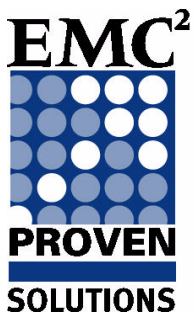




Enterprise Solutions for Microsoft Exchange 2007  
**EMC CLARiiON CX3-40**  
Metropolitan Exchange Recovery (MER) for Exchange  
in a VMware Environment  
Enabled by MirrorView/S  
**Reference Architecture**



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# About this Solution

## Purpose

The purpose of this solution is to validate the disaster recovery (DR) capabilities of EMC MirrorView™/Synchronous (MirrorView/S) in a virtualized Enterprise Microsoft Exchange 2007 environment. EMC® CLARiiON® and VMware are used for storage and server consolidation.

In this solution, the DR capabilities of MirrorView/S are tested over a metropolitan area of 50 km. MirrorView/S is used to provide highly available data protection with zero data loss between the primary and secondary site. VMware Virtual Infrastructure 3.0 is used to consolidate and virtualize 12,000 Microsoft Exchange 2007 users. The storage is provided on the high-performance, highly available CLARiiON CX3-40f array.

## The business challenge

Businesses today face the challenges of:

- Enabling affordable uniform high availability across an entire virtualized Exchange environment.
- Meeting service level requirements for recovery time and data loss.
- Enabling an efficient, effective, and affordable mirrored data storage solution.
- Performing rapid restart of applications upon failure.

For many businesses, it is critical that business information always be available. To protect this information, it is important to have a DR plan in place to safeguard against disasters that could make the data at the primary site unavailable. Recovery time objective (RTO) defines the amount of time a business can afford to be without its systems and information, measured from the beginning of the outage until the systems are operating again.

Recovery point objective (RPO) defines the amount of acceptable data loss in the event of a disaster. Many businesses require their RPO and RTO to be as low as possible. This solution illustrates how businesses can:

- Provide affordable uniform high availability across the entire virtualized environment.
- Limit impact on server resources and networks.
- Protect data and applications from local disruptions.
- Provide zero data loss and recover quickly from unplanned events.
- Migrate data across geographically dispersed storage systems.
- Avoid the cost and complexity of failover solutions tied to either operating systems or specific applications.

## The technology solution

In this solution, VMware technology is used to virtualize the Exchange environment, while MirrorView/S is used to provide protection from site disasters by replicating the Exchange 2007 database and logs to a remote CLARiiON. This solution describes a virtualized Enterprise Exchange environment consisting of four Exchange clusters: two on the production side and two on the DR side, each with three active and one passive virtualized nodes. Storage is provided by an EMC CLARiiON CX3-40f on the production side, replicating via MirrorView/S to a second CX3-40f on the DR side. This solution includes information on:

- Scaling and deploying Exchange 2007 in a VMware environment.
- Creating a well-performing storage design for Microsoft Exchange 2007 on an EMC CX3-40f with large and very active databases.
- Leveraging the data replication, recovery, and protection capabilities of MirrorView/S on the EMC CLARiiON CX3-40f storage system in the virtualized environment.
- Assessing the impact of synchronously replicating Exchange 2007 to a DR site with MirrorView/S at a distance of 50 km.
- Documenting the recovery procedure and MirrorView/S interaction.

## Solution details

**EMC CLARiiON CX3-40** — The CLARiiON CX3 UltraScale™ architecture, which is based on a high-performance, high-availability design, enables the CX3 UltraScale series to address a broad range of application environments. The CX3 UltraScale series systems are built on the same redundant modular architecture and run the FLARE® storage operating environment.

**Microsoft Exchange Server 2007** — Microsoft Exchange Server 2007 has been designed to meet today's communication and collaboration challenges. It provides advanced e-mail and calendaring while delivering new methods of access for employees, greater productivity for IT administrators, and increased security and compliance capabilities for organizations<sup>1</sup>.

**Disk layout** — A modular building block approach to optimize spindle allocation on the CLARiiON back end has been developed and tested specifically for Exchange 2007. This was done in order to provide maximum performance and reliability while using the minimum number of spindles. The building block is identical for both the physical and virtual environments.

**VMware virtualization technology** — The VMware ESX Server can transform or "virtualize" the hardware resources of an x64-based computer - including the CPU, RAM, hard disk and network controller - to create a fully functional virtual machine (VM) that can run its own operating system and applications just like a physical computer<sup>2</sup>.

**VMware layout** — The scaling of the VMs in this environment has been tested and developed to provide guidance on how best to spread resources across the virtual environment. A mailbox server building block of 2,000 users was decided upon after extensive testing of various configurations.

**MirrorView/S** — EMC MirrorView/S provides highly available data protection across a campus or metropolitan area environment. It provides an online, host independent, mirrored data storage and protection solution that duplicates production site data (primary) to one or two secondary sites. MirrorView/S is array-based, and therefore does not use any server cycles; it also supports consistency groups, which allows an application to use the secondary images should the primary storage system fail.

- 
1. [Microsoft](#) website source.
  2. [VMware](#) website source.

**Consistency groups** — Storage system-based consistency groups are available for MirrorView/S solutions. These consistency groups contain a number of mirrors that function together as a single unit. All operations, such as synchronize, fracture, and promote, happen to all of the mirrors in the group. These operations are no longer valid for any single member.

In database applications, this is important because database restartability is dependent on maintaining write order. Managing these volumes as a consistency group ensures that there is a restartable copy of the database at the DR site.

## Environment profile

Table 1 lists the environment profile parameters.

**Table 1** Environment profile

Parameter	Value
Number and type of storage system	2 x CX3-40f
Number of Exchange 2007 users	12,000
Read/Write ratio	1:1
IOPS	0.48 IOPS per user
Exchange 2007 server cluster configuration	2 x 3 active / 1 passive MSCS SCC clusters (8 nodes total)
Number of Exchange 2007 users per server	2,000
Number of Exchange 2007 storage groups per server	4
Number of Exchange 2007 mail databases per storage group	1
Number of Exchange 2007 users per mail database	500
Size of Exchange 2007 user mailbox	350 MB
Storage group mailbox database LUN size	250 GB
Storage group log LUN size	30 GB
Replication mechanism	MirrorView/S
Number of links	1
Simulated link distance	50 km

## Hardware resources

Table 2 lists the hardware used in this solution.

**Table 2 Hardware resources**

Equipment	Quantity	Configuration	Role
Storage	2	CX3- 40f Fibre Channel (FC) array with FLARE 24 (version 03.26.040.5.014): <ul style="list-style-type: none"> <li>• 16 x 146 GB FC, 15k rpm Exchange 2007 logs</li> <li>• 48 x 300 GB FC, 15k rpm Exchange 2007 database disks</li> </ul>	
SAN	4	Brocade 4100 version 5.2.2 (128 ports total, 32 ports per switch)	
Physical production servers	2	Dell PowerEdge R900, 4 x Quad Core 2.40 GHz Xeon CPUs, 64 GB RAM	Mailbox servers
Administration servers	1	Dell 6850, 4 CPUs, 3 GHz, 16 GB RAM	Hub Transport / CAS servers, Active Directory, and VirtualCenter
Physical DR servers	2	Dell PowerEdge R900, 4 x Quad Core 2.40 GHz Xeon CPUs, 48 GB RAM	Mailbox servers
Administration servers	1	Dell 6850, 4 CPUs, 3 GHz, 16 GB RAM	Hub Transport / CAS servers, Active Directory, and VirtualCenter
Client load generators	4	Dell 6850, 4 CPUs, 3 GHz, 16 GB RAM	
Network switch	4	Cisco 3750	

## Software resources

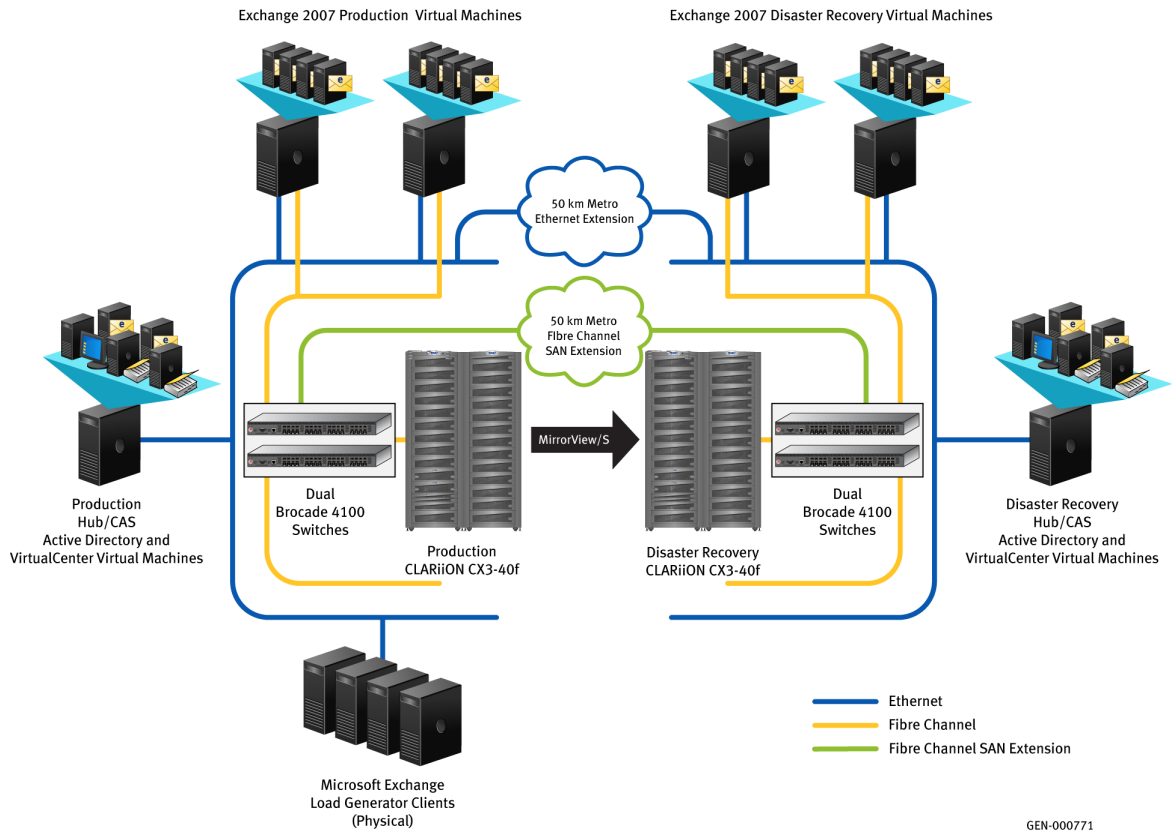
Table 3 lists the software used in this solution.

**Table 3**      **Software resources**

Title	Version	Configuration
Windows Server 2003 Enterprise Edition (64 bit)	2003 (R2) SP2	Cluster: 2 x 3 active / 1 passive (8 nodes total)
Microsoft Exchange	2007 (SP1)	Cluster: 2 x 3 active / 1 passive (8 nodes total)
Windows 2003 (64 bit) resource kit	2003 (SP2)	
Navisphere® Host software	R26	
MirrorView/S	R26	
ESX Server	3.5	Update 1
VirtualCenter	2.5	Update 1

## Physical architecture

Figure 1 illustrates the architecture for this solution.



**Figure 1** EMC Metropolitan Recovery for Virtualized Exchange 2007 enabled by EMC CLARiiON CX3-40f, MirrorView/S, and VMware ESX

## Conclusion

This reference architecture depicts a validated virtualized Exchange 2007 environment that is enabled by MirrorView/S and VMware technology. This solution utilizes EMC's CLARiiON CX3-40f array for storage and consolidation.

The Exchange 2007 VMware building block that was validated was based on 2,000 very heavy Exchange users with 350 MB mailboxes. It was scaled out to six building blocks that supported 12,000 users on two Dell R900 servers.

### Summary of testing

In the course of testing, the following items were explored and validated:

- VM configuration, scalability and deployment
- Exchange 2007 scalability in a VMware environment
- Performance of all objects from the Exchange user, through to the ESX Server, and the CLARiiON
- Impact of adding synchronous remote replication
- DR configuration and management

The test results demonstrate how Exchange 2007 can be consolidated when virtualized to exceed the eight core and 32 GB memory limitations that Exchange 2007 is subject to (in a physical server deployment that does not leverage VMware ESX Server).

### Summary of benefits

The solution provides the following benefits:

- **Reduced costs:** This solution illustrates server consolidation. By consolidating Exchange servers on VMs running on powerful 64-bit server hardware, companies will lower the costs associated with their Exchange server infrastructure. The cost savings are numerous: server hardware and maintenance costs, reduced rack and floor space, reduced data center power and cooling costs, and reduced infrastructure costs (host bus adapters, cables, and switch ports).
- **Simplified storage design:** A concise building block approach was detailed, illustrating how Exchange 2007 CX3-40f deployments can be easily designed with predictable high-performance results. The design outlined the number of spindles and the RAID type required to achieve the performance level, as well as showing how to implement RAID group layout and LUN sizes to suit the needs of the environment profile.

- **Increased flexibility:** Virtualized Exchange servers are no longer tied to a physical server and can be dynamically load balanced across VMware ESX Servers. The 2,000 very heavy Exchange user building block proved to be well suited to a dynamically load-balanced virtual environment.
- **DR:** EMC MirrorView/S provides highly available data protection and recovery across the 50 km metropolitan area.
- **Simplified mailbox server design:** By using the building block method, Exchange environment deployments result in predictable performance for all mailbox servers. The building block method removes any assumptions / guesswork when sizing mailbox servers and associated storage.
- **Risk mitigation and increased design flexibility:** Splitting the Exchange user population into multiple building blocks can reduce the risks associated with a single mailbox server outage, as each building block is limited to 2,000 users. This modular approach also allows the mailbox server design to meet different business and technical requirements for different groups of users, without requiring additional server hardware.

With EMC's continued partnership with VMware, this solution illustrates the many benefits of a virtualized platform for Exchange 2007. By using the validated building block approach, customers can begin to design and implement an Exchange 2007 virtualized environment.

EMC can help accelerate assessment, design, implementation, and management while lowering the implementation risks and cost of creating a virtualized Exchange 2007 environment.

To learn more about this, and other solutions, contact an EMC representative or visit [www.EMC.com/solutions/microsoft](http://www.EMC.com/solutions/microsoft).