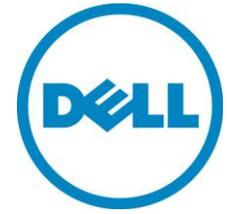


Microsoft Exchange 2010 on Dell Systems



Agile Consolidated Configurations



**Solutions for 500
to 50,000
Mailboxes**

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1 Introduction

1.1 Overview

This Microsoft® Exchange 2010 solution architecture manual contains possible configurations that can be used to architect your Exchange 2010 infrastructure. Samples in the manual are intended to serve as a blueprint or example for organizations whose requirements are similar. Each organization's requirements can differ significantly, though, and include items not accounted for in these configurations (e.g. message hygiene or third party archiving). For a configuration sized to your specific requirements, please contact your Dell representative or use the Dell Exchange 2010 Advisor tool at Dell.com/Exchange.

1.2 Finding Your Solution

Sample configurations for Microsoft Exchange on Dell server and storage hardware are provided in three manuals available from the Dell.com/Exchange landing page to help you find an appropriate solution for your needs. The three documents, which correspond to the three Dell Exchange 2010 architecture models, each contain multiple configurations of varying sizes, requirements and hardware choices.

- Small and Branch Office Model: Configurations ideal for small and branch offices with up to 1,000 mailboxes.
- Simple Distributed Model: Configurations that are streamlined, dedicated to Exchange, use internal server storage or direct-attached storage (DAS) and take the most advantage of the new high availability (HA) and replication features of Exchange 2010.
- Agile Consolidated Model (this manual): Configurations optimized for a shared, consolidated, and possible virtualized infrastructure.

1.3 About the Agile Consolidated Model

These configurations have been designed for larger organizations (1000+ mailboxes) primarily interested in enhancing efficiency and reducing costs through consolidation and standardization. By leveraging centralization and sometimes virtualization, this model is designed for robust, efficient, high-performing, and highly available and recoverable Exchange Server 2010 deployments. In particular, the agile consolidated model combines 11th-generation Dell™ PowerEdge™ rack and blade servers and Dell EqualLogic™ PS Series iSCSI SANs or Dell/EMC CX4 Series SANs with virtualization to enhance resource utilization, efficiency, and manageability.

1.4 Hardware

Sample solutions described in this manual use the following Dell equipment:

- [PowerEdge M1000e](#)
- [PowerEdge R610](#)
- [PowerEdge R620](#)
- [PowerEdge R710](#)
- [PowerEdge R720](#)
- [PowerEdge R715](#)

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- [PowerEdge R810](#)
- [PowerEdge M610](#)
- [PowerEdge M710](#)
- [PowerEdge M710HD](#)
- [EqualLogic PS4100E](#)
- [EqualLogic PS4100X](#)
- [EqualLogic PS6000X](#)
- [EqualLogic PS6100X](#)
- [EqualLogic PS6100E](#)
- [EqualLogic PS6500X](#)
- [EqualLogic PS6500E](#)
- [Compellent Series 40](#)
- [Dell Force10 S60 Switch](#)

Click on the links to the product landing pages for additional information on each product. Note that blade servers (PowerEdge M-series) require a PowerEdge M1000e Blade Enclosure and do not fit into standard server racks.

1.5 Virtualization

Those configurations that employ hardware virtualization software assume a platform approved via Microsoft's [Server Virtualization Validation Program](#) and deployed consistent with Microsoft's published [support guidelines](#) for running Microsoft Exchange Server 2010 on a virtualization platform. The sizing recommendations in this document are based on testing done on various versions of Microsoft® Hyper-V™ and VMware® vSphere™ (including VMware ESX® or VMware ESXi™).

2 1,000 Mailboxes on PowerEdge R610 with Dell EqualLogic PS4100E

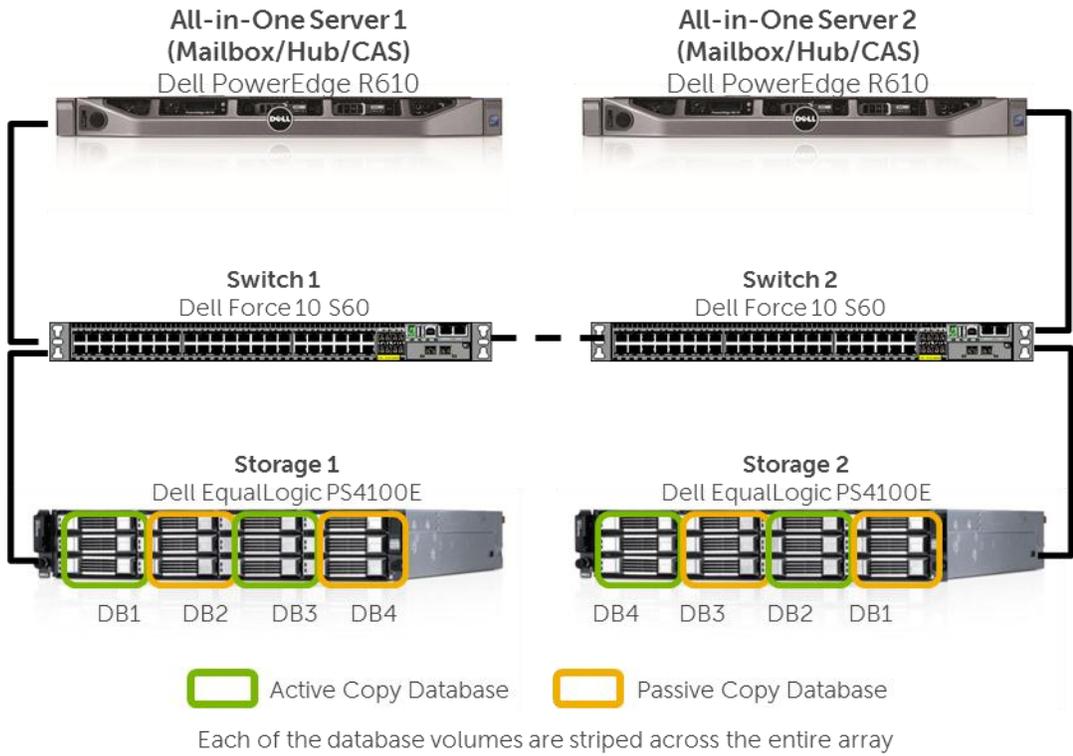
2.1 Solution Requirements

Number of mailboxes	1000
Average user I/O profile (messages/day)	Up to 0.20 (~ 200 messages per day)
Average mailbox size limit	4 GB
Total active/passive copies per database	2
Not included in this solution	Backup and recovery infrastructure Disaster recovery or site resiliency Additional server for Hub/CAS UM and Edge roles

2.2 Recommended Solution

Server Configurations	Detail
All-in-one (Mailbox/Hub/CAS) server	2 x PowerEdge R610 server 2 x quad-core processors and 24 GB of RAM
Number of DAGs	1
Servers per DAG	2
Number of active and passive mailboxes per server	500 active and 500 passive
Storage Configuration	Detail
Storage hardware	2 x EqualLogic PS4100E 12 drives each total
Storage switch	2 x Dell Force10 S60 switches
Data volumes per mailbox server	1
Databases per volume	2
Mailboxes per database	500
Disk type	3.5" 7.2 K RPM NLSAS - 2 TB
RAID type	RAID 10
Additional details	Jumbo frame enabled on storage switch Flow Control enabled on storage switch Portfast Enabled Databases and logs on same container NTFS allocation unit size = 64 KB 4 hotspare drives total (2 per EqualLogic array)

2.3 Architecture Diagram



3 2,500 Mailboxes on PowerEdge R620 with Dell EqualLogic PS4100X

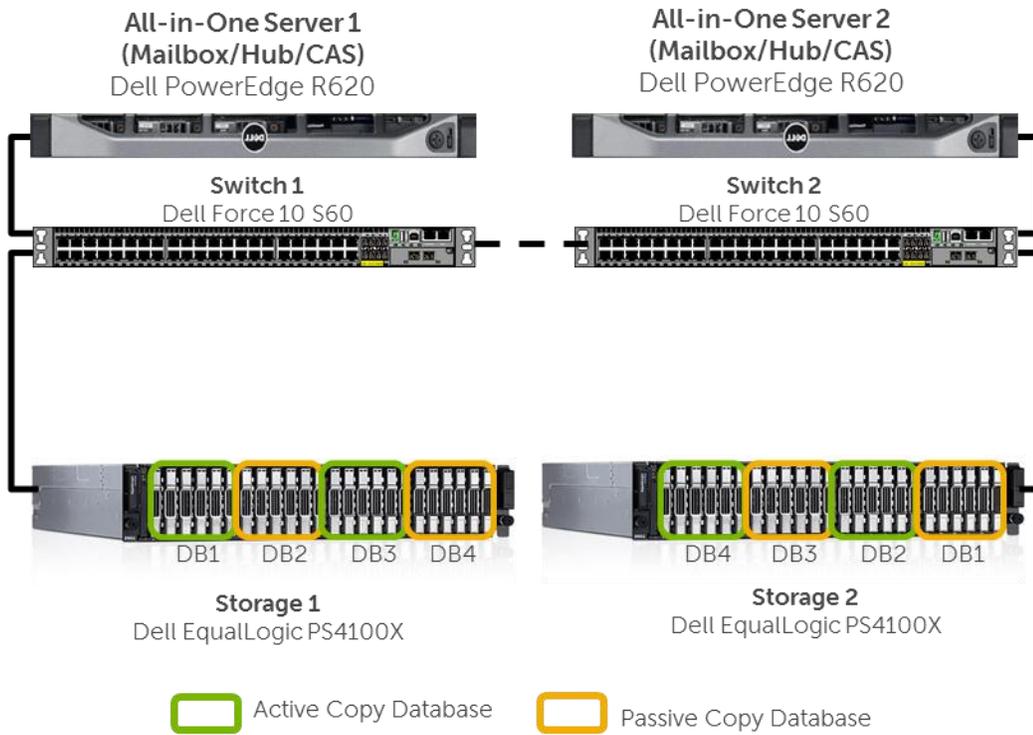
3.1 Solution Requirements

Number of mailboxes	2500
Average user I/O profile (messages/day)	Up to 0.20 (~ 200 messages per day)
Average mailbox size limit	4 GB
Total active/passive copies per database	2
Not included in this solution	Backup and recovery infrastructure Disaster recovery or site resiliency Additional server for Hub/CAS UM and Edge roles

3.2 Recommended Solution

Server Configurations	Detail
All-in-one (Mailbox/Hub/CAS) server	2 x PowerEdge R620 server 2 x 6-core processors and 64 GB of RAM
Number of DAGs	1
Servers per DAG	2
Number of active and passive mailboxes per server	1250 active and 1250 passive
Storage Configuration	Detail
Storage hardware	2 x EqualLogic PS4100X 24 drives each
Storage switch	2 x Dell Force10 S60 switches
Data volumes per mailbox server	1
Databases per volume	4
Mailboxes per database	625
Disk type	2.5" 10 K RPM SAS - 600 GB
RAID type	RAID 50
Additional details	Jumbo frame enabled on storage switch Flow Control enabled on storage switch Portfast Enabled Databases and logs on same container NTFS allocation unit size = 64 KB 4 hotspare drives total

3.3 Architecture Diagram



Each of the database volumes are striped across the entire array

4 3,500 Mailboxes on PowerEdge R710 with Dell EqualLogic PS6100E

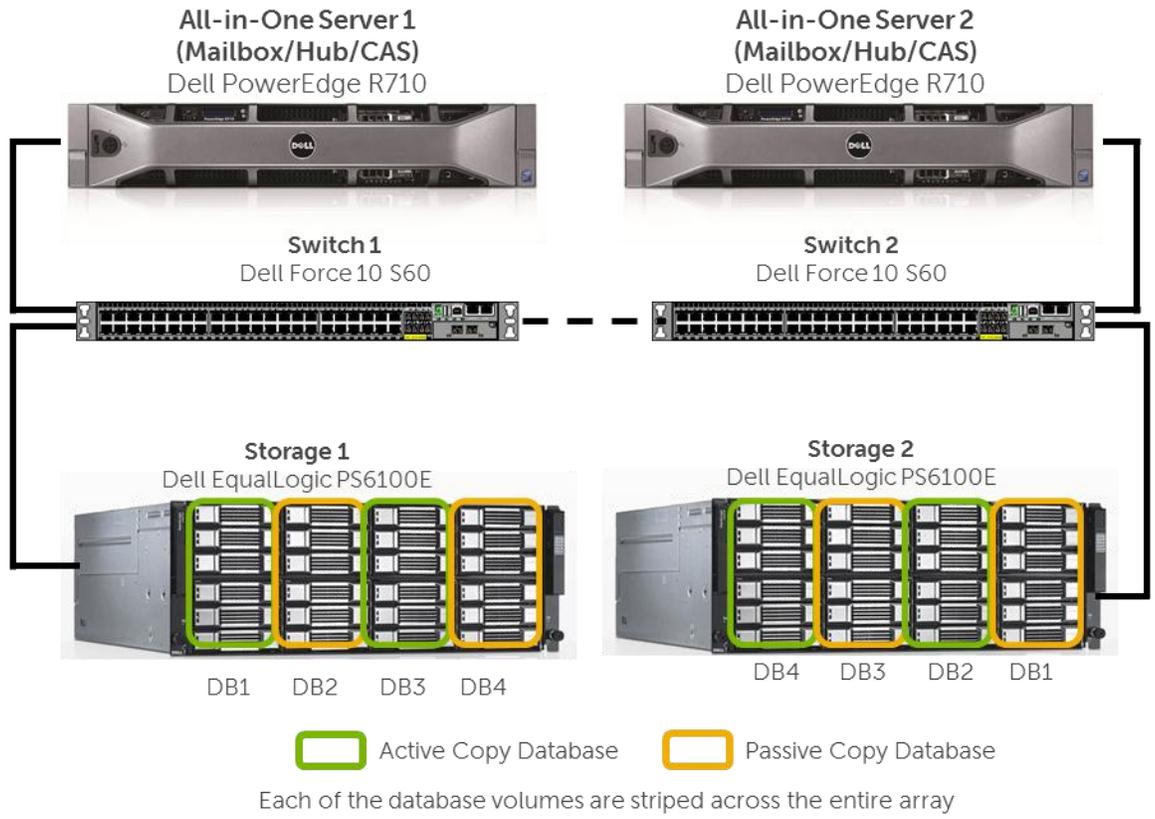
4.1 Solution Requirements

Number of mailboxes	3,500
Average user I/O profile (messages/day)	Up to 0.15 (~ 150 messages per day)
Average mailbox size limit	2 GB
Total active/passive copies per database	2
Not included in this solution	Backup and recovery infrastructure Disaster recovery or site resiliency Additional server for Hub/CAS UM and Edge roles

4.2 Recommended Solution

Server Configurations	Detail
All-in-one (Mailbox/Hub/CAS) server	2 x PowerEdge R710 server 2 x quad-core processors and 48 GB of RAM
Number of DAGs	1
Servers per DAG	2
Number of active and passive mailboxes per server	1750 active and 1750 passive
Storage Configuration	Detail
Storage hardware	2 x EqualLogic PS6100E 24 drives each total
Storage switch	2 x Dell Force10 S60 switches
Data volumes per mailbox server	4
Databases per volume	1
Mailboxes per database	875
Disk type	3.5" 7.2 K RPM NLSAS - 2 TB
RAID type	RAID 10
Additional details	Jumbo frame enabled on storage switch Flow Control enabled on storage switch Portfast Enabled Databases and logs on same container NTFS allocation unit size = 64 KB 4 hotspare drives total

4.3 Architecture Diagram



5 3,500 Mailboxes on PowerEdge M710 Blade Server with Dell EqualLogic PS6100E Virtualized

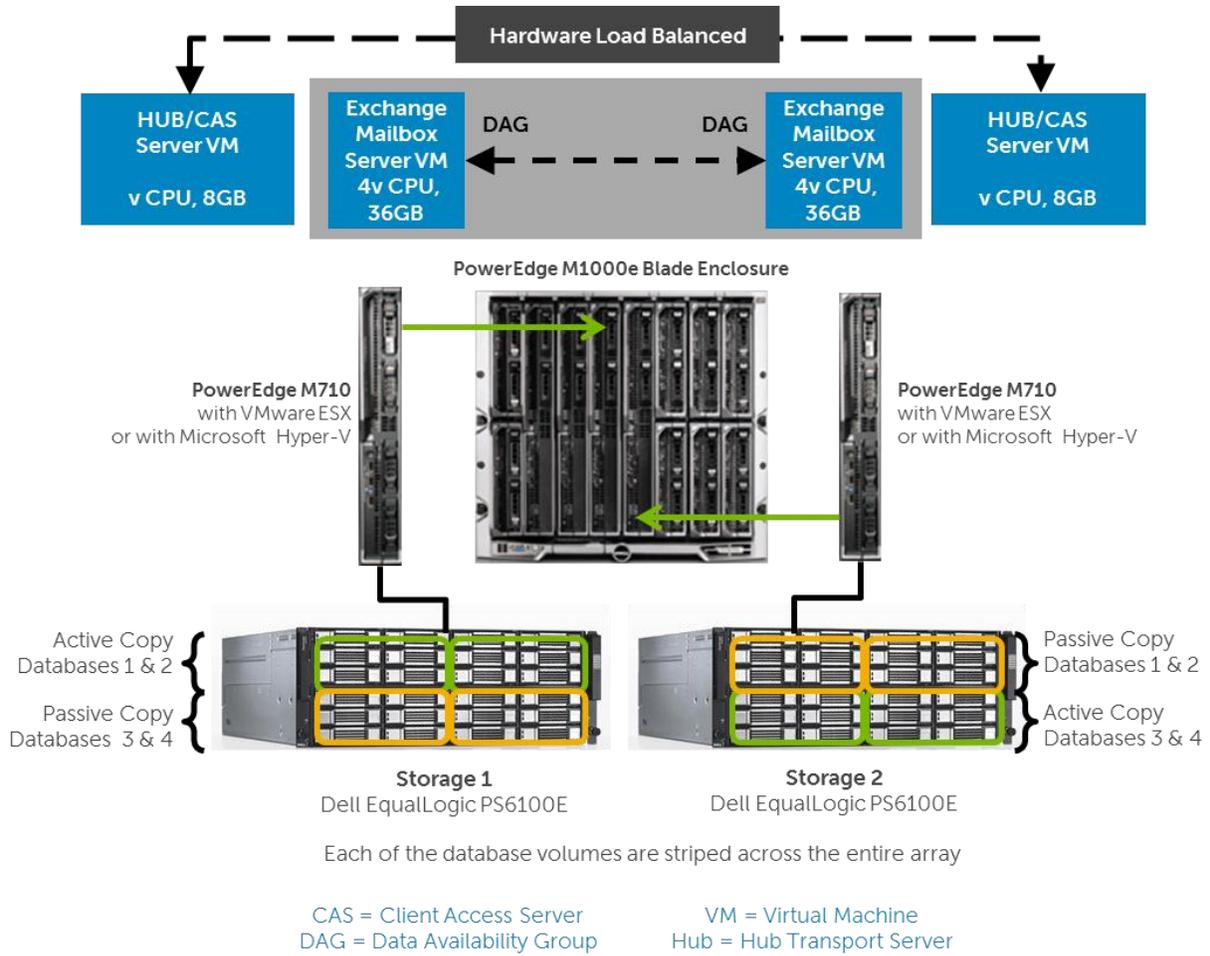
5.1 Solution Requirements

Number of mailboxes	3,500
Average user I/O profile (messages/day)	Up to 0.15 (~ 150 messages per day)
Average mailbox size limit	2 GB
Total active/passive copies per database	2
Not included in this solution	Backup and recovery infrastructure Disaster recovery or site resiliency Additional server for Hub/CAS UM and Edge roles

5.2 Recommended Solution

Server Configurations	Detail
ESX/Hyper-V (Host) Server (Processor/Memory)	2 x PowerEdge M710 Blade Server 2 x six-core processors and 48 GB of RAM
Mailbox (MBX) Server Virtual Machine (Processor/Memory)	1 x VM on each host server; 4vCPU/36 GB virtual memory
Hub/CAS server VM	1 x VM on each host server 4vCPU/8 GB memory
Number of DAGs	1
Servers per DAG	2
Number of active and passive mailboxes per server	1750 active and 1750 passive
Storage Configuration	Detail
Storage hardware	2 x EqualLogic PS6100E 24 drives each for total of 48 drives
Data volumes per mailbox server	4 with 1 DBs each; 2 active copies and 2 passive copies
Databases per volume	1
Mailboxes per database	875
Disk type	3.5" 7.2 K RPM NLSAS - 2 TB
RAID type	RAID 10
Additional details	Databases and logs on same container NTFS allocation unit size = 64 KB 4 hotspare drives total

5.3 Architecture Diagram



6 5,000 Mailboxes on PowerEdge R720 with EqualLogic PS6100X

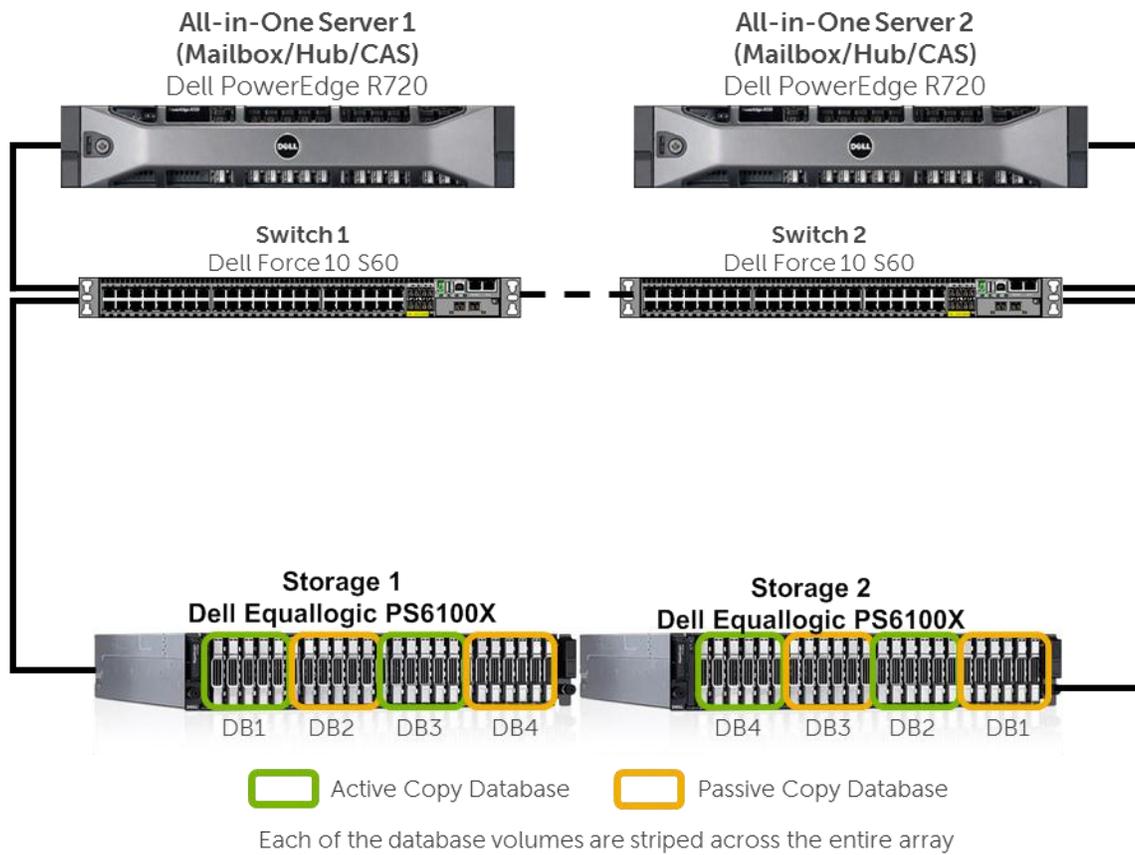
6.1 Solution Requirements

Number of mailboxes	5,000
Average user I/O profile (messages/day)	Up to 0.20 (~ 200 messages per day)
Average mailbox size limit	2 GB
Total active/passive copies per database	2
Not included in this solution	Backup and recovery infrastructure Disaster recovery or site resiliency Additional server for Hub/CAS UM and Edge roles

6.2 Recommended Solution

Server Configurations	Detail
All-in-one (Mailbox/Hub/CAS) server	2 x PowerEdge R720 server 2 x 6-core processors and 64 GB of RAM
Number of DAGs	1
Mailbox server VMs per DAG	2
Number of active and passive mailboxes per mailbox server VM	2500 active and 2500 passive
Storage Configuration	Detail
Hardware	2 x EqualLogic PS6100x 24 drives each
Storage switch	2 x Dell Force10 S60 switches
Data volumes per mailbox server	1
Databases per volume	4
Mailboxes per database	625
Disk type	2.5" 10 K RPM SAS 600GB
RAID type	RAID 50
Additional details	Jumbo frame enabled on storage switch Flow Control enabled on storage switch Portfast Enabled Databases and logs on same container NTFS allocation unit size = 64 KB 4 hotspare drives total

6.3 Architecture Diagram



7 5,000 Mailboxes on PowerEdge M710HD with EqualLogic PS6000X Virtualized

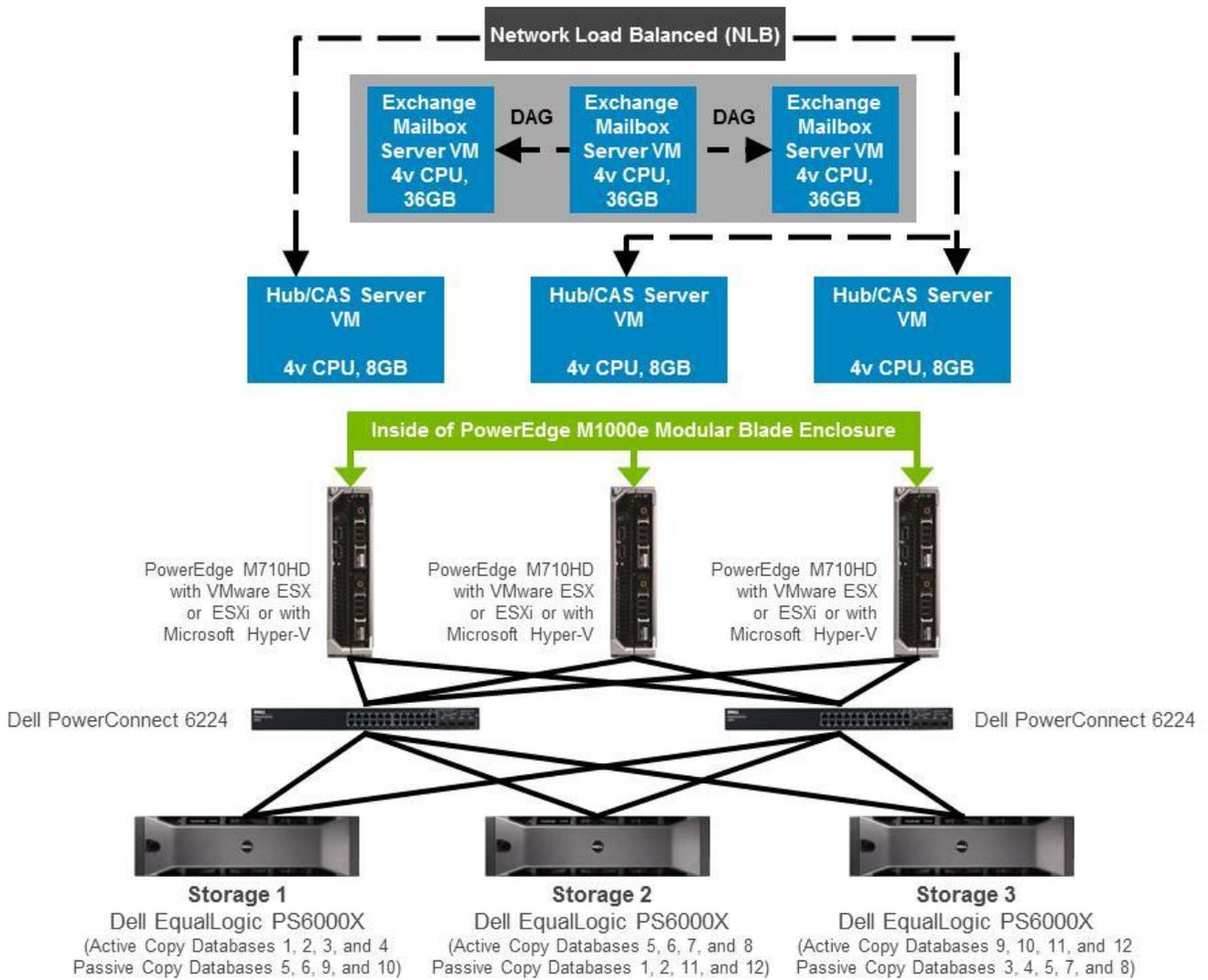
7.1 Solution Requirements

Number of mailboxes	5,000
Average user I/O profile (messages/day)	0.15 IOPs (~150 messages/day)
Average mailbox size limit	512 MB
Total active/passive copies per database	2 copy DAG (1 active + 1 passive)
Not included in this solution	Backup and recovery infrastructure UM and Edge Roles Site resiliency

7.2 Recommended Solution

Server Configurations	Detail
ESX/Hyper-V (Host) Server (Processor/Memory)	3 x PowerEdge M710HD servers 2 x six-core processors/48 GB memory
Mailbox (MBX) Server Virtual Machine (Processor/Memory)	1 x VM on each host server; 4vCPU/36 GB virtual memory
Number of database availability groups (DAGs)	1
Mailbox server VMs per DAG	3 mailbox servers per DAG
Number of active and passive mailboxes per mailbox server VM	1680 active and 1680 passive
Hub/CAS server VM	1 x VM on each host server 4vCPU/8 GB memory
Storage Configuration	Detail
Hardware	3 x EqualLogic PS6000X Enclosures 16 drives/enclosure—48 drives total
Data volumes per mailbox server VM	8 databases/volumes (4 active + 4 passive databases)
Mailboxes per database	420 mailboxes per database
Disk type	10 K RPM SAS—600 GB
RAID type	RAID-10
Additional details	Data and Log combined 10% estimated capacity for growth NTFS Allocation unit size = 64 KB for both DB and Log Jumbo frame enabled on storage switch Flow Control enabled on storage switch Portfast Enabled

7.3 Architecture Diagram



*Each of the database volumes are striped across the entire array

8 5,000 Mailboxes on PowerEdge R720 with EqualLogic PS6500E

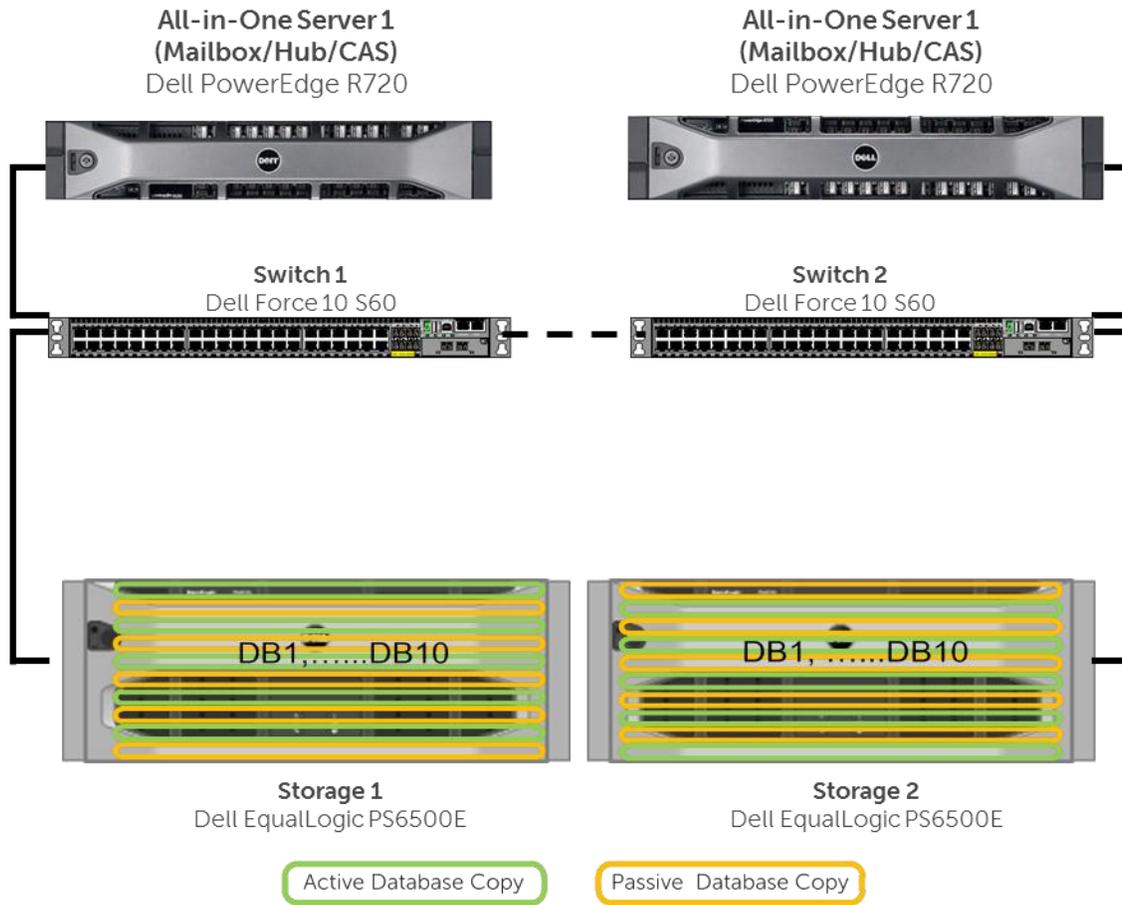
8.1 Solution Requirements

Number of mailboxes	5,000
Average user I/O profile (messages/day)	0.15 IOPs per user (~150 messages/day)
Average mailbox size limit	2 GB
Total active/passive copies per database	2
Not included in this solution	Backup and recovery infrastructure UM and Edge Roles

8.2 Recommended Solution

Server Configurations	Detail
All-in-one (Mailbox/Hub/CAS) server	2 x PowerEdge R720 servers 2 x 6-core processors per server 96 GB of DDR3 Memory per server
Number of DAGs	1
Servers per DAG	2
Number of active and passive mailboxes per server	2500 active and 2500 passive
Storage Configuration	Detail
Storage hardware	2 x EqualLogic PS6500E 48 x 3.5" 7.2K-RPM SATA disks per enclosure Total disks for entire solution = 96 disks
Storage switch	2 x Dell Force10 S60 switches
Data volumes per mailbox server	10
Databases per volume	1
Mailboxes per database	500
Disk type	3.5" 7.2 K-RPM SATA disks
RAID type	RAID-10
Additional details	Jumbo frame enabled on storage switch Flow Control enabled on storage switch Portfast Enabled Data and Logs combined 25% estimated additional storage space available NTFS Allocation unit size = 64 KB for both DB and Log

8.3 Architecture Diagram



Each of the database volumes are striped across the entire array

9 7,500 Mailboxes on PowerEdge M710 with EqualLogic PS6500X Virtualized

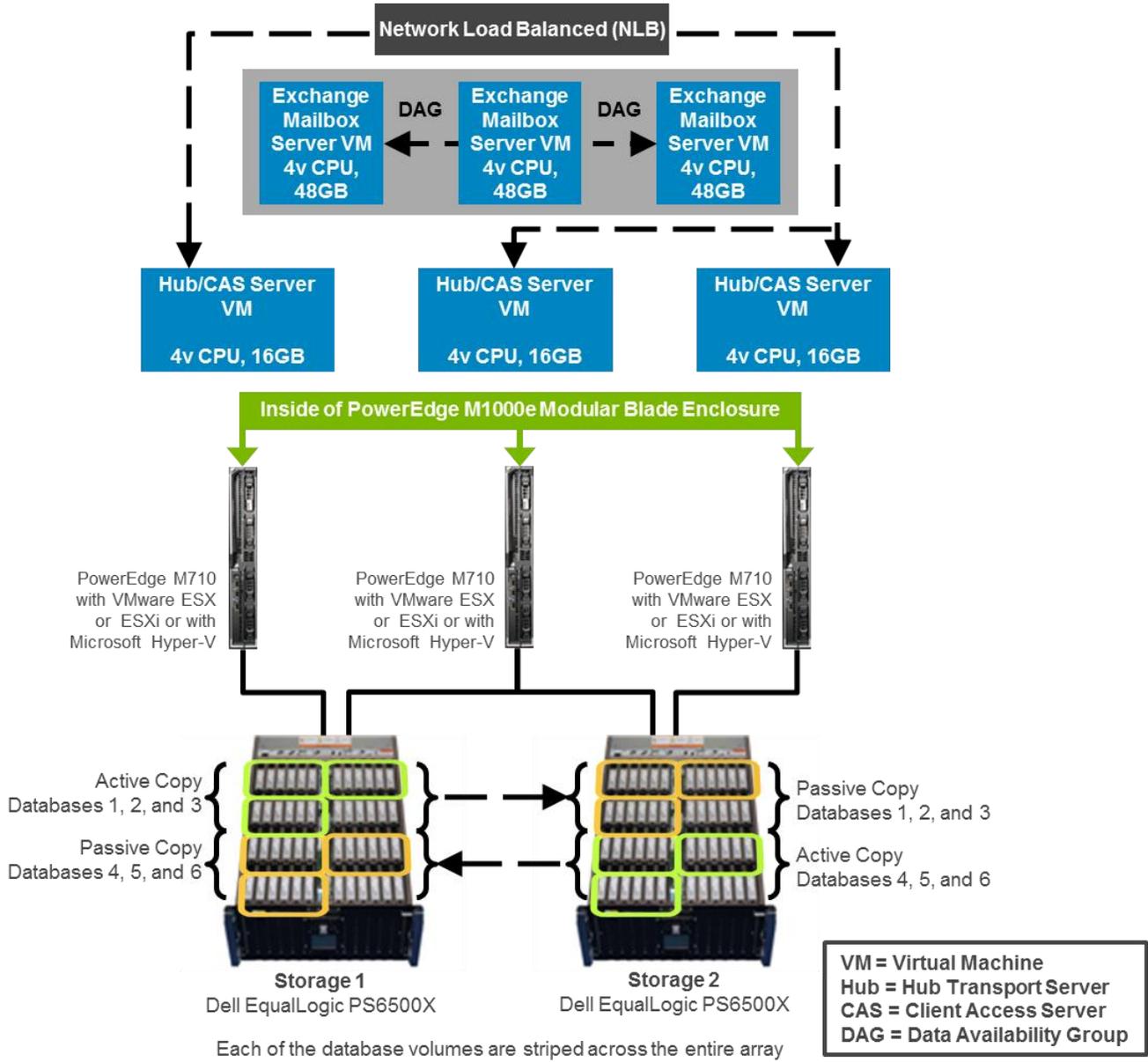
9.1 Solution Requirements

Number of mailboxes	7500
Average user I/O profile (messages/day)	.15 IOPS (~150 messages per day)
Average mailbox size limit	1 GB
Total active/passive copies per database	2
Not included in this solution	Site resiliency UM or Edge roles Backup and recovery infrastructure

9.2 Recommended Solution

Server Configurations	Detail
Virtualization server(s)	3 x PowerEdge M710 servers 2 x six-core processors and 72GB of RAM
Mailbox server virtual machine (VM)	1 x VM per PowerEdge M710 server 4 x CPU and 48GB of virtual memory
Number of database availability groups (DAGs)	1
Mailbox server VMs per DAG	3
Number of active and passive mailboxes per mailbox server VM	2500 active and 2500 passive
Hub/CAS server VM	1 x VM per M710 4 x vCPU and 16 GB virtual memory
Storage Configuration	Detail
Hardware	2 x EqualLogic PS6500X 48 drives each 96 total drives
Data volumes per mailbox server	4
Databases per volume	1
Mailboxes per database	1250 mailboxes
Disk type	3.5" 10 K RPM SAS 600 GB
RAID type	RAID 50

9.3 Architecture Diagram



10 5,000 Mailboxes Virtualized on PowerEdge R720 Server with Dell Compellent Series 40

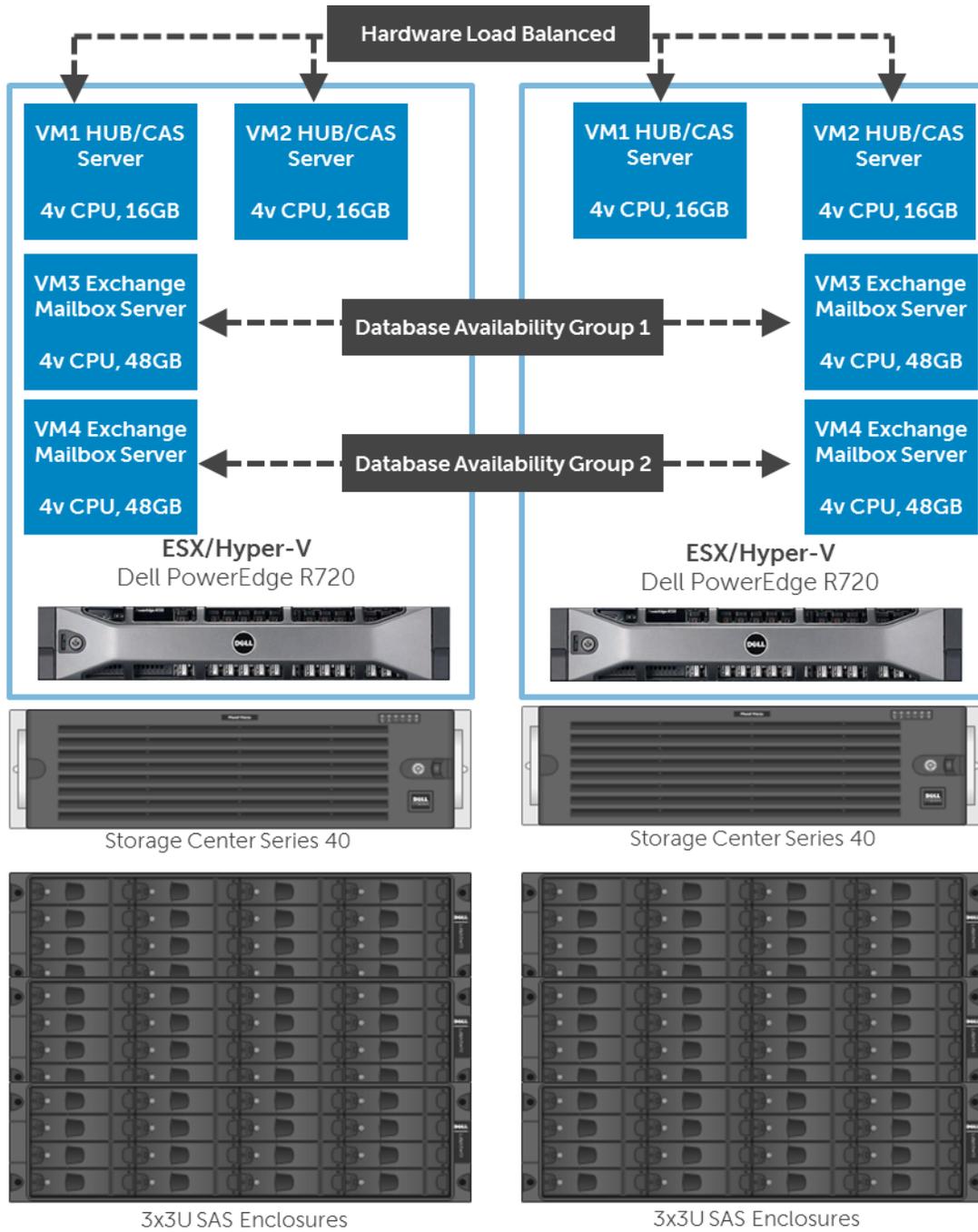
10.1 Solution Requirements

Number of mailboxes	5,000
Average user I/O profile (messages/day)	Up to 0.20 (~ 200 messages per day)
Average mailbox size limit	2 GB
Total active/passive copies per database	2
Not included in this solution	Backup infrastructure Additional server for Hub/CAS UM and Edge roles

10.2 Recommended Solution

Server Configurations	Detail
ESX/Hyper-V (Host) Server (Processor/Memory)	Site-1: 1 x PowerEdge R720 rack server 2 x eight-core processors and 144 GB of RAM Site-2: 1 x PowerEdge R720 rack server 2 x eight-core processors and 144 GB of RAM
Mailbox (MBX) Server Virtual Machine (Processor/Memory)	2 x VM on each Host server; 4vCPU/48 GB virtual memory
Hub/CAS server VM	2x VM on each Host server; 4vCPU/16 GB virtual memory
Number of DAGs	2
Servers VM per DAG	2
Number of mailboxes per server VM	1250 active and 1250 passive
Storage Configuration	Detail
Storage hardware	Site-1: 1 x Dell Compellent Series 40 (17@2TB NL-SAS drives)+ (11@600GB15K SAS drives) Site-2: 1 x Dell Compellent Series 40 (17@2TB NL-SAS drives)+ (11@600GB15K SAS drives)
Data volumes per mailbox server	2 with 2 DB each; 1 active copy and 1 passive copy
Databases per volume	2
Mailboxes per database	625
Disk type	3.5" 7.2 K RPM NLSAS - 2 TB and 3.5" 15 K RPM SAS
RAID type	Dell Compellent Recommended Storage Profile
Additional details	Databases and logs on same container NTFS allocation unit size = 64 KB 3hot spares drives per site

10.3 Architecture Diagram



11 24,000 Mailboxes on PowerEdge R810 with EqualLogic PS6500E

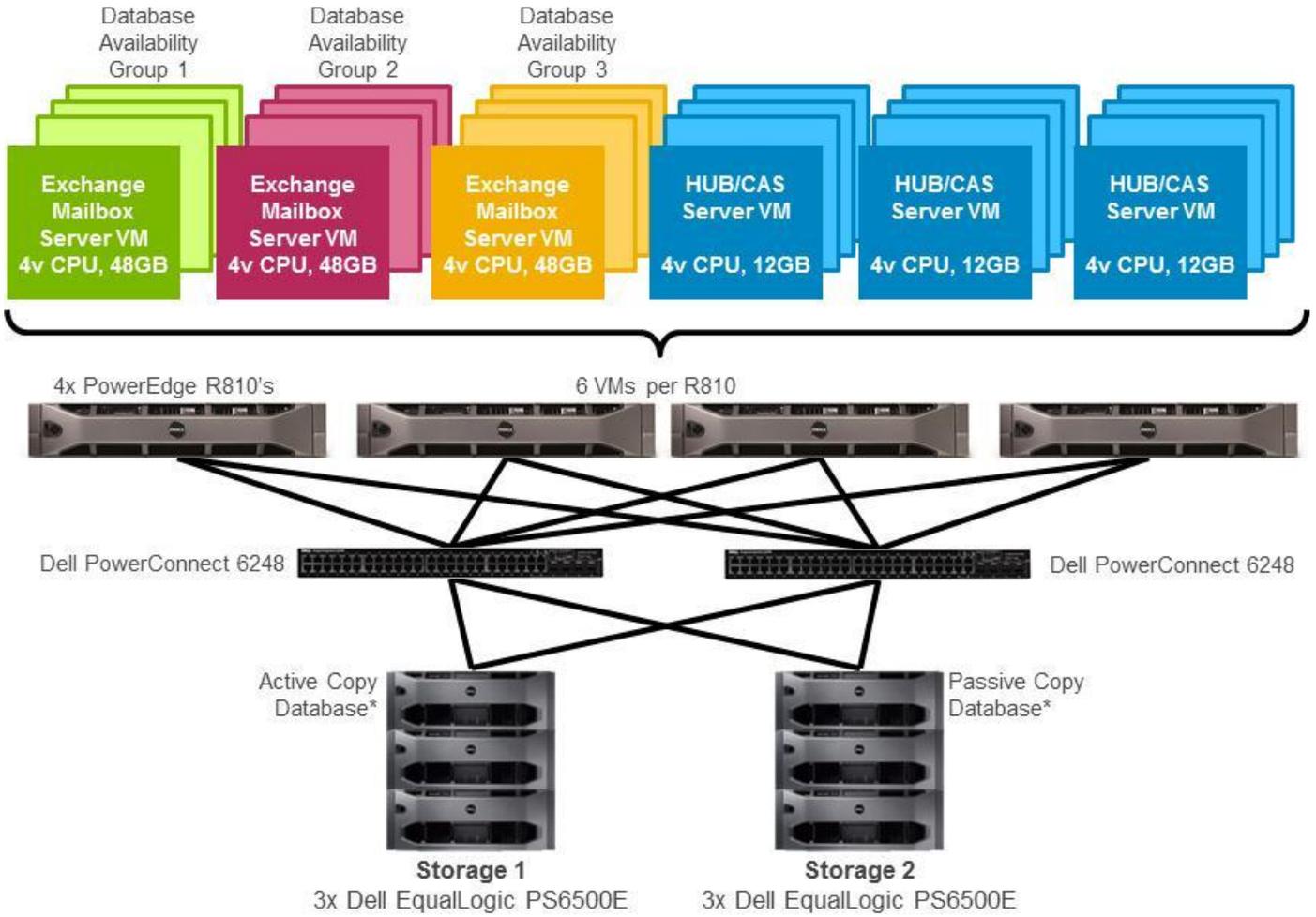
11.1 Solution Requirements

Number of mailboxes	24,000
Average user I/O profile (messages/day)	0.1 IOPs per user (~100 messages/day)
Average mailbox size limit	1.5 GB
Total active/passive copies per database	2
Not included in this solution	Backup and recovery infrastructure UM and Edge Roles Site resiliency

11.2 Recommended Solution

Server Configurations	Detail
ESX/Hyper-V (Host) Server (Processor/Memory)	4 x PowerEdge R810 servers 4 x six-core processors/192 GB memory
Mailbox (MBX) Server Virtual Machine (VM) (Processor/Memory)	3 x VM on each Host server 4 vCPU/48 GB virtual memory on each MBX VM
Number of DAGs	3 DAGs
Servers per DAG	4 mailbox servers per DAG
Number of active and passive mailboxes per mailbox server VM	2000 active and 2000 passive
Hub/CAS server VM (Processor/Memory)	3 x VM on each host server 4vCPU/12 GB memory on each HUB/CAS VM
Storage Configuration	Detail
Storage hardware	6 x Dell EqualLogic PS6500E iSCSI Enclosures 48 drives per enclosure—288 total drives
Data volumes per mailbox server VM	6
Databases per volume	1
Mailboxes per database	670 mailboxes per database
Disk type	1 TB SATA II 7,2 K RPM Drive
RAID type	RAID-10
Additional details	Data and Log combined 8% estimated additional storage space available NTFS Allocation unit size = 64 KB for both DB and Log

11.3 Architecture Diagram



*Each of the database volumes are striped across the entire array

12 25,000 Mailboxes on PowerEdge M710 Blade Server with Dell Compellent Series 40

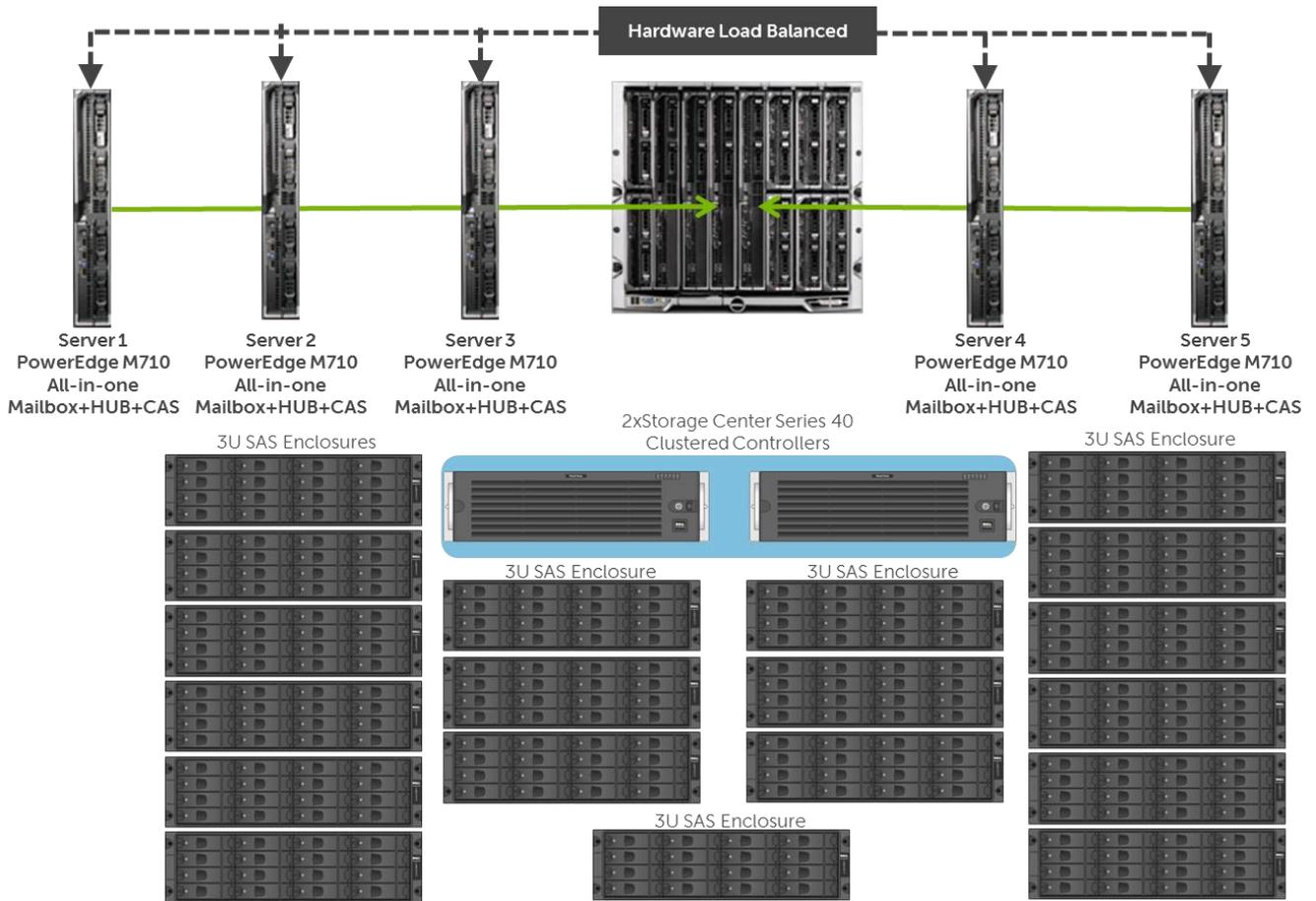
12.1 Solution Requirements

Number of mailboxes	25,000
Average user I/O profile (messages/day)	Up to 0.15 (~ 150 messages per day)
Average mailbox size limit	2 GB
Total active/passive copies per database	2
Not included in this solution	Backup infrastructure Additional server for Hub/CAS UM and Edge roles

12.2 Recommended Solution

Server Configurations	Detail
All-in-one Mailbox+HUB+CAS Server (Processor/Memory)	Site-1: 5 x PowerEdge M710 Blade Server 2 x six-core processors and 96 GB of RAM Site-2: 5 x PowerEdge M710 Blade Server 2 x six-core processors and 96 GB of RAM
Number of DAGs	1
Servers per DAG	10
Number of mailboxes per server	5000 per server (local site all active, remote site all passive)
Storage Configuration	Detail
Storage hardware	Site-1: 1 x Dell Compellent Series 40 (108@2 TB NL-SAS drives)+ (96@600 GB 15K SAS drives) Site-2: 1 x Dell Compellent Series 40 (108@2TB NL-SAS drives)+ (96@600 GB 15K SAS drives)
Data volumes per mailbox server	8 with 1 DB each; All active on primary site and all passive on remote site.
Databases per volume	1
Mailboxes per database	3125
Disk type	3.5" 7.2 K RPM NLSAS - 2 TB and 3.5" 15 K RPM SAS
RAID type	Dell Compellent Recommended Storage Profile
Additional details	Databases and logs on same container NTFS allocation unit size = 64 KB 19 hot spares drives per site

12.3 Architecture Diagram-One Site



13 25,000 Mailboxes on PowerEdge M610 with EqualLogic PS6500E

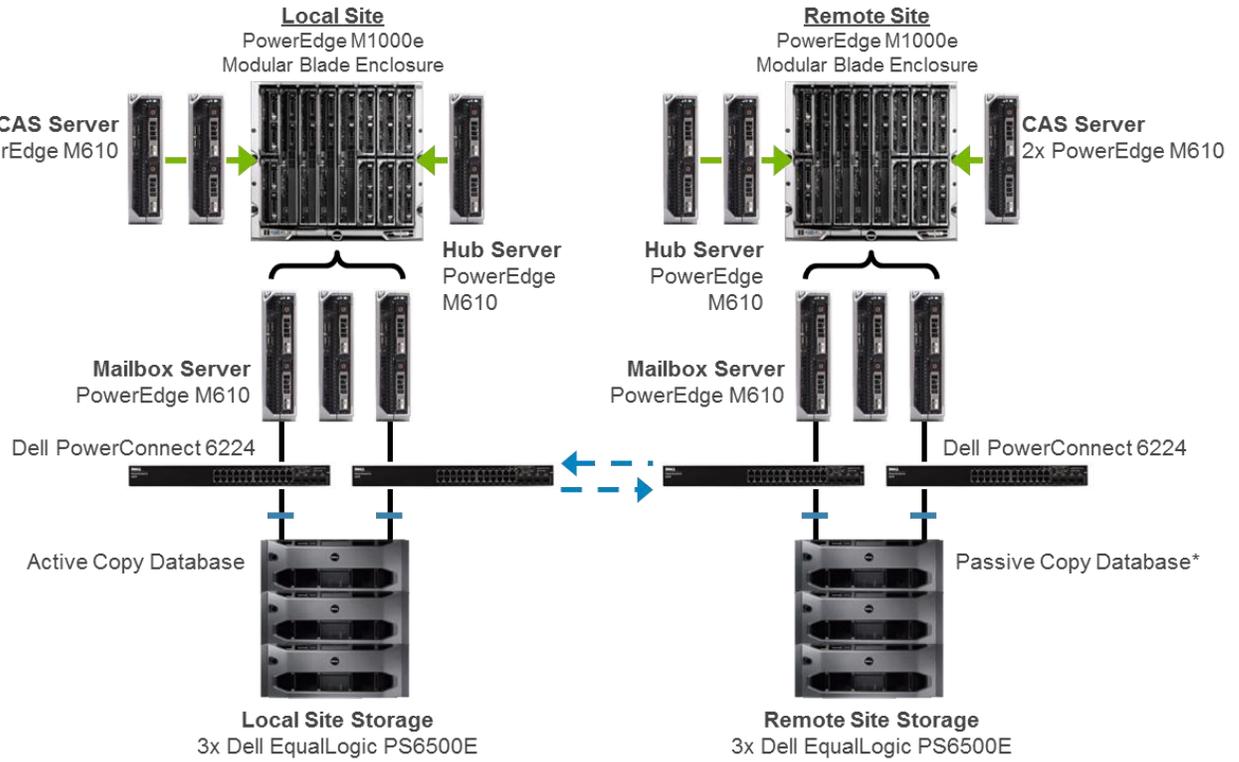
13.1 Solution Requirements

Number of mailboxes	25,000
Average user I/O profile (messages/day)	.1 IOPS (~100 messages per day)
Average mailbox size limit	1.5 GB
Total active/passive copies per database	2 (1 local + 1 remote)
Not included in this solution	Backup and recovery infrastructure UM and Edge roles

13.2 Recommended Solution

Server Configurations	Detail
Mailbox server	6 x PowerEdge M610 servers (3 local and 3 remote) 2 x six-core processors and 72GB RAM each
Number of DAGs	1
Servers per DAG	6
Number of active and passive mailboxes per server	8334 total (all active local site and all passive remote site)
CAS server	4 x PowerEdge M610 servers (2 local and 2 remote) 2 x quad-core processors and 12GB RAM
HUB server	2 x PowerEdge M610 servers (1 local and 1 remote) 2 x quad-core processors and 12 GB RAM
Storage Configuration	Detail
Storage hardware	6 x EqualLogic PS6500E (3 local and 3 remote) 48 drives per enclosure—288 drives total
Data volumes per mailbox server	10
Databases per volume	1
Mailboxes per database	834
Disk type	3.5" 7.2 K RPM SATA—1 TB
RAID type	RAID 10
Additional details	Databases and logs combined 6 x hotspares in each site NTFS allocation unit size = 64 KB

13.3 Architecture Diagram



Database Availability Group (DAG)
*Each of the database volumes are striped across the entire array

14 50,000 Mailboxes on PowerEdge M610 with EqualLogic PS6500E Virtualized

14.1 Solution Requirements

Number of mailboxes	50,000
Average user I/O profile (messages/day)	.1 IOPS (~100 messages per day)
Average mailbox size limit	1.5 GB
Total active/passive copies per database	2 (1 local and 1 remote)
Not included in this solution	Backup and recovery infrastructure UM and Edge roles

14.2 Recommended Solution

Server Configurations	Detail
Virtualization server(s)	Total of 14 x PowerEdge M610 servers configured across the following two virtualized server configurations: Virtualized Server Config #1: 10 x PowerEdge M610 servers (5 local and 5 remote) 2 x quad-core processors and 64 GB RAM Virtualized Server Config #2: 4 x PowerEdge M610 servers (2 local and 2 remote) 2 x quad-core processors with 96 GB RAM
Mailbox server virtual machine (VM)	Mailbox server virtual machine configured across the following two virtualized server configurations: Config #1: 1 per each Config #1 virtualization server (10 x total) 4 vCPU and 34 GB virtual memory Config #2: 2 per each Config #2 virtualization server (8 x total) 4 vCPU and 44 GB of virtual memory
Number of database availability groups (DAGs)	2
Mailbox server VMs per DAG	DAG 1: 10 DAG 2: 8
Number of active and passive mailboxes per mailbox server VM	Config #1: 5200 total per VM (all active local site and all passive remote site) Config #2: 6000 total per VM (all active local site and all passive remote site)
CAS server VM	1 per Config #1 virtualization server (10 x total) 2 vCPU and 8 GB of virtual memory
HUB server VM	1 per Config #1 virtualization server (10 x total) 2 vCPU and 4 GB of virtual memory

Storage Configuration	Detail
Hardware	12 x EqualLogic PS6500E (6 local and 6 remote) 48 x drives per enclosure; 576 drives
Data volumes per mailbox server	Config #1: 7 Config #2: 8
Databases per volume	1
Mailboxes per database	750
Disk type	3.5" 7.2 K RPM SATA 1 TB
RAID type	RAID 10
Additional details	Databases and logs combined 12 x hotspares in each site NTFS allocation unit size = 64 KB

14.3 Architecture Diagram

