

THINKING BEYOND TAPE: THE CASE AGAINST TAPE BACKUP AND THE EVOLUTION OF BRANCH OFFICE DATA PROTECTION

BUSINESS VALUE WHITEPAPER

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Abstract

Most companies understand that the only way to ensure data protection and business continuity in the face of the worst sorts of disasters is to establish a remote recovery site at a significant distance from their main and branch offices. As a result, many companies are already backing up their main and branch office systems to tape, but what they may not understand is just how vulnerable their data remains. This whitepaper explores the high cost, complexity and potentially dangerous shortcomings of a strategy based only on tape backup.

Introduction

Today most companies understand that the only way to ensure data protection and business continuity in the face of the worst sorts of disasters - floods, tornados, earthquakes, terror attacks, massive power outages - is to establish a remote recovery site at a significant distance from their main and branch offices.

As a result, every night many companies are already backing up their main and branch office systems to tape, and transporting them to a site anywhere from 50 to over 1,000 miles away. What they don't understand is just how vulnerable their data, and therefore their business, remains to these threats, even after such a huge outlay of administrative effort and cost.

This paper explores the high cost, complexity and potentially dangerous shortcomings of a recovery strategy based only on traditional tape backup and demonstrates how an alternative solution - continuous data replication to a remote recovery site over existing WAN connections - provides exponentially better remote disaster protection without adding significant cost or complexity. Finally, it introduces new data acceleration technologies that can optimize the performance of remote recovery solutions and the performance of any other applications running over a WAN infrastructure.

What's Wrong With Tape Backup?

The problems with tape backup are well known; companies have been dealing with them for decades. For starters, tape backup requires a significant investment. Tape hardware and backup software are expensive, as is the labor required to set up and maintain them. Tape cartridges are a continuing cost and completing daily tape backups requires heavy administrative intervention.¹ If you have multiple branch or remote offices (a recent census bureau survey indicates the average company has 50 locations) you have to set up tape equipment and allocate administrative supervision for each. The only other option in these situations is to forego protecting data in branch office locations which becomes a problem all of its own.

Even once the equipment is in place, making backups is inconvenient – bordering on impractical. Tape backup can involve downtime, known as backup windows, since the system being backed up cannot be used during the process. Given the ever-increasing demand for around the clock data access, it gets harder and harder for companies to complete nightly backups within the time window provided. In many cases, it is so hard that the once-nightly backup goal often slips to every other night for many machines. Foregone backups are even a common problem in remote branch offices where backing up is left to non-IT staff.

Most companies don't understand how vulnerable their data and business remain to disaster – even after they've made a huge up-front and ongoing investment in tape-based disaster recovery. An article in SearchSecurity reports that in a survey of 500 IT departments, as many as 20% of routine nightly backups fail to capture all data. Among participants of another survey cited in this article, 40% of IT managers were unable to recover data from a tape when they needed it.² This is a significant concern for corporations that are regulated by industry or government requirements as they can face the risk of being out of compliance if they cannot produce required data when they need it.

Tape backup also places limits on your *recovery point objective* (RPO), the point in time to which you can recover your systems should disaster strike. Periodic tape backup guarantees hours of lost data in the event of a disaster. Suppose, for example, that a critical system fails anytime today; the best you can do is recover to yesterday's data, which will be at least twelve hours old. The later in the day disaster strikes, the older the data from which you'll recover. In addition, recovering from a disaster, any data not backed up is lost for good – unless you recreate it.

The cost of permanently lost data is high and includes the cost of the revenue that the data represents, the business value you can extract from it, and the cost to recreate it. Consider:

- *How much money would your company lose if you lost all your transaction data for the last twelve hours, or even the last ten minutes?*
- *What is the value of the knowledge contained in your company's last twelve hours worth of e-mails and e-mail attachments? What would it cost to have your engineers recreate the last twelve hours worth of original or edited CAD/CAM drawings?*
- *What's your exposure if you can't produce this data in compliance with Sarbanes-Oxley, HIPPA, SEC and other regulations?*

In *The Cost of Lost Data*, a Pepperdine University report updated in 2003 – before the advent of Sarbanes-Oxley – Dr. David Smith estimates the average cost of irrecoverably lost data at more than \$10,000 per megabyte lost.³ But if the data lost is business transaction data or data that's especially expensive to reproduce and key to your company's regulatory compliance, your costs could be much, much higher.

Cost of downtime

When a large-scale disaster strikes, with tape backup you're out of business until you can restore your systems and your data from your tapes. This kind of restoration takes a minimum of several hours, and can easily take days or even weeks.

Gartner Group estimates that the average cost of network downtime for larger corporations is \$42,000 per hour; Contingency Planning Research pegs the average hourly downtime costs for small businesses at roughly \$18,000. But the cost of downtime can be significantly higher depending on the business. In fact, it can be in the hundreds of thousands per hour for health care, consumer products and banking businesses, and in the millions per hour for brokerage, energy, manufacturing and telecommunications companies.⁴

The key to a successful disaster recovery plan is to focus not just on the data (RPO) but also on the applications that end users run to gain access to that data. Recovery Time Objective (RTO) is generally defined as the amount of time it takes to regain access to business-critical data. Solutions like tape backup, which have an RTO of hours or days, don't provide the level of recoverability that most companies require.

¹ See Double-Take whitepaper "Reducing Costs and Risks of Branch Office Data Protection"

² Regan, Keith. "Concerns Raised on Tape Backup Methods." SearchSecurity.com 15 April 2004

³ Smith, David M. "The Cost of Lost Data." Graziadio Business Report Vol. 6 No. 3

⁴ Meta Group 2000 data

A Better Solution: Continuous Data Replication

Data replication has long been considered an impractical solution to the data protection problem. Historically, it required expensive hardware and large investments in bandwidth to protect data in real-time. The evolution of software-based, asynchronous replication has dispelled this long-held belief that continuous data replication isn't feasible - especially for small or medium-sized business with limited resources. And this new breed of data replication offers benefits that more traditional solutions such as tape-based periodic backup cannot:

- Data replication provides a continuously updated copy of critical data at a remote site which minimizes data loss should a recovery be necessary.
- Disk-based recovery is more reliable, less complex and takes less time, improving the RTO of the disaster recovery solution.

Even within the realm of software-based data replication, there are opposing approaches: synchronous and asynchronous replication. It's important to understand the benefits and drawbacks of each.

In synchronous replication, the replication software intercepts data being written to disk and sends it to both the primary and secondary disk arrays at the same time. Only when both arrays confirm receipt of the data does the software accept another write. Asynchronous replication can deliver recovery point objectives (RPOs) measured in minutes, and recovery times measured in seconds.

With synchronous replication, data loss approaches zero because both the primary and secondary disk arrays must contain the same data. But the confirmations required for each data write can cause performance problems, especially in applications that process lots of transactions. Acceptable performance often requires connecting the arrays with high-bandwidth fibre channel, which is very expensive and which has an effective range of about ten miles. As a result, synchronous replication is not ideal for remote disaster recovery, and is most often used to create a local backup of data in situations where having an exact copy of the data is essential.

In asynchronous replication, the replication software grabs data once it is written to disk, and rewrites it to a second array. In asynchronous replication, the application doesn't have to wait for any confirmations and can continue to operate. As a result, it has little or no impact on application performance, and can work effectively and economically over low bandwidth connections and long distances.

While it can't deliver the zero data loss available through synchronous replication, it can be configured to deliver RPOs measured in minutes, and recovery times measured in seconds, both of which are more than acceptable for most businesses. This combination of excellent data protection, minimal performance impact, long-distance effectiveness and low-cost deployment makes asynchronous replication an ideal solution for backing up data to a remote recovery site.

What to Look For in an Asynchronous Replication Solution

The asynchronous replication solution that makes the most sense for remote recovery implementation is the one that lets you implement the highest degree of data protection while making the most cost-effective use of your existing infrastructure. Specifically, you want a solution that works as-is with your existing applications and infrastructure, that poses no distance limitations, and that makes the most economical use of your existing bandwidth, enabling you to maximize data protection while minimizing the performance hit on your network overall.

One solution that clearly meets these requirements is Double-Take® from Double-Take Software. Double-Take combines patented asynchronous replication and failover technologies; it captures and replicates changes, as they happen, to a secondary array at any location, and then lets you recover from that location in seconds in the event of disaster.

Several Double-Take features combine to enable the highest level of data protection while maximizing your existing application and infrastructure investments:

- **Incremental, byte-level replication.** Double-take monitors all files and replicates only the bytes that change, as they change, which reduces replication traffic on your network to an absolute minimum.
- **Unlimited distance replication over standard IP networks.** With Double-Take you can replicate to a disaster recovery site in any location, as far away as necessary to minimize your vulnerability to natural or man-made disasters. And it replicates over any existing IP LAN, WAN, VPN or NAT.

- **Software and hardware independence.** Double-Take replicates with complete integrity from virtually any application; it runs on whatever hardware you have now and gives you the flexibility to choose whatever value-oriented hardware you prefer as your enterprise grows.
- **Bandwidth limiting.** Double-Take lets you put a cap on the bandwidth it uses, which lets you minimize or eliminate its impact on the performance of other applications, and of the network overall.
- **Proven savings.** Thousands of companies, including over half of the Fortune 500, protect their data with Double-Take; many, like Chicago-based MidAmerica Bank, use it instead of tape to provide cost-effective, up-to-the-minute remote data protection and disaster recovery for their headquarters and branch offices.

"Double-Take saves us about \$50,000 annually by eliminating the need for backup technical maintenance and assistance," says Ray Zamora, MidAmerica Bank's Vice President of Network Operations. "We also save with the simple setup of the Double-Take solution, which is less than a tenth of the cost of setting up tape drives. There's no recurring hardware maintenance cost and no loss of employee time in supervising the backup process. And during our last annual audit, our Double-Take solution for backup and recovery of branch data exceeded our expectations and requirements."

Augmenting or even replacing a tape-centric data protection scheme with more a more effective solution like continuous data replication can have a significant positive impact on your protection budget. And at the same time, it can provide a higher level of recoverability than tape. Consider the hypothetical Year 1 cost comparison of tape-based periodic backup with data replication provided by software such as Double-Take. In this example, you can look at the costs of each solution for remote disaster recovery for a company with ten offices each with 20 employees per office.

	Tape Backup	Double-Take
Fixed Costs		
Hardware, software & setup	\$120,000	\$31,570
Continuing Costs (per year)		
Maintenance	\$18,000	\$6,314
Media	\$36,000	\$0
Salary	\$150,000	\$15,000
Offsite pickup/storage	\$36,000	\$0
Year 1 Total	\$360,000	\$52,884

As you can see, replacing tape backups in branch offices with centralized backup methodologies and data replication can reduce the total costs of maintaining a recovery solution for those branch offices. Now, imagine one of these offices is struck by a disaster and needs to recover from the remote facility.

	Tape Backup	Double-Take
	Recovery to previous day's tapes in one business day - 8hrs	Recovery to 5-minute-old data with no downtime
Cost of unrecoverable lost data (\$10,000 per MB ⁵)	\$200,000	\$694.44
Cost of downtime (\$42,000 /hr ⁶)	\$336,000	\$0
Year 1 total	\$536,000	\$694.44

5 Smith, David M. "The Cost of Lost Data." Graziadio Business Report Vol. 6 No. 3

6 www.nwfusion.com/careers/2004/0105man.html

The numbers speak for themselves. Not only is relying on traditional tape backup methods costly and complex, it can negatively impact your ability to continue doing business after a disaster and can cause a company to incur additional expenses related to recreating critical lost data and employee productivity. While tape backup is the most common and cost effective method for protecting and recovering large amounts of data, it may be woefully unable to meet your established recovery goals. Tape backup is great for long-term archival and is most certainly a part of every disaster recovery plan. However, other solutions such as high availability, disk-based snapshots and data replication must become part of a company's overall data protection solution to be successful in meeting its RTO and RPO goals.

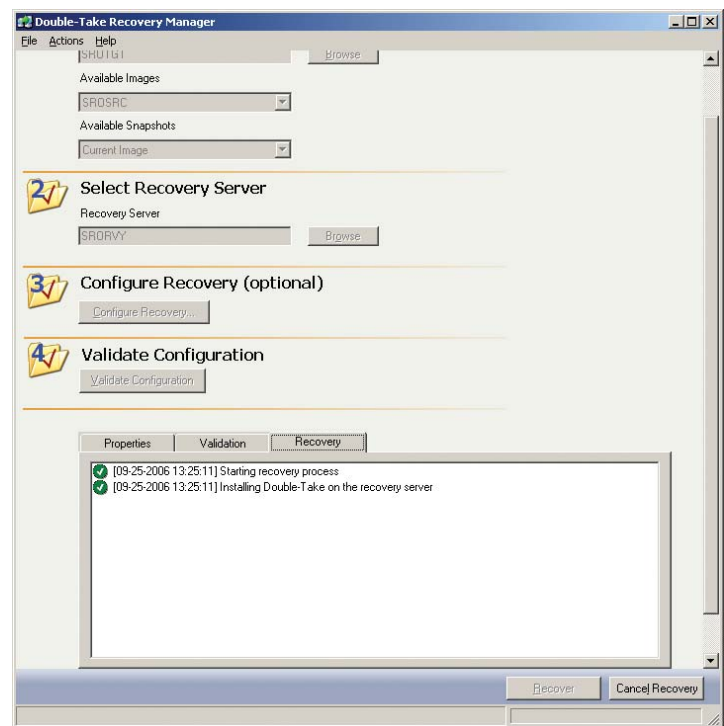
Beyond Protecting the Data – Recovering the Server

The complexity of traditional recovery solutions compounds an already difficult situation, and heightens the opportunity for human error. Speed and quality of recovery are extremely important when customers and employees are relying on access to critical data, but the average restoration takes hours at best. And with solutions like tape backup, even a successful recovery can result in the loss of any data that is new or has changed since the backup was made. The Double-Take Server Recovery Option is a whole-server data protection solution that, when combined with Double-Take real-time replication, simplifies the restoration process and reduces the time and effort involved with server recovery. Using Double-Take with the Server Recovery Option, the entire production server – its operating system, applications and data – can be protected and easily recovered to a new system quickly.

A common backup solution in a branch-office scenario is to replicate the branch servers to a central location and perform a nightly tape or disk backup. If the Branch 2 server fails, the administrator would have to provision the new server, install applications, then go through the cumbersome recovery process. On average, this would take more than one IT person and several hours. Still, when the recovery server is restored, Branch 2 is missing all of the data that is new or had changed since the night before.

"Historically, organizations have dutifully performed their backups to tape and shipped a copy of these tapes off-site. However, as installed disk capacity has grown faster than tape performance, traditional tape-based backup solutions have fallen behind and are no longer meeting backup/restore requirements. Add the demands of 24x7 Web operations and e-commerce-based applications, and the need to supplement traditional backup and recovery methods becomes obvious."⁷

Double-Take, when combined with the Double-Take Server Recovery Option (SRO), provides a single solution to continuously protect and recover an entire server. Protection is provided by the industry-proven real-time replication of Double-Take while recovery is performed by the Server Recovery Option. The Recovery Manager, provided as part of the Double-Take Server Recovery Option, presents the task of server recovery as a series of easy-to-understand steps. Because Double-Take replication protects the entire production server – its operating system, applications and data, restoring the server encompasses as few steps as possible and provides a significantly better recovery time than existing solutions such as tape backup.



Let's look at the initial example scenario that was provided, instead utilizing the real-time, whole-server protection and streamlined recovery of Double-Take and the Double-Take Server Recovery Option. When the branch server being protected fails, the administrator in the central office uses the Recovery Manager to choose the appropriate recovery server. This recovery server resides on the network at the branch office, but only requires a baseline Windows® operating system to be installed - no additional provisioning of software is required. The Recovery Manager validates the compatibility of the recovery server, then quickly restores applications and data that have been protected, in real-time, by Double-Take. Once the restoration process has finished, business can resume at the branch office with minimal downtime and lost data.

7 Zaffos, Stanley and Phillip R. Sargeant. "Designing to Restore from Disk: Backup Futures." www.gartner.com. 19 March 2001

Summary

There was a time when tape-based backup was widely believed to be the only feasible backup solution for remote offices. But tape backup alone is no longer the only realistic solution and centralized backup solutions are coming to the forefront. As a result of this shift, enterprises have re-evaluated tape-only backup solutions and don't like what they have found. According to a report by ESG , nearly one-quarter (24%) of companies say that twenty percent (20%) or more of their tape-based backups fail. As such, depending on tape backup alone creates an unacceptable level of risk.

Fortunately, advances in technology have made centralized backup easier to manage and less of a drain on the WAN. A centralized backup solution takes the tape-only backup responsibilities out of the hands of non-technical resources in each remote office, and puts them in the hands of experts back at a central data center. Replicating data to a central location from branch offices using Double-Take can reduce the per-location costs associated with tape-only solutions and provide a higher level of recoverability for business-critical systems and data.

About Double-Take® Software

Double-Take® Software provides the world's most relied upon solution for accessible and affordable data protection for Microsoft® Windows® applications. The Double-Take product is the standard in data replication, enabling customers to protect business-critical data that resides throughout their enterprise. With its partner programs and professional services, Double-Take delivers unparalleled data protection, centralized back-up, high availability, and recoverability. It's the solution of choice for thousands of customers, from SMEs to the Fortune 500 in the banking, finance, legal services, retail, manufacturing, government, education and healthcare markets. Double-Take is an integral part of their disaster recovery, business continuity and overall storage strategies. For more information, please visit www.doubletake.com.

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