



# WHITE PAPER

## **Disaster Recovery with EMC Replication Solutions and VMware Site Recovery Manager**

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**July, 2008**

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## Introduction

It's not "if" a disaster will strike, but more a matter of "when." Since most organizations rely on some form of electronically stored information, losing access to business systems and data is a real concern. The basic insurance policy is a backup process. However, reliance on local backups or recalling off-site tapes in the event of an outage at the primary site is impractical and very risky.

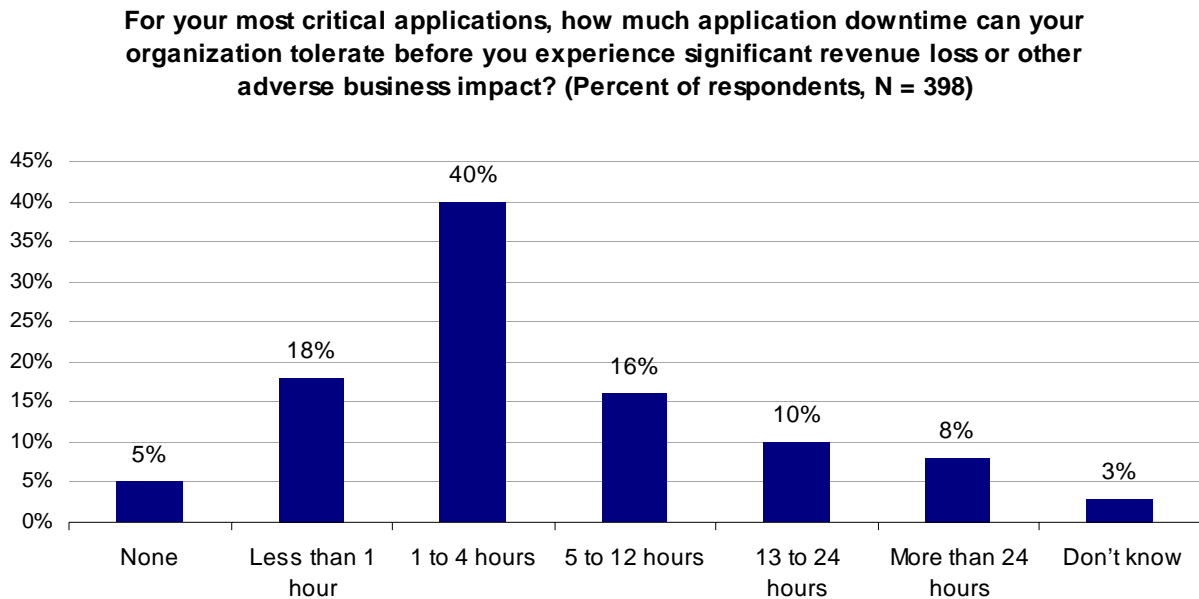
Today, server virtualization and remote replication have revolutionized recovery and failover. Copies of applications and data can be sent offsite while still remaining readily available. Server virtualization technology, such as VMware's, enables physical-to-virtual and virtual-to-virtual replication strategies that are easier and more cost-effective to implement than ever before. Pairing VMware Site Recovery Manager with EMC replication solutions such as EMC Symmetrix Remote Data Facility (SRDF), MirrorView, Celerra Replicator and RecoverPoint is the continuation of a trend that has eased disaster recovery and increased cost efficiency by streamlining and automating recovery plans.

## Disaster Recovery

Computer viruses, software faults, disk failures, data corruption and man-made errors: while these might not seem like "disasters," they cause interruptions that can wreak havoc on daily business activities. The same holds true for real disasters, such as fires, floods, power failures or weather-related outages. Technical or natural, they all cause unplanned downtime in the data center and IT organizations have to respond rapidly to maintain business operations.

For those organizations without a plan to rapidly recover from a disaster, the associated downtime could result in productivity loss, customer service issues or irreparable damage to the business' reputation or financial assets. ESG research found that 63% of organizations surveyed could withstand only four hours or less of downtime before experiencing adverse affects to the business.<sup>1</sup>

FIGURE 1. TOLERANCE FOR DOWNTIME



Source: Enterprise Strategy Group, 2008

<sup>1</sup> Source: ESG Research Report, *Data Protection Market Trends*, January 2008.

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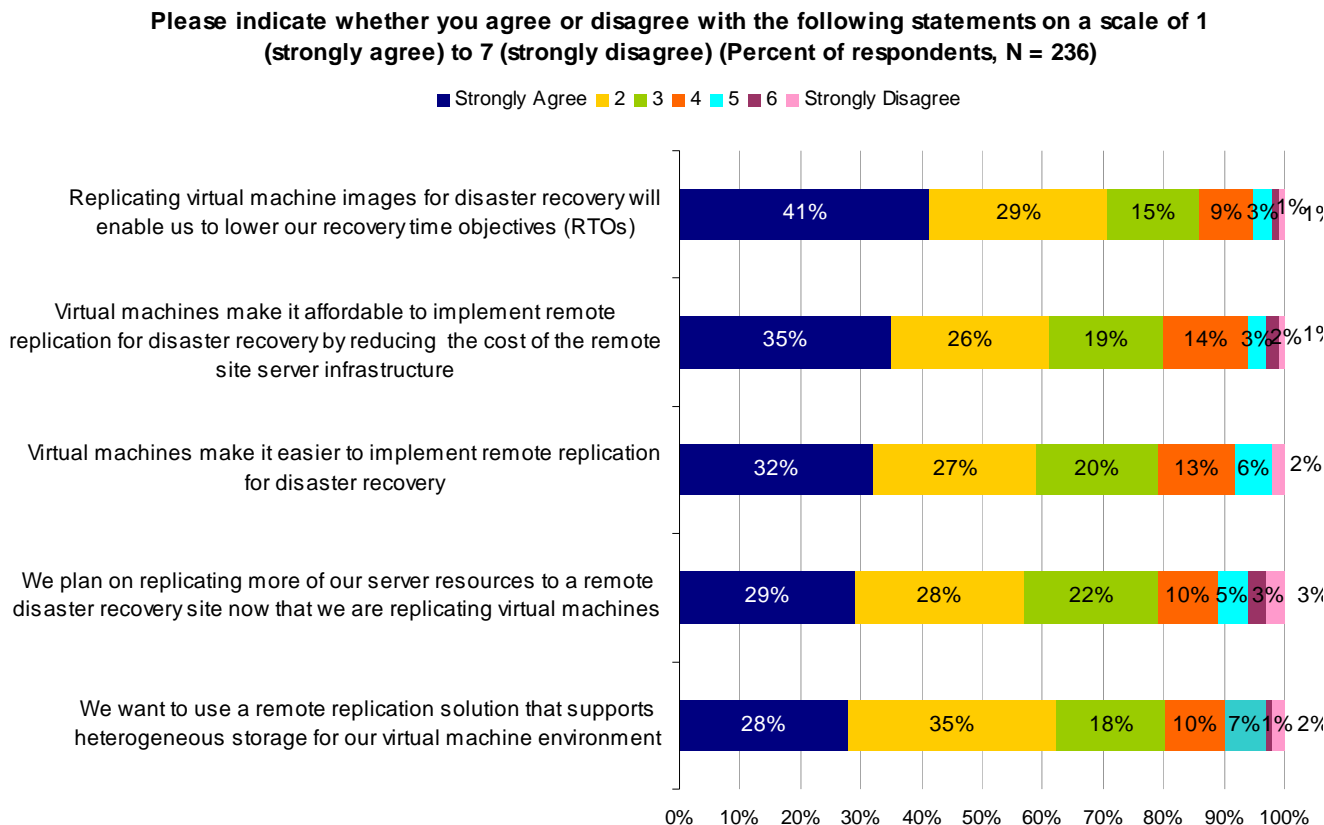
Many organizations prevent or mitigate downtime by implementing data protection solutions, such as backup or replication. The two metrics used to evaluate the effectiveness of these solutions are recovery time objective (RTO), which is the measure of time between outage and resumption of operations, and recovery point objective (RPO), which is the measure of the amount of data that may be lost in the transition. Data protection solutions are often tiered according to business requirements—the more critical the data, the smaller the recovery objectives, which means that the data protection technology offering the fastest recovery and/or the least amount of data loss is deployed. But there is more that goes into a disaster recovery (DR) plan than simply implementing backup or replicating data offsite.

Often, the challenges for IT organizations are centered on the time, cost and effort required to plan, implement, test and execute disaster recovery plans. Duplicate systems operating at a second, remote location are expensive and impractical to maintain. Identical hardware requirements, as well as ongoing upgrades and maintenance at a second site, add to the complexity and expense. Finally, there is typically little automation in recovery plans, which may result in errors or difficulty in executing test drills.

## Impact of Server Virtualization on DR

As evidenced in Figure 2, organizations believe that server virtualization technology is improving IT’s ability to minimize downtime, reduce the costs associated with remote site server infrastructure and simplify the implementation and testing of disaster recovery. Recent ESG research found that 26% of organizations surveyed are replicating virtual machine images to a remote DR site and another 39% plan to.<sup>2</sup>

**FIGURE 2. SERVER VIRTUALIZATION IMPACT ON DISASTER RECOVERY PERFORMANCE AND COST**



Source: Enterprise Strategy Group, 2007

<sup>2</sup> Source: ESG Research Report, *The Impact of Server Virtualization on Storage*, December 2007.

## Disaster Recovery with EMC Replication Solutions and VMware Site Recovery Manager

Why does server virtualization have such an impact? Server virtualization improves resource utilization and hardware consolidation because multiple virtual machines are able to run on a single physical server. It enables hardware independence by providing an abstraction layer between the physical hardware and the operating systems and applications. It also offers an isolated environment for applications without the impracticality of actually creating and operating dedicated physical silos. And, finally, a virtual machine in a server virtualization environment is encapsulated into one or more hardware-independent files, allowing for portability. It now becomes much easier to create multiple copies for disaster recovery purposes.

Disaster recovery becomes more cost-effective when server virtualization is combined with data protection technology. Creating a mirror copy of primary system data on a secondary system can minimize downtime and data loss. For example, in a physical to virtual (P2V) configuration, a production application running on a physical machine may be replicated to a virtual machine, and a virtual to virtual (V2V) setup has both production and recovery applications running on virtual machines.

When virtual machines are used as DR targets, as in P2V and V2V scenarios, organizations can achieve many-to-one failover for physical or virtual machines. Why this becomes interesting is that cost of DR sites can be a barrier for many organizations to implement DR. And, for organizations that have DR sites, the proliferation of hardware can be burdensome on DR budgets. Server virtualization may reduce the need for idle DR hardware at a remote site, creating savings in both capital and operational expenses. It also provides IT organizations with more realistic and cost-effective disaster recovery test environments. IT can perform tests on virtual machines without disrupting other virtual machines or the primary production system.

The real impact of server virtualization on disaster recovery, however, is the ability to extend protection to additional tiers of applications and systems in the environment. Now, for example, remote replication may be cost-effective for application servers with less stringent recovery objectives or for organizations that couldn't previously justify the expense. Furthermore, protecting only a single system when that system is dependent on other services or applications to function creates vulnerability in the DR plan. Server virtualization employed at a DR site removes this type of limitation.

## VMware Site Recovery Manager

System recovery is often a manual process. For many IT organizations, it requires multiple steps—including identifying the source of the outage; replacing, rebuilding or reinstalling infrastructure components; restarting servers and applications; mounting data; and testing and trouble-shooting the environment—before enabling access to users. The success of the recovery process is dependent on the skills and training of the people, the defined and, hopefully, documented process, and IT's ability to execute the recovery plan under pressure.

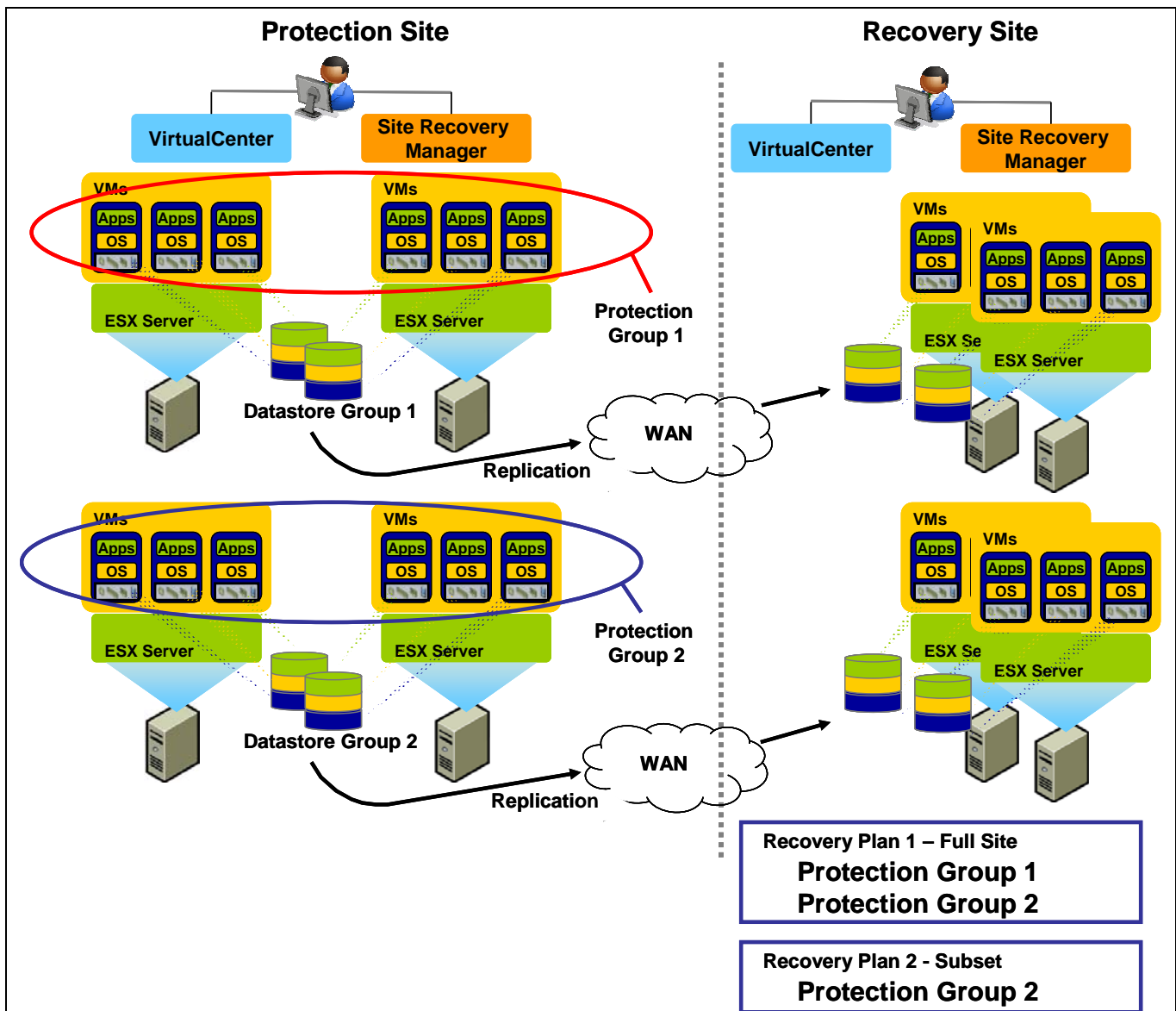
The risks? IT may take more time than anticipated to completely recover, putting its service level agreements in jeopardy. The once- or twice-a-year disaster recovery testing that is dependent on the IT personnel and manual DR processes are just as vulnerable to failure, and typically require planned system downtime.

### Site Recovery Manager

To address the challenges of a manual disaster recovery process in server virtualization environments, VMware introduced VMware Site Recovery Manager. Site Recovery Manager combines VMware Infrastructure and VirtualCenter with third-party replication technology to automate DR—making recovery faster, more reliable and more manageable than with manual processes. It's important to note that VMware is not actually performing data protection or data recovery, but rather is facilitating the disaster recovery process for server virtualization environments.

Site Recovery Manager automates the execution of DR processes—the setup, testing and actual failover courses of action. It plugs into VMware VirtualCenter, where recovery plans can be centrally managed. With Site Recovery Manager, organizations can automate and manage failover between active-passive sites—production data center (protection site) and disaster recovery (recovery site) location—or active-active sites—two sites that have active workloads and serve as recovery sites for each other.

FIGURE 3. FIGURE 3: SITE RECOVERY MANAGER CONCEPTS



## Site Recovery Manager Key Concepts

To understand how Site Recovery Manager works, it's important to be aware of a few concepts:

- Virtual machine images are stored as .vmdk files in a **datastore**, which consists of one or more LUNs that can be replicated.
- A collection of datastores is a **datastore group**. Datastore groups exist for protection and recovery site environments. Datastore groups are created by Site Recovery Manager to protect virtual machines that reside on a set of LUNs that must failover together.
- Individual datastores or a datastore group can be included in a **protection group**. A protection group contains all or a subset of virtual machines in the associated datastore prioritized and configured for recovery activities. They can belong to one or more **recovery plans**.
- Recovery plans contain one or more protection groups. They define the steps needed to recover and test recovery of the protection groups.

The diagram in Figure 3 represents a production site with two datastore groups replicating to a remote recovery site. The recovery plans specify a full site recovery in the first recovery plan and the recovery of just protection group 2 in the second recovery plan.

## Site Recovery Manager Integration

Site Recovery Manager requires several components to be installed at the protection and/or recovery sites:

- VMware VirtualCenter and Site Recovery Manager server must be installed at both sites.
- The minimum number of ESX Server hosts needed to provide sufficient resources for recovery.
- Site Recovery Manager uses an Oracle or Microsoft SQL Server database with ODBC connectivity between sites.
- Datastores are replicated between sites via pre-configured array- or network-based replication.
- The storage replication adapter, developed by the third-party replication vendor and certified and distributed by VMware, must be installed on the Site Recovery Manager server at both sites.

Storage- and network-based replication vendors are responsible for creating and certifying integration modules that allow VMware Site Recovery Manager to integrate with their replication platforms. The storage replication adapter facilitates discovery of arrays and replicated LUNs, and initiates test and failover. This makes it much easier to ensure that the storage replication and virtual machine configuration are established properly.

## Impact of Site Recovery Manager

ESG research has found that server virtualization has opened up opportunities for organizations to implement DR where it hasn't existed before, in addition to improving its cost or efficiency where it has already been deployed. Now, with Site Recovery Manager, previously manual recovery and testing activities can be automatically created, documented and managed. The result is the introduction of predictability and reliability in the DR process. It makes it easy to conduct frequent non-disruptive tests to ensure the DR process is correct and the organization's staff is practiced in executing it consistently and correctly

The core benefits of Site Recovery Manager include:

### **DR protection expansion**

- Virtual machine workloads with recovery objectives that were difficult to justify with a disaster recovery strategy can now be protected with minimal incremental cost and effort.

### **Reliability of recovery improvement**

- With automation, DR reliability increases and risk decreases.
- Non-disruptive, more realistic testing allows for more frequent and reliable test scenarios.

### **Recovery time reduction**

- Recovery from a mirror copy may speed recovery over traditional methods.
- Automation reduces recovery time by accelerating recovery tasks after a failover is manually initiated.

### **Management streamlining via VirtualCenter integration**

- Monitor protection and recovery sites.
- Easily create, update and manage recovery plans.
- View, save and distribute test and failover event results.

# EMC Replication Solutions

EMC is a leading provider of remote replications solutions—including Symmetrix Remote Data Facility (SRDF), MirrorView, Celerra Replicator and RecoverPoint—which are compatible with the company's storage systems (and in the case of RecoverPoint also heterogeneous storage systems). EMC's best practices, application reference architectures, testing and certifications ensure maximum product integration.

**Disaster Recovery with EMC Replication Solutions and VMware Site Recovery Manager**

Replication technology offers a high degree of protection, providing a mirror copy of primary storage data to local or remote secondary storage. Normally, this form of data protection is for operational and disaster recovery—if the primary system fails, the secondary system will take over. The benefit is little to no downtime or data loss—even with an entire site outage. Replication can be applied in a number of ways to efficiently and cost-effectively protect physical and virtual machines.

**EMC RecoverPoint**

RecoverPoint is a network-based local and/or remote data protection solution leveraging continuous data protection technologies. RecoverPoint is deployed in the fabric as an appliance leveraging host-, array- or fabric-based write splitting. The array-based splitter is accomplished with integration with CLARiiON CX arrays, while the fabric-based splitter is accomplished via integration with intelligent switches offered by a variety of vendors, such as Cisco or Brocade. The fabric-based approach offers better scalability, heterogeneous host and array support, and greater efficiency by performing processing without impacting the host production system. The CLARiiON splitter offers heterogeneous host support plus the ability to replicate iSCSI and Fibre Channel hosts with the same RecoverPoint system.

RecoverPoint protects individual virtual machines, a VMware ESX Server or an entire VMware ESX Server farm. Its support for heterogeneous arrays makes it stand out versus other replication products that integrate with Site Recovery Manager. RecoverPoint's approach enables more flexibility in storage system vendor selection, the ability to mix source and target arrays, and greater scalability.

**Summary**

Today, companies of all sizes have become keenly aware that it may only take a single outage event to cripple their organization. The rationalization that DR is costly and complex, or only necessary for the top-tier of IT systems, is less applicable given current technology advancements, such as server virtualization and remote replication. VMware server virtualization has contributed to the development of cost-efficient disaster-tolerant environments. And with the introduction of VMware Site Recovery Manager, organizations are aided with building, managing and executing disaster recovery plans.

Site Recovery Manager integrates with storage replication solutions—such as SRDF, Celerra Replicator, MirrorView and RecoverPoint from EMC—to simplify the use of storage replication with VMware. EMC's network-based, array-independent replication solution, RecoverPoint, has the added advantage of flexibility—in the choice of storage system vendors and scalability. Server virtualization environments with non-EMC storage systems can leverage RecoverPoint and Site Recovery Manager to automate DR.

**More Solutions in EMC's Replication Portfolio****EMC SRDF**

Leveraging high-end Symmetrix hardware architecture, the SRDF family of software delivers remote storage replication for local or remote disaster recovery and business continuity.

**EMC Celerra Replicator**

Celerra Replicator provides asynchronous file system and iSCSI LUN replication for EMC Celerra IP storage environments. Production data is efficiently replicated for single- or multi-site DR.

**EMC MirrorView**

MirrorView offers synchronous and asynchronous local or remote mirroring of data stored on EMC CLARiiON storage systems.



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