



# HP recommended configuration for Microsoft Exchange Server 2010: HP LeftHand P4000 SAN

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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 5,000 users with 256MB mailboxes. The hardware featured in this configuration is the HP ProLiant BL460c G6 (BL460c G6) server blade used to host the Exchange virtual servers and the HP LeftHand P4500 (P4500) storage systems to manage the data storage needs. The P4500 storage systems provide high availability by mirroring copies of the data across a cluster of storage nodes.

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 5,000 users with 256MB mailbox using the heavy usage profile. For this configuration all the Exchange server roles are deployed on virtual servers using Hyper-V R2.

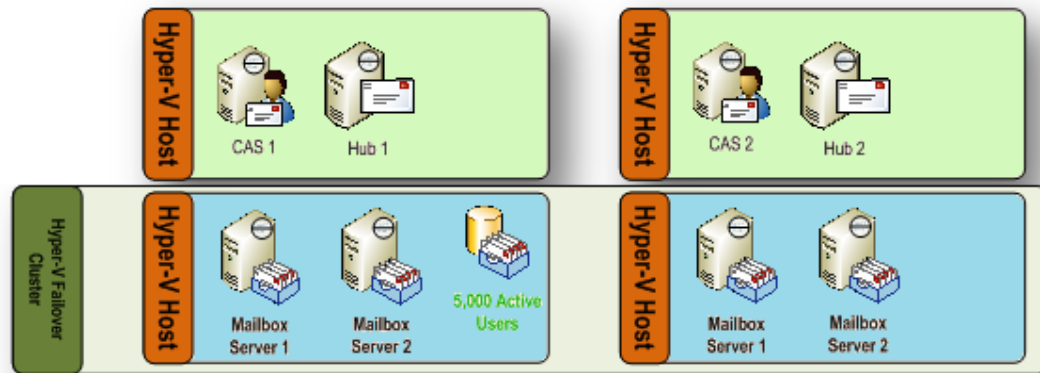
The virtualized environment consists of two Hub Transport (HT) servers, two Client Access Servers (CAS) and two mailbox servers. For increased availability the two mailbox servers are placed into Hyper-V failover cluster. The six virtual servers are hosted on four BL460c G6 server blades using two HP LeftHand P4500 IP based SAN storage nodes.

The BL460c G6 server blades use the HP BladeSystem c3000 (c3000) enclosure configured with redundant HP Virtual Connect Flex-10 10Gb Ethernet Modules. The P4500 storage nodes are clustered together providing storage for the virtual server's Operating Systems (OS) Virtual Hard Disks (VHD), Hub Transport queues, Mailbox databases and logs.

# Solution criteria

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

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



## Hyper-V guest machine configurations

There are two mailbox servers hosted on separate Hyper-V guest machines. The Mailbox server role has been sized to support 2500 users with 256MB mailboxes using the heavy usage profile. The two mailbox guest machines are configured in a failover cluster for high availability. 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: VHD stored on the P4500 storage cluster and the volume is presented to Hyper-V Host
Exchange Data Storage	Volumes are stored on the P4500 storage cluster and presented to the Hyper-V hosts
Network	Public and Replication only

There are two client access servers hosted on separate Hyper-V guest machines. For increased availability, the CAS servers are distributed between two Hyper-V host servers. 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 the P4500 storage cluster and the volume is presented to Hyper-V Host
Network	Public

There are two Hub Transport Server hosted on separate Hyper-V guest machines. For increased availability the two HT servers are located on separate Hyper-V host servers. 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 the P4500 storage cluster and the volume is presented to Hyper-V Host
HT Queues	Volumes are stored on the P4500 storage cluster and presented to the Hyper-V hosts
Network	Public

## Hyper-V host server configuration

The six Exchange virtual servers and the failover cluster are hosted on four – 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 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	24GB	Two quad-core	Intel Xeon E5540	2.53GHz 80W/8M

The BL460c G6 server blades are installed in a HP BladeSystem c3000 (c3000) enclosure. The c3000 enclosure pictured in figure 3 provides all the power, cooling and I/O infrastructure needed to support up to 8 half height servers and /or storage blades in 6U foot print. The c3000 enclosure provides a shared, multi-terabit backplane 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 enclosure is configured with redundant HP Virtual Connect Flex-10 10Gb Ethernet 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.

**Figure 3.** c3000 enclosure front and rear view

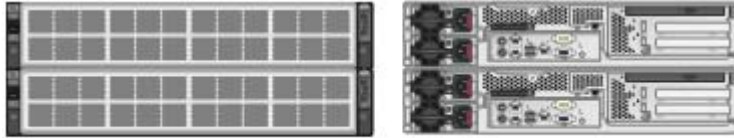


## Host storage configuration

The solution uses the HP LeftHand P4500 storage system pictured in figure 4, to support the Exchange environment. The P4500 is part of the family of HP LeftHand P4000 IP based SAN solutions, designed to deliver enterprise functionality that enhances virtual environments, simplifies management, and reduces costs. Easy to deploy, scale and maintain, P4000 SANs ensure that crucial business data remains available. The innovative approach to storage provides unique double fault protection across the entire SAN, reducing vulnerability without driving up costs the way traditional SANs can. The P4000 SANs provide all inclusive feature set providing enterprise functionality.

- **Storage Clustering simplifies scalability**  
Storage Clustering allows you to consolidate multiple storage nodes into pools of storage. All available capacity and performance is aggregated and available to every volume in the cluster. As storage needs increase the HP P4000 can scale performance and capacity on-line.
- **Network RAID delivers new levels of data availability**  
Network RAID stripes and mirrors multiple copies of data across a cluster of storage nodes, eliminating any single point of failure in the HP P4000 SAN. Applications have continuous data availability in the event of a power, network, disk, controller, or entire storage node failure.
- **Thin Provisioning reduces costs by increasing storage efficiency**  
Thin Provisioning allocates space only as data is actually written without requiring pre-allocation of storage. This raises the overall utilization and efficiency of the HP P4000 SAN and ultimately increases the return on investment.
- **Snapshots simplify data protection**  
Snapshots create thinly provisioned, instant point-in-time copies of data on a per-volume basis. Built in application integrated snapshots enable automated quiescing for Microsoft Volume Shadow Copy Service (VSS) enabled applications. Administrators can access HP P4000 SAN snapshots to recover individual files/folders from the volume, or rollback an entire volume to a prior state.
- **Remote Copy reduces costs for disaster recovery**  
Remote Copy replicates snapshots between HP P4000 SANs at primary and remote locations. Copies are thinly provisioned with no space reservation required at the remote location. Remote Copy enables centralized backup and disaster recovery on a per-volume basis.

**Figure 4.** HP LeftHand P4500 storage system front and rear view



The solutions uses two P4500 5.4TB storage nodes each configured with 12 Serial Attached SCSI (SAS) 450GB 15K disks. To provide high availability storage, the two P4500 storage nodes are clustered together. Storage clustering allows the data volumes to be replicated across storage nodes using Network RAID. For this configuration Network RAID level 2 is used to mirror the data volumes across the storage nodes using synchronous replication.

Table 5 lists storage volumes assignments for each of the Exchange guest machines.

**Table 5.** Storage volume assignments

LUN type	# LUNs per guest machine	Number of Disk Volumes	Volume capacity	Volume RAID type	Network RAID
OS VHD CAS servers 1-2	1	2	50	RAID5	Level 2
OS VHD HT servers 1- 2	1	2	50	RAID5	Level 2
HT servers 1 -2 queues	1	2	50	RAID5	Level 2
OS VHD Mailbox servers 1-2	1	2	50	RAID5	Level 2
Mailbox databases	2	4	650	RAID5	Level 2
Mailbox transaction logs	2	4	150	RAID5	Level 2

# Recommended configuration

## **Server hardware (Hosting mailboxes guest machines)**

- Two 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

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

- Two 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

## **BladeSystem hardware**

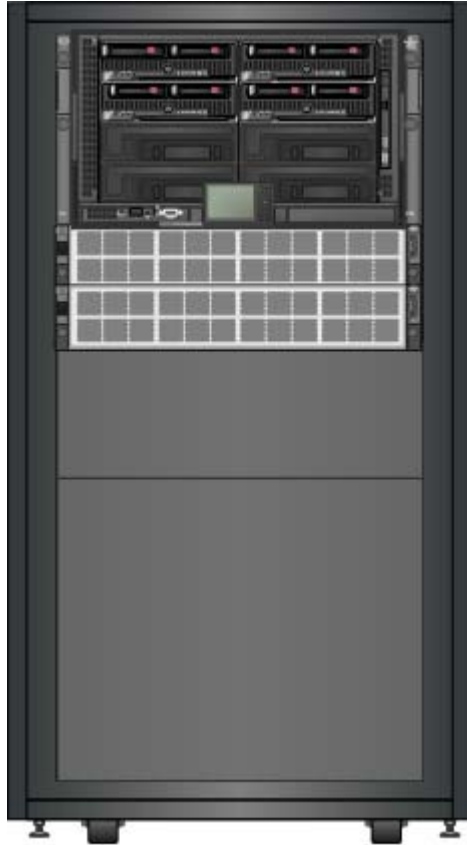
- One BladeSystem c3000 enclosures
- Two Virtual Connect Flex-10 10Gb Ethernet Modules

## **Storage hardware**

- One 22U Rack
- Two P4500 5.4TB SAS Storage Systems - 12 SAS Drives, 450GB, 15,000 RPM

Figure 5 represents a rack view of the recommended configuration. The rack is configured with c3000 BladeSystem containing four BL460c G6 server blades and the two P4500 storage systems.

**Figure 5.** Example recommended configuration showing BL460c G6 server blades and P4500 storage systems



## 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 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>		
2	ProLiant BL460c G6 CTO Blade	507864-B21
2	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
2	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
12	HP 8GB 2Rx4 PC3-10600R-9 Kit	500662-B21
4	HP 146GB 3G SAS 10K SFF DP HDD	418367-B21
2	256 MB Cache Module	462968-B21
2	Battery Kit Upgrade (for BBWC)	462969-B21
<b>Host server configuration (CAS and HT roles)</b>		
2	ProLiant BL460c G6 CTO Blade	507864-B21
2	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
2	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
12	HP 4GB 2Rx4 PC3-10600R-9 Kit	500658-B21
4	HP 146GB 3G SAS 10K SFF DP HDD	418367-B21
2	256 MB Cache Module	462968-B21
2	Battery Kit Upgrade (for BBWC)	462969-B21
<b>BladeSystem enclosure configuration</b>		
1	HP BladeSystem c3000 CTO Enclosure- Rack	508668-B21
2	HP 1200W High Efficiency AC Common Slot Power Supply	437572-B21
1	HP c3000 KVM module	437575-B21

QTY	Description	Part Number
1	HP c3000 Dual Onboard Administrator Module	488100-B21
2	c-Class Active Cool Fan HP BladeSystem Active Cool 100 Fan	507082-B21
2	HP Virtual Connect Flex-10 10Gb Ethernet Module for c-Class BladeSystem	455880-B21
<b>P4500 Storage configuration</b>		
2	HP LeftHand P4500 5.4TB SAS Storage System 12 SAS Drives, 450GB, 15K RPM	AT006A
1	10622 G2 Universal Rack w/Shock Pallet	AF022A

## 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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[http://h20219.www2.hp.com/ActiveAnswers/us/en/solutions/technical\\_tools\\_feedback.html](http://h20219.www2.hp.com/ActiveAnswers/us/en/solutions/technical_tools_feedback.html).

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