White Paper

The SANity of Using Networked Storage Rather than DAS for Exchange and SQL

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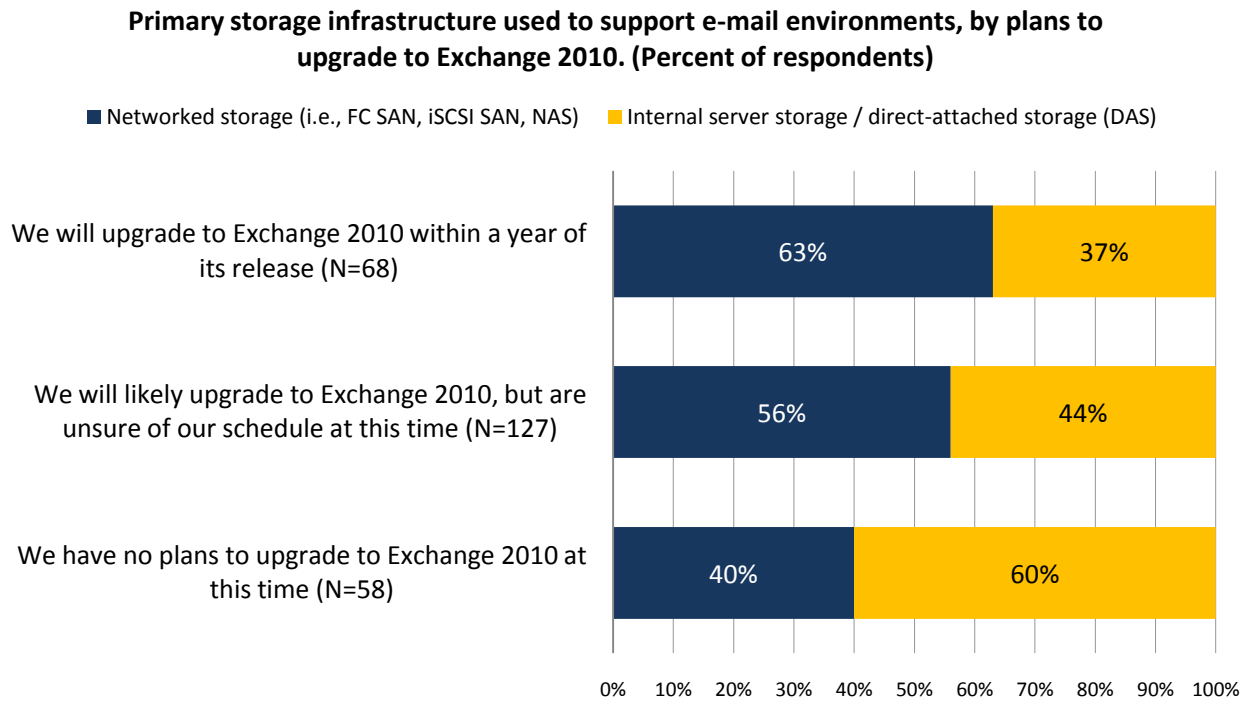
Market Situation: to Share or to Hold?

Increasing interaction, sharing, and networking of data have been hallmarks of IT development for decades. Networked storage has made shared data and shared data management services available within and between organizations, replacing rigid DAS (direct attached storage) systems with a more flexible infrastructure. This trend is markedly strong in virtual server environments, yet the benefit of this shared approach is being challenged by some loud voices with their own agendas; notably Microsoft, which is strongly encouraging users to run its Exchange (especially the 2010 version) and SQL Server products on DAS rather than on networked storage. But is that good advice? Using quantitative research and analysis, in addition to an examination of broad IT needs, this paper shows that following Microsoft's advice runs counter to not only proven wisdom, but also invariably to business needs, IT's interests within organizations, and even to optimizing storage TCO (total cost of ownership).

"Hermit" or "permit"? Should CIOs, architects, and other executives treat key—and often mission-critical—applications such as Exchange and SQL like hermits, sealed off from everything else? Or should they enable these applications to be a part of their wider IT operations and standards? As detailed later, the cost and functionality benefits of SANs (storage area networks; the market dominant form of networked storage) over DAS are compelling. Moreover, nothing in IT happens in a vacuum. Although those responsible for keeping, say, Exchange up and running, might exhibit "storage hugging" hermit qualities and embrace Microsoft's DAS suggestions, they are running against clear usage trends: as demonstrated in Figure 1, *almost two thirds of the leading edge adopters of Exchange 2010 are favoring networked storage over DAS.* Furthermore (see Figure 2) in medium and larger organizations, networked storage significantly exceeds DAS as the primary storage infrastructure for Exchange users of 1,000 or more seats.

Figure 1. Primary E-Mail Storage Infrastructure Profile of Users Based on Exchange 2010 Upgrade Plans



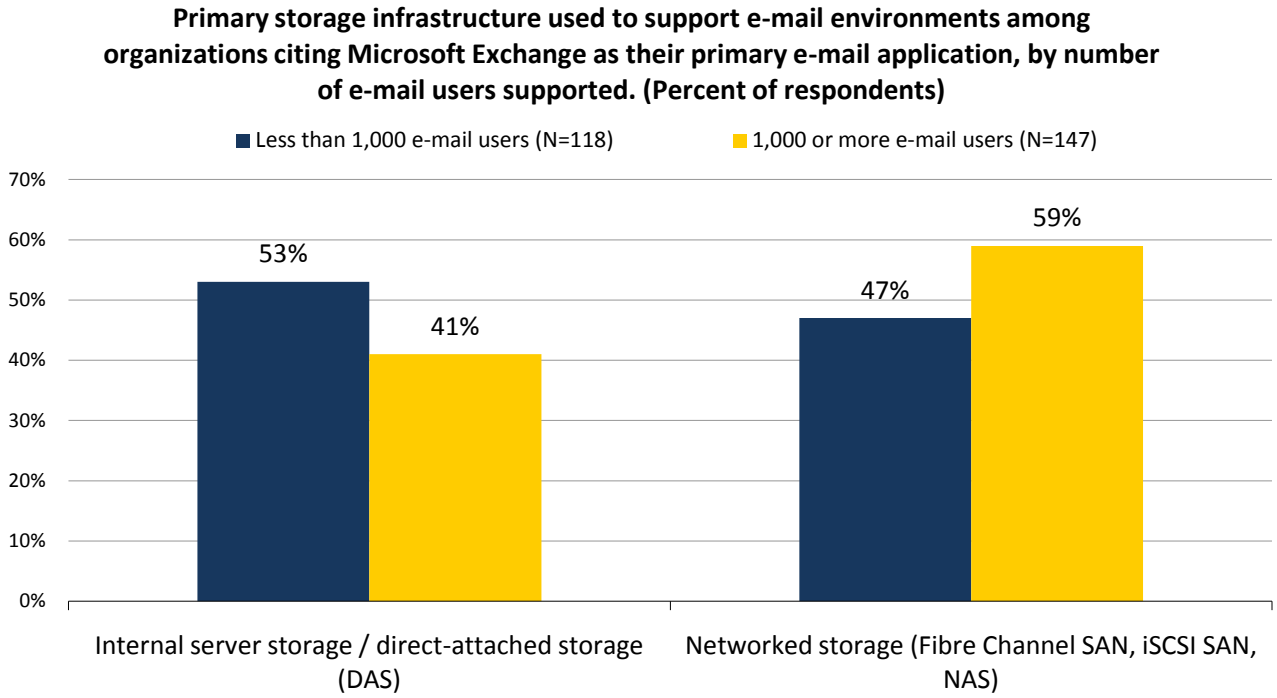
Source: Enterprise Strategy Group, 2010.

Beyond the "Exchange/SQL vacuum," ESG research shows adoption is consistent with the overall storage market; when asked about their top areas for investment for 2010-11, respondents indicated "new SAN systems" as number one by a considerable margin.[1] Indeed, the whole IT industry is currently emphasizing resource pooling ranging from public clouds to agile on-demand internal provisioning; such approaches are worlds away from the

[1] Source: ESG Research Report, *2010 IT Spending Intentions Survey*, January 2010.

capabilities of DAS and yet Microsoft is positioning it as the preferred storage tool for some of its flagship applications. So why are users making pro-networked storage decisions, either in general or for Exchange and SQL Server? Is there any reason to heed Microsoft's advice to re-emphasize DAS?

Figure 2. Primary Storage Infrastructure Used to Support Microsoft Exchange, by Number of E-Mail Users



Source: Enterprise Strategy Group, 2010.

Exchange and SQL Server Storage: Options and Opportunities

The Pros and Cons of Microsoft Advocating DAS: Citing tight integration, lower costs, and improved application performance, Microsoft advises IT managers to employ DAS for Exchange and SQL Server. Although some users will indeed boost their response times, they will also find themselves managing dozens or hundreds of independent and isolated compute and storage platforms; if an Exchange mailbox server needs more capacity, the free space from another server environment cannot be used. The net result is poor storage utilization and even unnecessary spending on server resources just to add storage capacity. To use a car analogy, such users may have great uphill speed (whether or not that was necessary is another question), but they have no anti-lock brakes (a disaster waiting to happen) and very poor gas mileage (utilization).

Independent or "siloed" Microsoft storage infrastructures also complicate backup and DR operations, which have to be executed and monitored on each individual server; in some instances, organizations have even omitted their Microsoft environments from DR plans simply because it is too hard to manage so many individual devices. Microsoft-specific tools such as Volume Shadow Services are provided at no cost, but they are really only suited for simple environments with a few servers and minimal storage capacity because they, too, must be configured on a per device basis (not to mention that the capabilities vary from version to version).

Microsoft has also made great play of reducing the IO load that Exchange 2010 places upon storage, which it says makes DAS more relevant—*but* it can just as easily be argued that this makes it easier to integrate Exchange with the overall performance needs of other applications and hence benefit from the many other advantages that a networked storage model provides. Indeed, there is an implicit admission in Microsoft's stance that DAS wasn't optimal before. So why change? After all, it is clear that users are increasingly adopting networked storage and they seem to be doing just fine. "Ah yes," says Microsoft, "but DAS is way cheaper than SAN or NAS and that's a great benefit." Isn't that so? Well yes … and no. While the raw (simple per TB) capital cost of DAS is indeed lower than

other options, its real TCO differs little from—and is at times even higher than— a SAN. So where is the "benefit" of DAS's cheapness? The answer seems to be that is accrues to Microsoft, which is engaged in a market share and control battle for e-mail (and other business applications) with Google and others. Promoting DAS manufactures a lower perceived cost for Microsoft applications. While an outsider might shrug and not worry about where the sales revenue and margins go in an industry, the issue here is complicated by the fact that it is not an apples-to-apples comparison; there are opportunity costs for users who choose DAS over networked storage.

The Case for Networked Storage: Although users are well enough informed to appreciate that DAS is a functional, ostensibly low cost, and seemingly simple option, the market continues to employ more shared storage (as already shown by the research data summarized in Figure 2, leading edge Microsoft users do this in increasing numbers). There are three main reasons for this, noted here and with further explanation in the following pages:

1. *The straightforward **limitations of DAS**.*
2. *The benefits of **combining networked storage with virtualized servers.***
3. *The **broader advantages of networked storage** itself, both TCO and functionality.*

SANs and Virtualization can Drive Business Benefits: EMC's range of SANs are a good example of networked storage solutions that certainly address the shortcomings of DAS and enable IT users to achieve leaps in efficiency, productivity, and manageability—improving ROI and lowering TCO. Table 1 summarizes the primary ways in which SANs, such as EMC's, can benefit *entire* data centers and businesses *including, but not limited to,* Exchange and SQL.

Table 1. SAN Networked Storage Advantages and DAS Limitations

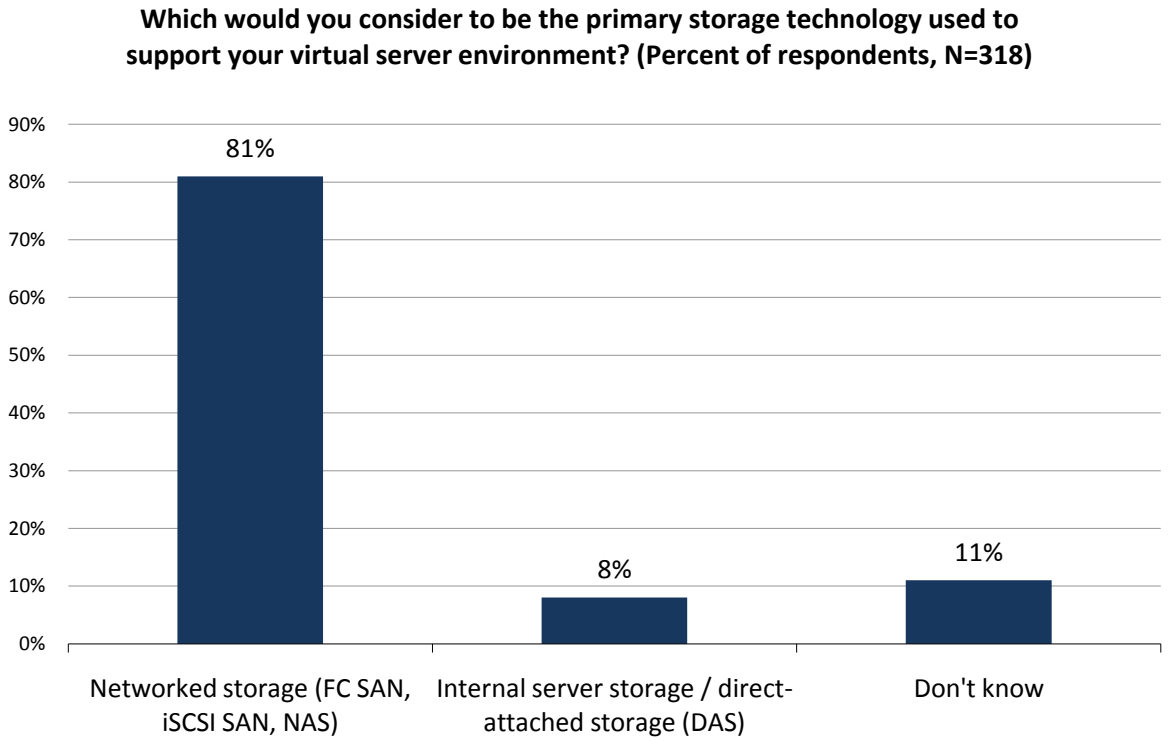
	Storage Area Networks	Direct Attached Storage
Total Cost of Ownership	Lower overall data center operating costs, decreased power and cooling, reduced footprint, & streamlined management via shared and tiered storage	Risk of extended downtime, multiple silos of management; runs counter to broader server virtualization goals
Capacity Utilization	Thin provisioning, data deduplication, "just-in-time" shared capacity; capacity is bought as needed	Poor allocation, low utilization, and over-purchased capacity are typical; dormant space = wasted $
Scalability	Provision from a central pool of capacity, grow based on demand without affecting applications	Requires planned downtime and has capacity limitations
Management	Centralized control and tool set, often with virtual OS integration	Many management points and significantly more manual IT resources needed
High Availability	Multi-pathing, redundant controllers, and built in data protection; HA levels appropriate to application needs	Difficult to replicate data dispersed across the data center; single point of failure per server
Disaster Recovery	Instant snapshots, integrated recovery	Single points of failure; third party replication tools required for DR
Backup and Recovery	Instant copies of data, easily cloned for test/dev; can save multiple space-efficient copies	Lengthy individual backup and recovery times
Server Virtualization	Built in mobility and high availability for maximum agility and resource utilization/consolidation	Sub-optimal for virtualization; limited consolidation and can require application downtime

Source: Enterprise Strategy Group, 2010.

1) DAS Limitations: At a high level, DAS is simply at odds with the notion—and popular aim—of having a truly dynamic data center with the ability to apply business policies in an automated fashion to the entire IT infrastructure. Its shortcomings can leave IT tripping over its own feet, struggling to keep pace with the rapid changes and escalating expectations to which businesses worldwide are constantly exposed. Because it is difficult to apply standard processes in a DAS environment, backup is likely to involve multiple strategies, the retention of excessive duplicate data, or extremely lengthy and error-prone restoration processes. Simply, compared to networked storage, DAS demands more dedicated IT resources—of all kinds—to manage the same capacity.

2) Networked Storage Complements Virtualized Servers: Server virtualization enables consolidation, load balancing, and improved utilization—all of which reduce costs. While DAS can be used with virtual servers, it clearly dilutes the IT power and business benefits of that virtualization. Networked storage is a prerequisite if businesses —leveraging virtualization's inherent mobility to achieve better flexibility, performance, and availability—are to take full advantage of some key benefits of virtualization, especially the valuable BC (business continuity) and DR (disaster recovery) capabilities now available in products such as VMware's Site Recovery Manager. Indeed, IT is increasingly virtualized and the chosen storage for virtualized server environments is overwhelmingly networked. As Figure 3 shows, 81% of virtual server environments consider networked storage to be their primary storage infrastructure used to support virtual server environments. The same survey also showed that SANs accounted for 69% of the 81% total, or six out of every seven instances.[2]

Figure 1. Primary Storage Infrastructure in Virtual Server Environments



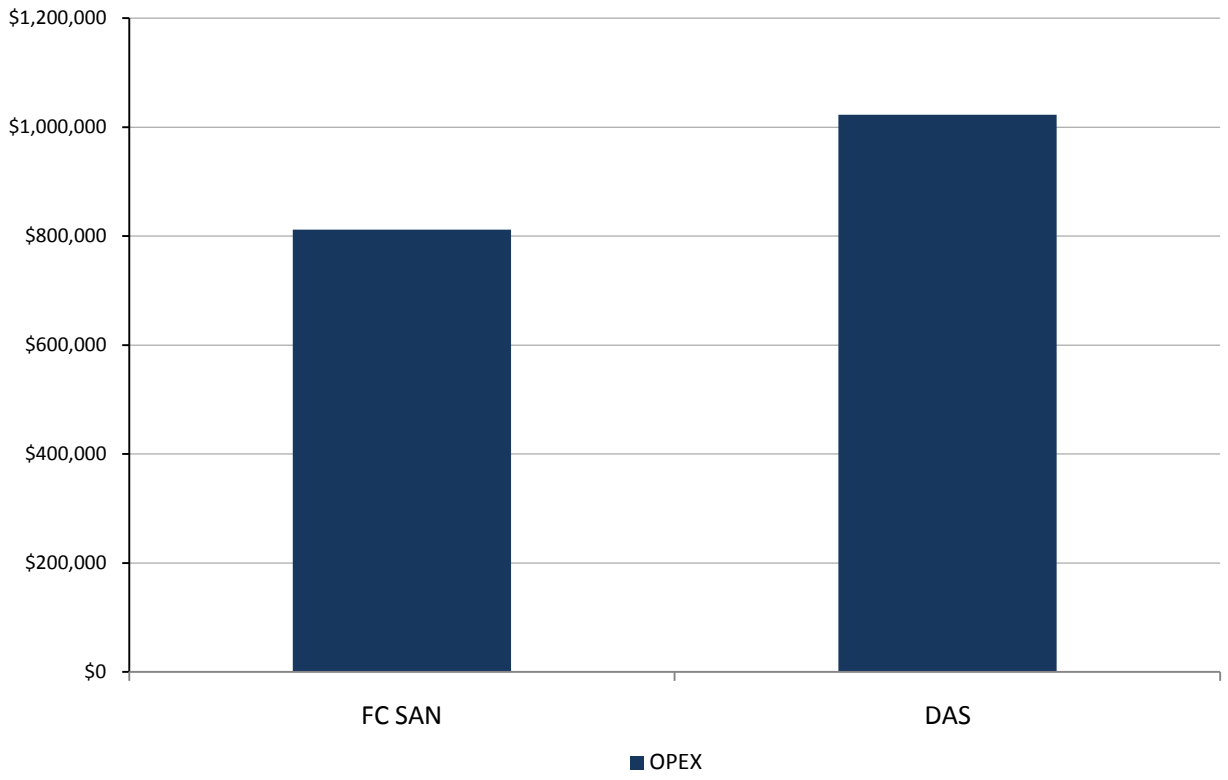
Source: Enterprise Strategy Group, 2010.

Emphasizing the point further, ESG's 2010 Spending Intentions Survey found that users' number one IT priority (by a significant margin) for 2010-11 is the increased use of server virtualization—and that users citing an increased use of server virtualization as one of their most important IT priorities were more than twice as likely as others (47% versus 21%) to be investing in new SANs.

[2] Source: ESG Research Brief, *iSCSI SAN Usage in Virtual Server Environments*, December 2009.

3) Broader Networked Storage Advantages—TCO and Functionality: Beyond the above-noted benefits of networked storage, vendors such as EMC are continually adding new capabilities that make SAN usage and adoption more compelling: for example, integration with VMware and Hyper-V, the new "FAST" tiering function, thin provisioning, and the inclusion of solid state flash drives. Microsoft might well counter this by saying that DAS is inexpensive and easy to manage, but such claims do not stand up to scrutiny. In 2009, ESG conducted a TCO analysis of a relatively small environment (80 TB). While the DAS option was less than one third of the purchase cost of the SAN, as Figure 4 demonstrates starkly, the OPEX associated with DAS was far higher.

Figure 2. Comparing the OPEX Elements of TCO for DAS and SANs



Source: Enterprise Strategy Group, 2010.

Interestingly, this example actually favors DAS for a couple of reasons:

1. It represents a relatively small configuration with associated management costs—key elements in the DAS OPEX calculation that are more linear for DAS than SAN, which is more automated and self-managing.
2. This TCO analysis does not account for the positive cost-benefit impact of the additional business value (such as better utilization, thin provisioning, DR, tiering, replication, etc.) that SANs can provide.

The data shows that DAS is only inexpensive when viewed superficially and that furthermore, the real underlying expense of DAS is felt precisely where users do *not* want it. In the previously cited ESG IT spending intentions survey, when users were asked what considerations were currently most important in justifying IT investments, "reduction in operational costs" was a clear number one for businesses of all sizes. For enterprise organizations, OPEX reduction was *twice* as important as CAPEX reduction (which was only fifth in terms of consideration priority), while midmarket organizations cited OPEX reduction as 58% more important than CAPEX reduction (and the fourth overall priority).

Implementation Considerations

Organizations need to weigh the competing claims of vendors. Exchange and SQL are often business critical applications and their underlying infrastructure should fully reflect that. In most cases, networked storage provides distinct advantages over DAS, including far more cost effective OPEX in addition to the more obvious functional advantages (with technologies such as deduplication and automated storage tiering improving both utilization and cost). At the most straightforward level, organizations are well advised to stop and think, ensuring that they take an appropriately broad view of their IT and the business of running it. In the holistic sense of making progress, networked storage can be an engine whereas DAS can all too easily become an anchor.

The Bigger Truth

The recommendations of large organizations such as Microsoft can seem like edicts, but they should be evaluated strictly in terms of what is best on a case by case basis. In simple terms, Exchange and SQL must be considered as a part of a larger IT environment and not in isolation. The job of IT is to deliver business value, whether that's measured as minimizing cost, maximizing agility, or reducing risk. None of these aims go hand-in-hand with blind adoption of DAS. And the weight of evidence presented in this paper demonstrates that users understand this:

- *Server virtualization addition is the current number one IT priority.*
- *SAN addition is the current number one storage priority.*
- *There is a high correlation between users adding server virtualization and users adding SANs.*
- *The vast majority of virtual server users have networked storage (mostly SAN) as their prime storage.*
- *OPEX reduction is the current number one consideration in justifying IT expenditure and is far more important than CAPEX reduction.*
- *TCO analysis shows that DAS OPEX is dramatically higher than that of SANs.*
- *Companies planning to move to Exchange 2010 overwhelmingly intend to use SANs as their primary storage.*

The facts demonstrate a consistent trend, one that strongly favors a shared and integrated IT resource pool. In terms of broad market dynamics, it is easy to see how Microsoft can gain from marketing the value of DAS, but far less easy to see how users will benefit in reality. While the improvements in storage functionality in Exchange 2010 are welcome, they are not sufficient reason to change a proven overall formula. DAS restricts, whereas SANs permit freedom and flexibility. Aside from a few marginal "hermit cases," networked storage remains the best overall approach. Even if some short-term, expedient efficiency is possible with DAS (and it needs a particular environment to be the case), it will be at the cost of longer term agility, value, and choice.

The bottom line is that IT organizations seeking high storage efficiency for Exchange and SQL will do well to leverage networked storage as they will have the best chance to achieve optimum capacity utilization, improve performance, increase availability, reduce floor space use, and provide global protection of their critical data using uniform processes across the entire data center and all applications.

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