



# HP recommended configuration for Microsoft Exchange Server 2010: StorageWorks EVA8400 using CA-EVA and CLX-EVA

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## Executive summary

With the release of Microsoft® Exchange Server 2010 (Exchange 2010) there are many new design features and configuration options to consider. To better understand how to deploy these new features with HP servers and storage, HP has developed a series of recommended configurations. The recommended configurations provide sizing guidance and deployment options to support the new Exchange 2010 solutions. The configurations described in this guide are meant to assist you in designing solutions that address your email business requirements.

The recommended configurations provide server and storage sizing details for deploying Microsoft Exchange 2010. In this reference configuration the Exchange server roles have been placed on virtual servers using Microsoft Windows® Server 2008 R2 Hyper-V (Hyper-V). The advantage of this solution is that it allows the use of Hyper-V Live Migration for the mailbox servers. The solution has been sized to support 20,000 users with 512MB mailboxes. The hardware featured in this configuration is the HP ProLiant BL460c G6 (BL460c G6) server blade used to host the virtualized Exchange server roles and the HP StorageWorks 8400 Enterprise Virtual Array (EVA8400) to manage the storage needs.

To provide high availability for the mailbox servers, EVA8400 storage arrays are configured with HP StorageWorks Continuous Access EVA (CA-EVA) synchronous data replication to provide mirror copies of the Exchange databases. HP StorageWorks Cluster Extension EVA (CLX-EVA) is also used to provide cluster integration and automated storage array failover. This solution is ideal for customers looking to providing high availability to their virtualized Exchange environment using failover clustering and storage array based data replication.

**Target audience:** The information contained in this white paper is intended for solutions architects, engineers, and project managers involved in the planning and design of Microsoft Exchange Server 2010 solutions. The reader should be familiar with Exchange Server 2010 terminology and best practices. For additional Exchange Server best practices go to: [www.hp.com/solutions/activeanswers/exchange](http://www.hp.com/solutions/activeanswers/exchange).

This white paper describes sizing performed during October 2009 with the pre-released version of Exchange Server 2010 and is subject to change.

## Introduction

The recommended configurations described in this document provide server and storage sizing details to assist you in planning and budgeting for your Exchange 2010 hardware deployments. Details in this recommended configuration provides server and storage requirements to support 20,000 users with 512MB mailbox using the heavy usage profile. For this configuration all the Exchange server roles are deployed on virtual servers using Hyper-V R2. The solution provides high availability for the mailbox server role using Hyper-V failover cluster feature and storage array based replication.

The virtualized environment consists of 2 Hub Transport (HT), 6 Client Access Servers (CAS) and 8 mailbox servers. For increased availability the mailbox servers are placed into Hyper-V failover clusters. There are 4 failover clusters, each supporting two mailbox servers. The sixteen virtual servers and 4 failover clusters are hosted on twelve BL460c G6 server blades and two EVA8400 storage arrays.

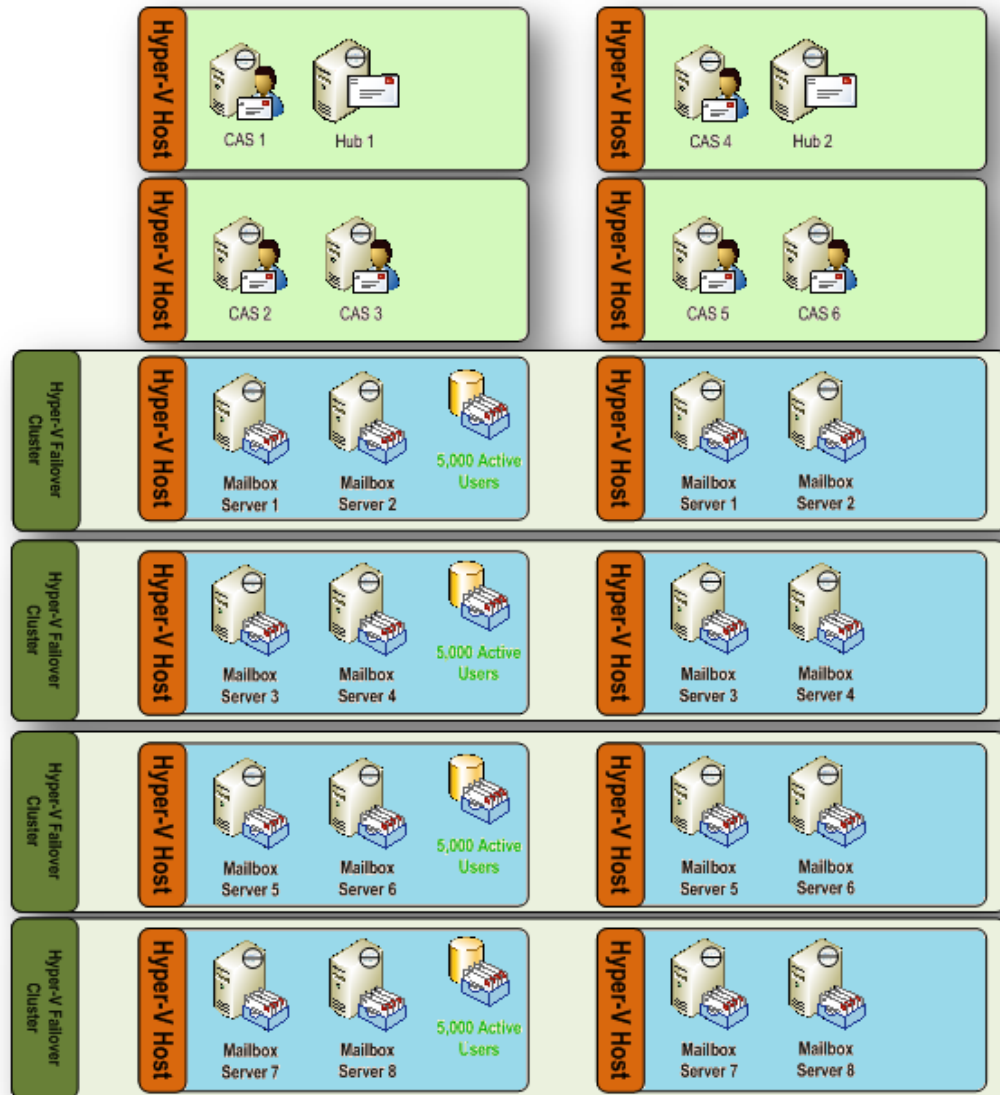
The BL460c G6 server blades are evenly distributed between two HP BladeSystem c7000 (c7000) enclosures configured with redundant HP Virtual Connect Flex-10 10Gb Ethernet Modules and HP Virtual Connect 8Gb 20-Port Fibre Channel modules.

The EVA8400 storage arrays provide storage for the virtual server's Operating Systems (OS) Virtual Hard Disks (VHD), Hub Transport queues, Mailbox databases and logs. The mailbox databases and logs are also mirrored between the EVA8400 storage arrays using HP StorageWorks Continuous Access EVA. For integrated storage failover, the Hyper-V failover clusters are configured with HP StorageWorks Cluster Extension.

## Solution criteria

The recommend configuration uses 12 Hyper-V servers to host the 16 virtual Exchange servers. Figure 1 details the Virtual Exchange server logical layout.

**Figure 1.** Virtual Exchange servers - logical layout



## Hyper-V guest machine configurations

There are 8 mailbox server hosted on separate Hyper-V guest machines. The Mailbox server role has been sized to support 2500 users with 512MB mailboxes using the heavy usage profile. The mailbox guest machines are configured in one of the 4 Hyper-V failover clusters for high availability. Each Hyper-V failover clusters supports 2 mailbox servers. Table 1 lists the Hyper-V guest machine configuration details for the mailbox server role.

Sizing Rules:

- Heavy Usage profile: 100 Message Sent / Received per day (75KB average message size)
- Processor: 750 active mailboxes per processor core (heavy profile)
- Memory: 4GB plus 6MB/mailbox (heavy profile)

**Table 1.** Mailbox guest machine

Guest Operating System	Microsoft Windows Server 2008 R2 Enterprise
Processor/Cores	Quantity: 4
Memory	20GB
Storage	OS: Virtual Hard Disk (VHD) stored on EVA Volume presented to Hyper-V Host
Exchange Data Storage	Volumes replicated on the EVA8400 Storage Arrays and presented to the Hyper-V hosts
Network	Public and Replication only

There are 6 client access servers hosted on separate Hyper-V guest machines. For increased availability the CAS servers are distributed between 4 Hyper-V host servers and the OS VHDs are evenly distributed between the EVA8400 storage arrays. Table 2 lists the Hyper-V guest machine configuration details for the CAS server role.

Sizing Rules:

- Processor: Processor core ratio for Mailbox to CAS is 4:3
- Memory: 2GB per core

**Table 2.** CAS guest machine

Guest Operating System	Windows Server 2008 R2 Enterprise
Processor/Cores	Quantity: 4
Memory	8GB
Storage	OS: VHD stored on EVA Volume presented to Hyper-V Host
Network	Public

There are 2 Hub Transport Servers hosted on separate Hyper-V guest machines. For increased availability the 2 HT servers are located on separate Hyper-V host servers and the OS VHDs are separated on the EVA8400 storage arrays. Table 3 lists the Hyper-V guest machine configuration details for the HT server role.

Sizing Rules:

- Processor: Processor core ratio for Mailbox to HT is 5:1 (with antivirus scanning on HT)
- Memory: 1GB per core or 8GB max

**Table 3.** HT guest machine

Guest Operating System	Windows Server 2008 R2 Enterprise
Processor/Cores	Quantity: 4
Memory	8GB
Storage	OS: VHD stored on EVA Volume presented to Hyper-V Host
HT Queues	Stored on EVA Volume presented to Hyper-V Host
Network	Public

## Hyper-V host server configuration

The sixteen guest machines and four failover clusters are hosted by twelve – HP ProLiant BL460c G6 server blades. The BL460c G6 server blade, pictured in figure 2, features the Intel® Xeon® 5500 series processors with the QuickPath Interconnect, support for 192GB DDR3 memory and Flex-10 networking. Flex-10 network technology gives the ability to define up to eight FlexNICs sharing two 10Gb Ethernet ports. The BL460c G6 also features Sea of Sensors which automatically tracks thermal activity across the server through a collection of 32 smart sensors. The sensors dynamically adjust system components such as fans, memory and input/output processing to optimize system cooling and increase efficiency.

For more information on the BL460c G6 go to <http://www.hp.com/servers/bl460c>

**Figure 2.** HP ProLiant BL460c G6 server blade



Table 4 provides hardware configuration details for the 12- BL460c G6 server blades hosting the guest machines. There are two memory configuration recommended, one for hosting the mailbox servers and the other for hosting the CAS and HT servers.

**Table 4.** Host Server configuration

Server role	Memory	Processor configuration	Processor model	GHz
Hosting Mailbox virtual servers	48 GB	Two quad-core	Intel Xeon E5540	2.53GHz 80W/8M
Hosting CAS and HT virtual servers	24 GB	Two quad-core	Intel Xeon E5540	2.53GHz 80W/8M

The twelve BL460c G6 server blades are evenly distributed between two HP BladeSystem c7000 (c7000) enclosures. The c7000 enclosure pictured in figure 3 provides all the power, cooling and I/O infrastructure needed to support up to 16 half height servers and /or storage blades in 10U foot print. The c 7000 enclosure provides a shared, 5 terabit per second high-speed NonStop midplane for wire-once connectivity of server blades to network and shared storage. Power is delivered through a pooled-power backplane that ensures the full capacity of the power supplies is available to all server blades for maximum flexibility and redundancy.

The enclosures are configured with redundant HP Virtual Connect Flex-10 10Gb Ethernet Modules and HP Virtual Connect 8Gb 20-Port Fibre Channel modules. The Virtual Connect Flex-10 Ethernet Module is a blade interconnect that simplifies server connections by separating the server enclosure from physical LAN topology. The Flex-10 feature of Virtual connect, provides network optimization allowing administrators to fine-tune network bandwidth at the server edge by dividing each 10Gb network connection into independent physical FlexNIC server connections.

The 8Gb Virtual Connect 20-Port Fibre Channel module is blade interconnect that simplifies server connections by separating the server enclosure from SAN fabric topology. The 20 port Fibre Channel module provides sixteen internal 8Gb server ports and 4 External 8Gb SAN ports designed to support multiple virtual machines per physical blade server. Virtual Connect architecture appears as a pass-through device to the network and removes all interoperability concerns and complicated switch management.

**Figure 3.** c7000 enclosure front and rear view



## Host storage configuration

The solution uses the HP StorageWorks 8400 Enterprise Virtual Array as pictured in figure 4, to support the Exchange environment. The Enterprise Virtual Array family is designed for the data center where there is a critical need for improved storage utilization and scalability. The Enterprise Virtual Array meets application specific demands for transaction I/O performance for mid-range and enterprise customers. It provides easy capacity expansion, instantaneous replication and simplified storage administration. The Enterprise Virtual Array combined with HP StorageWorks Command View EVA software provides a comprehensive solution designed to simplify management and maximize performance.

The two EVA8400 storage arrays are configured with HP StorageWorks Continuous Access EVA to provide array based replication. Data replication is performed at the storage subsystem controller level and is transparent to the host, alleviating the need for host or application based data mirroring functions. Unlike a network based or host based solution, the storage based solution dedicates its resources to managing the replication process between arrays, with minimal impact to applications, other data or devices on the SAN. CA-EVA can copy data online and in real time via synchronous or asynchronous replication to a remote EVA through a local or extended SAN.

To manage potential array failure, HP StorageWorks Cluster Extension EVA software is used to protect against system downtime from storage related fault and failures. It enables integration of the remote mirroring capabilities of HP Continuous Access with the high-availability capabilities provided by OS-specific clustering software. CLX-EVA provides a mechanism to manage the failover of server and storage resources in the event of failure of servers, virtual machines or storage. CLX failover integrates with Windows Failover Cluster and Hyper-V Live Migration to ensure that the entire server, VMs and storage failover is managed properly in the event of hardware/software failure.

**Figure 4.** HP StorageWorks 8400 Enterprise Virtual Array



Each EVA8400 is configured with 96 – 600GB 15K disks configured in two disk groups. The first disk group (DG1) is configured with 80 disks is used to support the Exchange databases, Hub Transport queues and the Hyper-V guest machine operating systems VHDs. The second disk group (DG2) is configured with 16 disks used for the transaction logs. Table 5 lists storage configuration assignments for each of the Exchange guest machines. The CAS and HT servers LUNs have been distributed between the two EVAs to increase availability while the mailbox LUNs are assigned to one EVA and replicated via continuous access to the second EVA for redundancy.

**Table 5.** Storage configuration assignments

LUN type	# LUNs per guest machine	Disk Group	Number of VDISKS	VDISK capacity	VRAID type	Assigned EVA	CA Volume
OS VHD CAS servers 1-3	1	DG1	3	50	VRAID1	EVA1	N/A
OS VHD CAS servers 4- 6	1	DG1	3	50	VRAID1	EVA2	N/A
OS VHD HT server 1	1	DG1	1	50	VRAID1	EVA1	N/A
HT server 1 queues	1	DG1	1	50	VRAID1	EVA1	N/A
OS VHD HT server 2	1	DG1	1	50	VRAID1	EVA2	N/A
HT server 2 queues	1	DG1	1	50	VRAID1	EVA2	N/A
OS VHD Mailbox servers 1-8	1	DG1	8	50	VRAID1	EVA1	EVA2
Mailbox databases	2	DG1	16	840	VRAID5	EVA1	EVA2
Mailbox transaction logs	2	DG2	16	100	VRAID1	EVA1	EVA2

# Recommended configuration

## Server Hardware (Hosting mailboxes guest machines)

- Eight BL460c G6 servers
- Two Intel Xeon E5540 processors per server
- 48 gigabytes system memory (DDR3 registered DIMMs) per server
- Two 146GB internal disks per server
- Smart Array P410i storage controller with 256MB BBWC option kit per server
- Embedded Flex-10 10GbE Multifunction Server Adapter
- 8Gb Fiber Channel host bus adapter mezzanine card (Emulex or QLogic)

## Server hardware (Hosting CAS and HT guest machines)

- Four BL460c G6 servers
- Two Intel Xeon E5540 processors per server
- 24 gigabytes system memory (DDR3 registered DIMMs) per server
- P410i storage controller with 256MB BBWC option kit per server
- Two 146GB internal disks per server
- Embedded Flex-10 10GbE Multifunction Server Adapter
- 8Gb Fiber Channel host bus adapter mezzanine card (Emulex or QLogic)

## BladeSystem hardware

- Two BladeSystem c7000 enclosures
- Four Virtual Connect Flex-10 10Gb Ethernet Modules
- Four Virtual Connect 8Gb Fibre Channel Module

## Storage hardware

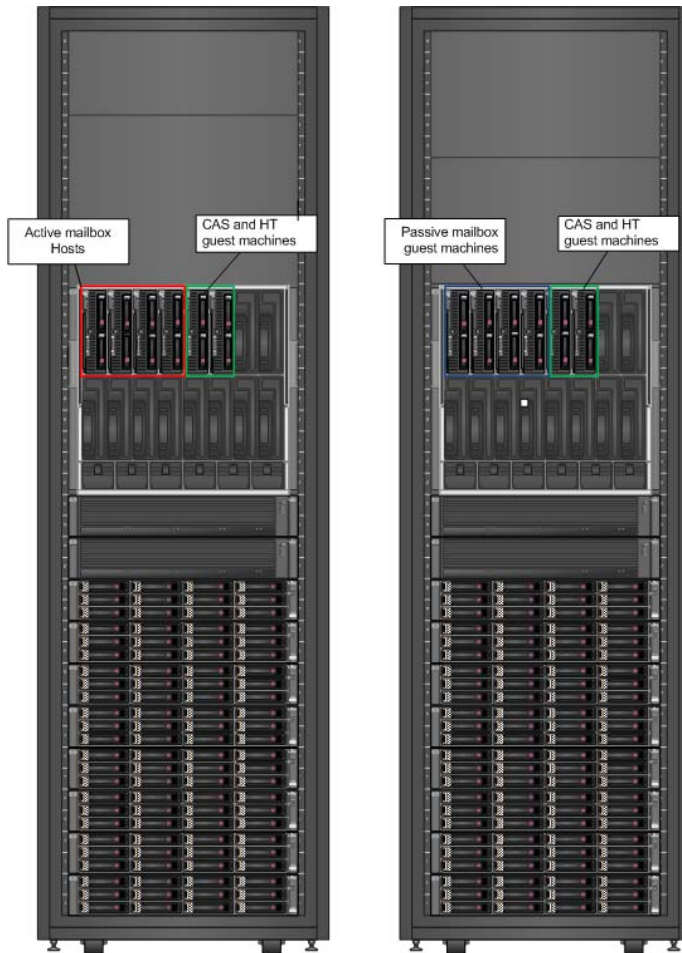
- Two 42U Racks
- Two HP StorageWorks EVA8400 14GB Cache Dual Controller Arrays
- 16 M6412A Fibre Channel Drive Enclosures
- 192 -600GB 15K 4Gb Fibre Channel Dual Port Hard Disk Drives

## Storage software and licensing

- HP StorageWorks Command View EVA
- HP StorageWorks Cluster Extension EVA
- HP StorageWorks Continuous Access EVA

Figure 5 represents a rack view of the recommended configuration. Each rack is configured with c7000 BladeSystem containing six BL460c G6 server blades and EVA8400 with 8 disks enclosures.

**Figure 5.** Example recommended configuration showing BL460c G6 server blades and EVA8400 storage arrays



## Bill of materials

The following bill of materials lists the major server and storage hardware components needed for each of the recommended configurations, however this is not an exhaustive listing of all the necessary components needed to build the complete solutions. For complete configuration details, including required HP StorageWorks EVA software and Licenses please contact your HP Reseller or HP Sales Representative.

**Table 6.** Bill of materials

QTY	Description	Part Number
<b>Host server configuration ( mailbox sever roles)</b>		
8	ProLiant BL460c G6 CTO Blade	507864-B21
8	Intel Xeon Processor E5540 (2.53 GHz, 8MB L3 Cache, 80W, DDR3-1066, HT, Turbo 1/1/2/2) BL460c G6 Kit, FIO	507794-L21
8	Intel Xeon Processor E5540 (2.53 GHz, 8MB L3 Cache, 80W, DDR3-1066, HT, Turbo 1/1/2/2) BL460c G6 Kit, FIO	507794-B21
48	HP 8GB 2Rx4 PC3-10600R-9 Kit	500662-B21
16	HP 146GB 3G SAS 10K SFF DP HDD	418367-B21
8	256 MB Cache Module	462968-B21
8	Battery Kit Upgrade (for BBWC)	462969-B21
8	HP BLc Emulex LPe1205- 8Gb FC HBA for HP c-Class BladeSystem or QLogic QMH2562 8Gb FC HBA for HP c-Class BladeSystem	456972-B21 or 451871-B21
<b>Host server configuration (CAS and HT roles)</b>		
4	ProLiant BL460c G6 CTO Blade	507864-B21
4	Intel Xeon Processor E5540 (2.53 GHz, 8MB L3 Cache, 80W, DDR3-1066, HT, Turbo 1/1/2/2) BL460c G6 Kit, FIO	507794-L21
4	Intel Xeon Processor E5540 (2.53 GHz, 8MB L3 Cache, 80W, DDR3-1066, HT, Turbo 1/1/2/2) BL460c G6 Kit, FIO	507794-B21
24	HP 4GB 2Rx4 PC3-10600R-9 Kit	500658-B21
8	HP 146GB 3G SAS 10K SFF DP HDD	418367-B21
4	256 MB Cache Module	462968-B21
4	Battery Kit Upgrade (for BBWC)	462969-B21

QTY	Description	Part Number
4	HP Blc Emulex LPe1205- 8Gb FC HBA for HP c-Class BladeSystem or QLogic QMH2562 8Gb FC HBA for HP c-Class BladeSystem	456972-B21 or 451871-B21
<b>BladeSystem enclosure configuration</b>		
2	HP Blc7000 CTO 3 IN LCD ROHS Encl	507019-B21
2	HP Blc7000 Three Phase Power Module, FIO	413380-B21
2	6x HP 2400W High Efficiency Hot-Plug Power Supply Bundle, FIO	517521-B21
2	6x HP Active Cool 200 Fan Bundle, FIO	517520-B21
2	HP c7000 Onboard Administrator with KVM Option	456204-B21
4	HP Virtual Connect Flex-10 10Gb Ethernet Module for c-Class BladeSystem	455880-B21
4	HP Virtual Connect 8Gb Fibre Channel Module for c-Class BladeSystem	572018-B21
<b>EVA8400 Storage configuration</b>		
2	HP StorageWorks EVA8400 14GB Cache Dual Controller Array	AJ758A
16	HP StorageWorks M6412A Fibre Channel Drive Enclosure	AG638B
192	HP EVA M6412A 600GB 15K 4Gb Fibre Channel Dual Port Hard Disk Drive	AJ872B
2	HP Rack 10642 G2 Shock (42U)	AF002A

## Implementing a proof-of-concept

As a matter of best practice for all deployments, HP recommends implementing a proof-of-concept using a test environment that matches as closely as possible the planned production environment. In this way, appropriate performance and scalability characterizations can be obtained. For help with a proof-of-concept, contact an HP Services representative or your HP partner.

## For more information

For more information on planning, deploying, or managing Microsoft Exchange Server on HP ProLiant servers and HP storage see:

[www.hp.com/solutions/exchange](http://www.hp.com/solutions/exchange)

For HP ActiveAnswers sizing tools and best practices on Microsoft Exchange Server see:

[www.hp.com/solutions/activeanswers/exchange](http://www.hp.com/solutions/activeanswers/exchange)

For more information on HP ProLiant servers see:

[www.hp.com/go/proliant](http://www.hp.com/go/proliant)

For more information on HP storage solutions see:

[www.hp.com/go/storage](http://www.hp.com/go/storage)

For more information on HP virtualization with Microsoft see:

<http://h18000.www1.hp.com/products/servers/software/microsoft/virtualization>

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