

# Solution Brief – Availability and Recovery Options: Microsoft Exchange Solutions on VMware

## Introduction

By leveraging the inherent benefits of a virtualization-based platform, a Microsoft Exchange Server 2007 deployment on VMware Infrastructure 3 offers a variety of availability and recovery options, each providing varying levels of protection and cost. This solution brief provides a description of the various options available. Topics include:

- VMware Infrastructure 3 Platform Advantages
- Increased Availability across the Exchange Lifecycle
- Tools for Availability and Recovery
- Local Site Availability and Recovery Options
- Remote Site Availability and Recovery Options

## VMware Infrastructure 3 Platform Advantages

Although application-level clustering has been the prevalent solution for most Microsoft Exchange Server 2007 implementations, features of the VMware Infrastructure 3 platform can enhance the overall availability of Exchange by providing options that help to limit both planned and unplanned downtime. In fact, for many organizations, the features provided by VMware Infrastructure 3 may satisfy the availability requirements of their business without needing to follow traditional clustering approaches. For other organizations that require a greater degree of availability, application-level clustering can be combined with the features of VMware Infrastructure 3 to create an extremely flexible environment, with options for failover and recovery at both the hardware and application levels. Below are some of the advantages of the VMware Infrastructure 3 platform:

- **Virtual machines are portable** – This means that your Exchange server is no longer bound to a particular piece of hardware, which can enhance availability in several ways.
- **Design decisions are no longer permanent** – You can adjust your CPU and memory requirements with a simple reconfiguration and reboot.
- **Easily upgrade to newer hardware** – As your Exchange environment grows or changes, simply move the Exchange virtual machine to newer hardware to accommodate increased workloads.
- **Virtual machines are hardware independent** – Hardware independence means increased flexibility when designing both production and disaster recovery components. Cluster nodes and recovery servers can be virtualized, eliminating the need for identical hardware.
- **VMware High Availability (HA) protects your server from hardware failure** – If your physical server or any critical component within the server fails for any reason, VMware HA will automatically reboot the Exchange virtual machine on another physical server, acting as a first line of defense against service outage. By combining VMware HA with traditional clustering approaches, you can mitigate both hardware and software failures for maximum availability.
- **VMware Distributed Resource Scheduler (DRS) can balance workloads and speed recovery** – VMware DRS is VMware VMotion with intelligence. As Exchange workloads increase, VMware DRS can move a bottlenecked virtual machine to another host with more available resources, automatically and without downtime. VMware DRS can also help to recover more quickly after server hardware failure. For instance, if a physical server fails, VMware HA will reboot the virtual machine on another physical server. When the failed server is replaced, VMware DRS migrates the virtual machine back to its original location with no downtime and no interruption to the end-user.
- **VMware offers consolidation opportunities** – Underutilized Exchange components, such as Hub Transport Servers, Client Access Servers, and Domain Controllers—and even non-Exchange components

such as underutilized file servers—can be consolidated onto fewer physical servers for maximum hardware utilization and lower costs.

## Increase Availability across the Exchange Lifecycle

### Simplify Upgrades and Reduce or Eliminate Downtime

- Traditional, physical environment upgrades and scale-up activities require a great deal of resources to accomplish, including:
  - Planning and implementation time from engineering resources, including application administration, server administration, and SAN administration;
  - Sizing and acquisition of new hardware;
  - Downtime required to perform an upgrade, which results in higher costs and risks.
- In comparison, scaling your environment using VMware Infrastructure 3 means simply adding more Exchange virtual machines as the client count increases.
- Physical Exchange server environments are tightly bound to a storage technology and are extremely difficult to scale. Adding more storage capacity to Exchange virtual machines (VMs), however, is less complex because VMware Infrastructure 3 emulates storage to a simple SCSI device. The end-result is that the Exchange environment can be upgraded regardless of the underlying storage technologies (i.e. iSCSI or FC).
- With VMware Virtual Machine File System (VMFS), the storage capacity serving Exchange environments can be reduced or increased “on the fly” with the hot add/remove storage functionality in VMware Infrastructure 3 .
- Virtualized Exchange environments can be serviced (e.g. adding more memory or upgrading CPU) without interruptions due to the shared storage functionality from VMware VMFS and VMware VMotion technology.

### Performance and Recovery Advantages

- Virtualized Exchange environments can recover from:
  - Planned and/or unplanned hardware disasters using VMware HA;
  - Hardware degradation by using VMware DRS capability to automatically balance workloads;
  - Application failure using Microsoft Cluster Service (MSCS) within a VM on shared storage.
- With built-in multipathing capability and advanced queuing techniques available in VM architectures, virtualized Exchange environments can leverage advanced configuration options to:
  - Increase the IOPS/transactions to service more clients;
  - Balance the workloads of multiple Exchange servers sharing the same physical server to utilize multiple SAN paths and storage processor ports.
- High I/O, memory- and CPU-intensive applications such as Exchange can better recover from SAN errors because the applications reside on VMFS3, which hides SAN errors from guest operating systems.

## Tools for Availability and Recovery

A number of tools are available from VMware, Microsoft, and third-party software and hardware vendors to allow for both in-site and remote site availability and recovery. Below are a few examples of the tools available to administrators running Exchange on VMware Infrastructure 3.

### Local Site Tools

#### VMware HA

VMware HA provides easy-to-use, cost-effective, high availability for applications running in virtual machines. In the event of physical server failure, affected virtual machines are automatically restarted on other production servers with spare capacity. Additionally, if there is an operating system (OS)-related failure within a virtual machine, the failure is detected by VMware HA and the affected virtual machine is restarted on the same physical server.

#### VMware Distributed Resource Scheduler (DRS)

VMware DRS collects resource usage information for all hosts and virtual machines and generates recommendations for virtual machine placement. These recommendations can be applied manually or automatically. VMware DRS can dynamically load balance all virtual machines in the environment by shifting workloads across the entire pool of ESX Servers. This ensures that critical Exchange virtual machines in the environment will always have the CPU and RAM resources needed to maintain optimal performance.

#### Microsoft Local Continuous Replication (LCR)

Microsoft LCR is a single-server solution that uses built-in asynchronous log shipping technology to create and maintain a copy of a storage group on a second set of disks that are connected to the same server as the production storage group. LCR provides log shipping, log replay, and a quick manual switch to a secondary copy of the data.

#### Microsoft Cluster Service (MSCS)

##### Cluster Continuous Replication (CCR)

Microsoft CCR provides a non-shared storage failover cluster solution. It uses built-in asynchronous log shipping technology to create and maintain a copy of each storage group on a second server in a failover cluster.

##### Single Copy Clusters (SCC)

Microsoft SCC provides a shared storage failover cluster solution, which uses a single copy of a storage group on storage that is shared between the nodes in the cluster. SCC is somewhat similar to clustering functionality in previous versions of Exchange; however, along with numerous improvements, there are some significant changes.

##### Third-Party Software Replication

Several third-party replication solutions are available to enhance availability and recovery of a virtual Exchange environment. Some of these products emphasize availability, providing immediate failover of Exchange services, while others emphasize recovery in the event of a catastrophic failure. In most cases, these solutions can be used either within a single Exchange site or replicated over the WAN to a disaster recovery site.

## Remote Site Tools

### Disaster Recovery (DR) Site Replication

#### Microsoft Standby Continuous Replication (SCR)

Microsoft SCR is a new feature introduced in Exchange Server 2007 Service Pack 1 (SP1). As its name implies, SCR is designed for scenarios that use or enable the use of standby recovery servers. SCR extends the existing continuous replication features and enables new data availability scenarios for Exchange mailbox servers. SCR uses the same log shipping and replay technology used by LCR and CCR to provide added deployment options and configurations, allowing administrators to create additional storage group copies. **Microsoft SCR can be used to replicate data from standalone mailbox servers and from clustered mailbox servers.**

#### Software-based Replication

As previously mentioned, many of the same third-party software-based replication products used for local site availability can also support replication over the WAN to a DR site.

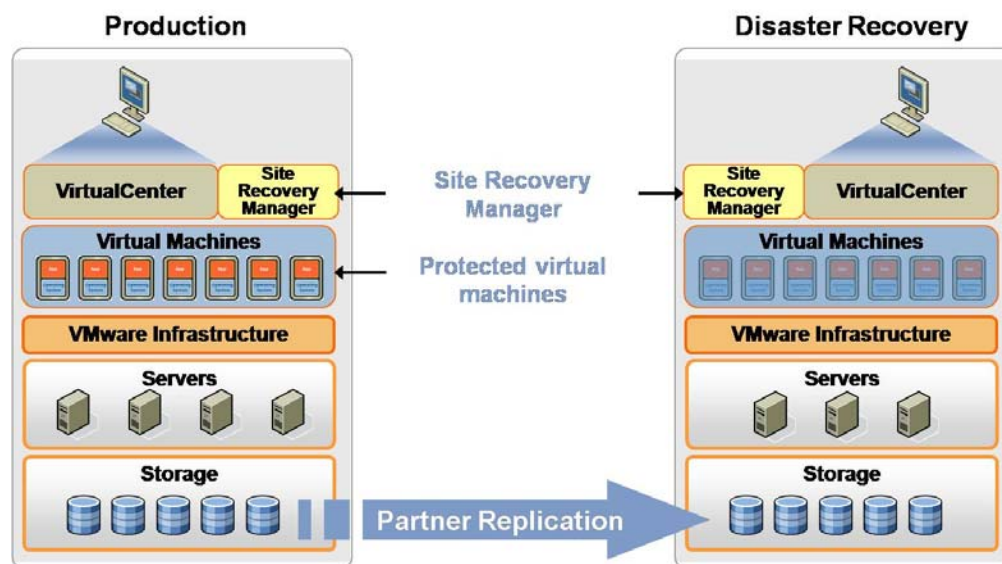
#### Hardware-based Replication

VMware has a comprehensive list of storage partners that provide hardware-based replication of storage arrays to a DR site.

### Disaster Recovery Site Automation

#### VMware Site Recovery Manager

VMware Site Recovery Manager makes disaster recovery rapid, reliable, manageable, and affordable. Site Recovery Manager leverages VMware Infrastructure and leading partners' storage replication software to deliver centralized management of recovery plans, automate the recovery process, and enable dramatically improved testing of recovery plans. It turns the complex paper runbooks associated with traditional disaster recovery into an integrated element of virtual infrastructure management. VMware Site Recovery Manager enables organizations to take risk and worry out of disaster recovery—yet another reason the VMware virtualization platform is the safest platform for datacenter applications.

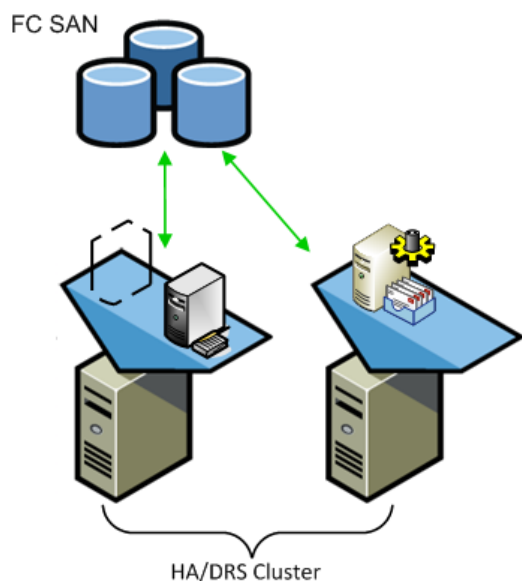


## Local Site Availability and Recovery Options

When running Exchange servers as virtual machines, traditional approaches to local site availability and recovery are enhanced by VMware Infrastructure features. Take a quick look at some of the options available to a virtual Exchange administrator:

### Standalone mailbox server VM with VMware HA, DRS, and VMotion

Out of the box, VMware Infrastructure 3 features can help to protect your standalone Exchange virtual machine (VM) from server host failure. VMware HA will automatically reboot your Exchange VM on another server in the event that the current one fails, so your VM can be restored to normal operation in the time that it takes to reboot the operating system and start the Exchange services. Once the original server hardware is fixed or replaced, VMware DRS and VMware VMotion can be used to quickly move the VM back to its original spot, with no additional downtime.



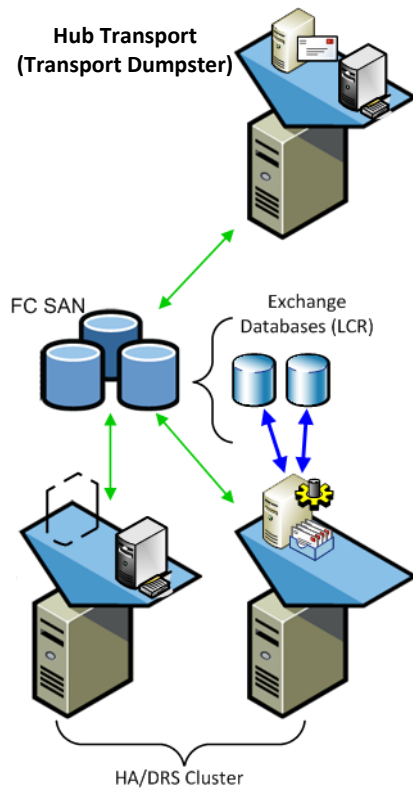
#### Characteristics

- MSCS required? – No
- MS License Requirement – Windows/Exchange Standard Edition
- Recovery time – Reboot
- Transport Dumpster enabled? – No
- Protects from hardware failure only

**Mailbox Server VM with VMware HA and DRS Clusters**

## VMware HA with LCR and the Transport Dumpster for database protection

Microsoft LCR clustering can be added to the configuration of your Exchange VM to help protect against database corruption. In an LCR cluster, transaction logs are played into a primary Exchange database and then shipped to a second copy of the Extensible Storage Engine (ESE) service, which then plays the transaction logs into the secondary database, thus providing data redundancy. As in the previous scenario, if the server hosting your mailbox virtual machine fails, VMware HA will reboot on another VMware ESX Server host. If the server failure caused database corruption issues, you can simply point the VM to the secondary copy of the database to restore service. In addition, use of Microsoft LCR (as of SP1) enables the Transport Dumpster feature, which allows undelivered messages to queue up on the Hub Transport server, limiting message loss as your virtual machine is rebooting. Finally, Microsoft LCR only requires a Standard Edition Windows license, making the LCR/HA combination a low-cost solution for environments on a tight budget.



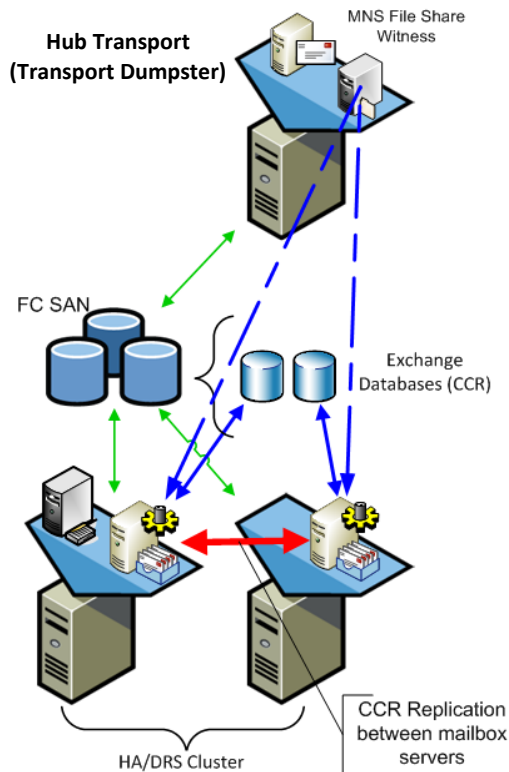
### Characteristics

- MSCS required? – No
- MS License Requirement – Windows/Exchange Standard Edition
- Recovery time – Reboot (or manual failover in case of database corruption)
- Transport Dumpster enabled? – Yes
- Protects from hardware failure and database corruption

### VMware HA in combination with Microsoft LCR

## VMware HA used with CCR clustering for faster failover

If higher availability is needed, a Microsoft CCR cluster can be used for faster failover of Exchange services. In the event of a server host failure, CCR will transfer ownership to the secondary node while the first node recovers. In the meantime, VMware HA will reboot the failed virtual machine onto another server host, restoring the CCR cluster to full operation after the reboot. The Transport Dumpster feature is active with CCR as well, helping to further limit message loss. This is a more expensive solution, however, requiring Windows Server Enterprise licenses for each node of the CCR cluster. It also requires Microsoft clustering expertise for design and operation and a third server role, the MNS FileShare Witness, to monitor cluster replication.



### Characteristics

- MSCS required? – Yes
- MS License Requirement – Windows/Exchange Enterprise Edition
- Recovery time – Immediate
- Transport Dumpster enabled? – Yes
- Protects from hardware failure, database corruption, and application failure

### VMware HA in Combination with Microsoft CCR

## Remote Site Availability and Recovery Options

Several technologies can be used to replicate production Exchange databases to a remote site for disaster recovery. Once the data is replicated, VMware HA can enhance availability at the disaster recovery site for maximum protection. To protect from catastrophic site failure, the following options can help the Exchange administrator quickly restore Exchange services:

### Storage Replication

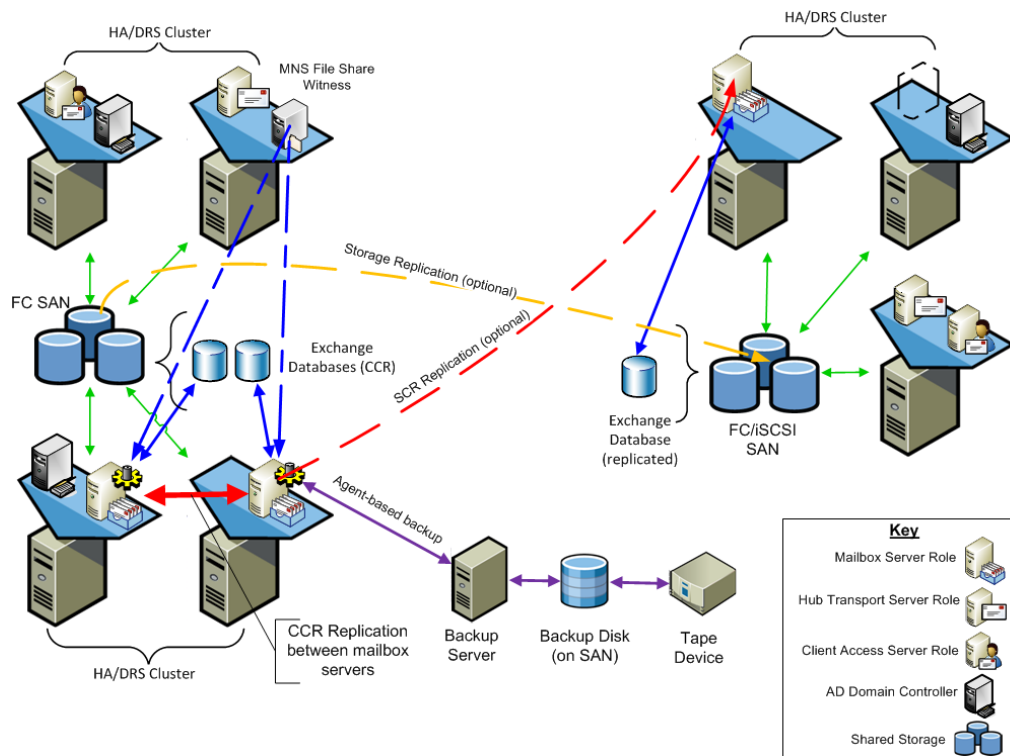
Storage replication technologies from VMware OEM partners can play an important role in implementing a remote site disaster recovery strategy. Our storage partners have proven solutions for replicating Exchange data or entire Exchange virtual machines. Recovery can be further enhanced through the use of scripting, which can be completely automated with VMware Site Recovery Manager.

### Microsoft SCR

Microsoft SCR can be used to replicate a production Exchange database to a disaster recovery site through the use of log shipping. Recovery can be scripted through the Microsoft Windows PowerShell interface.

### Third-Party Software Replication

Many of VMware's software partners have products that can replicate Exchange data or entire Exchange virtual machines. Recovery automation depends on product features and interfaces.



### Remote Site Availability and Recovery Options

## Additional Information

Please visit [www.vmware.com/landing\\_pages/exchange\\_solution.html](http://www.vmware.com/landing_pages/exchange_solution.html) for more information.

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