

Best practices for deploying Microsoft Exchange Server 2010 on HP E5000 Messaging System

Technical white paper

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Executive summary

The HP E5000 Messaging System (E5000) has been designed to simplify the initial planning, testing and configuration of Microsoft® Exchange Server 2010 by providing agile solutions that are pre-configured and ready to deploy. The E5000 is offered in five models, supporting 500, 1,000 or 3,000 mailboxes per messaging system, hosting large 1.25GB, 1.75GB or 2.5GB mailbox capacities¹. The E5000 incorporates both HP and Microsoft best practices to deploy Microsoft Exchange Server 2010 SP1 (Exchange 2010) in a highly available solution. Each system ships from the factory with pre-integrated hardware and pre-loaded software, to significantly reduce the time and complexity of deploying Exchange 2010.

The E5000 has been optimized for customers looking to reduce IT management complexities and automate existing manual tasks resulting in a lower Total Cost of Ownership (TCO). The E5000 platform combines two server blades and a dense storage drawer into a single enclosure capable of hosting a two-copy Database Availability Group (DAG). Each of the E5000 models is configured with multi-role² servers providing Exchange role and server redundancy, which is ideal for small and medium business, as well as, branch and remote office environments. For larger organizations, the E5000 offers units of scale, where each E5000 can be used as a self contained building block, allowing capacity to be increased by simply adding additional E5000 platforms.

To assist in the installation and deployment, HP has developed a set of value-add tools, which have been specifically designed to simplify the initial setup, configuration and verification of the HP E5000 Messaging System. Unlike traditional deployment models, where you must design, configure and validate the optimal configuration, HP and Microsoft have gone through the process of designing and testing to determine the optimal configuration. The E5000 ships with HP value-add tools which assist in deploying the E5000 in its optimal configuration. These specially developed setup tools provide guided setup assistance, performing many of the complex and time consuming tasks needed to configure and deploy a high availability messaging system. To provide ongoing operational support, the E5000 also includes specially developed monitoring and management tools to ensure the messaging system is running in its optimal state.

Target audience: The information contained in this white paper presents the best practices for deploying the HP E5000 Messaging System. It is intended for decision makers, IT support staff and project managers involved in planning and deploying Microsoft Exchange Server 2010 solutions. For more information on Exchange 2010 terminology and best practices go to www.hp.com/solutions/activeanswers/exchange.

This white paper describes work performed in February 2011.

Deploying Microsoft Exchange Server on HP E5000 Messaging System

What's in the box

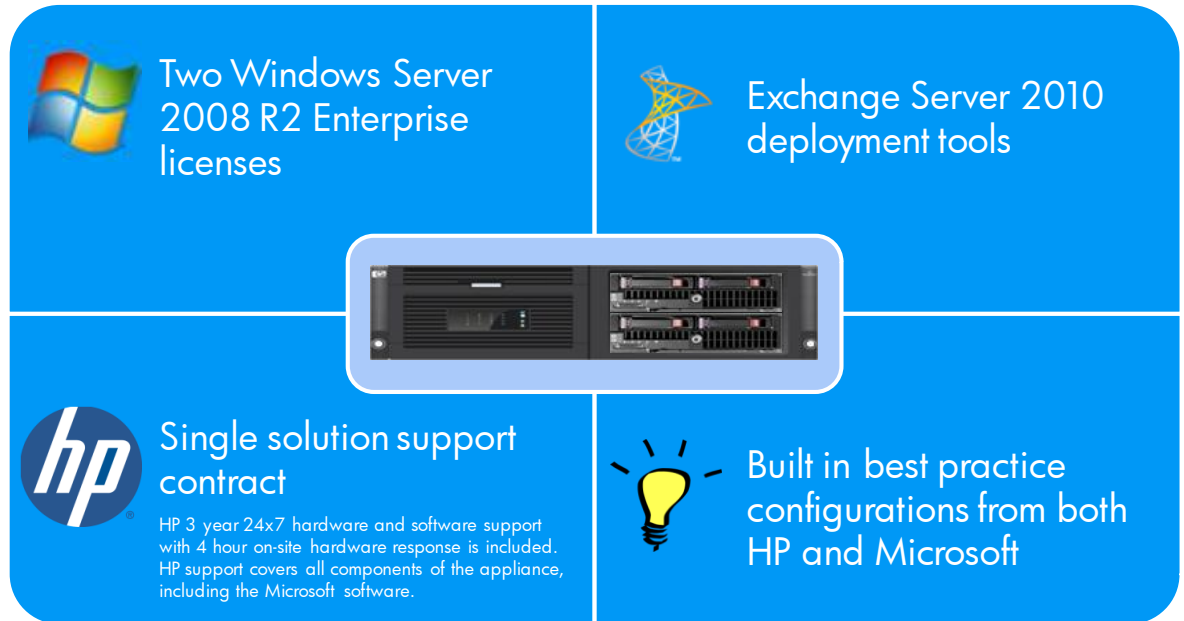
The E5000 Messaging System has been built as a self-contained platform, consisting of two server blades and an integrated (large capacity) storage drawer. It is designed, with built-in best practices, to simplify the complexity of properly sizing, deploying and managing a highly available messaging system. The E5000 Messaging System accelerates installation and configuration, using specially developed HP value-add deployment tools. These tools have been developed in close collaboration between HP and Microsoft to reduce the time and complexity needed to deploy Exchange 2010. The

¹ Depending on model

² Multi-role servers are configured with the Client Access Server, Hub Transport and Mailbox roles

E5000 Messaging System includes Microsoft Windows® Server 2008 R2 software licenses and 3 years of support. The installation software is preloaded including the deployment tools and Exchange 2010 SP1 setup binaries which are installed using the customer provided Exchange license keys. Note that, Microsoft Exchange and Client Access licenses are purchased from Microsoft.

Figure 1. What's in the box



HP E5000 – a basic overview

The E5000 uses a solution approach, developed by both HP and Microsoft, as part of the Infrastructure-to-Applications joint business program. Each of the E5000 Messaging System models incorporates best practices and performance standards from both companies. One of the key initiatives of the program is to reduce both time and complexity for the entire product lifecycle, from the initial ordering process through deployment and then ongoing monitoring and management. Unlike traditional approaches where you need to select the individual server, storage and software components, the HP E5000 Messaging System models have been designed and tested as preconfigured solutions. The E5000 solutions have been made simpler to order, by offering five configurations designed to support 500, 1,000 or 3,000 users with 1.25GB, 1.75GB or 2.5GB mailbox capacity. The E5000 solutions have also been designed and properly sized using the 200 messages sent /received per user per day profile.

The E5300 Messaging System (E5300) has been designed to support 500 users. This solution is ideal for Small and Medium Businesses (SMB) looking for enterprise class features, such as two-copy DAG and high availability hardware. The E5300 is offered in one configuration: the 12TB model supporting 1.75GB mailbox capacities.

The E5500 Messaging System (E5500) has been designed to support 1,000 users. This solution is ideal for organizations looking to support larger numbers of users in single or multi-site environments, such as branch offices. The E5500 also includes enterprise features such as two-copy DAG and high availability hardware. The E5500 is offered in two configurations: the 16GB model supporting 1.25GB mailbox capacities and the 32GB model for customers looking to scale up the mailbox capacities to 2.5GB.

The E5700 Messaging System (E5700) has been designed to support 3,000 users. This solution is ideal for enterprise organizations looking to scale up the number of mailboxes. The E5700 incorporates enterprise features, including two-copy DAG and high availability hardware. The E5700 systems can be used as self contained building blocks, allowing you to scale the number of mailboxes while still maintaining the benefits of preconfigured solutions. The E5700 is also offered in two configurations: the 40TB model supporting 1.25GB mailbox capacities and the 80TB model supporting 2.5GB mailbox capacities.

Each of the E5000 base system configurations can be ordered using a single part number, which includes all the server and storage hardware components. The configuration includes factory integration of the hardware and pre-loading of the E5000 software image, including Windows Server 2008 R2 Enterprise, which has been pre-installed and activated. The E5000 system configuration also includes the HP E5000 Configuration Wizard and E5000 Messaging System Quick Deployment Tool, which are used to deploy the Exchange servers and storage in their optimal configurations.

The E5000 Configuration Wizard assists during the initial out of the box setup and configuration of the E5000. This tool helps to configure each of the customer specific settings needed to prepare the server. Exchange 2010 SP1 is then installed and configured, using the E5000 Messaging System Quick Deployment Tool. The E5000 Messaging System Quick Deployment Tool has been developed to automate many of the tasks needed to deploy the E5000. To provide ongoing monitoring and management, the E5000 includes the E5000 System Manager. The E5000 System Manager provides a snapshot view of the health and status of the E5000 Messaging System, as well as tools to manage firmware updates.

E5000 solution components

The E5000 combines two HP E5460sb server blades and a Large Form Factor (LFF) disk storage drawer into a single enclosure. For the E5300 model, the disk storage drawer is configured with twelve 1TB Midline Serial Attached SCSI (MDL-SAS) disks. For the E5500 models, the disk storage drawer can be configured with sixteen 1TB or 2TB LFF MDL-SAS disks. The E5700 models use a total of forty 1TB or 2TB LFF MDL-SAS disks. In the E5700 configuration sixteen disks are located in the LFF disk storage drawer and the other twenty four disks are located in two E5000 Expansion Nodes. Table 1 lists the different E5000 base configurations and expansion options.

Table 1. E5000 base configurations and expansion options

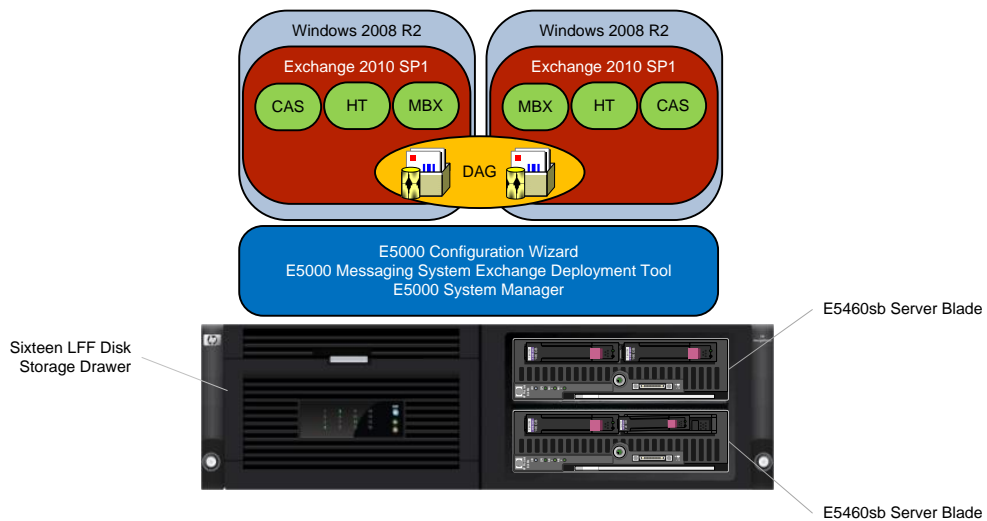
Model	Base configuration and expansion options		
	1.25GB mailbox size	1.75GB mailbox size	2.5GB mailbox size
E5300		12 1TB [†]	The E5300 ships with 12 disks in the disk storage drawer, and can be expanded to 16 disks. Four Expansion Nodes can be added with 12 1TB disks each.
E5500	16 1TB [†]		16 2TB [†]
E5700	40 1TB [†]		40 2TB [†]

[†] Raw storage capacity

The E5000 software components include Microsoft Windows Server 2008 R2 Enterprise, Exchange Server 2010 SP1 and HP value-add deployment and monitoring tools. To provide redundant Exchange services each of the two server blades is configured with the Exchange Mailbox (MBX), Hub Transport (HT) and Client Access Server (CAS) roles. The two Exchange servers are members of a DAG hosting two-copies of each of the mailbox databases.

Figure 2 provides a visual representation of the hardware and software components used as part of the E5300 and E5500 base system configurations.

Figure 2. E5300 / E5500 software and hardware components



For increased mailbox capacity beyond the base configuration model, the E5300 and E5500 models can be configured with up to four E5000 Expansion Nodes. The E5000 Expansion Nodes are configured with either twelve 1TB or 2TB LFF MDL-SAS disks providing either 12TB or 24TB of raw disk capacity³. Figure 3 depicts the E5000 Expansion Node.

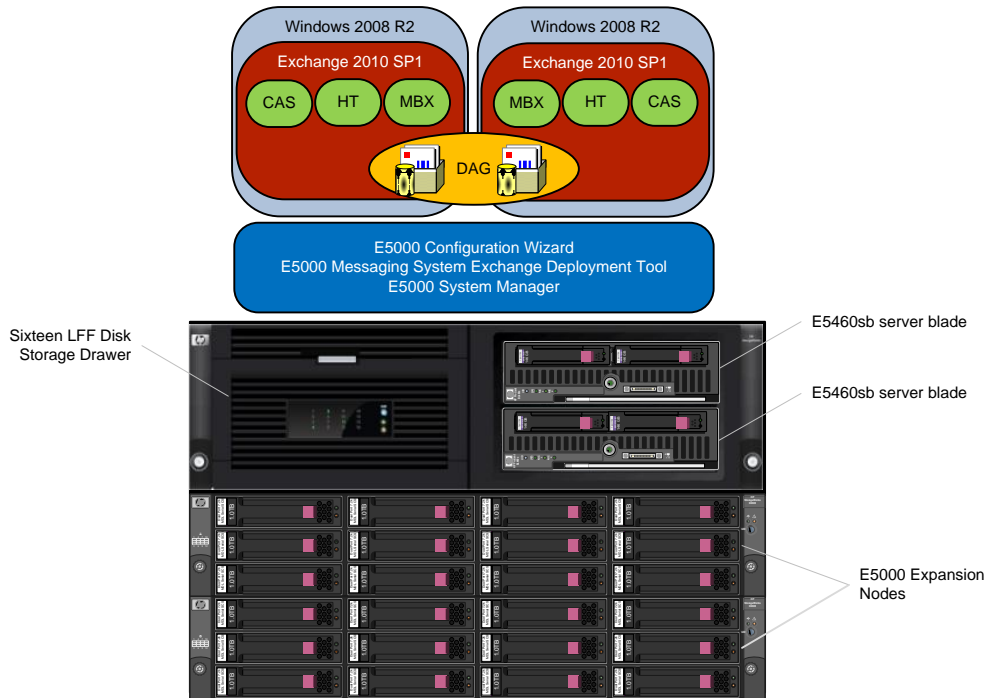
Figure 3. E5000 Expansion Node



The E5700 uses the sixteen-disk storage drawer located in the enclosure and two E5000 Expansion Nodes to support the storage requirements of the 3,000 user configuration. To increase mailbox sizes beyond the base configuration, the E5700 can also be configured with two additional E5000 Expansion Nodes for a total of four. Figure 4 provides a visual representation of the hardware and software components used as part of the E5700 base system configuration.

³ E5000 Expansion Nodes must use the same storage disk size as the base system configuration, mixing 1TB and 2TB disks is not supported.

Figure 4. E5700 software and hardware components



Exchange 2010 enhancements

As with any new version of Exchange, there have been significant changes to functionality that must be considered. One of the changes Microsoft has made in Exchange 2010 is to further reduce database disk I/O demands to facilitate deployment of large mailboxes on lower cost storage. Key storage I/O improvements were made in the Extensible Storage Engine (ESE), moving from bursty smaller data I/O patterns in Exchange 2007 to larger less frequent data I/O transfers in Exchange 2010. These new database I/O changes allow for new midline class storage⁴ configurations to be deployed, which were generally not feasible in Exchange 2007. Implementing lower cost, midline storage requires new design considerations when configuring and deploying storage.

In addition to deploying large mailboxes on lower cost storage, the new DAG features in Exchange 2010 also need to be considered and properly configured. In Exchange 2010 active and passive databases can be distributed across more than one mailbox server in the DAG. Database management of either (unplanned) failovers or (administrator initiated) switchovers is now done at the database level, unlike CCR (Cluster Continuous Replication) which requires the entire server to be failed over. In Exchange Server 2007 it is also not possible to combine features such as CCR with the HT and CAS roles. Administrators looking to deploy HT and CAS role redundancy with CCR for mailbox availability would need to deploy a minimum of four servers. However, Exchange 2010 supports combining HT and CAS roles with an MBX role that is also a member of a DAG. This multi-role model provides both mailbox resiliency with a two-copy DAG along with HT and CAS role redundancy using only two servers.

The E5000 Messaging Systems have been extensively tested to ensure the messaging system can handle peak workloads, as well as handling unplanned maintenance events, such as a potential

⁴ For more information download the HP drives – Entry, Midline and Enterprise brochure at <http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA1-9012ENW.pdf>

database or node failure. The testing conducted by HP and reviewed by Microsoft has determined the optimal configurations and best practices to be used to configure and deploy each of the E5000 Messaging System platforms.

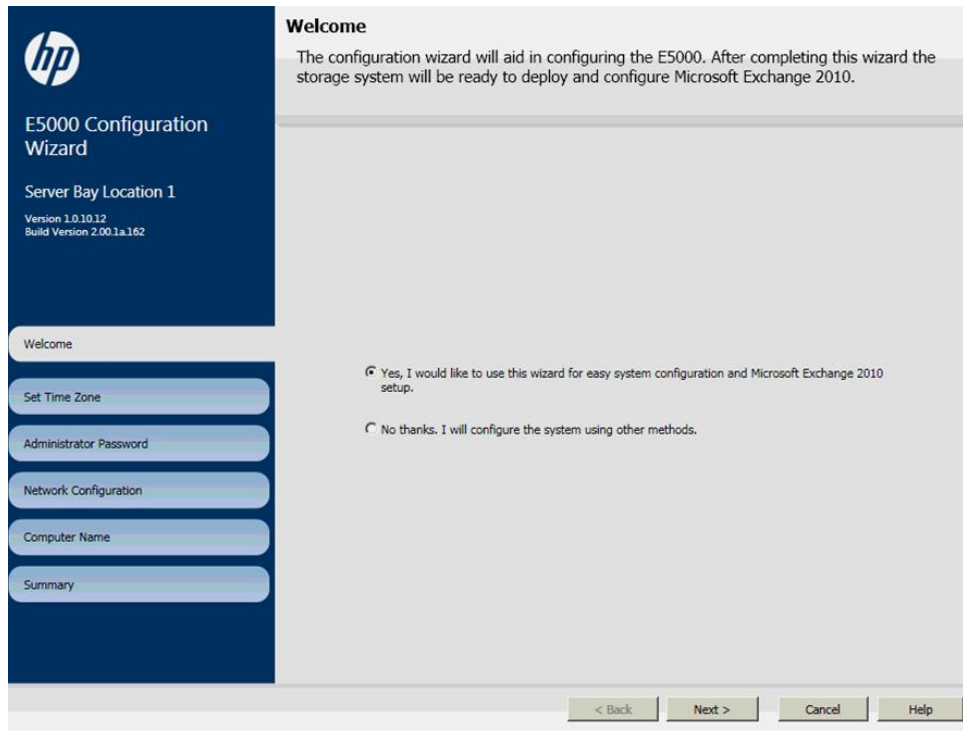
Deployment best practices

Deployment strategy

The deployment approach for the E5000 Messaging System is very different from traditional methods where extensive analysis and decisions must be made so that hardware and software components can be selected and then ordered, usually as individual Stock Keeping Units (SKUs). The E5000 base system configuration can be ordered as a single SKU and comes complete with both hardware and software components needed to support the specified number of users and mailbox sizes. This solution-based approach simplifies the deployment process, with the E5000 shipping with the servers and storage pre-integrated by HP Factory Express. The pre-integration process configures the server and storage hardware, prepares the disk arrays, assigns hot spares and performs the parity initialization of the logical disks. This step saves you significant on-site preparation time by not having to integrate the server and storage hardware components and prepare the disk arrays.

The E5000 server blades ship with Windows Server 2008 R2 Enterprise pre-installed and activated, requiring only the final customer configuration tasks to be completed onsite. Each of the customer configuration tasks have been streamlined by the E5000 Configuration Wizard, which provides a set of interview screens to step through the customer specific configuration tasks. Figure 5 depicts the E5000 Configuration Wizard welcome screen.

Figure 5. E5000 Configuration Wizard



In preparation for the Exchange installation, the E5000 Configuration Wizard also provisions storage at the operating system level and assists in the assignment of IP addresses for each of the network interfaces. Depending on the E5000 model, there will be either two or four network interfaces. The E5300 uses two network interfaces, which are configured as a dedicated MAPI⁵ network for client traffic and a dedicated replication network for Exchange DAG traffic. The E5500 and E5700 include two additional network interfaces, which can be optionally configured as dedicated management and backup networks.

After the Configuration Wizard completes, it then launches the E5000 Messaging System Quick Deployment Tool to install and configure Exchange 2010. The E5000 Messaging System Quick Deployment Tool automates many of the tasks needed to deploy the E5000 servers into a new or existing Exchange environment⁶. The E5000 Messaging System Quick Deployment Tool interview screens allow you to fill out the necessary customer configuration details and then the tool automates the installation of Exchange 2010. The tool creates the mailbox databases and then configures the servers as part of a DAG for mailbox resiliency. At the conclusion of the installation on both servers, the E5000 system is fully deployed and ready to host mailboxes. Figure 6 depicts the Custom Input screen used to configure Exchange.

⁵ Messaging Application Programming Interface

⁶ When deploying into an existing Exchange environment refer to the Exchange 2010 system requirements at <http://technet.microsoft.com/en-us/library/aa996719.aspx>

Figure 6. E5000 Messaging System Quick Deployment Tool, Custom Input screen

HP E5000 Messaging System Quick Deployment Tool

Custom Input

Please enter values for the following configuration options.

First Exchange server in this E5000 Messaging System? Yes No

Name of the E5000 Exchange server already deployed:

Number of database copies for high availability: 2

New or existing Database Availability Group (DAG) New Existing

Database Availability Group (DAG) name: DAG1

Database Availability Group (DAG) IP address: 0 . 0 . 0 . 0

Witness server: Name of existing server for Witness Share

Witness directory: C:\fsw

Database naming prefix: DB

Exchange 2010 Enterprise Edition license key:

The Client Access Server (CAS) role will be Internet-facing.

Enter the domain name you will use with your external CAS (e.g. mail.contoso.com):

New or existing Client Access Server (CAS) array New Existing

Enter the name of your load-balanced CAS array which will be set on the database property: casarray1.hp.com

Enable Exchange Error Reporting

Create Public Folder database? (Required to support Microsoft Entourage or Outlook 2003 clients)

Enable Exchange 2003 integration (adds the required routing group connector)

Exchange 2003 bridgehead server name:

Join the Exchange Customer Experience Improvement Program (CEIP)

About Back Next Deploy Close

E5000 Messaging System “built-in” best practices

Deploying Exchange 2010 requires a properly designed solution. From this design perspective, there were several key areas that were carefully evaluated to ensure the E5000 Messaging System design offers the best technical architecture while delivering a cost-effective solution. The E5000 Messaging System incorporates both HP and Microsoft best practices to build a solution which offers large mailbox capacities and high availability while focusing on lowering the TCO. With Exchange 2010 there are new hardware design options available to increase mailbox sizes and enhance mailbox availability.

Storage

An important design objective of Exchange 2010 is to host large mailboxes on lower cost storage devices. The end user demand for mailbox storage continues to grow with business requirements for gigabyte mailboxes becoming more and more prevalent. However, hosting gigabyte and multi-gigabyte mailboxes requires new methods to both store and protect messaging data. Transitioning mailbox sizes from a few hundred megabytes to gigabytes requires a significant increase in disk storage capacity. Increasing storage capacity also has a significant impact on your IT budget. This is compounded when factoring in the additional storage requirements needed to build highly available configurations.

To make large 1.25GB, 1.75GB and 2.5GB mailbox capacities economical, the E5000 Messaging System has been designed and tested using lower cost 1TB and 2TB MDL-SAS disks. Key design changes made in Exchange 2010 reduce the I/O demands placed on the storage subsystem, making midline disks a suitable solution for hosting large mailboxes. Midline disks offer larger disk capacities at lower price points, but operate at lower disk rotational speeds⁷. The lower disk speeds reduce the disk I/O performance, requiring new best practices for designing storage configurations.

Traditionally, in enterprise class storage designs, it is a common practice to group or pool multiple disks together into large multi-disk RAID arrays. The RAID arrays are either presented as one large logical disk or divided into several smaller logical disks, depending on implementation. This approach combines the disk resources to increase disk I/O performance as well as capacity. Building large disk arrays works well for Exchange 2003 and 2007 implementations, where the RAID arrays can be sized properly, providing the necessary disk I/O performance needed to host a large number of users.

In Exchange 2010, however, large mailbox deployments using high capacity midline storage changes some of the standard practices previously used with Exchange storage designs. A key feature of the DAG is that individual databases can be switched or failed over between mailbox servers. This can minimize the impact of a single database failure, requiring only the database in question to be failed over to the other mailbox server. To (fully) take advantage of this feature, the E5000 Messaging System has been designed to isolate each database and its log stream to its own disk array. This approach isolates any potential database or disk issue to only the single database, which can subsequently be failed over to another database copy with minimal impact.

With larger mailbox sizes, Exchange 2010 database sizes have increased considerably, so it is important to also consider unplanned maintenance tasks, such as having to re-seed⁸ a database or rebuild a disk array after a drive replacement. During these maintenance events, there can be an extended period of time where the larger disk arrays will be under added I/O load. To minimize the performance impact and time duration of the maintenance tasks, the E5000 disk arrays are designed and tested using two disk (mirror) RAID1 arrays for each database. Using a two disk RAID1 array minimizes the data to be reconstructed, which can shorten the duration of the rebuild. As a best practice, both Microsoft and HP recommend RAID1 over RAID5 when deploying midline storage. Testing has determined that the added overhead of RAID5 arrays significantly increases the time needed to perform write intensive tasks, such as database seeding and reconstructing disk arrays.

The E5000 Messaging System uses MDL-SAS disks to take advantage of the advanced data path features of the SAS interface. The SAS interface for the midline disks provides a full duplex 6Gb/s SAS link to the disk, compared to the half duplex 3Gb/s link speed used with the Midline Serial ATA (MDL-SATA) interfaces. The faster link not only provides more I/O for databases, it also helps to reduce disk rebuild times as data is being copied between the RAID1 drive set. MDL-SAS interfaces are also dual-ported, allowing the MDL-SAS disks to connect to 2 independent SAS domains, referred to as Dual-Domain. The Dual-Domain feature allows the SAS disks data path I/O to be distributed across the two SAS domains. Dual-Domain also provides redundant data paths in the event one of the SAS links, disk ports or controller ports fails.

Storage and database layouts

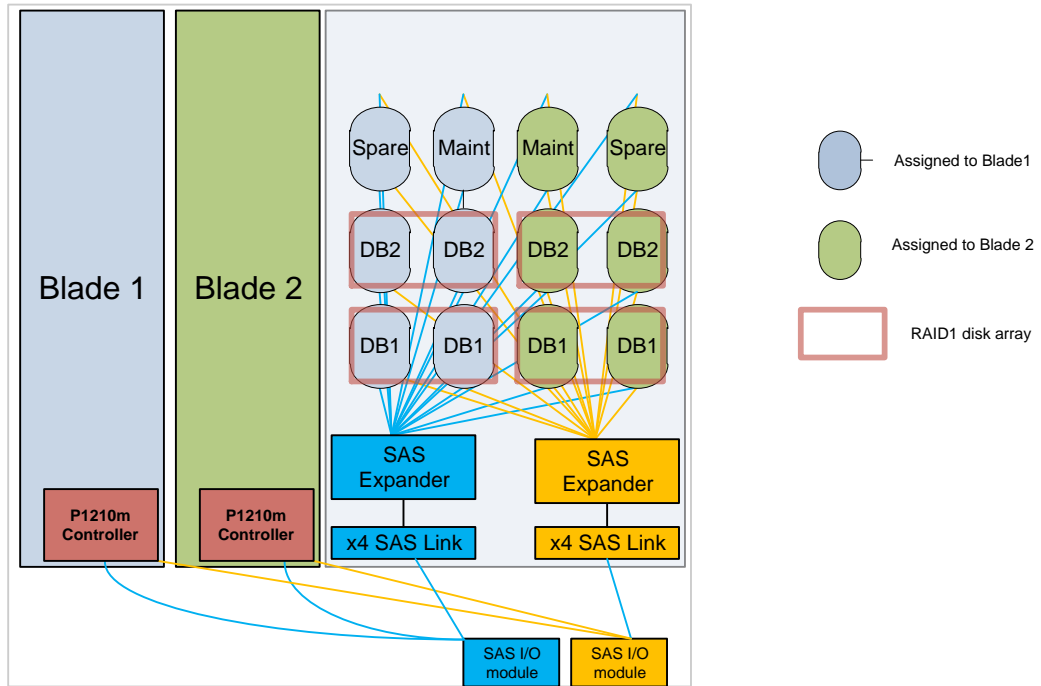
Each of the E5000 models has been designed and tested to support the 200 messages per user per day workload profile. Each model has a specific storage configuration, which has been determined to be the optimal storage and database layout for that configuration.

⁷ Midline disks operate at 7200 RPM compared to 10K and 15K RPM for enterprise SAS disks

⁸ Database seeding or re-seed is the process of copying the production database to a target location on another server

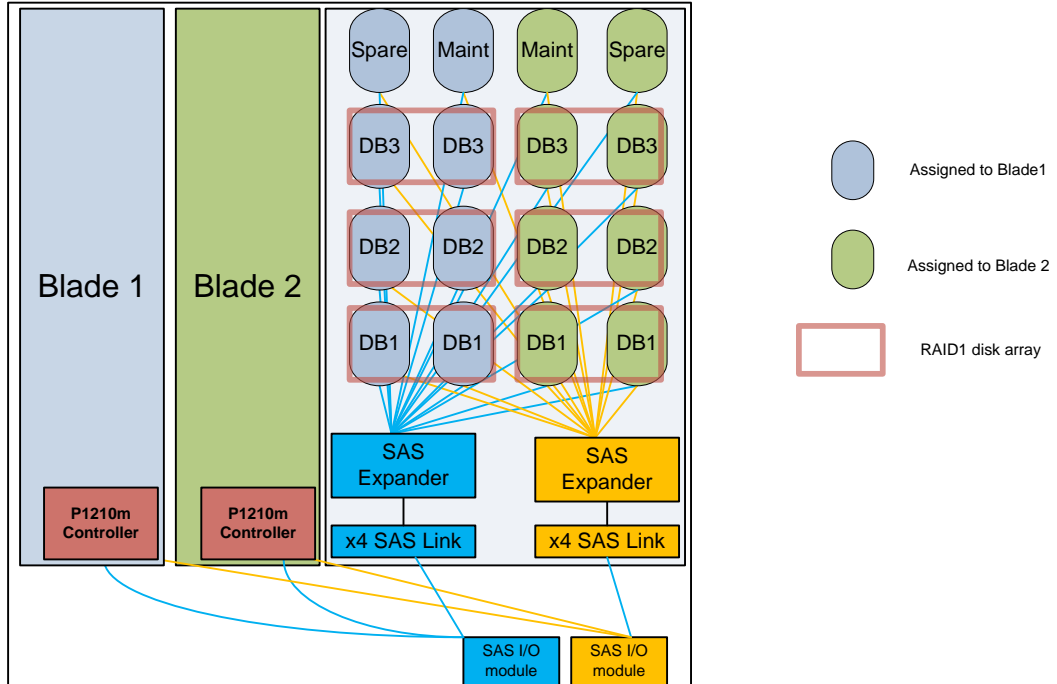
The E5300 storage and database layout uses twelve 1TB disks with six disks assigned to each server. Each server is configured with two RAID1 disk arrays, plus a hot spare disk and a maintenance disk that can be used for a recovery database. The E5300 supports 500 users with 1.75GB mailbox sizes which can be evenly divided between two mailbox databases. Each of the two mailbox databases is configured with an active and one passive copy. During normal operations each server will host one of the active databases. Figure 7 depicts the storage and database logical layout used by the E5300.

Figure 7. E5300 Storage Logical layout



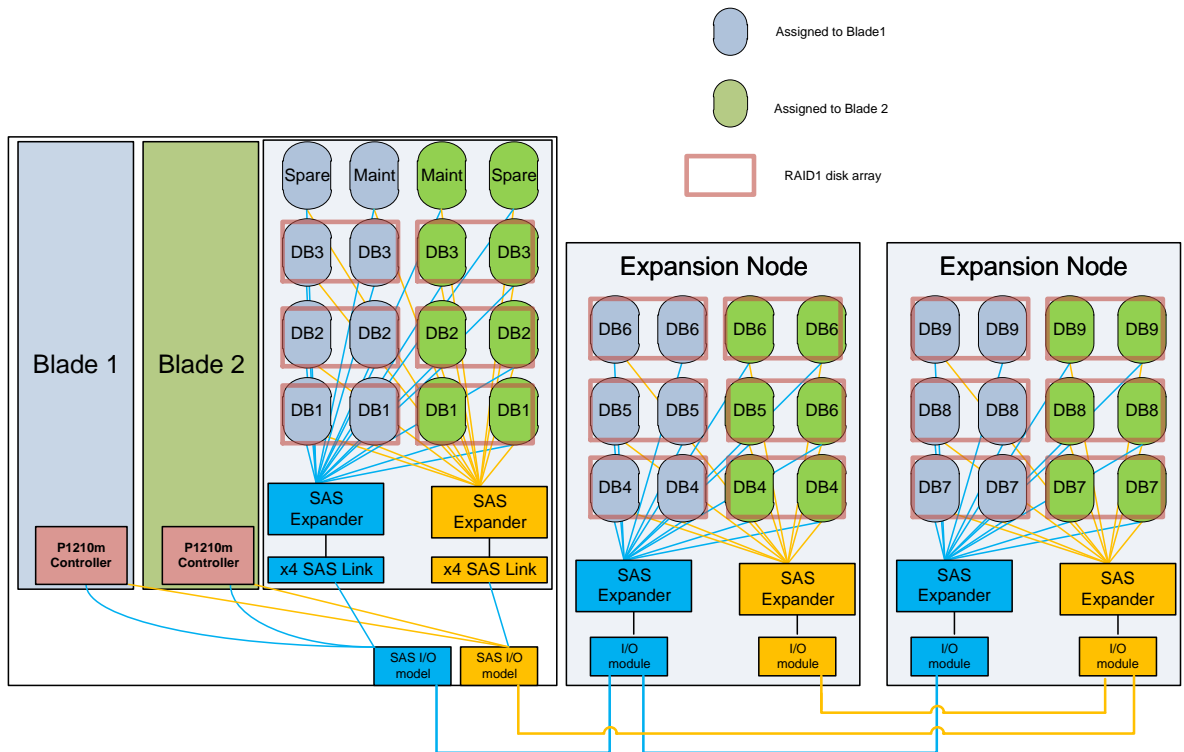
The E5500 storage and database layout uses sixteen 1TB or 2TB disks (depending on model) with eight disks assigned to each server. Each server is configured with three RAID1 disk arrays, plus a hot spare disk and a maintenance disk that can be used for a recovery database. The E5500 supports 1,000 users with 1.25GB mailbox sizes when using 1TB disks, or 2.5GB mailbox sizes when using 2TB disks. The mailboxes can be evenly divided between three mailbox databases. Each of the three databases is configured with an active and one passive copy. During normal operations, one server will host two of the active databases, while the other will host the third active database. Figure 8 depicts the storage and database layout used by the E5500.

Figure 8. E5500 Storage Logical layout



The E5700 storage and database layout uses forty 1TB or 2TB disks (depending on model) with twenty disks assigned to each server. Each server is configured with nine RAID1 disk arrays, plus a hot spare disk and a maintenance disk that can be used for a recovery database. The E5700 supports 3,000 users with 1.25GB mailbox sizes when using 1TB disks, or 2.5GB mailbox sizes when using 2TB disks. The mailboxes can be evenly divided between nine mailbox databases. Each of the nine databases is configured with an active and one passive copy. During normal operations, one server will host five of the active databases, while the other will host the other four active databases. Figure 9 depicts the storage and database layout used by the E5700.

Figure 9. E5700 Storage Logical layout



Servers

Exchange 2010 has made significant changes in the ESE to reduce database I/O operations, allowing lower cost, higher capacity storage to be deployed. Exchange 2010 increases checkpoint depth of the log files from 20MB to 100MB⁹ when there is more than one mailbox database configured. The larger checkpoint depth allows more write I/Os to be coalesced (combined) to reduce the number of database I/O operations. However, this change also increases the amount of database cache needed to handle outstanding transactions of the different workload profiles. As a result, Exchange 2010 uses new memory sizing guidelines which account for the different workload profiles in sizing database cache. For more information, go to <http://technet.microsoft.com/en-us/library/ee832793.aspx>.

Following the new memory sizing guidelines, the E5000 Messaging System has been sized and tested using the 200 messages sent /received per user per day profile, plus the additional system memory required to support the multi-role configuration. For this profile, the recommended database

⁹ Set only for the active database copy; to improve availability the passive copy is set to 5MB.

cache memory size is 12MB per user¹⁰ for optimal database I/O operations, plus 6GB memory for the E5300 and 12GB for the E5500 and E5700 to support the additional CAS and HT roles.

Exchange 2010 also introduces more detailed processor sizing guidance to support the new mailbox resiliency features. In the DAG model, mailbox servers can host both active and passive database copies¹¹, allowing individual databases to be active on different servers. Unlike CCR, the active mailbox databases can now be distributed between both servers in the E5000. The DAG functionality introduces additional processor workload which has been implemented in the capacity planning for the E5000.

One of the key requirements of the E5000 is to provide support for both active and passive databases as each Exchange Server supports active users or clients. Unlike active/passive cluster models in the past where the passive server is only responsible for managing data replication from the active databases, servers in the DAG model must be sized to support both active database client load, as well as the added overhead for managing passive database replication.

Similar to memory sizing guidelines, processor sizing is based on the messages sent/received per user per day mailbox profile. The mailbox profile provides processor sizing details that account for peak times, where there may be significant spikes in mailbox activity. Sizing the processor correctly ensures that it is capable of handling these peak periods when CPU resource demands may be at their highest. CPU sizing has also changed for Exchange 2010 and is now based on the number of processor cycles needed per mailbox profile, instead of the number of users supported by a given processor core. The processor cycles requirements, referred to in megacycles, are expressed in two values: megacycles for active mailbox and megacycles for passive mailbox. Considering that a server can host both active and passive mailbox databases, sizing needs to account for both resource types. The megacycle values for the active mailbox accounts for users interacting directly with their mailboxes and using various client types including Outlook¹² and ActiveSync devices. Megacycles for passive mailbox are related to replication of mailbox data to the passive database copy. To account for added processing load to perform database replication from the active copy to a passive copy, there is an additional 10% process load. The E5000 messaging system is sized using the 200 messages sent /received per user per day profile which recommends 4.4 megacycles per active mailbox and 0.6 megacycles per passive mailbox.

Note

Microsoft uses the Intel® Xeon® X5470 processor as the baseline in the calculations for the megacycles needed per mailbox profile. Newer processor architectures such as the Intel Xeon E5500 series used in the E5000 Messaging System have improved performance characteristics which need to be accounted for. For additional details on calculating the megacycles for different processor configurations refer to:

<http://technet.microsoft.com/en-us/library/ee712771.aspx>

The E5000 Messaging System uses two E5460sb server blades to host the Exchange roles. The E5460sb server blades are based on the HP ProLiant BL460c G6 platform, which features Intel Xeon E5500 series processors. The processor sizing includes the mailbox megacycle requirements, as well as the added requirement for the HT and CAS roles. Each server has been sized to support 100% of the load for all users in the event the other server in the E5000 becomes unavailable. Capacity planning for 100% of the users not only allows for high availability during unplanned events it also allows for flexibility during planned maintenance events. Routine updates and patches can be performed on one server while the other server maintains the entire client load.

¹⁰ <http://technet.microsoft.com/en-us/library/ee832793.aspx>

¹¹ The DAG model allows only one copy of a given database instance, either an active or passive copy, per mailbox server.

¹² Microsoft Office Outlook 2007 or Outlook 2010 using cached mode

Server hardware configurations

The E5300 system uses two identically configured HP E5460sb server blades, which have been sized to handle all 500 mailboxes along with the HT and CAS services. The E5300 has been sized with one dual-core processor and 12GB memory. Table 2 lists the E5300 server hardware configuration details.

Table 2. HP E5460sb server blade hardware configuration (E5300)

Server blades	Description	Notes
Processor type	One Intel Xeon Processor E5502	Dual-Core 1.86 GHz, 4MB L3 Cache, 80W, DDR3-800
Memory	12GB	Three – 4GB DIMMs
Internal blade storage	Two – 300GB SFF SAS	Boot disks, HT Logs and Software Images
Internal storage controller	P410i	256MB cache, no battery
External storage controller	P1210m	6 Gb/s SAS controller 1GB Flash Backed Write Cache
Blade NICs	NC532i	NC532i 2-port 1Gb Ethernet

The E5500 system uses two identically configured HP E5460sb server blades, which have been sized to handle all 1,000 mailboxes along with the HT and CAS services. The E5500 has been sized with one quad-core processor and 24GB memory. Table 3 lists the E5500 server hardware configuration details.

Table 3. HP E5460sb server blade hardware configuration (E5500)

Server blades	Description	Notes
Processor type	One Intel Xeon Processor E5520	Quad-Core 2.26 GHz, 8MB L3 Cache, 80W, DDR3-1066, HT, Turbo 1/1/2/2
Memory	24GB	Six – 4GB DIMMs
Internal blade storage	Two – 300GB SFF SAS	Boot disks, HT Logs and Software Images
Internal storage controller	P410i	256MB cache, no battery
External storage controller	P1210m	6 Gb/s SAS controller 1GB Flash Backed Write Cache
Blade NICs	NC532i NC382m	NC532i 2-port 1Gb Ethernet NC382m 2-port 1Gb Ethernet

The E5700 system uses two identically configured HP E5460sb server blades, which have been sized to handle all 3,000 mailboxes along with the HT and CAS services. The E5700 has been sized with two quad-core processors and 48GB memory. Table 4 lists the E5700 server hardware configuration details.

Table 4. HP E5460sb server blade hardware configuration (E5700)

Server blades	Description	Notes
Processor type	Two Intel Xeon Processors E5520	Quad-Core 2.26 GHz, 8MB L3 Cache, 80W, DDR3-1066, HT, Turbo 1/1/2/2
Memory	48GB	Twelve – 4GB DIMMs
Internal blade storage	Two – 300GB SFF SAS	Boot disks, HT Logs and Software Images
Internal storage controller	P410i	256MB cache, no battery
External storage controller	P1210m	6 Gb/s SAS controller 1GB Flash Backed Write Cache
Blade NICs	NC532i NC382m	NC532i 2-port 1Gb Ethernet NC382m 2-port 1Gb Ethernet

Multi-role considerations

In addition to deploying large mailboxes on lower cost storage, another key initiative of the E5000 is to simplify the hardware platform by consolidating server roles. Collocating HT, CAS and Mailbox server roles reduces the number of physical servers to manage, thereby reducing the operational cost of power and cooling. Exchange 2010 supports the collocation of the CAS and HT roles along with the mailbox role that is part of a DAG. However, there are special considerations when combining particular Exchange roles such as the CAS and Mailbox roles. Exchange 2010 changes the way Outlook MAPI clients connect to their mailbox data. In Exchange 2007, Outlook MAPI clients connect directly to the mailbox store¹³, while the other client types, such as Outlook Web Access and ActiveSync communication, connect through the CAS server role.

In Exchange 2010, however, Outlook MAPI clients connect to the RPC Client Access Service on the CAS server instead of directly to the mailbox store. This change provides a more consistent user experience between the different client types, using the same (middle tier) Exchange code logic to access the mailbox data. This change is also necessary to support the failover and switchover functionality of the DAG. To make a database failover or switchover transparent to the Outlook clients, the CAS server now manages the backend connections to the mailbox store. The CAS server role contains an Active Manager Client, which communicates with an instance of Active Manager running on each mailbox server within the DAG. The Active Manager Client is used to determine the status of each of the databases copies. In the event a database is failed over to another server, the CAS server will detect the change and will then redirect the clients to the newly activated database.

¹³ Public folder access remains on the mailbox server.

Clients do not arbitrarily connect to CAS servers in Exchange 2010; instead a CAS server¹⁴ is assigned to each database when it is created. The CAS server name is stored as a mailbox database property¹⁵. Outlook 2007 and 2010 clients using the Auto Discover¹⁶ feature connect directly to the CAS server instead of the mailbox server. While connecting directly to the CAS server improves the Outlook client experience during a database failover, it also introduces a single point of failure if the assigned CAS server becomes unavailable. To address this potential problem a CAS array can be created containing multiple CAS servers. The CAS arrays are then assigned to the database, allowing multiple CAS servers to support a given database.

As part of the E5000 deployment process, the E5000 Messaging System Quick Deployment Tool facilitates the process of creating a new CAS array, or for existing Exchange 2010 environments adding the E5000 servers to the existing CAS array (within the same AD site). The CAS array can then be defined in DNS with a Fully Qualified Domain Name (FQDN) and assigned a virtual IP address (VIP) to be configured with a network load balancer.

There are different load balancer options available for Exchange 2010, including Windows Network Load Balancing (NLB), hardware-based solutions, as well as third party software. The Windows NLB method is typically used in smaller deployments. However, NLB is not supported when the CAS role is collocated with a mailbox server role that is participating in a DAG. The Windows failover cluster feature needed for the DAG is not compatible with NLB. Therefore, for the E5000 Messaging System, a hardware load balancer is recommended. Microsoft offers a qualification program for load balancers supporting Exchange 2010. The following link lists the qualified load balancer solutions. <http://technet.microsoft.com/en-us/exchange/gg176682.aspx>.

¹⁴ CAS server and CAS arrays must be in the same Active Directory (AD) site as the mailbox server.

¹⁵ RpcClientAccessServer

¹⁶ Exchange 2003 requires the profile to be updated manually.

Monitoring and management

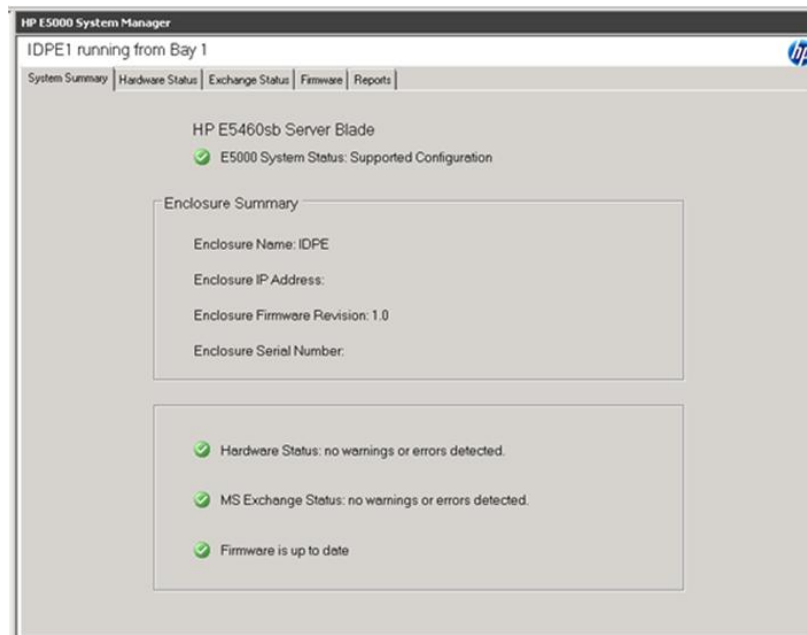
The E5000 takes a unified approach to monitoring and management. Often, administrators want to take a high level look at the overall health of the email servers; or, when problems arise, they find it difficult to determine where to look. There are many components to check and counters to review and correlate. The problem is compounded during potential support calls when support personal inquire about various server and storage firmware versions or request detailed system configuration information.

To simplify ongoing monitoring, management and support, the E5000 includes the HP E5000 System Manager. The HP E5000 System Manager has been specifically developed for the E5000 Messaging System and provides a snapshot view of the health and status of the E5000 hardware subsystems, system configuration, firmware, and Exchange components by using simple red, yellow and green status indicators. The E5000 System Manager provides a System Summary tab (see Figure 10) to display the overall health of the messaging system, as well as more specific drill down tabs into the hardware and Exchange subsystem details. For management and support there are tabs for firmware and reports functions.

The Hardware Status tab reports the status of the E5000 enclosure, the storage subsystems and the server blade itself. The Exchange Status tab details each of the Exchange server roles and displays key performance counter details. The Firmware tab is used to manage and update the various hardware subsystems of the E5000 Messaging System. The firmware update process assists in updating the various components of the E5000 system, while providing informational messages on the progress and required steps.

In the event of a problem requiring an HP support call, the Reports tab can be used to collect detailed server, storage, firmware and software configuration information, which can then be sent to HP support for review and analysis. Figure 10 depicts the System Summary tab of the E5000 System Manager.

Figure 10. E5000 System Manager



Data protection and recovery

Messaging data loss can present itself in many forms. It can be a relatively minor event, such as a user accidentally deleting an important message or entire folder. It can also be more disruptive, where multiple users may be affected by a database failure or an entire server becoming unavailable. Furthermore, catastrophic events, such as fire or flood, can render an entire physical site inaccessible. Best practices for designing a data protection and recovery plan start with some candid discussions with the management teams to outline the business continuity requirements. No matter how large or small the organization is, these discussions help to work through the different potential data-loss events and how to create support plans to best protect against these events.

Business requirements and support plans can be written into a formal Service Level Agreement (SLA) which contractually defines different data loss scenarios and details the required service requirements. SLAs are typically developed in larger organizations with separate IT groups. However, for smaller businesses, less formal agreements can be established using Service Level Goals (SLG), which detail different scenarios and describe processes used to resolve specific issues, but do not have contractually bound service levels. The use of SLAs and SLGs from an Exchange recovery perspective describe how long it takes to restore a service and how much acceptable data loss can occur. This is defined by two objectives: Recovery Time Objective (RTO) and Recovery Point Objective (RPO). RTO defines the amount of time allocated to restore the failed system back to an operational state. RTO is typically measured in seconds, minutes or hours. For example, the SLA may define a 4 hour recovery time window for the administrator to determine the problem, restore the database from tape, replay all outstanding transaction logs and mount the database if an Exchange standalone database failed and needed to be restored from tape backup.

When defining a RTO, it must be considered in terms of RPO. For Exchange, the RPO defines how much potential messaging data loss can be tolerated by the business and accounts for the worst case scenario where the failure occurs just before the next backup cycle. For example, the recovery point could be as high as 24 hours of data loss if the server backup schedule is once every 24 hours.

No matter the approach, SLA or SLG, the RTO and RPO help guide the discussions on what needs to be done to ensure that high availability and goals can be met. Different methods and tools may be necessary to build a comprehensive data protection and recovery plan. It is also important to realize that there need to be different RTO and RPO requirements based on the type of potential issues encountered. Addressing a single database failure is quite different than having to invoke a Disaster Recovery (DR) plan.

The E5000 comes equipped out of the box to handle many of the issues that end users and administrators may face during day-to-day business operations. For end users, Exchange 2010 includes an updated deleted items retention feature which includes a single item recovery mode, making it easier for the end users to recover items and folders that have been inadvertently deleted. Exchange 2010 also offers advanced retention policies allowing the administrator to configure policies such as legal hold which can prevent an end user from hard deleting messages during the hold period.

From a mailbox resiliency perspective, the E5000 is equipped with two copies of each database allowing automatic failover in the event of a database failure. Exchange 2010 makes significant improvements in RTO and RPO especially compared to restoring from tape or even from disk. What would take hours to recover from tape and restore operations now takes less than a minute. The E5000 with Exchange 2010 allows the granularity of failing over an individual database or an entire server when doing planned maintenance updates. For more complex recovery scenarios, the E5000 also includes dedicated storage LUNs for recovery databases allowing for more advanced mailbox database recovery activities to be performed.

Note

While the native data protection features of Exchange 2010 significantly improve the availability of Exchange for common data loss events, it is important to consider situations where traditional backups are still necessary. Point in time backups, stored off site, remain an integral part of a comprehensive backup and recovery strategy.

E5000 Messaging System configurations

The E5000 Messaging System is offered in five base configurations. Each base configuration includes the hardware, software and deployment tools needed to deploy the solution. To simplify the ordering process, each of the base configuration models is ordered using a single part number. For customers looking to expand mailbox sizes beyond the base configurations, Expansion Nodes are available as upgrade options. The following table lists the base system configurations and upgrade options available for each of the E5000 models.

Table 5. Base system configuration and available options

Base system configurations	Part Number	Notes
HP E5300 12 TB LFF MDL SAS Messaging System	BV839A	500 users with 1.75GB mailboxes (12 – 1TB disks)
HP E5500 16 TB LFF MDL SAS Messaging System	BV895A	1,000 users with 1.25GB mailboxes (16 – 1TB disks)
HP E5500 32 TB LFF MDL SAS Messaging System	BV840A	1,000 users with 2.5GB mailboxes (16 – 2TB disk)
HP E5700 40 TB LFF MDL SAS Messaging System	BV896A	3,000 users with 1.25GB mailboxes (40 – 1TB disks)
HP E5700 80 TB LFF MDL SAS Messaging System	BV841A	3,000 users with 2.5GB mailboxes (40 – 2TB disks)
Upgrade options		
HP 2 port 1Gb Ethernet Module	BV897A	Upgrade option for E5300 adding two network ports
HP E5000 12 TB LFF MDL SAS Expansion Node	BV844A	Upgrade option for 1TB base system configurations
HP E5000 24 TB LFF MDL SAS Expansion Node	BV845A	Upgrade option for 2TB base system configurations

Summary

The E5000 Messaging System incorporates Microsoft and HP best practices for designing and deploying a messaging system for Exchange 2010. HP and Microsoft have collaborated together to build an appliance email platform which delivers the large mailbox capacity needed by today's end users along with the reliability and availability features system administrators expect to lower RTO and RPO. The E5000 Messaging System is a budget friendly platform which combines lower-cost high-capacity midline storage with consolidated multi-role servers. The E5000 messaging platform has been designed for today's agile business requirements by simplifying the initial planning, deployment and ongoing operations for an Exchange 2010 messaging system. Solutions are offered for small and medium business, as well as larger enterprise customers looking to deploy preconfigured solutions that are ready to deploy.

For more information

Additional E5000 product information is available at: <http://hp.com/go/e5000>

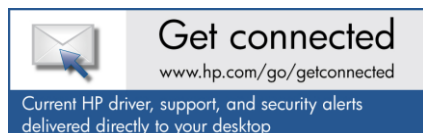
To read more about HP solutions for Exchange, including best practices and additional testing of HP server and storage products with Exchange, please see: <http://www.hp.com/solutions/exchange>

For additional information on HP BladeSystem solutions, please see:
<http://h18004.www1.hp.com/products/blades/solutions/customers.html>

For additional information on HP Sizer for Microsoft Exchange Server 2010, please see:
<http://h71019.www7.hp.com/ActiveAnswers/us/en/sizers/microsoft-exchange-server-2010.html>

For general information on Exchange sizing and best practices, there are several white papers and planning tools that are free to download from:
<http://www.hp.com/solutions/activeanswers/exchange>

To help us improve our documents, please provide feedback at
http://h71019.www7.hp.com/ActiveAnswers/us/en/solutions/technical_tools_feedback.html.



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