

## 5 Steps to Successful IT Consolidation and Virtualization

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### Introduction

Most organizations today are faced with conflicting goals and challenges. They have geographically distributed workforces, with headquarters, datacenters, branch offices, and mobile workers scattered widely. Everyone needs to access email, file shares, and mission critical applications, and the speed of access directly ties to employee productivity. So computing resources have been widely deployed in many locations to give the local workers the best possible service delivery. However, this approach is now seen as wasteful and expensive with extra hardware and software to buy and maintain for many locations, and often few local IT staff to support the systems. As budgets get tighter, organizations are looking for solutions to handle this burden. IT consolidation is the number one approach today, taking infrastructure out of remote offices and into the main data center as a way to cut costs and boost IT staff productivity. The trick is how to consolidate without hurting the performance for the end users.

Virtualization is seen as a fundamental enabling technology for consolidation, allowing each server to be much more efficient utilized and giving more flexibility to the infrastructure. Organizations are rapidly evaluating and implementing virtualization as they look to further consolidate and reduce the hardware footprint in their IT environment. Together consolidation and virtualization are said to produce these benefits with nothing more than a small one-time effort of some time and money, but can you believe the hype?

While consolidation can certainly bring a number of benefits to organizations, it will take more than just a Friday afternoon to ensure that your consolidation and virtualization projects are truly successful. As far too many IT managers will tell you, a poorly-planned project will have your executives screaming, users threatening mutiny, and IT in the hot seat to quickly undo all the effort that went into the project in the first place.

This paper lays out 5 steps to successful IT consolidation and virtualization projects. While you'll still be doing the hard work of actually implementing the new infrastructure, following these steps will enable you to make sure that you've covered all the issues in order to ensure that your organization experiences the full benefits of IT consolidation.

### Mapping out a successful IT consolidation and virtualization strategy

Like most projects, successful IT consolidation requires time, planning, buy-in, and methodical execution. But there are a special set of challenges that relate to the fact that you are fundamentally changing the footprint of your IT architecture. This has wide-ranging implications that cover everything from budgets and capital expenditures to political considerations over the location of infrastructure and perceived impacts on business units.

1. Lay out a change and risk management strategy
2. Develop a plan for resiliency
3. Test (and improve) branch office performance & local consolidation
4. Architect a forward-looking infrastructure & support plan
5. Plan a phased roll-out

#### Step 1: Lay out a change and risk management strategy

Risk management is part of project management 101, but there are some special considerations in the case of IT consolidation. The benefits are most obvious to the corporate entity (immediate cost savings, less strain on IT) and less obvious to business units or remote offices. After all, these other groups may feel like they are losing "their" servers or local tools and will be penalized with reduced performance for no apparent reason. And, since IT is generally tasked to align their own goals with those of the business, this can create conflict and misunderstanding.

Similarly, IT teams located in remote offices may worry about their own ability to deliver on agreed-upon service levels to business units in a new environment where they may have less control of physical infrastructure to fine-tune.

#### Why consolidate?

The reasons to consolidate and virtualize IT infrastructure are wide-ranging. While most IT managers focus on just the cost of the physical IT infrastructure, there are many additional benefits that can be derived from IT consolidation:

- Simplified management
- Improved data protection
- Improved resource utilization
- Easier revision control
- Easier data protection and security
- More flexibility
- Reduced server and software costs

A good change strategy always begins with communication. It will take time and effort to communicate to various business units the benefits that they will see from consolidation and virtualization, as well as understand the corporate benefits. More than likely, users in remote offices will resonate with the following benefits:

- Systems are patched, upgraded, and maintained more frequently. Because systems are located where the majority of IT staff is located and there is more flexibility in delivering services, it is much easier to schedule regular maintenance of systems. This means less down time and the most up-to-date applications and services for users.
- Collaboration with other offices will be simplified. Because all important data is located in one place, users do not have to hunt and peck for the right information across a multitude of servers.
- Revision control problems are reduced. With multiple users and multiple locations working on the same project, often times it is hard to keep track of the “right” file to work on. Again, with data in one place, these problems are diminished greatly.
- The company will save money. Show users the results of your business case and explain how it will help the bottom line. A tool for estimating your ROI is available at [http://www.riverbed.com/lq/ty/roi\\_calculator\\_ty.php](http://www.riverbed.com/lq/ty/roi_calculator_ty.php).
- Consolidation reduces the risk of data loss through theft or insufficient processes. This loss could otherwise result in federal or local regulatory non-compliance auditing, negative press, and a loss in confidence by customers and partners.

IT managers in remote offices must be assured that the consolidation plan will benefit them as well:

- Routine maintenance tasks will be reduced. Instead of focusing on repetitive maintenance-related server tasks, IT managers can focus on forward-looking projects that actually help users get more work done in less time.
- Service levels will be maintained. Ensure the IT managers that you will work with them to maintain performance of applications across the network (See step 3 for more details.)
- Feedback will be taken seriously. Communicate that IT managers’ feedback will significantly affect the consolidation and virtualization plan.
- The first step takes a significant amount of time to complete across an organization of almost any size. But, it will pay off handsomely as you enter the more complicated process of completing the consolidation project. Users will understand what is happening, and most constituents will be more willing to work with you in the event of an unforeseen disruption or in the case that you need “testers” to ensure proper operations.
- A benefit of a phased approach (described below) is you can leverage the success at the first few sites where consolidation occurs to calm and encourage the remaining sites that this will be a successful, productive project for the company.

## Step 2: Develop a plan for resiliency

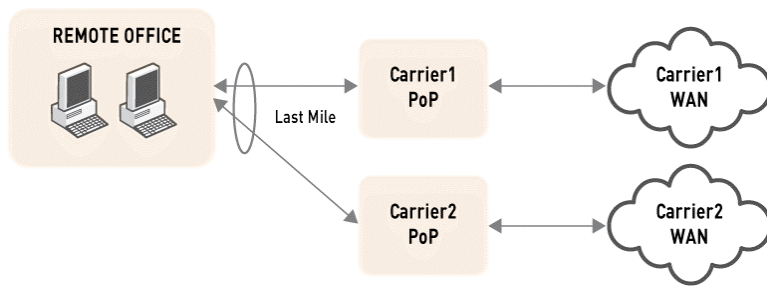
One of the primary downsides of IT consolidation is that your users are more reliant on the WAN and the central data center for data and applications. With this infrastructure shift, IT managers need to carefully consider the resiliency of this architecture.

Systems that were previously distributed provided some level of resiliency; all of an organization’s users wouldn’t be immediately affected by an outage of a system. But, with a centralized system, downtime immediately impacts the whole organization. This problem can, and must be, designed around.

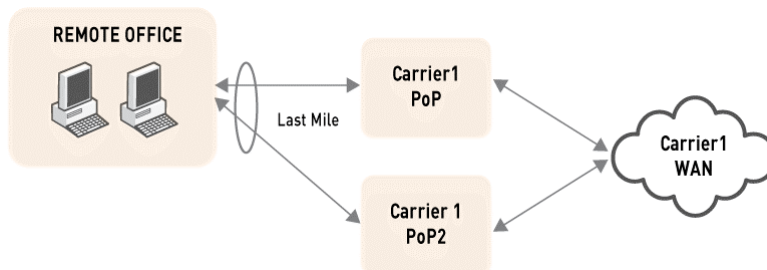
First, consider the redundancy of applications, storage and servers. As application servers are consolidated to the main data center and virtualized onto fewer physical servers, it becomes easier to provide backup systems without breaking the IT budget. It makes sense to implement backup systems that enable immediate failover for mission critical systems. Putting such systems in place, however, will also require new plans for reliably replicating information from the primary to the secondary server, ensuring consistent failover in the event of an incident. These plans will also require an IT department to consider the location of backup systems: should they be located in the primary data center or in a secondary, off-site facility? Off-site redundant systems are useful for recovery from major disasters, but may introduce additional performance problems discussed in the next section. If the plan includes replicating or moving numbers of large virtual machine images, it’s important to make sure the network will be adequate for the load and recovery time objectives.

Similarly, organizations should consider WAN redundancy. With centralized data and applications, users in branch offices will be more dependent on WAN connectivity, and a WAN outage will have a severe negative impact on user productivity.

When considering WAN redundancy strategy, organizations must make a tradeoff between using two different service providers for last-mile connectivity and using one service provider via different PoPs.



The first option gives an organization greater diversity of transport, and therefore provides greater peace-of-mind that remote offices will always be connected to headquarters.



The second option provides a remote office with a slightly lower level of redundancy; if the carrier's WAN goes down the office will be taken off-line. Nonetheless, if just one PoP goes down, the office will maintain connectivity. The benefit of this strategy comes in cost and management. Assuming that your carrier is reliable and has a high uptime to begin with, you are only defending against occasional outages. If a small amount of downtime is acceptable, this approach provides for easier IT management (and one less vendor to deal with), and probably lower costs, since you can buy bandwidth in volume.

### Step 3: Test (and improve) branch office performance

There is no doubt that one of the most vocal constituents during this project will be end-users in remote offices. Aside from feeling like they are "losing" their IT infrastructure, they will have serious issues if they cannot access the data and applications they need to do their jobs.

It is important to put this potential problem on the table immediately, and work with end users to test performance. Most users – and many IT staff – will simply assume that this is a bandwidth problem. Given that the consolidation of applications and storage will drive an increased amount of data over the WAN, it is natural for many to consider additional bandwidth to be the de-facto solution to performance across the WAN. But additional bandwidth will often not solve the problem – and in many cases is not necessary. Latency combines with application protocol inefficiencies to create an additional bottleneck to WAN application performance. Many organizations have turned to WAN optimization to simultaneously address bandwidth and latency constraints. WAN optimization products combine data reduction, transport protocol optimization, and application protocol optimization to provide WAN application acceleration and bandwidth reduction to all applications that run over TCP.

Often times, organizations just attempt to consolidate infrastructure and plan to deal with performance problems afterwards, hoping that performance will be "good enough" for distributed users. This is a path that will lead to dissatisfaction at best, and mutiny at worst. In fact, many organizations have started a consolidation project only to completely undo it when an executive experiences the pain of working over a congested, latency-impacted WAN connection in a remote office, or when users have just become so frustrated that they demand a reversion to the infrastructure of old.

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### A Case in Point

Greenhill & Co., an international investment advisory firm (NYSE: GHL), decided that it needed to consolidate its Microsoft Exchange deployment into its central data center for cost, complexity, and security reasons. Yet, given the firm's employees were highly paid knowledge workers who depended on email as a main form of communication, performance was a serious consideration. "We believed that with the right WAN optimization solution, overall we would spend less time and cost managing remote offices, while providing faster access to our centralized resources," stated John Shaffer, Director of IT at Greenhill.

In order to improve application over the WAN, Greenhill decided to deploy Riverbed Steelhead appliances. Steelhead appliances have enabled Greenhill to successfully migrate their users from three Exchange servers to a single server located in a secure, high availability co-location facility – with no reduction in user performance. Exchange WAN performance was dramatically improved: email that took 3-4 minutes prior to Riverbed is now delivered in just seconds. While these appliances added additional cost to the consolidation project, Shaffer notes, "I'm certain the Riverbed Steelhead appliance will pay for itself within the first four months."

It is imperative to find users, preferably influential ones, who agree to test the performance of application access across the WAN. Do simple tests such as using a stopwatch to test:

- Accessing files from a file share
- Browsing remote folders
- Opening files within Office applications
- Accessing databases
- Interacting with web applications

Perform these tests first without and then with a WAN optimization appliance in place. While the prospect of adding an additional device seems to be contrary to the whole concept of consolidation, these tend to be easy-to-manage appliances that can greatly ease the removal of file servers, applications, and tape backup from remote offices. In that sense, WAN optimization appliances generally pay for themselves in just a few months. For more information see "Extreme Savings: Cutting Costs with Wide-Area Data Services" (available at <http://www.riverbed.com/lq/resource/WhitePaper-Riverbed-CostCutting.pdf>.)

An additional benefit of application acceleration deployment is that access to previously-centralized services will be accelerated! So some common current tasks will likely get faster in the consolidated design.

### Step 4: Architect a forward-looking infrastructure & support plan

This is the step where IT departments actually save money. There is much to be saved by moving servers to virtual machines in a centralized data center and consolidating NAS boxes to improve utilization.

The consolidation strategy gives IT the opportunity to scale and secure data more efficiently in the future. After all, if the bulk of infrastructure is just located in one place, it is easier to deploy, manage, and test in the case of future modifications.

But the challenge to doing so will be in the technical dependencies of various components in your architecture. How will these changes affect dynamic links to other applications? Does it make sense to move certain groups of applications at the same time? What about backup routes within the network configuration?

This phase of the consolidation process is a good place to get key team members of your application, storage, networking, and support groups (if they are separate groups in your organization) on the same page. Clearly, many of the dependencies discussed in this section cross typical organizational boundaries. As such, it's important to consider the ramifications of consolidation to your infrastructure and IT processes with all of the team. What applications and technology can be consolidated, and to what degree? Will you need different shifts to handle IT monitoring or user support? How will plans for evaluating, testing, and rolling out new technologies need to be modified?

Additionally, if you decide to consider a WAN optimization appliance for application acceleration across the WAN, you will need to do additional architecting around their implementation. Key to deployment will be exploring various options of where these appliances will live in your network, how they will be sized (various vendors have different approaches), if they will provide some support for disconnected operations in the event of a WAN outage, and if these devices will need redundancy as well.

Once organizations have widely implemented IT infrastructure consolidation they may find that there are still services that must by their very nature be delivered locally. Local print, DNS, and DHCP servers are good examples of this type of "edge" services that defy many central consolidation efforts. However, the best WAN optimization solutions now allows organizations to run these services on their appliances, so organizations can eliminate these now redundant branch servers to further reduce hardware, software, and maintenance costs and complexity.

A good approach provides customers with the capability to run multiple additional services and applications on an industry leading virtualization platform in a protected partition on the WAN optimization appliance. This allows customers to deploy local services in all their branch offices without the need to deploy and maintain full-blown servers to run the applications, and further leverages their investment in both virtualization technology and WAN optimization. This concept is often called the "server-less branch office."

Finally, loop the earlier WAN redundancy discussion back into your architecture planning. Will you depend on the WAN optimization appliances for support in the event of a WAN outage, or will you implement some level of WAN redundancy?

## Step 5: Plan a phased roll-out

Like step one, this step applies to most complicated technology initiatives within an enterprise. In considering a phased rollout, explore a few different factors:

- How well can you support the offices in the initial phases of the project?
- Which applications make the most sense to consolidate first?
- How complete will the consolidation process be?

The initial phases should focus on offices that can be easily supported. They may be the ones with on-site support staff or relatively close to your IT hubs. In this manner, any difficulties can receive immediate assistance. Communication is easier, too, when these locations are in similar or the same time zones. Another way to slice the phase is by size. Smaller offices may be first on the list, even though they are not the easiest to support, because in the event of difficulties as few people as possible will be affected.

Next, consider the applications you have distributed and which ones it makes sense to consolidate first. Many will go with the "tried and true" consolidation targets like file servers, exchange servers, MS-SQL databases, and web applications. That is a good approach, as it allows organizations to lean on what others have successfully done in the past. Other organizations will often go with less widely-deployed systems, such as document management servers, tape backup systems, time and billing applications, and accounting packages. The furthest reaching efforts will achieve completely server-less branch offices enabled by their WAN optimization solutions. This is a great approach as well; what is important is that you have thought through the issue with your team and come up with a reasonable plan.

Finally, think through the level of consolidation that will actually occur. While every organization would love to remove everything from a remote office, just leaving a WAN connection, router, and a WAN optimization appliance, that is not always the reality of the situation. For certain offices, full consolidation is fine. But others may find that is necessary to have servers for "scratch" data – that is, temporary files that don't necessarily need to be accessed by other offices. This could be the case for offices that are quite far from the data center, and shouldn't have to send all this temporary information over the WAN.

Other offices may be so large that it makes sense to leave some infrastructure there. After all, they may have support staff and such a high utilization of certain applications that they would essentially require the full resources of an application server. In that case, the benefits of 100% centralization may not apply,

## Conclusion

There are many benefits associated with IT Consolidation, but it can be a very challenging process. It is important to consider all components of an IT consolidation project before embarking on it. Organizations that spend time and effort communicating the consolidation plan, testing and ensuring application performance, and implementing redundancy, will see tangible results.

## About Riverbed

Riverbed Technology is the performance leader in WAN optimization solutions. By enabling application performance over the WAN that is orders of magnitude faster than what users experience today, Riverbed is changing the way people work, and enabling a distributed workforce that can collaborate as if they were local.

Riverbed Steelhead appliances have been named *InfoWorld's* "Technology of the Year" four years in a row as the "Best WAN Accelerator". In addition, Riverbed was named the winner of *The Wall Street Journal's* 2005 Technology Innovation Award in the Network/Broadband/Internet category, *Network Computing's* 2006 Well-Connected Award for Remote Office Network Infrastructure, and *eWeek's* 2006 Excellence Award for Networking Infrastructure. Riverbed's award-winning solutions are available worldwide from resellers who are members of the Riverbed Partner Network, from Riverbed OEM partners, or directly from Riverbed.

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