple times and averaged the elapsed time that it took for the video to finish playing. The unoptimized tests all periodically paused while video buffered. Figure 7 compares before and after streaming times, pre- and post-optimization. The black line indicates the 90 second duration of the video.

Figure 7. Reduction in Video Streaming Times

■ Average Streaming Time Unoptimized   ■ Average Streaming Time Riverbed Cloud Accelerator
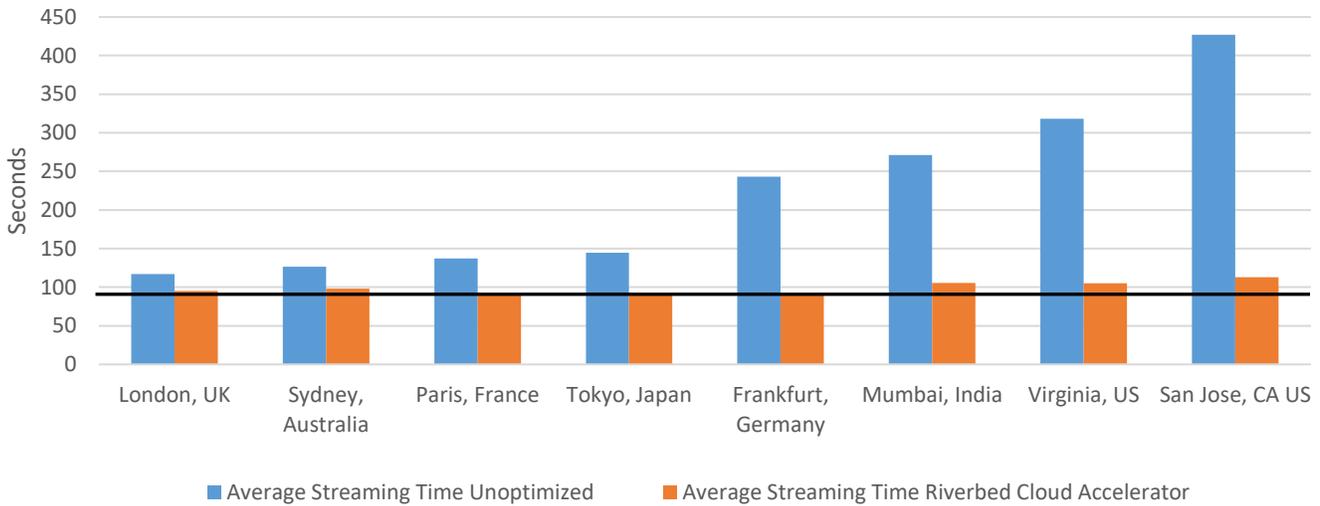
Source: Enterprise Strategy Group

Unoptimized viewing times averaged from 117 seconds (London) to 427 seconds (San Jose). Riverbed Cloud Optimizer virtually eliminated video buffering and allowed viewers to watch the complete video in close to the actual running time of 90 seconds, from 90 seconds in Frankfurt to 113 seconds in San Jose.

What the Numbers Mean

- Riverbed Cloud Accelerator reduced the time required to migrate an application with a 120GB data footprint by 64%, eliminating hours of wait time.

- Riverbed acceleration services significantly accelerated users' file transfers in every location we tested regardless of network bandwidth or latency, by up to 97%.

- Riverbed Cloud Accelerator significantly reduced the average time users spent waiting for a streaming video to play.
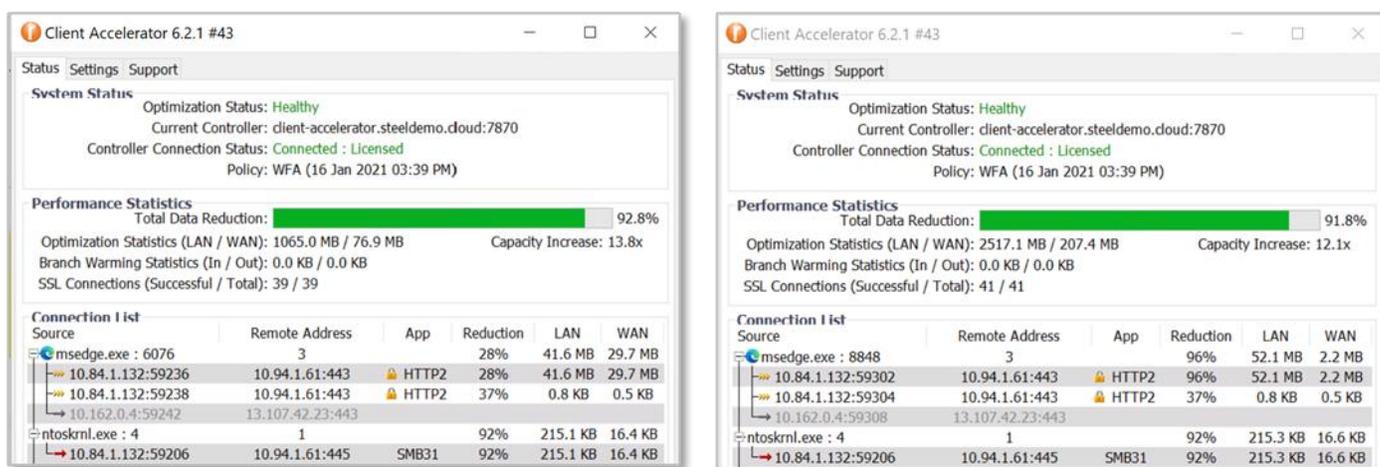
Data Reduction

Data reduction is an important component of Riverbed Cloud optimization, particularly as enterprises move to more data-rich collaboration apps and working remotely increases. User networks are often less reliable and out of the control of IT. The more data moved across any given network, the more likely it is that the network will experience congestion and users will have a poorer experience. It should be noted that data reduction is only one of the techniques used by Riverbed to optimize remote connections to applications. Riverbed's deep knowledge of network protocols and application behavior play a significant role along with data reduction.

ESG Testing

ESG asked users to check the data reduction at their location by opening the Client Accelerator on their machines. Data reduction ratios were collected at the beginning, after the first round of warm-up tests, then in the middle, then at the end. Figure 8 shows data reduction at selected sites. The window on the left shows data reduction in the middle of testing, and the window on the right shows it at the end of testing. You can see that on the left, Microsoft Edge data is being reduced by a factor of 28%, but the system on the right is achieving a much higher reduction rate. This makes sense because at the end of testing there was a much higher percentage of data that had already been seen.

Figure 8. Data Reduction

Source: Enterprise Strategy Group

ESG found that data reduction was remarkably consistent across all sites, with data reduction improving as testing progressed. This is not surprising given that the testing was done with a consistent distribution of file types, sizes, and content across all our sites.

Productivity Benefits Over Time

ESG modeled cumulative time savings based on our testing to estimate productivity improvements that might be achieved using the solution.

ESG Testing

Calculations were based on an average workday data transfer of 500 MB—combined uploads and downloads—and leveraged ESG's experience using cloud-based apps for collaboration and content creation. Pre- and post-optimization transfer times were averaged across all locations used in these tests and extrapolated for organizations of increasing size. Figure 9 shows the potential savings for organizations from 500 to 10,000 employees.

Figure 9. Cumulative Productivity Improvements
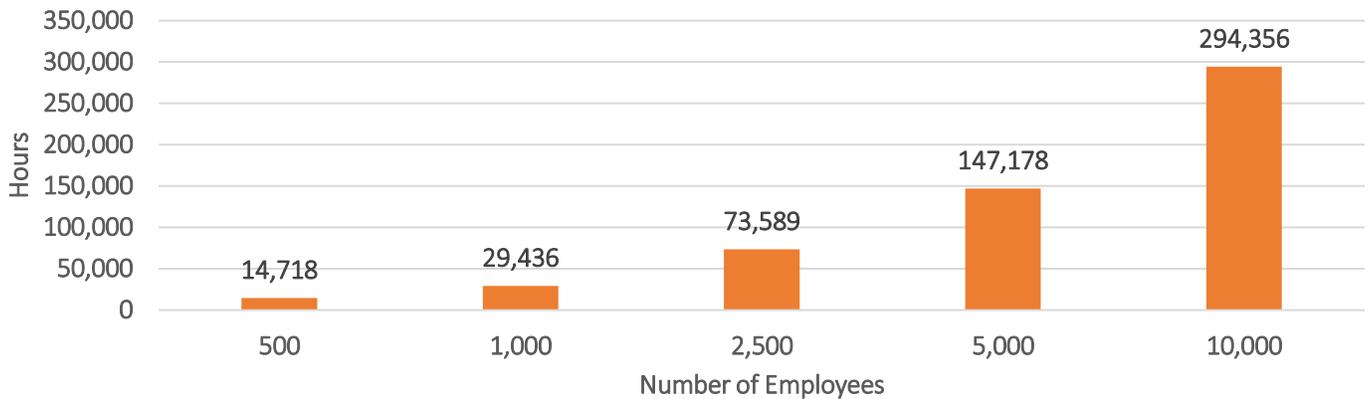
Source: Enterprise Strategy Group

Over the course of a year—with an average 500 MB of data transfer per workday—an organization can expect to reclaim over 29 hours per year, per employee. This adds up quickly for organizations, with a 1,000-employee shop reclaiming nearly 30,000 person-hours and a 10,000-seat organization reclaiming more than 294,000 person-hours in a single year. To put this into context, every 70 employees using Riverbed acceleration services would reclaim the equivalent of a full year's worth of work for one FTE (full-time equivalent). Put another way, users at a 10,000-employee company would save enough time to staff a 147-person project every year. It's important to note that this analysis applies to organizations with homogeneous data usage.

> ### ⓘ Why This Matters
>
> Workers expect to be productive from anywhere—at the office, home, or while traveling. Organizations have been leveraging their enterprise applications in the cloud in part to help address this issue, providing access to critical applications that are not tied to their on-premises data centers. This issue has continued to gain prominence, with the global pandemic in its second year and forcing ever more employees to work from home. This impacts virtually all employees based on their location, home internet connection, and how congested their home network and local ISP are. Organizations are challenging IT to migrate legacy applications to the cloud to provide this universal access.
>
> What is needed is a solution that not only enables employees to work from home or anywhere away from a primary office setting effectively, but technology that can also accelerate migrations to the cloud, delivering results quickly and transparently, increasing productivity and delivering a better user experience for both IT and its users.
>
> Through hands-on testing and actual production use, ESG has validated that Riverbed Cloud Accelerator provides significant and consistent optimization of connectivity to the cloud for data migrations and application access. Running unnoticed in the background, Riverbed Cloud Accelerator and Client Accelerator optimize performance and productivity for IT administrators and remote users, regardless of location, bandwidth, or latency, often rivaling local access. ESG used Riverbed Cloud Accelerator to speed migration of a legacy on-premises application by 4.5 hours, then accelerated access to that application for our mobile workforce, enabling more productive knowledge work and collaboration.

The Bigger Truth

The application landscape is rapidly changing as organizations continue to drive digital transformation initiatives to increase operational efficiency and create positive experiences. With organizations rapidly adopting cloud infrastructure, it will be imperative to not just ensure employees are still productive and having a positive experience accessing applications and files in the cloud, but to also ensure that IT can migrate those legacy apps to the cloud quickly and efficiently. While this would be important for normal business operations, it is even more critical now with increasingly mobile workforces and an extended global pandemic forcing an increased number of employees to work from home.

The Riverbed Cloud Acceleration services validated by ESG include Riverbed Cloud Accelerator and Client Accelerator. Cloud Accelerator is an infrastructure-as-a-service (IaaS) environment designed for modern, dynamic organizations and engineered to accelerate application migration to the cloud and ensure consistent performance of homegrown and commercial applications in the cloud for anyone connecting from anywhere. Client Accelerator, designed for the modern dynamic workforce, enables fast, reliable application performance for anyone connecting from anywhere. The solution leverages Riverbed's years of experience optimizing application performance regardless of network latency, bandwidth constraints, or application contention. With Riverbed Client Accelerator, remote workers are no longer remote. Client Accelerator offers a flexible, scalable management tool that streamlines provisioning of large-scale remote and mobile deployments.

As this technical validation has demonstrated, Riverbed acceleration services, including Cloud Accelerator and Client Accelerator, are able to accelerate data transfers significantly and consistently to and from cloud applications from anywhere on the planet. ESG saw a reduction in time required for data transfer in an application migration from 7.9 hours to 3.3 hours using Riverbed Cloud Accelerator. That's more than 4.5 hours saved, or a 64% reduction in data transfer time.

ESG also found that organizations can enhance both productivity and the user experience with Cloud Accelerator and Client Accelerator, saving minutes of time per day, per user. Organizations can reclaim thousands of hours of lost productivity per year. In a hypothetical company with 10,000 remote workers, this adds up, saving hours equivalent to 147 full time employees each year. Organizations can very easily attach this technology today as part of a revised business operations plan and enable workers to be productive from anywhere. If your organization is looking to enhance the process of cloud migrations and improve the remote user experience with a solution that deploys into an existing infrastructure with minimal effort and disruption, Riverbed Cloud and Client acceleration offerings are worth a close look.

Appendix

Table 1. Average File Transfer Time Reduction by Location

Location	Bandwidth	Average Time Saved Streaming 1:30 Video	Average Time Reduction Uploads	Average Time Reduction Downloads
Paris, France	20 Mbps Down 8 Mbps Up	9 Sec.	96.4%	94.7%
London, UK	35 Mbps Down 15 Mbps Up	22 Sec.	92.3%	90.0%
Sydney, Australia	50 Mbps Down 20 Mbps Up	28.7 Sec.	86.5%	53.6%
Tokyo, Japan	250 Mbps Down 150 Mbps Up	39.7 Sec.	34.4%	16.1%
Frankfurt, Germany	10 Mbps Down 5 Mbps Up	153 Sec.	95.9%	96.7%
Mumbai, India	10 Mbps Down 5 Mbps Up	165.5 Sec.	96.4%	81.6%
Virginia, US	10 Mbps Down 10 Mbps Up	202.7 Sec.	19.8%	44.5%
San Jose, California, US	10 Mbps Down 10 Mbps Up	270.7 Sec.	25.8%	90.1%

Source: Enterprise Strategy Group

Enterprise Strategy Group is an IT analyst, research, validation, and strategy firm that provides market intelligence and actionable insight to the global IT community.