



EMC Solutions for a Virtualized Exchange 2007 Environment using EMC RecoverPoint

Reference Architecture



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Published February, 2009

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Reference Architecture

Part Number: H5801.1

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This document provides an architectural overview of the EMC solution for e-mail remote replication in a virtualized Exchange 2007 environment using the RecoverPoint array splitter. Remote replication of Exchange data can be achieved with minimal hardware by using VMware. The technology documented in this reference architecture was selected to provide site recoverability and consolidation without sacrificing high availability. This solution is developed by the EMC Global Solutions Group.

Purpose

The purpose of this document is to provide a reference architecture to deploy Microsoft Exchange 2007 SP1 within a virtual environment, using EMC's RecoverPoint for the remote replication of Exchange data. A reasonable amount of tuning was performed to ensure that the performance measurements achieved were consistent with real-world, best-of-breed performance.

Audience

This document is intended for internal EMC personnel, EMC partners, and customers.

The business challenge

In today's business environment, uptime and availability through technology platforms are more important than ever. Requirements such as high availability (HA), business continuity, and disaster recovery (DR) are an essential aspect of all infrastructure designs. As electronic messaging through Microsoft Exchange Server has become a mission-critical application in recent years, messaging downtime can be costly to companies.

When a solution requires the long-distance replication of production data to a remote site, the design can be challenging and present additional factors for consideration. This document provides an overview of a reliable local and remote data recovery solution using EMC RecoverPoint for Exchange 2007 on EMC CLARiiON storage disk array technology.

Related documents

The following document provides additional, relevant information. Access to the document is based on your login credentials. If you do not have access to the content listed below, contact your EMC representative:

- ◆ *White Paper: EMC CLARiiON Storage Solutions: Microsoft Exchange 2007 - Best Practices Planning*

Additional product information on the RecoverPoint Family is available from EMC Powerlink.

Chapter 1 Solution Overview

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Technology solution

This reference architecture provides high-level reference points, validation, and an architecture overview, which were submitted to a series of tests. Testing included scalability, performance, and functionality required in a disaster recovery scenario across extended distances.

This reference architecture leveraged EMC® CLARiiON® CX4-240 disk array technology, housing 600 simulated Exchange seats. It was validated through JetStress and LoadGen for the purposes of performance. For extended distance replication, which provided for site-to-site resiliency, EMC RecoverPoint® was leveraged and provided the engine for local and remote data replication.

In summary, the combination of technologies discussed in this introduction provides a great DR solution that is both highly scalable and affordable.

Chapter 2 Solution Architecture

This chapter presents these topics:

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Overall architecture

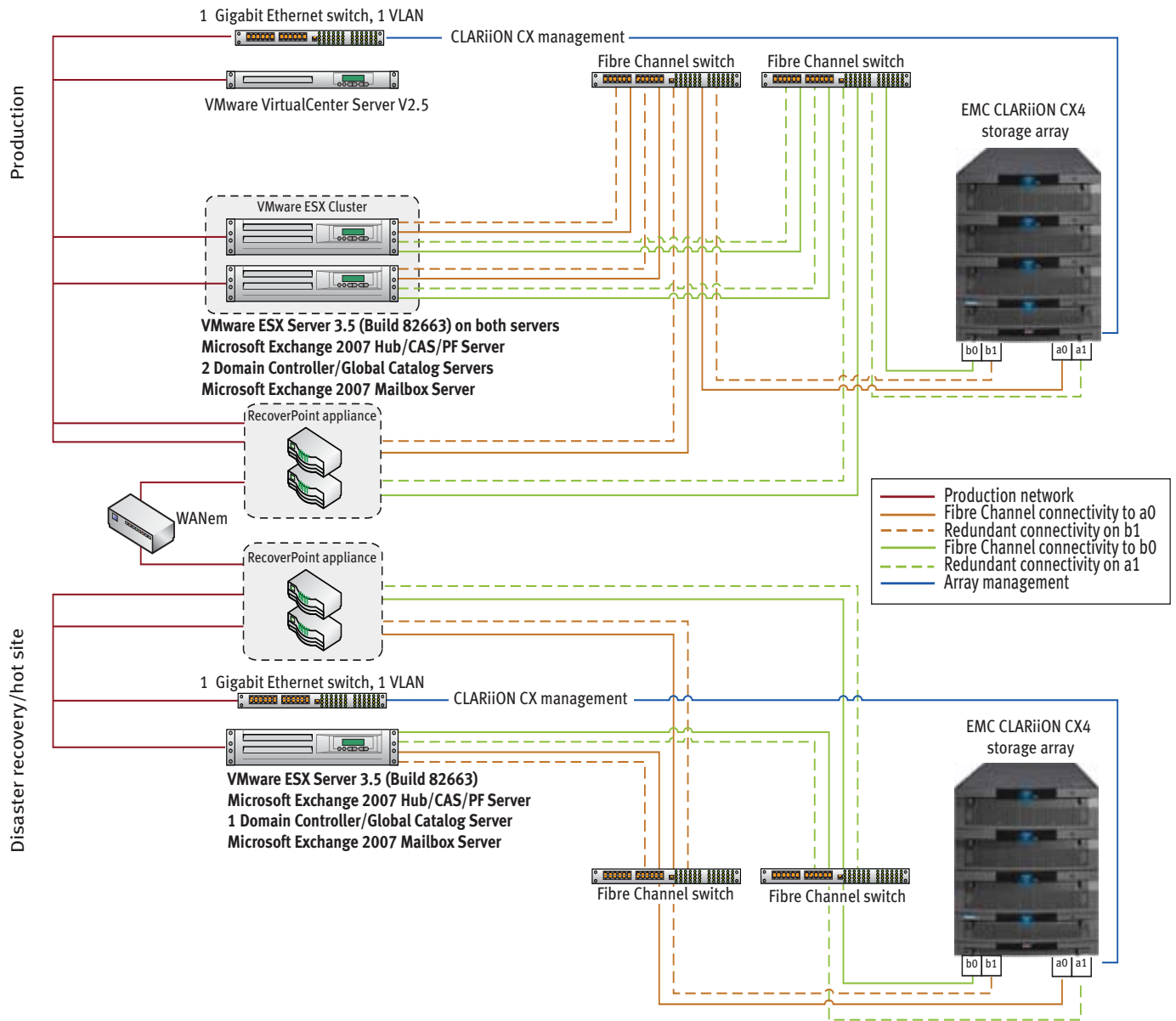
Figure 1 shows the overall physical architecture of Virtual Exchange 2007 SP1 using RecoverPoint for e-mail remote replication. This solution is included within the four-part, stackable module set that helps businesses to consolidate, back up, archive, and protect their environments. The solution outlined in this reference architecture is for a proven solution of protection that uses the following:

- ◆ CLARiiON CX4-240
- ◆ RecoverPoint array splitter
- ◆ Exchange 2007 mailbox server
- ◆ VMware ESX Server 3.5 VMware High Availability (VMHA)

A VMware ESX 3.5 server was used for the consolidation of the hardware for a low-cost solution. Although it still has the ability to home a midsize enterprise level of mailboxes, this solution also works in a physical environment, requiring individual server hardware for every VMware Guest identified in the following sections.

Performance measurement

This configuration is for 600 Exchange users, with 150 users per storage group and four storage groups with an average I/O profile.



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Figure 1 Physical architecture of Virtual Exchange 2007 SP1 using RecoverPoint

Table 1 lists the configuration information for the production site:

Table 1 Production site configuration

<p>VMware VirtualCenter Server 2.5</p> <ul style="list-style-type: none"> • 2 quad-core Xeon 2.33 GHz 32 GB • Microsoft Windows 2003 x32 R2 Enterprise Edition Service Pack 2 • Broadcom NetXtreme II Onboard
<p>VMware ESX Server 3.5 (Build 82663) on both servers</p> <ul style="list-style-type: none"> • 4 Intel dual-core 3 GHz 64 GB • Broadcom NetXtreme dual-port Gigabit Ethernet • 2 dual-port QLogic HBAs
<p>Exchange 2007 Hub/CAS/PF Server (Virtual Guest)</p> <ul style="list-style-type: none"> • 2 VCPU 3 GHz 8 GB • Microsoft Windows 2003 x64 Enterprise Edition Service Pack 2 • Microsoft Exchange 2007 Service Pack 1 (Virtual Guest) • 1 production NIC
<p>2 * Domain Controller/Global Catalog Servers (Virtual Guest)</p> <ul style="list-style-type: none"> • 2 VCPU 3 GHz 2 GB • Microsoft Windows 2003 x64 Enterprise Edition Service Pack 2 • 1 production NIC
<p>Microsoft Exchange 2007 Mailbox Server</p> <ul style="list-style-type: none"> • 4 VCPU 3 GHz 16 GB • Microsoft Windows 2003 x64 Enterprise Edition Service Pack 2 • Microsoft Exchange 2007 Service Pack 1 (Virtual Guest) • 1 production NIC • 4 dual-port HBAs • PowerPath® 5.2 • Navisphere® CLI 6.26
<p>EMC CLARiiON CX4 Series storage array</p> <ul style="list-style-type: none"> • FLARE® .28 • 300 GB/15k FC drives • 4 GB RAM per storage processor

Table 2 lists the configuration information for the DR/hot site:

Table 2 DR/hot site configuration information

<p>VMware ESX Server 3.5 (Build 82663)</p> <ul style="list-style-type: none"> • 4 Intel dual-core 3 GHz 64 GB • Broadcom NetXtreme dual-port Gigabit Ethernet • 2 Intel PRO/1000 PT quad-port Gigabit Ethernet
<p>Microsoft Exchange 2007 Hub/CAS/PF server</p> <ul style="list-style-type: none"> • 2 VCPU 3 GHz 8 GB • Microsoft Windows 2003 x64 Enterprise Edition Service Pack 2 • Microsoft Exchange 2007 Service Pack 1 • 1 production NIC
<p>1 * Domain Controller/Global Catalog Server</p> <ul style="list-style-type: none"> • 2 VCPU 3 GHz 2 GB • Microsoft Windows 2003 x64 Enterprise Edition Service Pack 2 • 1 production NIC
<p>1 * Standby VMware VirtualCenter Server 2.5</p> <ul style="list-style-type: none"> • 2 VCPU 3 GHz 2 GB • Microsoft Windows 2003 x64 Enterprise Edition Service Pack 2 • 1 production NIC
<p>Microsoft Exchange 2007 Mailbox Server</p> <ul style="list-style-type: none"> • 4 VCPU 3 GHz 16 GB • Microsoft Windows 2003 x64 Enterprise Edition Service Pack 2 • Microsoft Exchange 2007 Service Pack 1 • 1 production NIC • 2 dual-port HBAs • PowerPath 5.2 • Navisphere CLI 6.26
<p>EMC CLARiiON CX4 Series storage array</p> <ul style="list-style-type: none"> • FLARE .28 • 300 GB/15k FC drives • 4 GB RAM per storage processor

Network architecture

The network architecture discussed in this reference architecture focuses on two areas:

- ◆ RecoverPoint continuous remote replication (CRR) using the CLARiiON RecoverPoint splitter
- ◆ Virtualization using VMware ESX Server 3.5

RecoverPoint provides comprehensive data recovery for SAN-attached heterogeneous (EMC and non-EMC) storage across the entire data center, including local continuous data protection (CDP) and CRR. In addition, RecoverPoint provides concurrent local and remote (CLR) data protection with support for both local CDP and continuous clustered replication (CCR) of the same data. This intelligent data-protection and recovery solution runs on out-of-band appliances located in the network.

You can use RecoverPoint to protect against data loss resulting from common issues such as server failures, data corruption, software errors, viruses, and end-user errors, as well as catastrophic events that can bring entire data centers to a standstill.

EMC's RecoverPoint provides you with continuous data protection and continuous remote replication for on-demand protection and recovery at any point in time. RecoverPoint's advanced capabilities include policy-based management, application integration, and WAN acceleration.

With RecoverPoint you can implement a single, unified solution to protect and/or replicate data across heterogeneous storage. You can also simplify management and reduce costs, recover data at a local or remote site at any point in time, and ensure continuous replication to a remote site without impacting performance. Table 3 outlines the features and benefits of RecoverPoint.

Table 3 Features and benefits of RecoverPoint

Features	Benefits
Continuous data protection	Employ on-demand local recovery to any point in time regardless of array type.
Continuous remote replication	Use bi-directional, heterogeneous block-level replication across any distance.
Concurrent local and remote data protection	Protect and replicate data in many local and remote-site combinations for operational and disaster recovery.
Policy-based management	Leverage service-level policies that optimize storage and Internet Protocol (IP) wide area network (WAN) resources with built-in WAN acceleration and compression.
Bandwidth optimization	Enhance bandwidth utilization with advanced network data compression.
Block-level journaling of data changes	Enable full read/write access to any point-in-time image.
Data protection	Use RecoverPoint to protect against data corruption with flexible protection and recovery options.
Virtual infrastructure integration	Simplify and automate disaster recovery in VMware environments with Site Recovery Manager integration.

Virtualization is a technology that can be used for the consolidated usage of hardware along with high availability, using VMware technologies within the ESX 3.5 server, such as VMotion, Distributed Resource Scheduler (DRS), and VMHA.

An EMC CLARiiON CX4-240 using EMC's PowerPath software in an interconnect storage processor (SP) design allows for multiple paths and fault tolerance in the event of an SP failure.

Microsoft Exchange Server architecture

The Microsoft Exchange Server architecture in this reference architecture guide is a stand-alone mailbox server in the production and disaster recovery site. The production site Exchange mailbox server is virtualized on VMware ESX Server 3.5 within a VMHA/DRS cluster for high fault tolerance and high availability.

The reference architecture in Figure 1 represents a CRR configuration using Microsoft Windows 64-bit Microsoft Windows 2003 Enterprise Edition SP2, Exchange 2007 Enterprise Edition SP1 installed for messaging with PowerPath 5.2 64-bit, and Navisphere Agent/CLI .28 for both the production and DR Exchange guests.

A VMware VirtualCenter 2.5 server is installed for management of the ESX 3.5 servers.

Each ESX server is configured with four Fibre Channel (FC) paths allowing for redundant path and higher fault tolerance in the event of an SP, switch, path, or cable failure.

RecoverPoint appliances are configured in a clustered configuration to ensure continuous data replication.

After the installation of Exchange, it is highly recommended that you run the Microsoft Best Practices Analyzer. In the current setup, Microsoft Best Practices Analyzer is installed with Exchange 2007, following all the recommendations for performance tuning and hotfix installation found in the Exchange Management Console.

Storage architecture

An EMC CLARiiON CX4-240 provides external storage to the VMware ESX cluster and nodes for the Guest Exchange Server(s) using Raw Disk Mapping.

The storage architecture is based on a design utilizing building blocks. This design builds on itself as customers grow and require additional space and fault tolerance. The building blocks guarantee performance and minimize design and operations complexity in increments of four-disk RAID 10 building blocks, with a 0.48 user I/O profile and a maximum mailbox size of 270 MB.

A RAID 10 supports high fault tolerance and performance levels with the least amount of disks and the maximum number of users. Thorough testing has found this building block approach design providing exceptional performance.

Building blocks

Consolidate

The *Building Block 1* design is set up using four Exchange storage groups, one database per storage group.

For the databases, a four-drive (300 GB/ 15,000 rpm FC) RAID 1_0 group is created, and four LUNs of 120 GB are created within each of the newly-created RAID groups.

The log files are configured in a four-drive (300 GB/ 15,000 rpm FC) RAID 1_0 group, and four LUNs of 12 GB are created within the newly-created RAID group. Within this RAID group, a 350 GB LUN is created for the VMware Guest operating system datastore, homing the Virtual Machine Disk Format (VMDK) and swap files.

The databases are placed onto the corresponding LUNs (drive or mount point) created on the 120 GB LUNs. The log files are placed onto the corresponding 12 GB LUN (drive or mount point), along with another LUN created to home the VMware datastores, which hold the boot file (VMDK) for the Exchange 2007 operating system.

Volume Shadow Copy Service (VSS) is shared along with streaming backup on a five-drive (300 GB/ 15,000 rpm FC) RAID 5 group. For VSS backups, one LUN of 12 GB and another LUN of 120 GB are dedicated on the production site, and four LUNs of 12 GB and another four LUNs of 120 GB are dedicated on the DR site.

Four journaling LUNs were created for RPA journaling of 24 GB in size, with a single LUN for the RPA repository at 8 GB, and all using the RAID 5 set for backup to disk or cloning.

Figure 2 shows the drive layout.

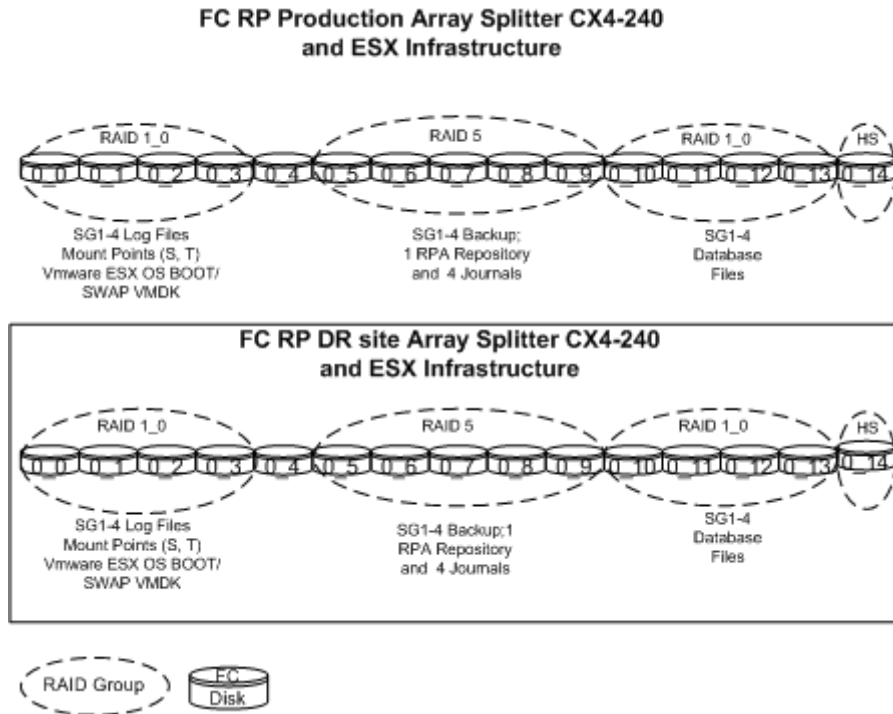


Figure 2 Disk drive layout

Protect

For remote replication, the RecoverPoint splitter was installed on the CLARiiON production and DR site arrays. Each array requires that the RecoverPoint splitter software is installed and configured within RecoverPoint as shown in Figure 3. There was a latency of 60 ms between the primary and DR site.

Graceful production site failover to the hotsite, and graceful failback to production site was completed successfully. All databases were mounted and were accessible in both scenarios. Failback to the production site was successful and able to resync in a very short amount of time. In our testing, this was within seconds.

The screenshot shows a window titled 'F17CX4-240 - Storage System Properties' with tabs for 'General', 'Cache', 'Memory', 'Storage Access', and 'Software'. The 'Software' tab is active, displaying a table of installed packages. The 'RecoverPointSplitter' package is highlighted in blue.

Name	Revision	Status
-AccessLogix	-	Active
-NavisphereAnalyzer	-	Active
-NavisphereManager	-	Active
-RecoverPointSplitter	-	Active
AnalyzerProvider	6.28.0.4.27	Active
AnalyzerUI	6.28.0.4.27	Active
Base	04.28.000.3.828	Active
CLIProvider	6.28.0.4.27	Active
EMCRemoteNG	04.28.3.828	Active
FLARE-Operating-Environment	04.28.000.3.236	Active
ManagementServer	6.28.0.4.27	Active
ManagementUI	6.28.0.4.27	Active
MirrorProvider	6.28.0.4.27	Active
MirrorView	04.28.006.3.828	Active
MirrorView/A	04.28.006.3.828	Active
MirrorViewUI	6.28.0.4.27	Active
Navisphere	6.28.0.4.27	Active
QoSManagerProvider	6.28.0.4.27	Active
QoSManagerUI	6.28.0.4.27	Active
RecoverPointSplitter	04.28.006.3.828	Active
SANCopy	04.28.006.3.828	Active
SANCopyProvider	6.28.0.4.27	Active
SANCopyUI	6.28.0.4.27	Active
SecurityPolicy	04.28.001.3.828	Active
SIWRules	6.28.0.4.27	Active
SnapCloneProvider	6.28.0.4.27	Active
SnapView	04.28.006.3.828	Active
SnapViewProvider	6.28.0.4.27	Active
SnapViewUI	6.28.0.4.27	Active
SNMP	04.28.006.3.828	Active

Figure 3 RecoverPoint splitter installed and configured

EMC's RecoverPoint was used for remote replication of the Exchange databases and log files to a hot site as shown in Figure 4. RecoverPoint can be configured to use the ability of Microsoft Exchange for an Exchange database to start on any Exchange server, using the move mailbox attributes **cmdlet** or **setup /m:recoverserver installation**.

Chapter 3 Hardware and Software Resources

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Hardware resources

Table 4 shows the hardware resources used in this solution for e-mail remote replication on Virtual Exchange 2007 SP1 using the RecoverPoint array splitter:

Table 4 Hardware specification

Quantity	Hardware	Configuration
1	CLARiiON CX4-240	FLARE version 4.28
1	DAE	15–300 GB 15k rpm FC drives
1	Windows server for VMware Virtual Center	4 dual-core EM64T Family 6 Model 15 Stepping 7 Genuine Intel ~2.992 GHz 16 GB RAM
3	ESX servers for Exchange and Active Directory	4 dual-core EM64T Family 6 Model 15 Stepping 7 Genuine Intel ~2.992 GHz 64 GB RAM 4 Intel PRO/1000 MT network connections 2 dual-port HBAs 2 Broadcom BCM5708C NetXtreme II Gigabit Ethernet switches (NDIS VBD Client)
2	Gigabit Ethernet switch	2 VLANs 1 production 2 iSCSI
4	RecoverPoint appliance	2 Intel Zeon quad-core E5345 at 2.33 GHz 32 GB RAM 2 dual-port HBAs

Software resources

Table 5 shows the software resources used in this solution for e-mail remote replication on Virtual Exchange 2007 SP1 using the RecoverPoint array splitter:

Table 5 Software specification

Software	Version	Count
VMware ESX	3.5 Build 82663	3
Microsoft Windows 2003 Enterprise Edition	x64 Service Pack 2	12
PowerPath	5.2 64 bit	2
Navisphere Agent/CLI	6.28	3
Microsoft Exchange 2007 Enterprise Edition	2007 Service Pack 1	4
RecoverPoint	3.0 Service Pack 1	4 (2 RPAs per site)
Microsoft LoadGen	08.02.0045	3

Virtual Infrastructure server

Table 6 describes the Virtual Infrastructure server used in this solution for e-mail remote replication on Virtual Exchange 2007 SP1 using the RecoverPoint array splitter:

Table 6 **Virtual Infrastructure server**

Software	Version	Purpose
Microsoft Windows 2003 Enterprise Edition 32-bit	5.2.3790 Service Pack 2 (Build 3790)	Operating system (OS)
Microsoft .Net	2.0 Service Pack 1	Needed for the Virtual Infrastructure server
Microsoft SQL Desktop Engine		Part of the Virtual Infrastructure server, used to store information about the virtual infrastructure
VMware Virtual Infrastructure server	2.5	To manage the ESX 3.5 server centrally
VMware Virtual Infrastructure Client	2.5	To access the Virtual Infrastructure server features

Chapter 4 Conclusion

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Conclusion

This EMC solution uses VMware for the consolidation of servers and RecoverPoint for the remote replication of Exchange data, providing a disaster recovery solution that allows for fast point-in-time failover and failback capabilities.

The solution provides the following benefits:

- ◆ Consolidation of the Exchange environment physical servers. The Active Directory (Domain Controller/Global Catalog), Hub/CAS/PF, and Mailbox Server are consolidated within a single, high-availability configuration.
- ◆ A disaster recovery solution that enables customers to use the array splitter without having to purchase a SAN Tap splitter.

In conclusion, the RecoverPoint array splitter proved a valuable addition to the disaster recovery capabilities that commercial and enterprise customers are looking to achieve. Production failover and failback using RecoverPoint to protect Exchange data is possible, with the ability to failback without extended or complicated resync of data to the production site.

To learn more about this, and other solutions, contact an EMC representative or visit www.EMC.com/solutions/microsoft.