Business Continuity & Disaster Recovery for ROBO Sites

A Look at Business Continuity and Disaster Recovery planning from the perspective of ROBO sites. How IT can deliver Data-Center-grade SLAs in Branch and Remote Sites.

There are numerous enterprise infrastructure technologies focused on the strict requirements of the data center. These solutions advertise high availability, offer enhanced business continuity at the data center and usually come at a high cost. The ROBO landscape differs from the data center in many ways. At the infrastructure layer, data centers get best-of-breed, while remote locations are designed with a best-effort mentality. Outages at ROBO locations directly impact the business as the majority of the business workforce resides remotely.

Riverbed's Hyper-Converged Edge SteelFusion solution is the only purpose-built ROBO infrastructure solution on the market that delivers unprecedented levels of business continuity and disaster recovery.

According to the Business Continuity Institute, "Business Continuity (BC) is defined as the capability of an organization to continue delivery of products or services at acceptable predefined levels following a disruptive incident (Source: ISO 22301:2012)." This term is often confused, and used interchangeably, with Disaster Recovery (DR) which is the capability to restore a service or services in case of a data center, server, or infrastructure outage. Business Continuity is the overall business strategy under which DR is one of the pillars of planning. In this document, we will focus on the technology that empowers IT to deliver high service level agreement (SLAs) during various outage scenarios (DR being one of these scenarios).

It comes as no surprise that the prosperity of a business directly hinges upon its ability to continue no matter the circumstance. While many variables are controlled and usually entail a design solution, numerous situations can be out of IT and business control. IT has to deal with unplanned outages, natural disasters and physical and logical threats as well as rapid business changes. A robust and elastic infrastructure, regardless of the location, is paramount for business agility and continuity.

BC/DR and ROBO Environments

The data center landscape is typically fairly predictable. Most of the business critical applications and services reside at the data center and most of the trained IT staff also sit on site to manage them. Well-planned and well-funded BC/DR strategies naturally lead to a robust, highly resilient and available infrastructure in data center locations. When looking at ROBO environments, planners typically only consider the application landscape, just as they would at the data center. Having fewer crucial applications resident at the branch leads to a lesser-grade infrastructure.

We know that the majority of the critical applications reside at the data center. However, it is also just as true that most of the customers and consumers of these services reside in remote locations. The applications and associated data that remain resident at the ROBO locations are usually crucial to the local business user and specific to the location. With a large number of remote sites, adding up even a small number of applications from each site results in a massive manageability challenge for most IT organizations. Individual outages, however minute, when distributed can add up and impede the overall business continuity.

Also, applications and services are only as good as their effective consumption by the customer. When the remote business workforce experiences poor availability and performance due to outages and inelastic infrastructure, it reduces overall productivity and leads to an unacceptable business experience.

Technology Trends and Customer Expectations

Technology and consumer trends reveal some remarkable and interesting observations. During the past few decades and continuing into the foreseeable future, the main infrastructure technology trends are all built to expect and withstand failure.

- **Virtualization** – Arguably the most commonly used infrastructure technology, deployed in most enterprises, virtualization delivers high availability through features like compute and storage vMotion. Abstraction from the physical world means that administrators can treat physical hardware as commodity infrastructure. Failure of physical servers does not affect service up time since they are commonly deployed in a highly available (HA) configuration.

- **Cloud Infrastructure** – The next evolution of virtualization is cloud computing. Whether private or public, cloud infrastructure provides an added layer of abstraction where compute and storage resources can be assigned in a demand-driven software-defined world.

- **SaaS Platform** – Usually built on cloud infrastructure, many enterprises use some form of SaaS-based applications. Whether public SaaS offerings like Salesforce or O365, or private home-grown services, enterprises rely on the availability and continuity of services that are built to be always on, no matter the circumstance.

- **Next Gen Apps & Mode 2 IT** – Gartner defines Mode 2 IT as being one that is built on innovation and exploration and focused on agility and speed, as opposed to Mode 1 that is focused on stability. The majority of next gen apps are not built on monolithic DBs confined within the walls of the enterprise, but rather on a distributed architecture that is built to scale and be accessed anywhere, any time and on any device. The applications themselves are self-healing and are designed for self-recovery in a consistent state.

All of these technology trends point to a much more resilient and robust world of apps. Infrastructures, as well as applications, are designed to expect something to go wrong and have healing algorithms already in place.

In addition, user trends have also massively changed over the past few decades.

- **Mobility** – Users are no longer confined to the enterprise premises. They now access the same services on multiple devices from multiple locations.

- **Always On** – As consumers, we no longer live in the world of 9 to 5 operating hours. We want to access anything, from anywhere, on any device, at any time. IT has to maintain the current state of business, deal with unexpected outages while also planning and implementing future needs.

- **Raised Expectations** – Social networking has completely changed our expectations of what it means to be always available. Google, arguably one of the largest houses of data, has a disk failure every few minutes, yet it never experiences an outage and provides 100% availability. The likes of Facebook, Twitter, and LinkedIn have blurred the lines between social and enterprise interactions. Business users expect the same level of reliability from enterprise services as they get from the social and enterprise networking services.

The result is a symbiotic relationship between the service and the consumer (Figure 1). As applications and infrastructure technology become more robust and resilient, users' expectations of peak performance and always-on availability increase. And as users expect more from their IT departments, the next generation of services must be designed to be even more robust, resilient and available.
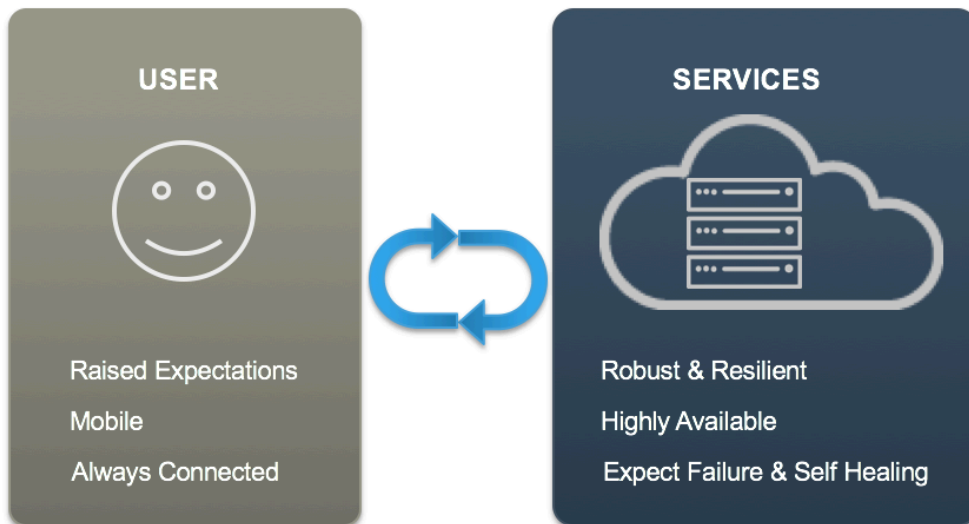
Current Solution to the ROBO BC/DR Challenge

Solutions currently available for ROBO environments can be viewed as stripped and scaled-down versions of their data center counterparts. However, there is compute, storage and networking present at each ROBO location that requires:

- **Local Backups** – The 2 in the 3-2-1 Backup Rule dictates that one must maintain 2 copies of the data onsite for increased business continuity. The argument is for swift recovery. While theoretically true, it doesn't translate in the real world as it adds further complexity to the overall ROBO environment. Complexity equals inelasticity, leading to degraded business continuity.

- **Local IT Administration** – Real data and its backup locally exist in each ROBO location, thus recovery (during outages) requires local IT presence. Since most ROBO locations do not have trained IT staff on hand, delays are inevitable during recovery procedures while IT admins travel onsite to fix the issue.

- **Local Security** – Typically not considered in a BC/DR context, however a disaster can strike in the form of a physical or logical threat (for example, a physical assault or a Denial of Service (DoS) attack). Such unwarranted events can impede service and loss of data, hindering business continuity.

None of the solutions currently available address business continuity in a ROBO environment because they are architected to be managed locally.

Riverbed Answers the ROBO BC/DR Challenge

From its inception, Riverbed has been focused on creating a better ROBO landscape for enterprises worldwide. First, it successfully tackled the challenge of poor application performance at the remote site with SteelHead™ WAN optimization. With Riverbed's Hyper-Converged Edge, the focus goes beyond performance to include exceptional levels of business continuity. Riverbed recognizes that data consolidation is the key to BC/DR salvation. However, until now 100% consolidation has been impractical due to the laws of physics. Consolidation causes ROBO users to be WAN dependent for remote applications. Dependencies on the WAN can cause an unpredictable experience, and outages can cause loss of availability. Even when everything is healthy, the longer the distance between the service and user, the worse the user experience.

With Riverbed's Hyper-Converged Edge SteelFusion™ solution, enterprises can now achieve 100% consolidation without sacrificing experience and productivity, while maintaining higher standards of security and business continuity. The solution has unique key attributes:

- **Consolidation** –The core foundation of the architecture. Regardless of the ROBO location, the solution consolidates 100% of enterprise data at the data center. It intuitively predicts the subset of data that will be used primarily at the edge and caches a copy of that data at the remote location for local IO needs. This eliminates any dependency on the WAN and delivers a LAN-speed experience to the business user. Any data generated at the edge is continuously streamed through an optimized, secured tunnel back to the data center. All ROBO data resides on data center grade infrastructure, resulting in better ROI for data center investments.

- **Centralized Data Management** – All management is performed at the data center using data center tools and trained personnel. Most of the IT staff resides at the data center so managing ROBO environments centrally is more efficient than managing individual sites. Data protection is also orchestrated centrally for all ROBO applications. Consolidating backups yields much higher ROI and better management efficiencies, also resulting in a simpler ROBO infrastructure. The SteelFusion solution also helps orchestrate the entire backup process through data center storage arrays and vCenter integration at the data center to deliver consistent data-protection staging.

- **Security** – It is common knowledge that data is more secure at the data center than at remote locations. Compared to ROBO sites, the data center has a higher grade infrastructure, better management tools, trained IT staff, and better physical and logical security countermeasures. A threat at the edge, whether physical or logical, can hinder business continuity and cause massive data loss that can be detrimental to the business. The SteelFusion solution delivers multiple

levels of security and data governance. Through consolidation, data is placed at a more protected location. Data also has end-to-end encryption whether in flight or at rest. The keys are stored and managed safely at the data center. In the event of a threat or disaster, the entire branch can be wiped clean with the push of a button in the data center with all data remaining safe at the data center.

- **Business Experience** – With SteelHead WAN optimization, both the compute and storage of a service are consolidated at the data center and application acceleration techniques are employed to give the user a LAN-like experience over the WAN. This works for the majority of applications, however, there are local compute requirements at the edge for business continuity of certain crucial branch-specific applications.

  The Riverbed SteelFusion solution addresses these ROBO-specific services by separating the compute from its associated storage. Compute sits in the Hyper-Converged SteelFusion Edge appliance at the ROBO site while data is consolidated at the data center. Not only does this enhance the business experience by providing LAN performance, but also increases business operations and continuity in times of intermittent WAN connectivity. It removes the dependency on the WAN and can withstand, hours, days and even weeks of network downtime while business operations continue.

- **Proactive Monitoring** – With Riverbed SteelCentral™, application and network performance monitoring has never been more agile and proactive. It provides total visibility and control to IT organizations for all operations. It trends normal everyday application behavior and preemptively alerts admins when erratic patterns are detected. SteelCentral monitors network and application performance across all ROBO locations, as well as helps to identify and mitigate performance issues and outages in a timely fashion to maintain and exceed business SLAs.
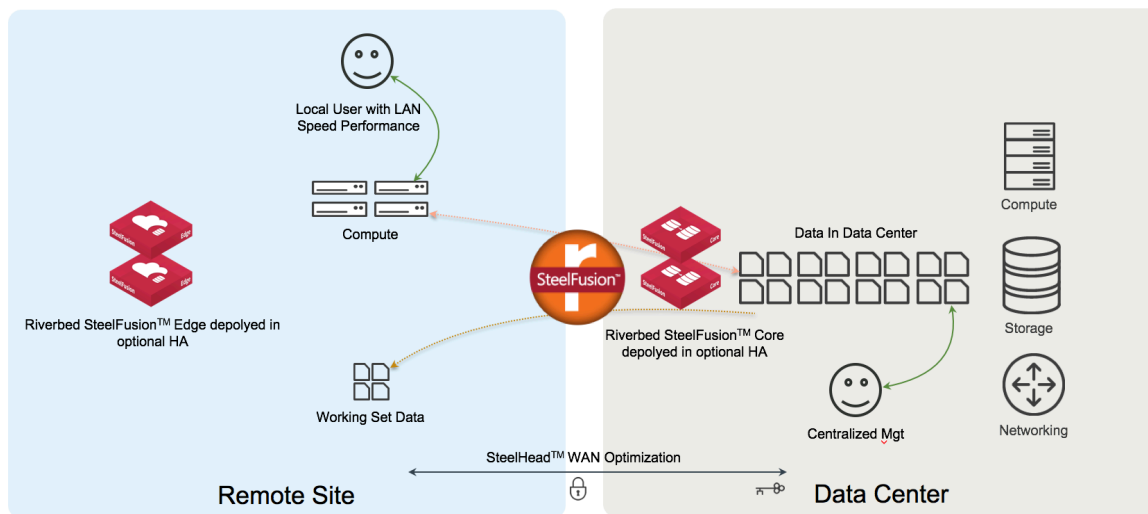
Lifecycle of an Enterprise Application

The Riverbed Hyper-Converged Edge SteelFusion solution is architected and designed to improve every phase of a ROBO application. From provisioning to recovery, monitoring, and management, the SteelFusion solution enhances the business experience, productivity and continuity.

Let's see how the Hyper-Converged Edge approach addresses each phase of the lifecycle of an application.

Provisioning & Delivery

Since all data is consolidated at the data center, provisioning is performed centrally using data center tools and staff. Previously, 100% of the data for an application had to be replicated or shipped to the ROBO site before it could be brought up. This process would take days or even weeks in some cases. The Riverbed SteelFusion solution intelligently predicts the working set, normally a small subset of the total data, and projects it out to the edge in real-time over a secure optimized tunnel. Applications can now be instantly booted over the WAN regardless of distance or size. Whether a 10GB or a 100GB (or larger) application, users at the edge can now experience the same time to access. This reduces the provisioning time from days and weeks to minutes.

Once an application is online, only the working set data is transmitted from the data center to the edge using SteelHead WAN optimization to enhance the business experience for local speed.

Manage & Protect

After an application has been provisioned and delivered, every day management tasks are conducted centrally from the data center. Since all data is consolidated at the data center, SteelFusion centrally orchestrates all branch backups. It automates the backup staging of each ROBO application by integrating with data center storage arrays and vCenter to create consistent snapshots and backups. With other ROBO infrastructure solutions, local backups are required at each branch, which are then replicated back to the data center for DR, normally performed nightly. In the event of a catastrophic event at a ROBO site happening at 11PM, with normal backups taking place at 12AM, 23 hours' worth of data is lost and unrecoverable. With SteelFusion, all newly created data at the branch is continuously and asynchronously replicated back to the data center. Normally only a few minutes behind, if a catastrophic ROBO failure were to happen, almost all data can be centrally recovered without a hitch. Thus the SteelFusion solution reduces the Recovery Point Objectives (RPO) of ROBO applications from hours to minutes and seconds - even in the face of catastrophic failures.

Recovery

To quote Sir Isaac Newton, "What goes up must come down". Every application falls victim to outages, planned and unforeseen. Whether infrastructure related, a natural disaster or threat, or data corruption, outages happen when least expected. Fast recovery is arguably the biggest contributor to BC planning for most organizations. Traditionally, when compute and storage both reside at the ROBO site, in the event of a failure, local data, compute and management are required to nurse these applications back to health. This is not the case with Riverbed SteelFusion solution. SteelFusion is built with multiple layers of resiliency and fault tolerance for various outage scenarios.

- **ROBO Infrastructure Failures** – Both the SteelFusion Edge and the Core appliances can optionally be deployed as an HA pair to withstand equipment outages without administrative intervention. If a Core and an Edge go down, business continues as usual with the HA counterpart. A new HA unit can be added in a live configuration without interruption to service to regain HA status.

- **Catastrophic ROBO Failures** – In the event that an entire ROBO site goes down, the same branch can be brought up instantly at the data center for remote user access. Since all data is consolidated at the data center, there is no need for replication or retrieval of backups. Data can be used live off of storage arrays and instantly presented to compute at the data center. Business users can use SteelHead WAN optimization to get LAN like performance while accessing these services remotely. Once the branch infrastructure is brought back online, the same data is projected back out to the branch for instant access. There is no additional management solution required throughout this process, making recovery faster and more efficient.

- **Catastrophic Data Center Failures** – Even in the event that the primary data center goes down, using the FusionSync™ feature, all data is continuously replicated from the primary data center to a

secondary DR location. This provides an additional remote copy of the data as well as taking over ROBO management functions seamlessly with users and remote applications none the wiser.

In all three of these failure scenarios, the Recovery Time Objectives (RTO) are greatly reduced, and the loss of data is minimal if any.

Summary

With the new era of business applications, users expect 100% availability of all services regardless of device, location, or time. IT endlessly struggles to maintain business SLAs in the face of upgrades, outages and unforeseen disasters. While most BC/DR planning revolves around data center landscapes, no solution has been able to tackle the ROBO BC/DR scenarios until now. Riverbed's Hyper-Converged Edge SteelFusion solution is the only solution specifically designed for the ROBO environments that provides unprecedented levels of business continuity during various forms of failure. Using data center or cloud-based resources, IT can now extend data center grade SLAs (RPOs and RTOs) out to the ROBO edge. Provisioning and recovering applications in minutes results in higher availability times for all ROBO services. Continuous data replication ensures near zero data loss during catastrophic failures.

Numerous business advantages are achieved with this approach.

Better Data Center ROI – IT organizations get better return for data center investments by consolidating all data, data management and protection.

- **Governance and Compliance** – All enterprise data is governed by business policy instead of physics. Consolidating data at the data center provides better physical and logical security, and protection of all intellectual assets.

- **Business Agility** – IT organizations can deliver and recover services much faster centrally than locally for each ROBO location. This results in greater business agility. Businesses are constantly in flux

and IT can now keep up with their ever-changing demands.

Various technical advantages are also quite evident.

- **Security** – Consolidating ROBO data at the data center provides better physical and logical security; end-to-end encryption of all data provides an additional layer of security.

- **Data Management** – Management is more efficient with centralized tools for all applications regardless of location. Similarly, centralizing data protection delivers better data center grade RPOs and RTOs for all ROBO applications.

- **Proactive Visibility** – With SteelCentral, IT organizations have a holistic view of all network and application performances attributes. The system can intelligently discover abnormal behaviors, performance degradation and outages, and proactively mitigate all failures in a timely fashion with minimal effect on business operations.

About Riverbed

Riverbed, at more than $1 billion in annual revenue, is the leader in application performance infrastructure, delivering 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. Riverbed enables hybrid enterprises to transform application performance into a competitive advantage by maximizing employee productivity and leveraging IT to create new forms of operational agility. Riverbed's 26,000+ customers include 97% of the *Fortune* 100 and 98% of the *Forbes* Global 100.

Learn more at riverbed.com

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