



Using Silver Peak for Successful Data Replication, Backup, and Recovery

Better Business Continuity through WAN Acceleration

As companies become more reliant on business critical information, it becomes increasingly imperative to protect resources against unexpected loss. Threats come in many shapes and sizes – from server maintenance to unexpected network outages to catastrophic natural disasters that can debilitate an entire building or region. Significant emphasis is being placed on business continuity management as a way of addressing these concerns. As part of this process, CIOs are taking a hard look at their IT infrastructure to ensure that data is protected and easily recoverable in the event of an unfortunate event or disaster.

Data backup and replication are two solutions that are essential to most enterprises' disaster recovery plans. However, given the fact that both of these solutions typically involve the transfer of large amounts of information across significant geographic distances, limitations in WAN technology can make it difficult to implement them effectively. By overcoming these challenges, Silver Peak's WAN acceleration solution facilitates disaster recovery, making it an essential component of most enterprises' business continuity plans.

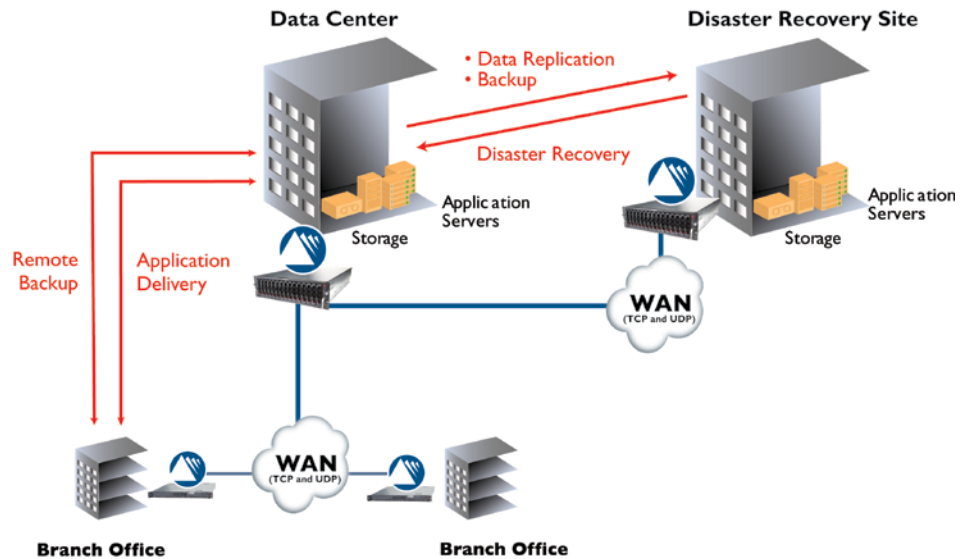


Figure 1. WAN Acceleration facilitates disaster recovery while improving application performance across the WAN

COMMON CHARACTERISTICS

Both network backup and data replication (synchronous and asynchronous) have common characteristics that can impact the effectiveness of these solutions when delivered across a WAN. These include:

- **Large volumes of data.** When performing backup and replication, database files, control files, and other information must be transferred across the WAN. As a result, WAN links are forced to handle hundreds of Megabytes (or Terabytes) of data when doing disaster recovery. To accommodate this enormous volume of data, enterprises will typically deploy large WAN links between data centers – e.g., 45 Mbps or higher. Given the price of WAN bandwidth, this often becomes the most expensive component of a disaster recovery solution.

In some instances, backups can be postponed until non-peak hours to assist with this problem. In many instances, however, this is not an option, as backups must be performed regularly (e.g., every hour) for compliance reasons. Furthermore, data replication is most effective if performed in real-time, eliminating the ability to postpone this function until off-hours.

Historically, 10 Mbps of bandwidth was recommended for each MB of data copied per second. In that scenario, a 45 Mbps T3 link could handle almost 5 MB of data per second. This can become quite costly in environments where exceptionally large volumes of data are being transferred. Fortunately, this metric is changing dramatically as enterprises are deploying new techniques for data reduction, as discussed below.

- **Sensitive to bandwidth and latency.** When performing synchronous data replication, the primary server cannot continue to write until the secondary server finishes writing and sends an acknowledgment. As a result, the process is highly subjective to WAN latency. Even asynchronous replication and network backup can suffer from high latency as transfers can time-out across the WAN, leading to file transfer failures and subsequent database synchronization problems that can be difficult, and time consuming, to troubleshoot.

The Transport Control Protocol (TCP) often requires significant tweaking to run on WAN links with high latency and/or low bandwidth. As a result, many data replication solutions, such as Veritas Volume Replicator, default to the User Datagram Protocol (UDP) instead of TCP. In those instances where TCP is employed, specific acceleration techniques are often required to maximize the effectiveness of disaster recovery.

- **Repetitive information.** A significant portion of information sent across the WAN for disaster recovery purposes is repetitive. As a result, many solutions transfer only data blocks that have changed since the previous backup/replication. Incremental changes can significantly reduce the amount of traffic traversing the WAN, which speeds up the back/replication process.

It is important to note, however, that backup/replication solutions will examine large blocks of information to determine what is incremental. They do not have the same level of granularity (and therefore WAN efficiency) as other solutions that can detect repetition at the individual byte level. For instance, if a single byte edit is inserted into a file, all of the blocks within the file will change. Block level data reduction will not catch this change, and therefore cannot reduce the amount of data transferred across the WAN in this scenario. Byte level solutions, on the other hand, can detect deltas down to a single byte, detecting the slightest changes for maximum WAN efficiency.



In addition, incremental backups require a full backup as a baseline. If the full backup is compromised or out of date, the incremental backups are useless. As a result, it is essential to perform full backups fairly regularly – once a week for example. In the event of a disaster, it is the full data set that is often required to restore the main servers. As a result, the WAN must be able to handle large volumes of data, above and beyond what is sent as incremental changes.

These characteristics can make it difficult to perform disaster recovery across a WAN. As a result, they can compromise disaster recovery plans by reducing the frequency of backups/replication. Or, in some instances, they increase the cost of performing disaster recovery as IT resources are required to troubleshoot and correct errors, as is the

case with database synchronization problems. Either way, enterprises can be exposed to a vulnerability gap that may compromise their business continuity plans.

SILVER PEAK FACILITATES DISASTER RECOVERY

Silver Peak enables enterprises to minimize the vulnerability gap through improved disaster recovery operations. Silver Peak provides the following advantages:

- **Improve data transfer times.** Silver Peak's Network Memory recognizes repetitive information and delivers it locally, a concept known as data reduction. Silver Peak offers the only data reduction solution on the market that accelerates both TCP and UDP traffic, accommodating all backup and replication platforms and configurations.

In addition to data reduction, Silver Peak provides enhancements to accelerate TCP and CIFS, including selective acknowledgement, read-aheads, and write-behinds. This reduces the impact of latency on data transfers using these protocols. As a result, large files, such as VMware™ system images, can be transferred 50 to 100 times faster using Silver Peak appliances.

- **Maximize WAN efficiency.** Network Memory can reduce as much as 99% of WAN traffic by eliminating the transfer of duplicate information. Network memory fingerprints at the byte level, enabling Silver Peak to detect and eliminate repetitive patterns even when the backup/replication solution is performing similar functions at the block level.

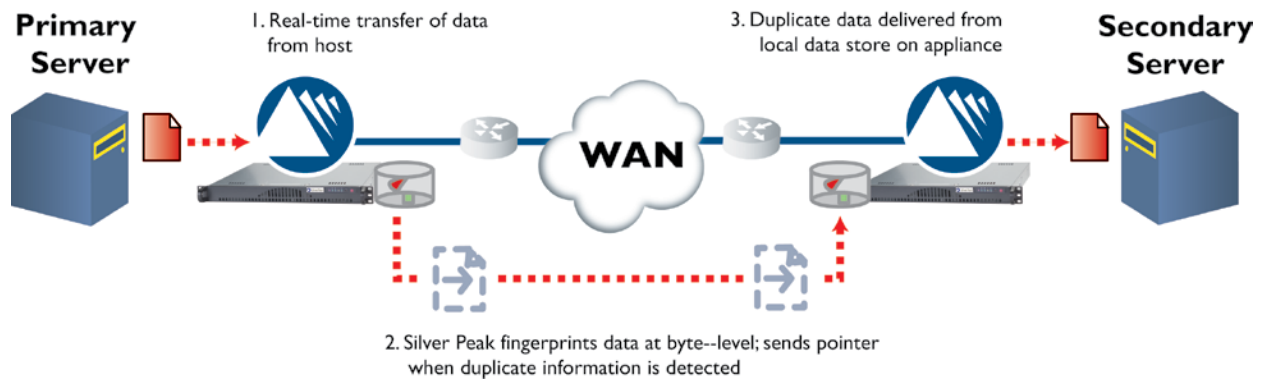


Figure 2. Network memory recognizes duplicate information and delivers it locally, improving the transfer time of data across the WAN



In addition, Silver Peak leverages advanced compression techniques to further reduce the amount of WAN bandwidth required for backup and replication. These techniques work in both directions of a WAN link, improving the backup/replication process while ensuring that the WAN can efficiently handle a restore if needed. By providing compression within the acceleration appliance, this functionality can be offloaded from the host replication server, ensuring better scalability and performance. In addition, significant performance improvement can be provided even when non-repetitive information is sent across the WAN.

Silver Peak provides 10-100x reductions in WAN traffic when handling disaster recovery applications. That can make a 45 Mbps WAN link look 450 Mbps or higher. By dramatically improving WAN efficiency, enterprises can keep pace with growing disaster recover demands without requiring costly increases to WAN bandwidth.

- **Reduce packet loss and delivery errors.** Silver Peak reduces the impact of both packet loss and jitter that occurs when router links are oversubscribed and drop or re-order packets. This is handled via adaptive Forward Error Correction (FEC), a technology that is used to reconstitute lost packets at the far end of a WAN link, avoiding delays that come with multiple-round-trip retransmissions. The Silver Peak solution dynamically adjusts the FEC overhead in response to changing link conditions for maximum effectiveness in environments with high packet loss.

- **Increase geographic distances.** By reducing the impact of latency, enterprises can extend the distances between data centers and disaster recovery locations, increasing operational flexibility.
- **Ensure data security.** Silver Peak NX appliances use hardware-based AES encryption to protect network traffic and local content, ensuring that all data is protected from unauthorized access at all times.
- **Cost effective scalability.** Silver Peak can support a full 800 Mbps WAN capacity in a single NX appliance, with several variants available that support over 45 Mbps. This enables enterprises to cost effectively support data center to data center links, which are often fairly large in size, as well as network-based backups across many remote locations

CASE STUDY #1 TAKING THE RISK OUT OF DISASTER RECOVERY

Silver Peak enabled one of the largest construction risk management companies to implement a reliable disaster recovery plan.

The company required real-time replication of all applications, which involved transferring terabytes of data to clients and partners, as well as between corporate facilities in San Diego and Denver. Due to WAN limitations, the company routinely saw large file transfers take over 30 minutes, with server backups taking hours to complete.

Server distribution was examined as a way of replicating information between locations. However, this would require additional hardware and software expenditures, and add additional server support costs. In addition, the company estimated that it would cost several hundreds of thousands of dollars to upgrade existing operating systems, add clustering capabilities across their databases, build out new server room facilities, implement a new storage array network (SAN), and add new senior IT personnel to support this initiative.

Instead, the risk management firm deployed Silver Peak NX appliances. Upon doing so, the company saw a 20x reduction in WAN traffic, which enabled them to avoid upgrading their existing WAN links. 30 minute file transfer times were reduced to less than 1 minute, ensuring successful data replication. And, perhaps most importantly, they were able to implement a secure and reliable disaster recovery plan for a fraction of the cost of alternative measures.

CASE STUDY #2:

The company had difficulty getting all information from one site to the other during allocated 15 minute windows, which caused databases at each location to get out of synch. The only way to fix this was to go to the disaster recovery site and load the updated data from scratch, which was not very scalable or cost effective. This problem, which sometimes occurred as often as every two weeks, would take approximately 8 hours to fix – a major distraction for a busy IT group.

After deploying Silver Peak, the company

noticed immediate improvements. For example, 15 minute transfers were reduced to less than 1 minute. The volume of data traversing the WAN was also significantly reduced - from 5.25 GB to 350 MB on average, which is a 15x improvement. Data reduction jumped as high as 50x during peak periods, enabling the company to get significantly better utilization out of its saturated WAN link.

CONCLUSION

Data reduction, compression, and latency/loss mitigation are all essential for overcoming WAN performance limitations. This is particularly true when handling large volumes of data, as is the case with disaster recovery.

Silver Peak delivers all of the tools necessary for reliable disaster recovery. By offering a full suite of acceleration techniques in a scalable family of appliances (i.e. capable of supporting from 2 Mbps to 800Mbps WAN capacity in a single device), Silver Peak is ideally suited for all backup/replication environments – including data center to data center transfers and network backup across many REMOTE sites. In addition, Silver Peak is the only solution capable of accelerating both TCP and UDP traffic, making it a perfect compliment for all disaster recovery applications, including:

- Synchronous and asynchronous replication, including IP-based SAN technologies and iSCSI. Silver Peak has demonstrated significant gains with EMC's SRDF/A,

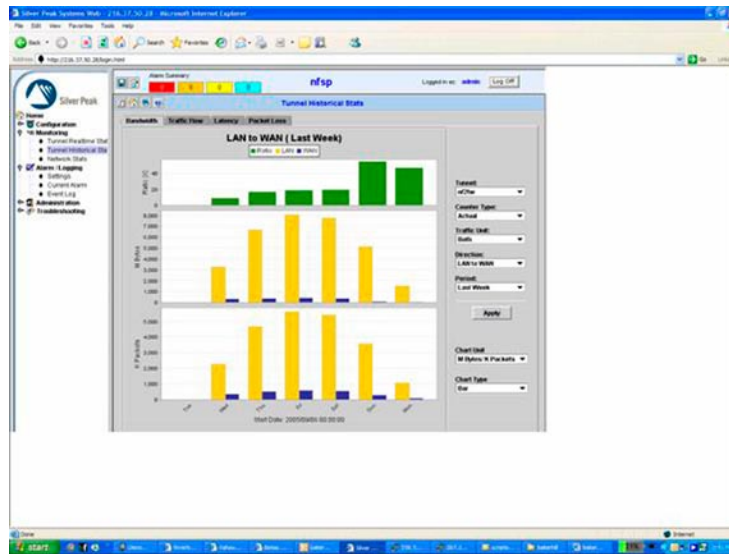


Figure 3. Silver Peak provided a 50x reduction in WAN traffic, enabling a financial institution to avoid database synchronization issues when performing regular backups

NetApp SnapVault/SnapMirror, Double-Take, Hitachi TrueCopy, Isilon, EqualLogic, and other leading solutions

- Remote backup, including solutions from Commvault, Evault, EMC, NetApp, and Microsoft.

- Standard file copy and file services, such as Xcopy, FTP, TFTP and rsync
- Replication of both pre-compressed and non compressed system images, including VMware™

Silver Peak is the answer for those enterprises looking to ensure business continuity through successful disaster recovery operations.



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