

A Better Way to Upgrade Microsoft Exchange: Consolidate, Then Migrate

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Regardless of industry, e-mail and instant messaging functions have evolved from a form of novel communication to one that has achieved mission-critical status. Service failures are increasingly viewed as financially detrimental to an organization. Improvements in the feature sets of Exchange facilitate server consolidation and ease platform management for IT professionals.

Platform improvements have also lowered the TCO for the Exchange infrastructure and have enabled organizations to separate e-mail storage from the server. Organizations that have implemented EMC Automated Networked Storage™ have been able to gain performance and service level improvements by needing fewer e-mail servers, having centralized storage management, faster backup and restore times, in addition to avoiding CPU and server storage constraints. When combined together, all of these improvements have helped business to lower costs while simultaneously increasing productivity organization-wide. EMC hardware, software, and services help Microsoft customers get the maximum value from their information throughout the lifecycle of their information. The value of your e-mail messages can increase and decrease over time. And it's the value of the information that determines the level of service required.

This white paper describes the issues that an organization could face during server and storage consolidation and the subsequent migration to Microsoft Exchange 2000 and Exchange Server 2003. EMC Corporation's Automated Networked Storage is also highlighted as a preferred centralized storage solution for Exchange and is discussed in the context of its integration with Exchange and its ability to ensure that service level agreements are met. Additional attention is directed at automated networked storage and its ability to simplify and accelerate backup and restore processes, thereby lowering IT costs while also ensuring business continuity by reducing downtime for end users.

Current and Future States of Microsoft Environments

Microsoft Windows NT, Windows 2000, and Windows Server 2003

Microsoft has been a strong participant in the server operating system market for several years; however, improvements in its Windows Server operating system have led to an increased adoption of the Windows Server platform since 2002. More recent revisions, including Microsoft Windows 2000 and Windows Server 2003, have shown strong adoption rates and by 2003, Windows Server 2000 has emerged as the dominant operating system in the market with over 4.5 million units shipped and almost a 50 percent installed base worldwide. The last remaining Windows NT users must upgrade to the 2000 or 2003 by the end of 2004 to ensure that the operating system used in mission-critical applications is supported by Microsoft for security patches and other SP upgrades. Despite having to upgrade from Windows NT to maintain support, it should be noted that Microsoft Windows 2000 and Windows Server 2003 operating systems offer compelling features such as Active Directory, enhanced performance, reliability, and stability.

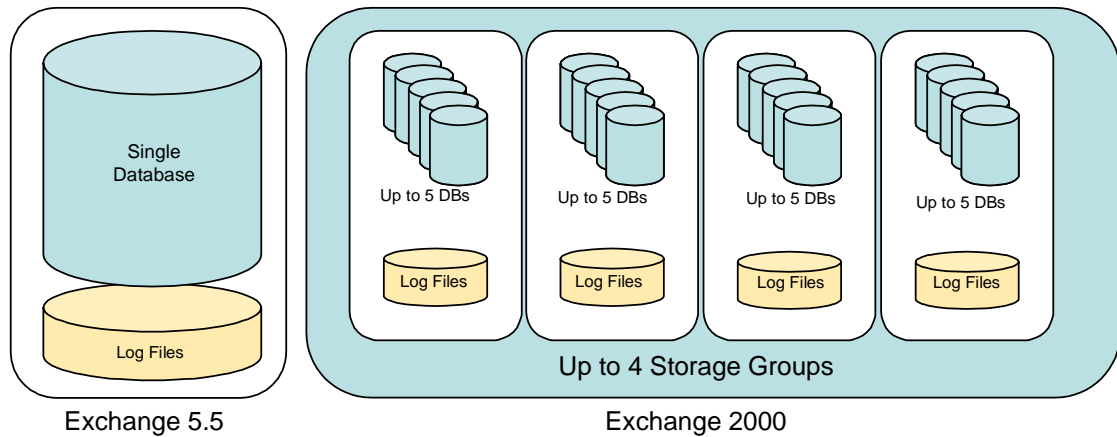
Active Directory is a feature of Microsoft Windows 2000 and Windows Server 2003 that is of particular interest for e-mail administrators due to its ability to allow users with LDAP-compliant clients to search for other users. It also enables policy-based management across Windows domains helping IT management decrease man hours needed to set up and support internal communications across disparate domains.

Microsoft Exchange 5.5, Exchange 2000, and Exchange Server 2003

As of the fourth quarter of 2003, almost 60 percent of Microsoft Exchange users were still utilizing the Exchange 5.5 platform. In addition, almost all organizations running Exchange 5.5 are still using the Microsoft NT4.0 operating system. Many users will consider whether or not it is possible to upgrade the server operating system and temporarily forego additional software expenditures as they pertain to the e-mail system. Exchange 5.5 with SP3, can run on Windows 2000, however it cannot run on Windows Server 2003. Some may view this scenario as a good incremental software upgrade to get through difficult budgetary times, but other issues should be evaluated that go beyond simple cost calculations based on software license fees.

One issue that should be closely examined is the possibility of cost savings due to server consolidation. Microsoft Windows NT was not designed to accommodate multiple applications on the same server. This led administrators to scale out the server architecture to accommodate multiple applications. The same scaling out behavior was also observed with Microsoft Exchange 5.5. With Exchange 5.5, scaling out occurred due to the fact that e-mail administrators limited most servers to 500 seats in order to meet service level restore time objectives.

It should be noted that upgrading to Microsoft Windows 2000 or Windows Server 2003 enables server consolidation on an average of 4:1 when moving from Windows NT to Windows 2000. Further consolidation is expected to be possible with Windows Server 2003. In addition, as seen in the figure below, upgrading from Microsoft Exchange 5.5 to Exchange 2000 also enables server consolidation averaging from 4:1 to 6:1 when used with Windows 2000. Additional server consolidation is expected to be possible with Microsoft Windows Server 2003 when used with Exchange Server 2003.



If a mail administrator made the choice to remain with Exchange 5.5, improvements in the server operating system and improvements in the newer Exchange platforms could not be leveraged. The core issue in the upgrade decision process should be how platform improvements can save money for your organization over the next 24-36 months rather than how you can save money now by putting off an upgrade. Exchange 2000 and 2003 platform improvements and their impact on productivity should be thoroughly investigated as productivity enhancements can save your organization money in the short to medium-term.

One of the best examples of productivity is the ability of Exchange 2000 and Exchange Server 2003 to increase the number of storage groups and information stores on a single server. Organizations still using Exchange 5.5 are forced to support a single mail store database on a server that must be backed up or restored as a unit. Upgrading to Exchange 2000 or Exchange Server 2003 changes that by enabling e-mail administrators to configure up to four storage groups on each server. Within those four storage groups, the administrator has the ability to implement up to five Exchange databases each, meaning that a single Exchange server can host up to twenty mailbox store databases. If, in order to ensure SLA restore time guarantees, your organization has fallen into expensive server scaling out behavior with Exchange 5.5, upgrading to Exchange 2000 or Exchange Server 2003 will dramatically decrease server expenditures over the life of the new messaging platform. Additional money-saving platform enhancements include:

- Four-node clustering with Exchange 2000 and up to eight-node clustering with 2003.
- SAN connectivity with Exchange 2000 and 2003.
- Virus-scanning API with Exchange 2000 and 2003.
- Signed LDAP requests to Active Directory Service with Exchange 2000 and 2003.
- Single mailbox restoration with Exchange 2003.
- Improved server performance for replication traffic when Exchange 2003 is used with Windows Server 2003.
- Single seat administration for Exchange 2003 and infrastructure through Active Directory Service.
- Advance junk e-mail message filtering and protection with Exchange 2003.
- RPC over HTTP in Exchange 2003 allows Outlook 2003 to work over standard WWW protocols, removing the need for VPN infrastructure just to have a rich e-mail client.
- Exchange Server 2003 to Outlook 2003 compression greatly reduces the amount of data on the wire, extending the capacity of the network.
- Outlook Cached Mode allows users to use local copies of mail, and the Exchange Server 2003 to notify Outlook 2003 when there is new mail – greatly reducing the amount of traffic on the network.

What each of these points has in common is their ability to increase productivity for the e-mail administrator and decrease e-mail service interruptions for the entire organization. Doing more with fewer man hours equates to real money saved for the organization. It also helps to prevent business grinding to a halt for a user group on a server due to a problem with one mailbox or because Exchange 5.5 isn't integrated with a third-party anti-virus solution. By remaining with Exchange 5.5, your organization could be losing more money in lost productivity than you stand to save by putting off your upgrade to Exchange 2000 or 2003. To explore these issues further, see the appendix to this paper that compares Microsoft Exchange 5.5, Exchange 2000, and Exchange Server 2003.

The Best Practices Continuum to Upgrade from Exchange 5.5

Consolidation Before Migration

For the e-mail administrator that has already conducted an analysis of benefits related to upgrading from Exchange 5.5 to a newer Exchange platform, uncertainty might arise as to the best point at which to embark upon the upgrade path. Examination of the benefits offered by newer Exchange platforms points to server/storage consolidation prior to platform migration. This step should be taken first in order to minimize the man hours needed to complete the platform migration. The reasoning behind this recommendation is simple; by consolidating numerous smaller Windows servers to larger Windows servers, the e-mail administrator can significantly reduce the number of incremental upgrades or migrations that will be required.

Additional benefits from consolidation prior to migration include, but are not necessarily limited to:

- Less data center space needed for Exchange servers
- Storage is more efficiently used through the Exchange single instance feature that stores a single copy of an attachment for all users in the same Exchange database
- Fewer IT personnel are needed in remote office locations to maintain Exchange servers

Exchange Migration Challenges

There are several issues that a business can have problems with during the migration process from Exchange 5.5 to 2000 or 2003 and steps must be taken to minimize the impact on end users. According to importance, the following migration issues could become problems for the organization if not properly addressed:

1. Network availability
2. Security
3. System performance levels following the upgrade

Upgrading from Exchange 5.5 to a newer platform normally entails the installation of new servers with improved processing power and RAM to ensure the new Exchange platform will function within pre-established service parameters. Additionally the network must be able to handle increased traffic after server consolidation has taken place. If your consolidation and migration has proceeded according to plan, but you discover too late that the network cannot

handle the increased traffic demands, service level agreements within the organization will not be met.

Another migration issue that will have to be addressed is security. Ensuring that access authorization remains consistent on the new platform is critical. With Active Directory Service on Windows Server 2000 and 2003 this process will be simplified for the IT administrator, however testing should be conducted prior to bringing users outside of the IT organization onto the new Exchange server. These challenges should not be viewed as insurmountable obstacles; on the contrary, Exchange migration challenges should be viewed as productivity enhancement opportunities that will flow out from the IT department throughout the rest of the organization.

Backup & Restore Weaknesses of Local Disk Storage and Tape

Local disk storage has been the traditional method of storage for the Exchange e-mail platform and has been a logical choice for users of Exchange 5.5 where the ability to cluster servers was limited by the platform itself. Unfortunately as more accounts were placed on an Exchange server, performance issues arose during business hours as users accessed their e-mail and when IT staff attempted to back up the Exchange server. This is problematic for administrators that are bound to time and performance limits outlined in service level agreements for the organizations they support.

Backing up Exchange logs not only degraded server performance due to processing and storage limitations, but also forced e-mail administrators to perform necessary maintenance such as backups outside of business hours. Working outside of normal business hours has the effect of increasing personnel costs for an organization, which is undesirable. On occasions when the Exchange database would become corrupted and a restore process was required, productivity would be negatively affected in a number of ways.

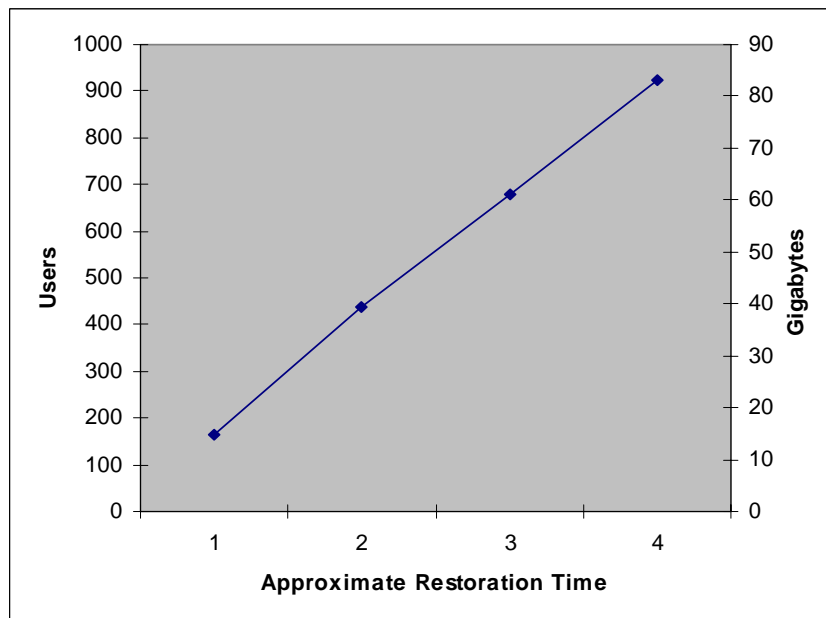
1. The e-mail administrator will be required to find the backup tape, which can take one or more hours. In addition, tape is perishable, can break, can be misplaced, and can lose data over time.
2. The entire Exchange server will be brought down, which could affect up to 400-500 users if the restoration were to begin during business hours.
3. If the database restore is put off until after peak business hours, the e-mail administrator will have to race against the clock to complete a full database restore before users return to work the next day.

4. Restore times can require eight hours or more, depending upon the last time a full backup had been initiated, the number of accounts residing on the server, and the amount of storage each account was assigned by the e-mail administrator.

When an IT issue affects a mission-critical application such as e-mail, productivity for the entire organization will plummet. Intel Corporation has analyzed the cost of a single Exchange server outage during business hours and determined that a single daylong outage for 500 users would cost the equivalent of a new messaging server.

In order to minimize costly e-mail downtime, the common Exchange 5.5 strategy had been to limit Exchange database sizes to 40 gigabytes or fewer. This ensured that backups had a minimal impact on performance and any restore procedures would affect users for no more than two hours. The problem with this strategy however, is that it fosters an environment with higher IT expenditures by creating a need to purchase additional servers as the organization grows.

All of the aforementioned issues not only point to the need to upgrade from Exchange 5.5, but also the need to consolidate e-mail onto a more redundant, highly available platform than server-attached storage.



EMC Automated Networked Storage Benefits and Microsoft Exchange

Server Consolidation Opportunities

For businesses that are planning to upgrade from Microsoft Exchange 5.5 to Exchange 2000 or Exchange Server 2003, server consolidation is one of the principle benefits. Unfortunately, server consolidation is a double-edged sword for IT departments that choose to continue utilizing local disk storage for their messaging storage needs. Financial resources saved by server consolidation over the life of the new Exchange platform can be rendered irrelevant. This is because using the local disk storage model; each Exchange server has dedicated storage that cannot be shared with other Exchange servers. What this means is that when additional storage is needed, purchasing a new server is the most common solution, rather than utilizing free storage on another Exchange server.

An organization choosing to remain with local disk storage for Exchange 2000 and 2003 not only wastes resources purchasing additional servers when more storage is needed, it also creates a larger messaging infrastructure that will eventually require more IT professionals to manage. Thus, the financial waste becomes compounded by spending money on unnecessary servers and by the need to hire additional staff to maintain them. By moving Exchange storage requirements to network storage technology to protect data integrity, productivity and financial resources, benefits will be obtained through:

- Exchange administrators no longer need to limit an Exchange database size to 40 GB or fewer as part of their backup and restoration planning (for organizations with SLAs requiring a full Exchange database restore in two hours or less).
- Scaling up with consolidated storage becomes possible instead of scaling out the Exchange environment with more servers each time additional storage is needed.
- Servers become dedicated to applications, not to backup management. This gives the organization better server performance and negates the need to purchase new servers to address CPU constraints.
- Centralized storage management lessens the workload on IT staff responsible for database backup and restore of all operating systems, applications, and servers.

Lastly, it should be noted that an organization unwilling to abandon tape storage for archiving e-mail should reconsider its archiving storage options. As government oversight of corporate governance issues intensifies, the ability to provide unaltered e-mail archives to government agencies when needed throughout the lifecycle of information is of paramount importance.

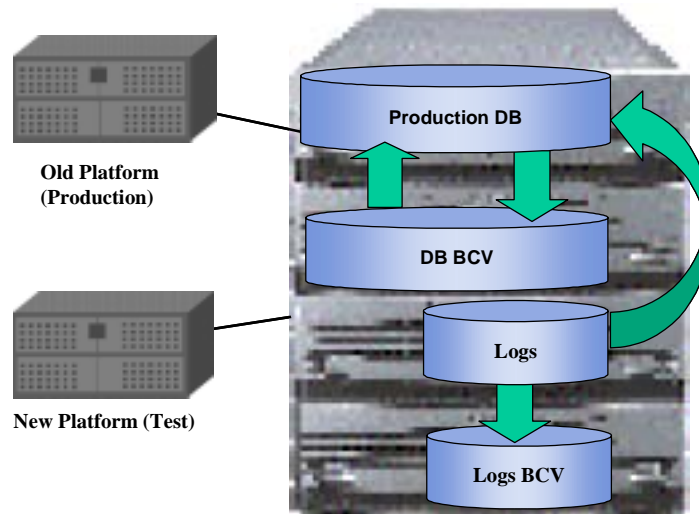
EMC Centera with content addressed storage is an ideal solution that guarantees content authenticity for e-mail archive data. Microsoft customers realize the importance of automatically, cost effectively, and intelligently managing all information from creation to archiving and disposal, which is possible with Centera. For additional information on EMC's Centera™ and how content addressed storage can meet your e-mail archive needs, visit www.emc.com or contact an EMC representative.

EMC Migration Simplicity

For Microsoft-centric organizations, migrations are a common aspect of the Windows environment. They have the potential to become time consuming, can impact production applications, and as a result, are normally done after hours. EMC Automated Networked Storage minimizes the risk of extended downtime through the use of BCV replicas.

Fortunately, EMC works closely with Microsoft and has a thorough understanding of what organizations might encounter if proper planning is not laid out in a step-by-step manner. The process of developing a detailed roadmap for Exchange migration is not something to be taken lightly as it could mean the difference between a smooth transition to a new messaging platform and service interruptions that affect productivity for an entire organization.

EMC and its implementation partners are highly skilled at developing high-level Exchange migration roadmaps that break down the migration process into easy-to-follow steps. The result of EMC's close cooperation with Microsoft has enabled EMC and its implementation partners to develop an intricate knowledge of issues pertaining to Exchange migration. EMC's connection with Microsoft is what sets it apart from other storage manufacturers and highly benefits EMC customers through a migration assessment service.



As the implementation commences, EMC Automated Networked Storage BCV replicas will become a useful tool for IT staff during the actual migration. By providing an independent copy of the new Exchange database, BCV replicas on the Automated Networked Storage array free in-use Exchange servers as well as the LAN to permit testing of the new Exchange platform and server operating system during normal business hours. In addition, it also accelerates the testing phase of the new environment by allowing different developers to test the operating system, the Exchange application, and the Exchange database simultaneously.

Depending upon the size of the implementation, the new server operating system and Exchange environments can be running in a matter of days for smaller organizations, and for large organizations, implementation can take place in as little as six months.

Exchange Backups – Tape versus EMC Automated Networked Storage

Backup and restoration of Exchange databases have long been dreaded routines by e-mail administrators for several reasons. To begin with, backups with local disk storage significantly degrade server performance on two fronts:

- Storage I/O speeds decrease for end users during backup.
- Server CPU resources are redirected to handle the backup process rather than handling the messaging load put upon it by end users.

Because of the negative performance implications surrounding Exchange backups, most e-mail administrators are forced to back up the Exchange logs and database after traditional business

hours. This method will work for some organizations that are unconcerned with additional personnel costs associated with after hours Exchange maintenance, but for companies with operations spanning several time zones, it becomes increasingly difficult to find an appropriate hour to begin Exchange backups. Additionally, administrators will also have to plan for ways to cope with the real possibility that some of the backups being performed will be invalid due to database corruptions occurring prior to the backup. This is because unlike EMC Automated Networked Storage software and services, most offline Exchange backup processes do not utilize an Exchange utility designed to check for database corruptions prior to backup. Finally, if the e-mail administrator chooses to perform a multiplexing backup onto tape, restore times are adversely affected as explained in the restore segment of this paper.

All of these issues begin to burden the e-mail administrator with additional contingency planning and the possibility of having to race to sunrise if something goes wrong in the backup process. As if that weren't enough, tape media also has a tendency to be less reliable than disk-based arrays and could also lead to corrupt backup files if the media is defective.

Exchange Rapid Restore – Tape versus EMC Automated Networked Storage

In the event of having to initiate a restore sequence, tape media limits the restore time for Exchange mailboxes following database corruptions because the tape must be found, loaded, accessed, data transferred, and unloaded which can take hours to days depending on the size of database restore needed. Additional time is added to the process if the Exchange administrator performed a backup by multiplexing data from several Exchange servers onto tape. Although tape storage vendors have made multiplexing possible, tape media was not inherently designed to handle multiplexed data, thereby slowing the read and restore process even further.

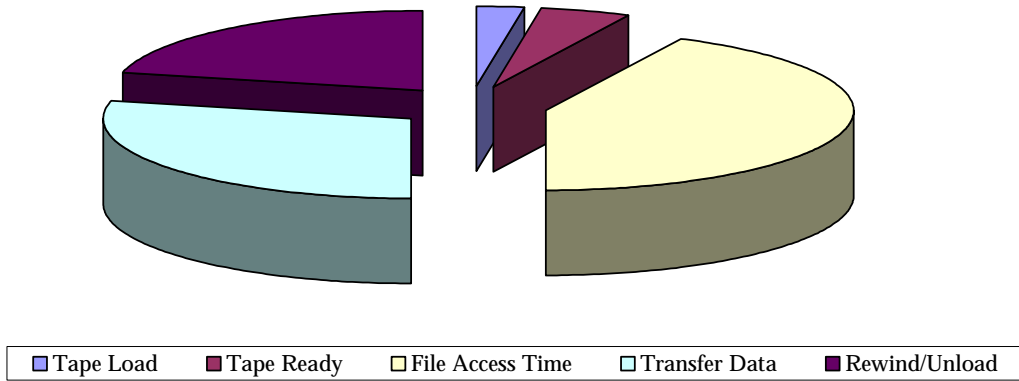
Using EMC Automated Networked Storage for the Exchange database restore process has several advantages over tape, such as:

- Multiplexed database restored in minutes rather than hours.
- Snapshots, mirrors, and business continuance volumes (BCV) provide near-instant backup and restore of Exchange databases.
- Unlike tape, EMC Automated Networked Storage is not a sequential access medium and can perform backups and database recovery simultaneously while also permitting users to access production data from the BCV before the restore process is completed.

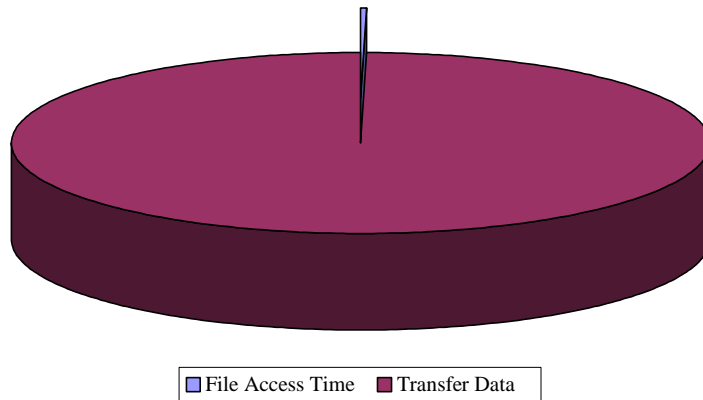
EMC Automated Networked Storage integration with Exchange ensures that all databases are checked for corruption prior to backup, thereby ensuring a rapid and successful database restore.

As shown in the two pie charts below, Automated Networked Storage has an inherent advantage of providing online access to data without requiring mechanical loading of media. In a worst-case scenario, an administrator may be required to retrieve tape media from an off-site storage facility prior to tape load, dramatically increasing total elapsed time to restoration.

Tape-to-Disk Restore Time for 40 Gigabytes: Total Elapsed Time 93:32



Disk-to-Disk Restore Time for 40 Gigabytes: Total Elapsed Time 15:32



Conclusion

Frost & Sullivan believes that business users have compelling reasons to choose the Microsoft Exchange environment due to the productivity advantages it can offer. Those organizations that do choose to upgrade or migrate to Exchange 2000 or Exchange Server 2003 should remember however, that the ideal path to a successful migration should include server and storage consolidation as the first milestone to higher IT infrastructure efficiency.

Although the upgrade to Exchange 2000 or Exchange Server 2003 will afford an organization cost-saving productivity enhancements, consolidating Exchange database storage on EMC's Automated Networked Storage solution first will maximize cost savings and productivity gains afforded with a new Exchange platform. This is because ANS allows users to sidestep performance issues related to Microsoft Exchange database backup processes during business hours and enables companies to avoid adverse financial consequences related to a lengthy database restore process with local disk and tape storage.

Organizations using ANS are neither burdened with overtime for Exchange database backups nor with the possibility of lost or broken tapes, tape degradation, and data loss during a database restore. Using ANS provides an organization with centralized storage management, as well as the ability to meet or surpass service level agreements in demanding corporate environments. Meeting SLA requirements for e-mail uptime and data throughput is crucial due to its mission-critical status, which in turn makes ANS a solid storage solution for IT departments that need to make infrastructure investments do more with fewer IT staff. It's simple; EMC can map the right service level to Exchange applications at the right cost and at the right time within the lifecycle of your information.

Finally, it is important to remember that the ability of ANS to offer customers rapid simultaneous Exchange database backup and restoration means that productivity enhancements will flow outwards into the organization by providing end users minimal Exchange server downtime. All of the aforementioned factors contribute to lower the TCO of ANS when compared with local disk storage and tape backups enabling EMC customers to decrease the time required to achieve a positive ROI following ANS implementations regardless of industry.

For more information regarding EMC Microsoft Exchange Solutions go to <http://www.emc.com/solutions/>

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Appendix - Comparison of Exchange 5.5, 2000, and 2003

Features	Exchange 5.5	Exchange 2000	Exchange 2003
2-node clustering	x	x	x
4-node clustering		x	x
8-node clustering			x
Cluster failover time improvement			x
Mount points overcome the 24-drive letter limitation			x
Standard storage area network (SAN) connectivity		x	x
Standard backup with third-party hardware		x	x
Database backup (Volume Shadow Copy service)			x
Mailbox Recovery Center tool			x
Restore Storage group			x
2-GB standard allocation		x	x
3-GB user mode		x	x
/USERVA memory switch (Requires Microsoft Windows Server™ 2003)			x
Public folder store replication improvements			x
Distribution list caching improvements			x
Suppression of Out of Office messages to distribution lists			x
Microsoft Office Outlook® 2003–cached Exchange mode	x	x	x
Internet Protocol security (IPSec) support for front-end and back-end clusters			x
Cross-forest Kerberos authentication with Outlook 2003 (Requires Microsoft Metadirectory Service [MMS] and Outlook 2003)			x
Signed Lightweight Directory Access Protocol (LDAP) requests to Active Directory® directory service		x	x
Front-end and back-end Kerberos authentication			x
Internet Information Services (IIS) 6.0 security and dedicated application mode			x
Distribution lists are restricted to authenticated users			x
Real-time Safe and Block lists			x
Inbound recipient filtering			x
Advanced junk e-mail message filtering and protection (Requires Outlook 2003)		x	x

Features	Exchange 5.5	Exchange 2000	Exchange 2003
Virus Scanning API 2.5 (Requires third-party antivirus software)		x	x
Attachment blocking in Microsoft Office			x
Outlook Web Access			
Public folder permissions improvements for unknown users			x
Restricted submissions improvements			x
Outlook Web Access user interface (UI) and feature set improvements			x
Outlook 2003 performance improvements through MAPI compression			x
HTTP access from Outlook 2003			x
cHTML, xHTML, and HTML mobile phone browser support			x
Exchange Server ActiveSync®		x	x
Pocket PC 2002 and Smartphone support		x	x
Up-to-date notifications synchronization (Requires Microsoft Windows Mobile™ 2003–based devices such as Pocket PC and Smartphone)			x
Real-time collaboration (Replacement for Exchange Instant Messaging and Exchange 2000 Conferencing Server) (Requires Microsoft Office Live Meeting and Microsoft Office Live Communications Server 2003)		x	x
Microsoft SharePoint™ Portal Server Web Parts (Requires SharePoint Portal Server and/or Microsoft Windows® SharePoint Services)		x	x
Advanced managed, remote accessible application programming interface (API) for collaborative application development			x
Exchange System Manager running on Windows XP		x	x
Queues are centralized on a per-server basis			x
UI improvements			x
All system queues are exposed			x

Features	Exchange 5.5	Exchange 2000	Exchange 2003
Cookie authorization enablement			x
Move log files and queue data using Exchange System Manager			x
Public folder Send hierarchy			x
Public folder Search capabilities			x
Public folder Send Contents			x
Public folder affinity to control referrals			x
Public folder migration from Exchange Server 5.5 to Exchange 2003			x
Multi-user Move Mailbox function			x
Dynamic distribution lists			x
Multiple Windows forest support (requires MMS)		x	x
Automatic error reporting		x	x
1,700 Exchange-specific events using Microsoft Operations Manager (Requires Microsoft Operations Manager)			x
Deployment and migration tools			x
Active Directory Connector improvements			x
Internet Mail Connection Wizard			x
Multiple Mailbox Move tool			x
Collaboration data objects (CDOs)		x	x
Managed API			x

Source: Microsoft Corporation