CONVERGING BRANCH IT INFRASTRUCTURE THE RIGHT WAY

Riverbed SteelFusion

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Companies with significant non-data center and often widely distributed IT infrastructure requirements are faced with many challenges. It can be difficult enough to manage tens or hundreds if not thousands of remote or branch office locations, but many of these can also be located in dirty or dangerous environments that are simply not suited for standard data center infrastructure. It is also hard if not impossible to forward deploy the necessary IT experience to manage any locally placed resources. The key challenge then, and one that can be competitively differentiating on cost alone, is to simplify branch IT as much as possible while supporting branch business.

Converged solutions have become widely popular in the data center, particularly in virtualized environments. By tightly integrating multiple functionalities into one package, there are fewer separate moving parts for IT to manage while at the same time optimizing capabilities based on tightly intimately integrating components. IT becomes more efficient and in many ways gains more control over the whole environment. In addition to obviously increasing IT simplicity there are many other cascading benefits. The converged infrastructure can perform better, is more resilient and available, and offers better security than separately assembled silos of components. And a big benefit is a drastically lowered TCO.

Yet for a number of reasons, data center convergence approaches haven't translated as usefully to beneficial convergence in the branch. No matter how tightly integrated a "branch in a box" is, if it's just an assemblage of the usual storage, server, and networking silo components it will still suffer from traditional branch infrastructure challenges – second-class performance, low reliability, high OPEX, and difficult to protect and recover. Branches have unique needs and data center infrastructure, converged or otherwise, isn't designed to meet those needs. This is where Riverbed has pioneered a truly innovative converged infrastructure designed explicitly for the branch which provides simplified deployment and provisioning, resiliency in the face of network issues, improved protection and recovery from the central data center, optimization and acceleration for remote performance, and a greatly lowered OPEX.

In this paper we will review Riverbed's SteelFusion (formerly known as Granite) branch converged infrastructure solution, and see how it marries together multiple technical advances including WAN optimization, stateless compute, and "projected" datacenter storage to solve those branch challenges and bring the benefits of convergence out to branch IT. We'll see how SteelFusion is not only fulfilling the promise of a converged "branch" infrastructure that supports distributed IT, but also accelerates the business based on it.

WHY LOOK FOR BRANCH CONVERGENCE SOLUTIONS?

Companies need distributed branches for many reasons but mainly to conduct business operations close to where key expertise, resources, or customers are located. For many of these companies, this also requires localizing critical business data and supporting IT. However, branch IT operations often suffer from at least one if not several of these challenges at the same time:

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- **Lack of remote IT** staff or expertise to manage or protect locally deployed infrastructure and data, or maintain and restore local IT operations when needed
- **Terrible performance** due to second-class or insufficient forward deployed resources, or network bandwidth constraints
- **Unreliable availability** due to network connectivity issues or complex equipment and configuration failures with long recovery/restore times
- **Inflexible infrastructure** that requires long lead times, significant change-out cost, and travel or on-site expertise as branch needs evolve
- **Loss of critical business data** due to an inability to protect or secure forward deployed assets against environmental conditions, corruption, theft, or other branch location hazards, and loss of business it-self due to inability to restore or effectively recover from outages

Mitigating these challenges is costly. WAN's are notoriously unreliable – and even with enough (expensive) bandwidth and good WAN optimization you can still have localized islands of isolatable and at-risk IT resources, not the least of which are large sets of business-critical data. The temptation is to forward deploy inflexible "mini" sets of compute and storage infrastructure across branches. While the branch might then perform better locally and have some persistence through network outages due to having localized resources, even more of the business is placed at-risk in the forward locations, with an increased cost of remote (or on-site) IT infrastructure, operations and support.

Instead of shipping racks of disparate equipment, traditional data center convergence solutions can be used in a branch setting to lower some costs of deployment and support, but they aren't designed for and don't address some of the major challenges that branches entail – especially the protection of critical data, significant remote IT costs, and long recovery times when problems occur.

We note that even having a small probability of disaster per branch leads to a high outage rate when multiplied across a large number of branches (support and other costs and risks similarly multiply). And many companies require branches in less than stellar locations with critical data exposure and poor facilities for IT infrastructure that greatly increase the cost/risk "per branch". With this equation in mind, there is a compelling case to stop trying to deploy "mini copies" of data center targeted solutions and instead look for a new type of branch infrastructure that is designed specifically to address branch IT requirements.

RIVERBED STEELFUSION BRANCH CONVERGED INFRASTRUCTURE

Riverbed has evolved a converged solution for branch IT that perhaps only they could have built and brought to market called SteelFusion. At a high level, SteelFusion integrates together a branch-friendly converged infrastructure appliance with world-class WAN optimization technologies and most uniquely, a solution for "projecting" data actually stored in the data center out to that branch appliance as needed.

This data projection capability means that the persisted, primary copy of all branch data actually resides in a core data center, able to leverage enterprise class data center storage infrastructure and

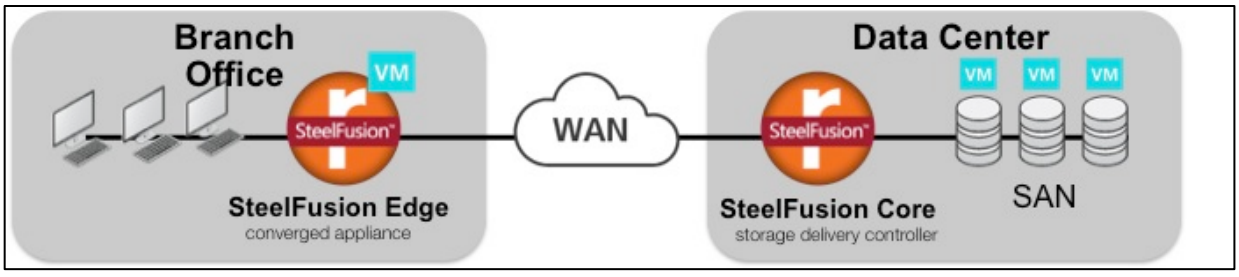

Figure 1 Riverbed SteelFusion Edge and Core

data management solutions for centralized protection, backup, patching, and even analytics.

The branch appliance, referred to as SteelFusion Edge, maintains a forward cached copy of the actual primary storage which is kept current back in the data center through connection to the SteelFusion Core (see Figure 1). The core device can project any allocated data center storage out to the edge device transparently to the end user or application.

STEELFUSION AS APPLICATION PERFORMANCE PLATFORM

As a converged solution, SteelFusion Edge integrates a hypervisor (VMware vSphere) so that it can run virtual machines locally and directly in the branch location. Of course, those VMs as well as application data can be projected out from the data center to enable a type of "stateless computing" in the branch. Having all the branch VM's and data hosted in the data center supports centralized mastering and patching of the distributed branch applications.

More than an appliance, SteelFusion in effect provides a branch data and application platform. Some of the unique capabilities that make up SteelFusion include data consolidation and storage projection, stateless computing, and WAN optimization.

Branch Converged Infrastructure Example #1

I was able to talk with Searl Tate, Director of Engineering for Paul Hastings, a large corporate law firm with over 2200 people distributed across roughly 20 cities globally. Data is a key asset for Paul Hastings, and they have over 100 million documents in their "repository".

Searl is helping move the company from architecture with a data center in every location, to a more consolidated hub and spoke model with only the main hubs hosting master data replicates. Historically, every location had a variety of NAS filers, but going forward the hubs will have large capacity focused arrays, while tenant spoke offices will have Riverbed converged infrastructure.

With a global presence, Paul Hastings has a compelling need to ensure top-tier security no matter where they do business. Now with this Riverbed solution, forward "projected" data is encrypted at rest on the edge devices, and is able to be fully protected in secure data center facilities.

Searl indicated that the converged solution is 1/3 the cost of doing things the old way, and has increased their agility tremendously. They deployed a new office in global location in less than half the time it used to take them. And now they feel they have moved up to active "disaster avoidance" instead of reactive DR.

Storage Projection through BlockStream

A big part of the unique magic in SteelFusion is that it enables branch locations to leverage enterprise storage actually located in the data center as if it were local high performance storage. Riverbed's BlockStream functionality combines a sophisticated block-level prediction algorithm on the edge device that optimizes a local "authoritative" cache for accelerated block storage access. For writes, BlockStream provides an authoritative block-based write accelerator feature that uses asynchronous write-back. This effectively presents a "projected" copy of centralized storage out to any local users or applications as if it were locally hosted, providing local access and performance. In many cases SteelFusion can even "hide" short-term network issues due to this sophisticated caching, which lets the local clients continue to execute and then later updates the data center when it's back online – a big benefit for branches with sketchy connectivity.

Because the actual persistent storage resides in the data center, all data is highly protected and secure. It can be readily backed up (and restored) within existing data center processes – no need to backup each branch separately (nor backup from any branch location). If there are any disasters at a branch, a new copy can be projected out in short order, or readily cloned and pushed out elsewhere

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(e.g. for second site recovery, migration or testing). Another benefit is that by hosting all the branch data converged back in the primary data center, higher levels of deduplication will be achieved.

Stateless Computing on the Virtual Services Platform (VSP)

Once critical business data is available in a SteelFusion Edge device, any local hosted IT can access it. But SteelFusion appliances are truly converged platforms, and come with VMware vSphere natively integrated and optimized to take full advantage of SteelFusion's networking and storage capabilities outlined above. SteelFusion is available in a range of configurations including some that can have larger memory and SSD resources if necessary to host not just ordinary apps like file and print servers, but also write-intensive and performance demanding business-critical applications.

When, in addition to business data, the VM images for branch applications are also projected out from the data center, a truly stateless branch architecture emerges. Compute is hosted locally on the appliance providing a local user experience, while the VM's can be managed, mastered, patched, cloned, replicated, backed up, and secured from the data center.

Branch Converged Infrastructure Example #2

I got the opportunity to interview Michael Rinken, Director of IT with Mazzetti, a mechanical engineering firm specializing in the higher education and healthcare space. Over time Mazzetti has grown to 9 distributed engineering offices with various specialists that all might need to collaborate on large projects based on sharing 2 and 3D CAD & BIM files. Michael indicated that this industry is all about efficiency, sharing large files and ensuring good application performance in each office.

While Mazzetti had SteelHead WAN optimization already in place, as they grew and become overdue for a server and storage refresh, it made more and more sense to look at how to better share the sizable data sets that they work with. SteelFusion (Granite) allowed them to centralize data in their Denver data center and simply deploy edge devices to project data out to each branch. This eliminated branch servers and storage while providing locally cached copies of data. Users could work locally while their data would be automatically saved back to the core. They also liked the ability to run virtual machines in the branch that would be projected out from the core data center, and therefore also kept protected and secure.

Michael reports that going this route has saved them over 50% in CAPEX per branch, and more in OPEX since one IT staffer can support 2-3 large branch offices. And they can now open a new location in a "day or less" by shipping a pre-configured edge box.

Admittedly switching to Riverbed SteelFusion caused them to have to beef up core storage, but that storage doesn't need to serve as many IOPS due to the edge local processing and can now be focused on providing cost-effective capacity. Eventually, Michael expects this strategy to enable moving consolidated capacity into cloud services to take advantage of further cost benefits.

An entire branch IT implementation can therefore be "projected" out from the data center into branches requiring only local SteelFusion Edge "platforms". With available HA, MPIO, and encryption options, we don't think that branch IT operations have ever been this protected, secure, performant or cost-efficient.

WAN Optimization with Riverbed SteelHead

Riverbed's market-leading SteelHead WAN optimization solution optimizes traffic over a WAN to provide LAN-like performance, lowering the overall costs of networking and making best use of

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available bandwidth. SteelHead achieves this through the intelligent application of data reduction methods, application protocol optimizations, and TCP acceleration.

SteelFusion embeds an integrated instance of SteelHead to accelerate all branch network traffic to and from the data center. First, this serves to control and minimize required network resources, which at scale across all branch connections can lead to quite significant cost savings. But it also helps ensure branch-side user performance while supporting the effective consolidation of storage and other services back into the data center.

Remote IT management and operations

We also note some interesting changes in how IT can manage SteelFusion converged branches. First, there is centralized management for the SteelFusion Edge appliances. Second, SteelFusion can also embed Riverbed's Cascade Shark that can collect packet level data with application-aware visibility without additional instrumentation or layers of overhead. This detailed branch data we are sure in many organizations will be a welcome feed into "big data" security solutions residing in the data center.

The SteelFusion approach also means that all backup and replication protection processes can occur from and between data centers. Branches no longer require dedicated backup equipment nor need rely on local non-technical staff to load tape drives. Instead, branch data and apps can be protected with enterprise class storage features that can considerably improve RPO and RTO's across the organization.

Because of their near real-time data synchronization back to the data center, each branch now can receive RPO's as low as that offered in the data center. RTO's are low as well, because recovering VM's in the branch is a simple matter of "projecting" back out its image from the data center to the branch. And if the branch itself isn't available, the branch's VM's (and data) can be brought up right in the data center (for remote access) or projected elsewhere as convenient.

SteelFusion also changes the approach to scaling and upgrades. As branch needs change, it becomes a relatively simple matter to upgrade the deployed "stateless" appliances compared to what it might take to upgrade or refresh any or all of the

Branch Converged Infrastructure Example #3

I talked with Jerry Vigil, Director of IT at Bill Barret Corporation, an Oil and Gas exploration and mining company in the Rocky Mountains about his experiences with branch convergence and Riverbed's solutions. Jerry manages 5 branch locations that when he first started held aging equipment in a traditional one server per app architecture. He noted that remote backup processes didn't work or even existed. As much of that infrastructure was due for a refresh, he was facing options that included "a site in a box" (or rather a half rack) complete with backup servers, multiple switches, and even a tape device. He knew that option wasn't really going to fix any problems, and doubted that backups would still ever work leaving branches unprotected.

He found Riverbed through a trusted VAR, and did a POC to see if they could solve his backup problem, shrink the required footprint, and provide a better user experience. What Jerry found was that they delivered that and more including a practical DR plan, significant operational cost savings, and a virtualization platform that avoided multiple physical servers at an implementation price less than half that of the alternatives.

After implementation they found that they could use the ongoing cost savings on other projects like converging their phone systems. Where before backups weren't even being done, today they simply don't lose any data to start with. They spend less time firefighting, and their remote users are no longer loudly complaining about IT issues. Riverbed is now part of their blueprint for any new sites under consideration. Branch converged infrastructure has let him establish trust with his business, demonstrate competency and improve IT's reputation – and bottom-line save money.

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traditional stack of local servers, storage, and networking.

BRANCH CONVERGED INFRASTRUCTURE THAT DELIVERS

Taken together, Riverbed SteelFusion not only delivers the expected "simplicity" and cost benefits of infrastructure convergence (like those expected in data center convergence solutions) but also uniquely addresses significant branch IT challenges by providing:

- **Stronger Resiliency and Higher Availability** – The unique combination of WAN optimization and storage projection ensures that local users aren't subject to remote network connectivity issues
- **Local Performance** – Having both data and compute effectively running local provides a great user experience, while keeping the key assets safe and protected in the corporate data center
- **Increased Agility** – The stateless platform means branches can be deployed, re-deployed, upgraded, moved or migrated with relative ease
- **Secured Data** – Since all data is fully protected in the data center and the projected cache is encrypted in the branch, the risk of operating branches in dangerous or unsecured locations is minimized
- **Instant Recovery** – Because the branch is essentially virtualized IT, many potential "remote location" problems are avoided outright, and unavoidable disasters can be quickly recovered from using the data center master

The IT value of SteelFusion will be recognized in the TCO reduction, both in CAPEX initially and over time, and especially in OPEX when you factor in data protection, networking costs, remote site support, and all the other myriad challenges of managing a distributed environment. But ultimately the real value of SteelFusion is to the business at those remote locations, as user performance and application reliability and access to key data all contribute to branch business operational success.

TANEJA GROUP OPINION

In our field research we find it surprising that many branch-challenged organizations continue to flounder with outdated IT architectures. For many of these organizations it seems that it can be difficult to imagine that there might be a fundamentally better (and cheaper) way to architect their branch IT. It can seem easier to simply focus on refreshing each branch IT resource silo by silo - networks this year, servers next year, maybe storage every third year. But this approach will never lead to the kind of wholesale improvements that a branch converged infrastructure solution like Riverbed's SteelFusion promises.

As mandated by simple math, IT must simplify what happens at the branch as branches multiply in numbers and importance. This means bringing the enterprise parts of IT back into the data center where expert staff and high-quality resources are suited for the job. Centralization and consolidation drives economic benefits such as efficiencies of scale and the ability to share expensive backend solutions.

We are firmly convinced that branch converged infrastructure based on sound data center storage consolidation principles will result in significant dollar savings that can be applied to other areas of value (such as investing in higher quality data center storage solutions). In addition, all the anecdotal evidence we've seen indicates that end users end up, if not outright happier with IT services, then at least pleasantly ignorant of IT infrastructure, no longer seeing it as a major problem with getting business done in the branch.

Riverbed comes to this arena fully armed with a set of unique capabilities to solve branch IT challenges. We recommend that organizations faced with branch IT challenges take a serious look at how converging their branch infrastructure with Riverbed SteelFusion could fundamentally improve their IT costs, their branch operations, and ultimately their business prospects.

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