Effective Disaster Recovery Planning Using F5 Application Acceleration and Double-Take Solutions

Overview

This paper addresses the increased performance needs of a disaster recovery plan, and the common barriers to achieving success. It also addresses the performance gains that can be achieved by combining a F5 WANJet application acceleration solution with Double-Take® replication solutions from Double-Take® Software.

Challenge

Factors That Affect Disaster Recovery Success

Disaster recovery (DR) plans are becoming a key part of a company's overall IT planning process to ensure continuous availability of the company's critical infrastructure at all times. A major component of these plans involves protecting business-critical data through backups and data replication. Such replication and backup processes may occur between data centers, branch and home offices, or primary and backup sites.

A successful business continuity/DR plan has two key components at its core: a solid replication product to manage replication processes, and an effective and efficient Wide Area Network (WAN) that enables those processes to be accomplished successfully.

Two of the critical metrics used in measuring the success of a disaster recovery plan are recovery point objectives (RPO) and recovery time objectives (RTO). These two metrics measure the amount of data lost during a disaster and the time required to restore to normal operations. IT managers must counterbalance the lowest RTO and RPO possible with factors such as:

- Increasing data storage requirements from increased usage and regulatory archival requirements
- Limited bandwidth between primary and backup locations
- The expense of adding additional bandwidth between the DR locations
- Variable factors that can affect the performance of the DR solution over the WAN (e.g. WAN Latency and Packet Loss)

One of the most common barriers to the effective deployment of any high-performance data replication solution is the performance of the solution over the WAN between the DR sites. Storage teams, when sizing the bandwidth requirements, often find that their initial sizing estimates are insufficient to meet the performance requirements of a DR solution. In practice, true WAN performance is rarely given much thought until the organization ramps up their production replication system and realizes that the WAN bandwidth they have does not provide the expected throughput. Suddenly, the RPOs and RTOs they expected to meet are no longer realistic.

WANs have several inherent characteristics that are the source of missed expectations within replication scenarios:

- Latency (caused by limits to the speed of light over distance and the number of network hops between the DR sites)
- Packet Loss (caused by signal degradation over the network medium, oversaturated network links, corrupted packets rejected in-transit, or faulty networking hardware)
- Network congestion (excess of data on the network slows overall transmission speeds)
- Actual bandwidth does not match expected bandwidth (often due to a combination of the factors listed above)
- Expense (large pipes can incur significant monthly leasing charges)

Unfortunately, these factors often cripple what was originally a good backup/DR plan. Moreover, when the DR application shares the WAN links with other application traffic, file transfers, and even possibly other migration or recovery activities, the RPOs and RTOs that were met previously can be

completely unobtainable. This could be due to a variety of factors including congestion caused by the added throughput from the other applications. In addition, large latency due perhaps to the extended distance between the DR sites can prevent the storage team from achieving their RPOs and RTOs irrespective of how much bandwidth is used.

The most common solution attempted by storage teams is to replicate the most critical data and hence reduce the amount of data replicated. The other option frequently exercised by the DR team is to increase the amount of bandwidth leased. Neither option is attractive since they do not solve the core issue, which is the performance of the application over the WAN.

Solution **WANJet and Double-Take**

The solution from Double-Take Software is a disaster recovery application based on asynchronous real-time replication and automatic failover to provide cost-effective business continuity for Microsoft® Exchange®, Microsoft SQL Server, Oracle®, virtual systems, file servers, and many other applications. Double-Take provides continuous data protection by sending an up-to-the-minute copy of the data as it is being changed on the origin server to the target replication server. Double-Take does an excellent job at ensuring transactional integrity of the replication data, but like all replication solutions, their performance is subject to adverse WAN conditions.

F5's WANJet® appliance uses compression and acceleration technologies to dramatically improve the speed of application traffic over WANs. WANJet accelerates a wide variety of application traffic types including data replication, file transfer, e-mail, client-server applications, and many others. WANJet also has some unique features that enable bandwidth to be efficiently allocated across different applications, thereby ensuring that the most critical traffic receives priority access to valuable bandwidth.

The advantages of using the WANJet to accelerate the Double-Take replication processes are:

(1) The combination helps meet RPOs and RTOs without upgrading bandwidth or replication infrastructure by:
- Accelerating the replication processes irrespective of the WAN conditions
- Enabling the network to adapt dynamically to network congestion levels
- Guaranteeing bandwidth for important and critical replication traffic
- Providing more control of WAN resources allocated to Storage or DR needs

(2) Reduces the cost of meeting the RPOs and RTOs by:
- Using less bandwidth to replicate the same or more amounts of data
- Reducing the tangible and intangible costs associated with troubleshooting

(3) Secures the replication traffic by:
- Encrypting the replication traffic using SSL encryption

WANJet Acceleration of a Typical Double-Take Replication Scenario

The WANJet and Double-Take solution has been thoroughly tested for compatibility and performance. While each customer deployment is unique, the following data shows the likely performance gains for most customers.

Replication Scenario	Performance Increase from WANJet
Mirroring of Microsoft Exchange® Database (4.5GB in size)	**11-times** Faster Mirroring (aka initial bulk transfer)

Replication of Microsoft Exchange® Database	**6-times** Faster Replication
Replication of typical departmental File Server data	**8-times** Faster

WANJet Impact on Replication	Concept	How It Is Accomplished
Avoid transmitting uncompressed data	Dynamic Compression	Transparent Data Reduction Level 1, which is a dynamic compression routine that adjusts compression ratios based on WAN conditions.
Avoid transmitting redundant data	Byte-Level Pattern Matching	Transparent Data Reduction Level 2, which is a high speed byte-level pattern matching and removal algorithm. This is very different from file-level caching, and much more efficient for replication scenarios that are not dealing with files per-se.
Avoid degrading critical replication traffic, when sharing bandwidth with less important traffic	Bandwidth Guarantees and Prioritization	Application QoS, which ensures that the Double-Take replication protocol gets the bandwidth it needs and is protected from other data on the WAN.
Ensure that the Double-Take replication protocol is accelerated irrespective of the WAN conditions	TCP Optimization	WANJet Optimization Policy, which allows you to specify the ports related to the Double-Take application.
Ensure that important information gets encrypted for protection during transmission	SSL Encryption	

Factors that affect the acceleration performance that the WANJet provides:

- Amount of redundant data traversing the WAN
- "Compress-ability" of the data (e.g. text is easily compressible, images are typically not)
- Traffic mix over the WAN links (this requires WANJet to begin enforcing bandwidth guarantees which can significantly improve performance of the important traffic, at the expense of the less important traffic)
- Traffic volume and link utilization (Congestion on the WAN links are also affected by the change in traffic volume over the course of a day. Peak load times during which a replication process is ground to a halt can now be prevented using bandwidth allocation).

Overview of Test Scenario

Double-Take Software and F5 Networks partnered to perform formal testing of the Double-Take solution in conjunction with the F5 WANJet WAN acceleration appliance. Figure 1 shows the replication test scenario used.

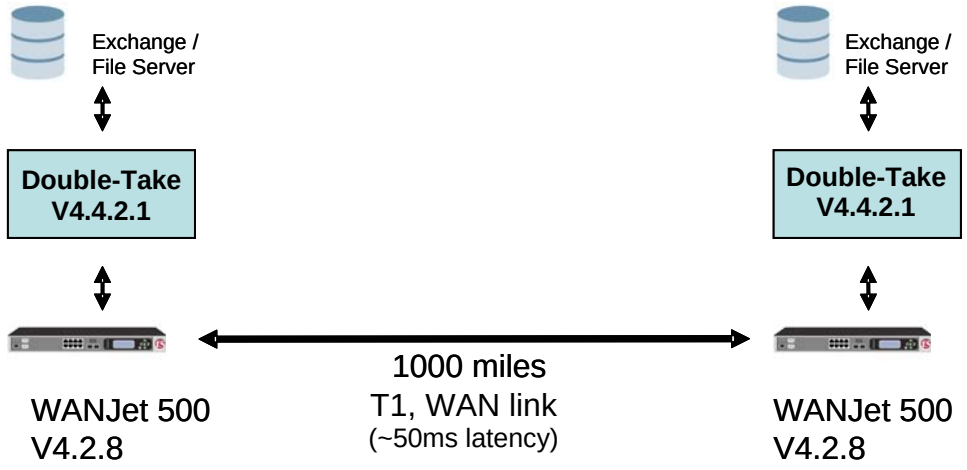

Figure 1: Replication Test Scenario

Separated by a T1 WAN link of about 1000 miles with a latency of 50 milliseconds, Double-Take was coupled with F5's WANJet 500 acceleration appliance and put through a series of tests using Microsoft Exchange and generic file server data. Mirror and replication operations were performed with Double-Take Software using an Exchange database on the target server on the opposite end of the WAN link. This established a common starting point for both databases. Subsequently, a second test using replication was performed. Replication is the Double-Take operation which mirrors all activity on one Exchange database to the other across the WAN link. DR administrators generally use this procedure to maintain dual copies of Exchange for failover and backup in the case of disaster. A final test mirrored typical file server data, which included a mix of document, presentation, media, graphics, and binary files from one server to the other across the WAN link.

Conclusion

The combination of F5 Networks' WANJet acceleration appliances with Double-Take Software's data protection and recovery solutions offer significant performance gains to the storage team managing replication. The combination delivers cost savings and improved RPOs and RTOs for the customer's business. The end result is reduced risk and lower costs.

About F5 F5 Networks is the global leader in Application Delivery Networking. F5 provides solutions that make applications secure, fast and available for everyone, helping organizations get the most out of their investment. By adding intelligence and manageability into the network to offload applications, F5 optimizes applications and allows them to work faster and consume fewer resources. F5's extensible architecture intelligently integrates application optimization, protects the application and the network, and delivers application reliability—all on one universal platform. Over 10,000 organizations and service providers worldwide trust F5 to keep their applications running. The company is headquartered in Seattle, Washington with offices worldwide. For more information, go to www.f5.com.