A year ago, we published an in-depth review of Riverbed’s broad suite of WAN optimization solutions from an IT performance viewpoint. Put simply, Riverbed’s focus for the last decade has been on improving overall IT performance through industry-leading WAN optimization technologies and solutions wherever possible.

Now, the company has identified a critical emerging challenge that limits IT performance in highly distributed customer environments: costly, complex, and hardware-heavy branch offices. Riverbed customers report that they are struggling to achieve the same level of consolidation (and cost efficiency) in their branch offices that server and storage virtualization have enabled in their datacenters. So the WAN optimization pioneer has now turned its full attention to overcoming its customers’ top barriers to fully virtualized and consolidated infrastructure: limited server virtualization, heavy reliance on distributed, regional storage, and the need for edge locations to function even when disconnected from a central datacenter.

The result is the new Steelhead EX + Granite, which extends the virtual edge of the data center, and introduces a new architectural approach that does for edge servers outside of the data center what virtual desktop infrastructure (VDI) did for desktops: allow IT to consolidate and manage all edge servers in the data center. The approach, known as edge virtual server infrastructure (Edge-VSI), combines a true “branch-office box” virtualized hardware platform with a first-of-its-kind block storage technology. In this updated profile, we explore Steelhead EX + Granite in detail and review the quantifiable business benefits early adopters are enjoying by reducing the technology footprint and operations overhead in their branch offices.

IT TODAY: DISTRIBUTED BUSINESS, CONSOLIDATING INFRASTRUCTURE

Enterprises face a paradox today: while business becomes more distributed, IT infrastructure is rapidly consolidating. Mobile workers move farther from the applications and data they need, yet require faster response times and “always on” availability. At the same time, economic pressures force technology managers to lower hardware costs, drive out redundancy, and reduce overhead.

This paradox is also clear when looking at the conflicting goals of the modern enterprise: The business requires agility and availability, to respond to opportunities anywhere with all the necessary tools at hand, while the IT organization often struggles to deliver those technology tools where they are needed, at the right time, and at the lowest possible cost.

The need to resolve this “consolidation paradox” has fueled the most important technology innovations of the last decade. Server virtualization has enabled widespread and new levels of workload mobility, while often also improving availability and simplifying management. Storage advances—such as virtualization, thin technologies, deduplication and replication—have driven up both utilization and performance, while also offering new strategies for better data protection.
The key to getting the most business benefit from these innovations, however, lies in how they are brought together, optimized, and delivered—and that’s where the enterprise wide area network (WAN) plays an increasingly pivotal role.

**RIVERBED WAN OPTIMIZATION HAS POWERED A DECADE OF CONSOLIDATION**

Riverbed has been at the forefront of this decade-long wave of innovation. As we stated in our update profile in 2010, “Riverbed essentially created the WAN optimization market, by improving on and integrating what were previously discrete technologies into the first comprehensive and scalable WAN optimization solution: the Steelhead product family.”

Steelhead has enabled companies to expand the benefits of storage and server virtualization within the datacenter and extend them outward—between multiple datacenters, to public networks and to the cloud, and to branch office and mobile workers. Riverbed WAN optimization is now a core, foundational technology for the distributed datacenter, and indeed, the entire distributed modern enterprise. Riverbed WAN optimization’s core benefits are well-established in thousands of deployments, and include:

*Application performance acceleration.* IT can safely centralize applications while delivering performance improvements of 12x, 18x, and up to 50x to remote users. By reducing protocol chattiness and minimizing application overhead, users enjoy LAN-like performance over the WAN, wherever they work and however they connect.

*Faster file sharing and collaboration.* File transfers are accelerated up to 66x, delivering important data to users on demand. Steelhead’s massively scalable data reduction algorithms deliver astonishing compression ratios (100:1 or greater) to push more data through existing WAN links. Tunable Quality of Service features ensure sufficient bandwidth for the most important applications and data.

*Optimized disaster recovery operations.* With Riverbed, customers can confidently move to WAN-based disk-to-disk backups, shorten backup windows, and eliminate tape stackers in remote offices. In addition, Steelheads accelerate storage replication for the broadest range of third-party storage platforms—up to 30x or more—enabling more replication, more often, for the highest levels of business continuity at reasonable cost.

*Overall IT efficiency performance boost.* Steelhead yields unparalleled reductions in overall WAN bandwidth utilization—ranging from 60-95% in practice—unlocking inaccessible bandwidth and helping customers extract more value from existing network investments by deferring costly upgrades. Centralized management and control features automate deployment, simplify maintenance, and speed troubleshooting, which lower operations overhead significantly.

*Branch office consolidation.* The Riverbed Virtual Services Platform (VSP) combines WAN optimization with server virtualization and addresses challenges unique to branch consolidation. VSP allows those IT services that typically remain in the branch—“edge” services such as directory, DNS, DHCP, and print—to be virtualized and run on a VMware platform directly on the Steelhead appliance. This further lowers branch IT costs and simplifies management.

**THE BRANCH IS NOW THE FOCUS OF FURTHER CONSOLIDATION**

Riverbed has invested heavily over the last ten years in product innovation to help its customers resolve the IT consolidation paradox. As new barriers to further compute and storage consolidation emerge, Riverbed moves quickly to tear them down with new WAN optimization technologies and solutions. Recently, Riverbed turned its attention to consolidation efforts in branch offices.

Consolidation in the branch has all too often failed to yield returns that match those from datacenter consolidation projects. In too many companies, branch offices remain islands of inefficiency, where IT
consolidation has effectively stalled. Too much infrastructure remains in the branch, and too many staff members are required to support it.

In fact, in a recent survey, Riverbed found that 77% of its own customers continue to require branch office IT resources in addition to their Steelhead appliances. Why is this? To find out, Riverbed asked its customers, “Why do you maintain additional servers and storage devices in the branch?” Three important reasons were cited the most often:

- “We rely on write-intensive applications that depend on local storage.”
- “We depend on custom applications that were designed to require local resources.”
- “We need to keep branches running independently of a connection to the datacenter.”

Taneja Group research backs up these findings. In a recent survey of 359 North American enterprise IT infrastructure managers and storage administrators, we found that 60% support more than 10 remote branch office sites, and 22% support more than 100. Only 40% currently rely on virtual servers in branches, and a third of respondents support five or more primary storage sites. This data illustrates that branches are far from fully virtualized and storage consolidation is still a work in progress.

We then asked how these IT pros planned to improve or enhance their IT infrastructures to enable further virtualization and consolidation. The top five answers were data protection, disaster recovery, storage utilization, high availability, and application performance (Fig. 1). It’s clear that customers realize they can only consolidate further if they can ensure that critical data is always available and protected, and if they can optimize storage utilization without affecting application performance.

Figure 1: How companies plan to improve their virtualized server and storage environments

<table>
<thead>
<tr>
<th>Element of your Virtual Server Environment You Plan to Improve or Enhance Over the Next 12 Months</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backup and recovery</td>
<td>66.8%</td>
</tr>
<tr>
<td>Disaster recovery</td>
<td>63.4%</td>
</tr>
<tr>
<td>Storage utilization (i.e. % of capacity utilized)</td>
<td>59.6%</td>
</tr>
<tr>
<td>High availability</td>
<td>58.9%</td>
</tr>
<tr>
<td>Application performance</td>
<td>57.1%</td>
</tr>
<tr>
<td>Ease and speed of storage provisioning</td>
<td>53.7%</td>
</tr>
<tr>
<td>Storage management capabilities</td>
<td>51.7%</td>
</tr>
<tr>
<td>Virtual machine security</td>
<td>46.5%</td>
</tr>
<tr>
<td>Administrative security of application data</td>
<td>38.3%</td>
</tr>
<tr>
<td>Storage utilization (i.e. % of capacity utilized)</td>
<td>37.5%</td>
</tr>
<tr>
<td>None of the above</td>
<td>8.1%</td>
</tr>
</tbody>
</table>


CHARTING A COURSE TO THE DATACENTER WITHOUT BOUNDARIES

Taken together, Taneja Group and Riverbed’s own research brings the next wave of consolidation challenges into sharp focus. Too many existing and legacy applications are assumed to require local IT resources in order to deliver adequate user performance. Too many workloads have yet to be virtualized and consolidated, leading to continued server sprawl and higher branch support costs.
And, too much local storage remains in branch offices, requiring redundant support teams and data protection strategies, and lowering overall storage efficiency throughout the enterprise.

In order to move forward, customers need technology solutions that enable a new level of consolidation—consolidation that goes beyond the datacenter and beyond piecemeal branch server consolidation. These solutions must extend the concept of consolidation to all corners of the enterprise, to create a “datacenter without boundaries.” In this end state, applications and data are delivered efficiently wherever they are needed, without artificial restrictions imposed by network limitations.

The first step in this journey requires implementation of that elusive technology platform, the true “branch office box.” The ideal unified branch office box provides a high-performance network gateway to a company’s centralized, consolidated IT resources. Through this gateway, some critical user applications can be run remotely. Others can run on the branch office box itself, as virtual workloads, accessing centralized storage through the same accelerated WAN link.

The second step is eliminating (or at least significantly reducing) the need for local storage in branch offices. Every locally-deployed branch storage device is another point of data duplication, requiring another strategy for protection and introducing more “storage sprawl.” The need is clear for innovative storage technology that can present remote storage locally, enabling data-intensive applications in the branch to perform whether the data they require is held locally or remotely.

By reducing the number of physical moving parts in the branch, and consolidating as many storage platforms and as many local services as possible into a central location, companies can move closer to a “stateless” branch architecture. The stateless branch needs only a minimal hardware footprint and relies primarily on remote, consolidated, and centrally managed resources—tied to the branch via a high-performance WAN link.

**RIVERBED INTRODUCES EDGE VIRTUAL SERVER INFRASTRUCTURE**

With customer feedback in hand, Riverbed went to work building the platform to power the datacenter without boundaries. To start, Riverbed translated its customers’ top branch consolidation barriers into a set of product design goals. These summarize the technology requirements for the active, stateless branch office:

- **Accelerate the performance of more business-critical applications over the WAN**, including those considered too latency-sensitive to be consolidated today;
- **Reduce the number of servers in the branch** by extending the existing Riverbed Services Platform (RSP) to support more virtual workloads with less overhead;
- **Overcome the limitations of block storage over the WAN** in order to offer SAN-like access speeds for branch applications currently dependent on local filers and arrays; and
- **Enable disconnected operations**, so that local services remain available and user experience is maintained even during transient WAN outages.

The company that pioneered WAN optimization and set the industry standard for performance then turned its sights on setting a new standard—one that solves the compute and storage problems lower in the stack than competing solutions.

The result is a new suite of enhanced WAN optimization appliances, a new branch office box platform, and a first-of-its-kind storage technology.
Steelhead CX Series: Bigger and Better WAN Optimization

The Steelhead CX is the successor to Riverbed’s widely deployed and highly successful core WAN optimization product line, the Steelhead xx50. The CX Series extends the family’s core values—speed, scalability and simplicity—with more memory, CPU, and disk options, including high-performance SSD drives. As with previous Steelhead family enhancements, the CX is offered in a wide range of sizes and form factors.

The CX Series extends the value of WAN optimization for on-going consolidation of applications to a central location, where they can be more efficiently managed, without sacrificing user experience. Riverbed’s core application acceleration technology truly untethers the mobile workforce by offering the industry’s broadest range of application-specific modules, from file sharing (CIFS and NFS) to Exchange (MAPI), Lotus Notes, Web (HTTP and HTTPS), desktop virtualization protocols (such as Citrix ICA), and databases (MS-SQL and Oracle).

Steelhead EX Series: Making a Branch Office Box a Reality

The Steelhead EX combines more hardware power than previous versions and adds a new Virtual Services Platform (VSP). VSP is VMware-based and allows customers to run multiple virtualized workloads directly on the Steelhead platform (Fig. 2). Riverbed’s embedded and tightly integrated management tools add further control, via fine-grained configuration of data rules governing which services to run in and out of the data path. Security services such as a firewall can be configured to run in-path, while other virtual services such as directory, DNS/DHCP, and print, can run out-of-path, for example.

The EX Series directly addresses customer demand for a consolidated branch office box solution based on VMware. With additional memory and storage options (including high-performance SSD), the EX Series is powerful enough to consolidate many “edge” services onto a single platform, including resource-intensive applications such as network security and streaming video, CAD, document
management, Access databases, or local Exchange servers. Like all Steelhead appliances, the EX Series deploys in minutes through auto-discovery of peers and auto-interception of traffic, requiring no re-configuration of clients, servers, or routers. This extremely "low touch" deployment dramatically simplifies branch IT operations, saving both time and money.

**Introducing Optimized Storage Consolidation: The Steelhead EX + Granite**

For even greater branch consolidation, Riverbed introduces Steelhead EX + Granite, a first-of-its-kind product combining WAN optimization with virtualization and storage optimization. Steelhead EX + Granite is designed to address the needs of customers who wish to consolidate branch storage arrays and Windows file servers without sacrificing end-user performance or read/write speeds.

Granite features new Riverbed BlockStream technology that effectively presents an iSCSI target over the WAN, appearing to branch applications like a local drive. BlockStream combines unique block-level prediction algorithms with a local authoritative read cache to enable accelerated block storage access across the WAN. For write operations, BlockStream also includes an authoritative block-based write accelerator, with asynchronous write-back support for faster cold write operations. Taken together, these features mean that centralized storage appears to local applications as a high-performance local storage, without duplication of resources or added security risk.

Figure 3: Granite in action. Consolidate more servers and services.
The Steelhead EX + Granite targets customers whose branch consolidation efforts have stalled due to their reliance on write-intensive local workloads, such as architectural design or scanning applications. It allows customers to keep these applications in the branch while centralizing storage arrays to remove islands of underutilized capacity (Fig. 3). Centralized storage is easier to manage and protect. It also lowers the compliance risks of storing sensitive data in distributed arrays and file servers.

**THE BUSINESS BENEFITS OF THE RIVERBED STATELESS BRANCH ARCHITECTURE**

The potential benefits from the stateless branch architecture are clear. In order to explore how these potential benefits can be quantified in real-world customer environments, we reviewed some success metrics reported by early adopters of the Granite platform. Our objective was to quantify the ways in which Riverbed’s stateless branch architecture delivered measurable returns in business agility and availability. Some highlights from the data we reviewed:

- **A large regional law firm maintained multiple Windows servers** (Active Directory, DNS/DHCP, print, local document management services) and a local iSCSI SAN in each of 10 branches. Acquisition costs were ~$55K, and total 3-year costs including support came in close to $75K per branch. Replacement with a Granite solution ($35K 3-year cost per branch) plus Granite “Core” datacenter component (~$25K over 3 years) saves just over 50% in total infrastructure costs.

- **A global media leader with 20 distributed sites and a heavy branch footprint** (local servers plus a NAS filer with 2-4TB of local replicated storage) was able to save over 30% in 3-year infrastructure costs while simultaneously eliminating the need for redundant replication of data to remote locations.

- **A global manufacturer of advanced wireless electronics needed to consolidate** more than 40 regional sites with local AD, DNS/DHCP, and print services, while supporting teams that collaborated on very large Office and CAD files. IT support costs continued to grow to support local resources and to manage backup and recovery operations. Consolidating local storage and services with Granite is projected to save over 18% in total 3-year costs.

These examples are representative and show that potential returns are significant, from **18% to over 50% over three years**. The key takeaway here is that while each customer situation is unique, Granite offers—for the first time—the opportunity to significantly consolidate both compute and storage resources from branch offices to a central location.

In addition, these savings are compounded when customers take into account the impact on branch operations: fewer dedicated IT staff needed to support each location, faster and cheaper backups, and centralized data protection.

**TANEJA GROUP OPINION**

If you’ve deployed WAN optimization but still find yourself supporting too many local servers and storage devices in your branch offices, it’s time to take a fresh look at what “next generation” WAN optimization from Riverbed can do for you. Indeed, Riverbed is writing the next chapter in the WAN optimization story. And if you haven’t yet explored what WAN optimization can do for your enterprise IT consolidation efforts, it’s most definitely time to take a first look.

Server and storage virtualization by themselves are only strategies for IT consolidation. WAN optimization pulls them together into a true enterprise-wide solution. Both types of virtualization support moderate levels of consolidation, but are locally-focused—either at the datacenter or the branch, for example—and in many companies their benefits are leveling out, leading to consolidation stall.
Until now, there hasn’t been a simple and cost-effective solution to consolidate branch IT devices any further. Today, however, with Steelhead EX + Granite, the company that set the standard for WAN optimization has set a new standard for branch office optimization.

Riverbed has created a multi-tiered, cross-domain, and integrated solution that links service consolidation based on high-performance virtualization with storage consolidation based on first-in-class data streaming technology—and ties them together with WAN optimization to deliver rock-solid performance and cost savings for highly distributed customer environments.

The Steelhead EX and EX + Granite offering, in our view, represent the industry's first truly integrated branch office box solution. It's the first product family to combine WAN optimization, virtualization, and storage optimization into a tightly-integrated solution targeted directly at overcoming consolidation stall.