



Hitachi Data Systems: Attacking The NAS Market With Compelling Business Value

Executive Summary

With general availability in February 2006 of two types of NAS solutions, Hitachi Data Systems has signaled its intent to make an aggressive move into the NAS market space and compete in the long-term. The first is the introduction of a new product family of Hitachi TagmaStore™ Workgroup Modular Storage and Adaptable Modular Storage (WMS and AMS) low-end to midrange NAS filers. The second solution is the improved performance of the original NAS Blade add-ons to the Hitachi TagmaStore™ Universal Storage Platform (USP) and Network Storage Controller (NSC), which attack the SAN/NAS integrated storage market.

Hitachi Data Systems has quickly become the high-end storage market leader with the success of its USP and NSC. The company is leveraging this expanded customer base to address the NAS market. Each NAS product has distinct value components.

The value proposition of the WMS and AMS NAS filers is:

- Very aggressively priced NAS filer heads
- The ability to intermix high-end Fibre Channel and SATA disks on the same filer head, which reduces overall cost of storage
- Reliable, high-performance, and scalable NAS solutions
- Very aggressive initial pricing of the overall WMS and AMS filer systems – targeting an overall 50% price reduction over market leader pricing for specific market segments for the total NAS solution.

The value proposition of NAS Blade add-ons to the Hitachi USP and NSC is:

- The possibility of controlling NAS and virtually all other enterprise storage (up to 32 Petabytes) within a single architecture and a single management framework, with a common set of storage tools
- The ability to mix, match, and manage different storage technologies from multiple vendors within this integrated architecture
- An architecture providing true virtualization that works for all storage volumes and storage types (NAS, SAN, and DAS)
- A Tiered Storage architecture, which allows customers to match application requirements to storage attributes (e.g., high-performance applications stored on internal disks; archival volumes stored on externally-attached SATA-based storage systems)

This white paper details two case studies to help identify and quantify the value proposition of the Hitachi Data Systems NAS solutions in mid-sized and high-end data centers. The scenarios analyzed are:



- **Case 1:** The value of using the WMS/AMS NAS storage as a stand-alone consolidation solution to traditional server farms with DAS. This case shows the potential of NAS consolidation to decrease total cost of ownership (TCO) by 70% relative to standalone DAS solutions, and show a TCO improvement of 18% relative to best-of-breed competition.
- **Case 2:** The value of managing all NAS and SAN assets from the NSC by virtualizing all data, and providing Tiered Storage. This case shows the potential to leverage the NSC improved TCO by 44% relative to best-of-breed NAS solutions. This case further demonstrates how this approach provides storage for performance-critical workloads and lower cost storage (e.g., SATA) where appropriate. In addition, the NSC provides common software services as required for all storage. This is compared to the traditional method of managing different storage pools with different configurations, in this specific case staying with a separate silo of NAS storage.

ITCentrix concludes that Hitachi Data Systems offers highly cost competitive solutions in the NAS spaces it serves, both as stand alone NAS filers and as embedded NAS Blades on the USP and NSC.

In the near term, the company's biggest strength is leveraging its TagmaStore USP and NSC virtual storage controllers with a blade strategy to manage data center storage under a single pane of glass. ITCentrix believes Hitachi Data Systems has a clear and compelling vision for managing SAN and NAS data center storage, with an approach that is inclusive and cooperative. This allows customers to consider radically different methods of organizing enterprise storage assets driven by quality-of-service and improvement of functionality to the business, rather than incompatible storage technologies. This vision will be cautiously adopted by enterprise storage executives.

Hitachi Data Systems standalone, head-to-head NAS filer strategy is rapidly emerging. Data centers having large-scale or performance critical CIFS-based NAS requirements will probably wait until the company fills out its product line with improved CIFS solutions. Hitachi Data Systems does not as yet supply the very large clustered NAS file servers required by very large data centers that are predominantly NAS.

Hitachi Data Systems impressive track record, emphasis on advanced software functionality, and new management are all indicators that the company will be a force in the NAS market. IT executives, specifically those responsible for data centers, should examine the Hitachi Data Systems NAS offerings, and include them in storage evaluations.

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Hitachi Data Systems WMS and AMS NAS Value Proposition

Hitachi Data Systems WMS and AMS NAS Filers

The WMS and AMS NAS filers have the following characteristics:

- Excellent performance and scalability at extremely competitive prices
- The ability to intermix SATA or high availability FC drives matching performance and cost
- Excellent reliability and support for SATA drives with RAID-6
- Easy-to-use software for configuring, managing, backup and recovery of any workload

Case Study 1 – Mid-sized Financial Organization

The mid-sized financial organization has revenues of slightly less than \$1B, and 3,000 staff at an average salary of \$70,000. Users spend about 45% of their time actively using IT applications.

The current customer Data Center environment includes a significant number of UNIX servers with DAS storage used for a range of applications, including Data Warehouses and Data Marts, complex financial models, and other financial support systems. The center supports 1,000 users.

The storage requirements for these servers has been growing significantly (4 Terabytes growing at 30%), and management wants to bring storage costs under control, while continuing to provide improved availability and better time-to-change within this part of the data center. For security reasons, the financial organization needs to keep this area of its computing separate from the traditional transaction systems.

Challenge and Objectives:

- Reduce the cost of storage for UNIX server farms by consolidating storage assets
- Improve the ability to introduce change for the applications supported by the UNIX servers
- Maintain or improve systems availability

Hitachi Data Systems WMS and AMS NAS Solution Objectives

- Provide 4TB of mixed performance NAS storage for UNIX server farm
- Consolidate all DAS storage from UNIX application onto the NAS storage
- Create a single management process for provisioning, allocation, monitoring, protection, and recovery, so improved flexibility objectives can be met



Projected Benefits

- The projected TCO business case for consolidation to Hitachi Data Systems NAS filers was \$1.34M over 3 years, with a TCO improvement of 70% from \$3.24M to \$1.90M .
- Improved service to end users in availability of 1% from better management of storage
- A simpler, more stable and flexible storage management environment reducing the amount of time required to introduce or change applications by about 5 days
- An improvement in NAS storage acquisition costs of 18% compared with best-of-breed competition. This is due to lower NAS filer and storage costs in year 1, and better allocation and utilization of storage due to the ability to mix SATA and high performance storage on the same NAS filer head.

Model Outputs

A general description of the ITCentrix methodology is provided in Appendix I. The following examples quantify the incremental business case for the Hitachi Data Systems **NAS Filer Solution** as compared to continuing with current DAS strategy.

- **Figure 1 below** – This reflects a TCO improvement from the consolidation of DAS to NAS storage on best-of-breed competition, and Hitachi Data Systems Modular NAS storage. The total TCO improvement is \$1.34M over 3 years. The Hitachi Data System NAS Filer solution shows a TCO improvement of 18% relative to best-of-breed competition.
- **Figure 2 below** – Shows the total business case for consolidation to Hitachi Data Systems Modular NAS storage of \$1.78M, including TCO benefits of \$1.34M and the additional benefits to the business of improved availability and flexibility.
- **Figure 3 below** – shows the detailed business case and financial analysis. The total business benefit is \$1.78M over 3 years, with a NPV of \$1.53M, an IRR of 186% and a breakeven of approximately 5 months. If a more conservative case is taken excluding the business value benefits and only including the impact on the IT budget, the NPV is \$1.14M, the IRR is 152%, and the breakeven is approximately 6 months.

Figure 1- The TCO Impact of Consolidating UNIX DAS Storage to Hitachi Data Systems NAS

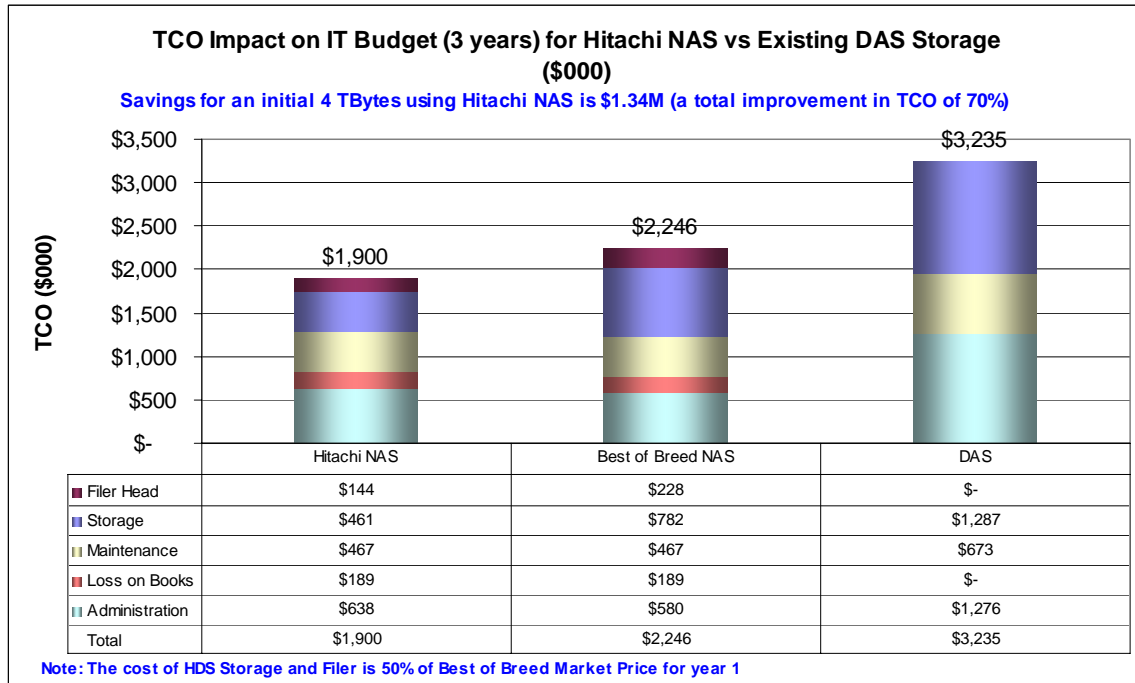


Figure 2 - The Total Business Benefit of Consolidating DAS Storage to Hitachi Data Systems NAS

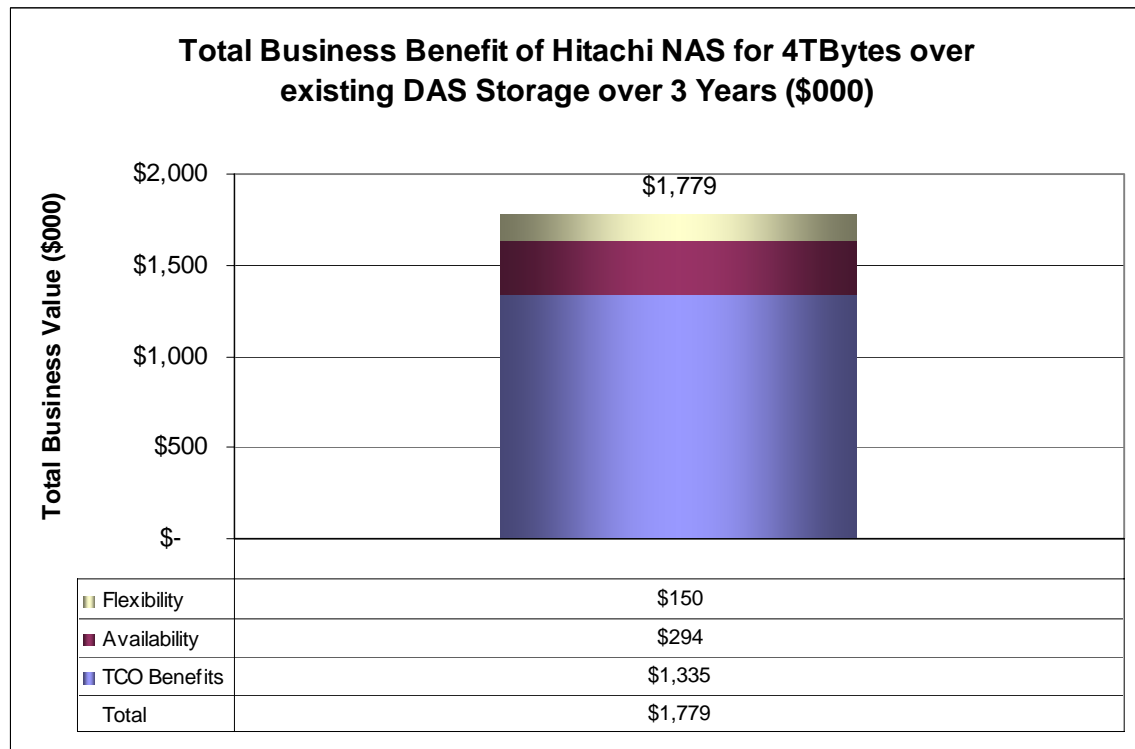




Figure 3 – The Detailed Business Case for Consolidation of DAS Storage to Hitachi Data Systems

Business Case for WMS/AMS (Consolidation 4 TBytes)					
Project Costs (\$000)		Startup	Year 1	Year 2	Year 3
	Replacement of DAS Storage with NAS	\$364,000	\$128,800	\$288,232	\$291,912
	Loss on Books on Existing DAS Storage	\$189,280			
	Total Costs	\$553,280	\$128,800	\$288,232	\$291,912
Benefits					
	Reduced Storage Administration Cost		\$200,000	\$212,333	\$225,427
	Avoidance of Future DAS & Maintenance (Better Utilization & Mapping)		\$1,135,680	\$410,738	\$413,321
	Improved Availability		\$96,000	\$97,920	\$99,878
	Improved Flexibility		\$49,091	\$50,073	\$51,074
	Total Benefits		\$1,480,771	\$771,064	\$789,701
Financial Analysis					
	Net Value	-\$553,280	\$1,351,971	\$482,832	\$497,789
	Cumulative Value	-\$553,280	\$798,691	\$1,281,523	\$1,779,312
	Net Present Value	\$1,525,965			
	Annual ROI	92%			
	IRR	186%			
	Payback Period (months)	4.9			
	Net Present Value (IT Budget Benefits)	\$1,142,332			
	Annual ROI (IT Budget Benefits)	69%			
	IRR (IT Budget Benefits)	152%			
	Payback Period (IT Budget Benefits)	5.5			
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Hitachi Data Systems NAS Blade Value Proposition

Hitachi Data Systems NAS Blade for USP and NSC

The NAS Blades have the following characteristics:

- Deliver full NAS functionality in a high-availability clustered configuration
- RAID data protection, including RAID-6 for SATA exploitation
- Supported by Hitachi Data Systems Management software enabling business continuity—Hitachi ShadowImage™ In-System Replication, TrueCopy™ Remote Replication, and Universal Replicator software
- NAS Blades are integrated with Hi-Track® and have the same “phone-home” capability as the storage system
- Consolidate all storage (FICON/ESCON, direct attach, SAN and NAS) onto a single footprint



- Leveraging the embedded virtualization layer and heterogeneous management capabilities of the USP and NSC, NAS volumes can be kept on high-performance, high-availability Fibre Channel drives within the Universal Storage Platform or on inexpensive externally attached SATA-based storage
- NAS storage can be allocated (or de-allocated) in seconds
- All storage can be managed from one "pane of glass" with the Hitachi HiCommand® Device Manager software

New Data Center Storage Management Capabilities

The Hitachi Data Systems USP and NSC55 virtual storage controllers are based on the new Hitachi Universal Star Network™ crossbar switch architecture and capabilities to the marketplace. Overall, this unique architecture provides IT management with the best of two worlds; the ability to use almost any storage available to meet price/performance and functionality requirements, and the ability to manage storage across the data center with a single set of software.

The NAS Blades extend the range of this value proposition to NAS storage. NAS volumes are fully integrated into the USP and NSC architecture, enabling storage administrators to have total flexibility of allocation and management of SAN and NAS storage resources, improving efficiency.

This allows the potential of reducing storage management costs, by providing, on a controlled basis, enriched functionality or storage with minimal functionality. In addition, significant benefits to the user experience through improved performance, availability, security, and flexibility (the ability to update and introduce new function as the business changes) are provided.

Case Study 2 – Large Manufacturing Organization wanting to Integrate NAS storage with other Storage

A large manufacturing organization with revenues of slightly less than \$1B, 25,000 contractors and staff with an average salary of \$55,000. The IT users spend about 40% of their time actively using IT applications.

The current customer Data Center environment includes a significant amount of NAS storage providing NFS services mainly to UNIX servers (and some CIFS services to Windows servers). The NAS storage supports a range of applications, including Data Warehouses and Data Marts, and some technical and manufacturing applications. The infrastructure supports 2,000 users.

The NAS storage for these servers has been growing rapidly (10 Terabytes growing at 40% annually). Management has been striving to bring storage costs under control. They have installed a NSC virtual storage controller for the SAN network, and want to investigate the business case for extending tiered storage and virtualization architecture to NAS.

Challenge and Objectives:

- Reduce the cost of NAS storage by bringing it into a single pool with common administrative storage management



- Improve the ability to introduce new applications and change for the applications supported on the NAS storage
- Maintain or improve systems availability

Hitachi Data Systems NAS Blade Solution Objectives

- Provide 10TB of mixed Performance NAS storage to replace NAS Silo of Storage
- Create a single management process for provisioning, allocation, monitoring, protection, and recovery, so improved flexibility objectives can be met

Projected Benefits

- The projected TCO delta business case for consolidation to NAS Blades on the NSC was \$2.5M over 5 years, with a TCO improvement of 44% from \$8.2 M to \$5.7M. This was due to lower NAS filer head costs and better allocation and utilization of storage because of the ability to mix SATA and high performance storage on the same NAS filer head
- Improve service to end users in availability by 0.1%
- Simpler, more stable and flexible storage management environment enabling a reduction in time to introduce or change applications of ~1%

Model Outputs

A general description of the ITCentrix methodology is provided in Appendix I. The following case study quantifies the business case for migrating to a **NAS Blade on a Network Storage Controller** as compared to competitive best-of-breed “Silo” solution.

- **Figure 4 below** – This reflects the TCO improvement costs from the migration of a NAS Silo to NAS Blade storage on the NSC of 44%.
- **Figure 5 below** – Shows the total business case for migrating to NAS Blade storage, including the benefits to the business of improved availability and flexibility. The total business benefit is \$2.8M over 5 years.
- **Figure 6 below** – Details the business case and financial analysis, showing a Net Present Value of \$2.3M, a breakeven of 6 months, and an IRR of 349% for the total business case. A more conservative case, excluding the business value benefits and only including the impact on the IT budget, would reflect a Net Present Value of \$2.1M, an IRR of 325%, and a similar breakeven of approximately 6 months.



Figure 4 – The TCO Impact of Migrating a NAS Silo to Hitachi Data Systems NAS Blade

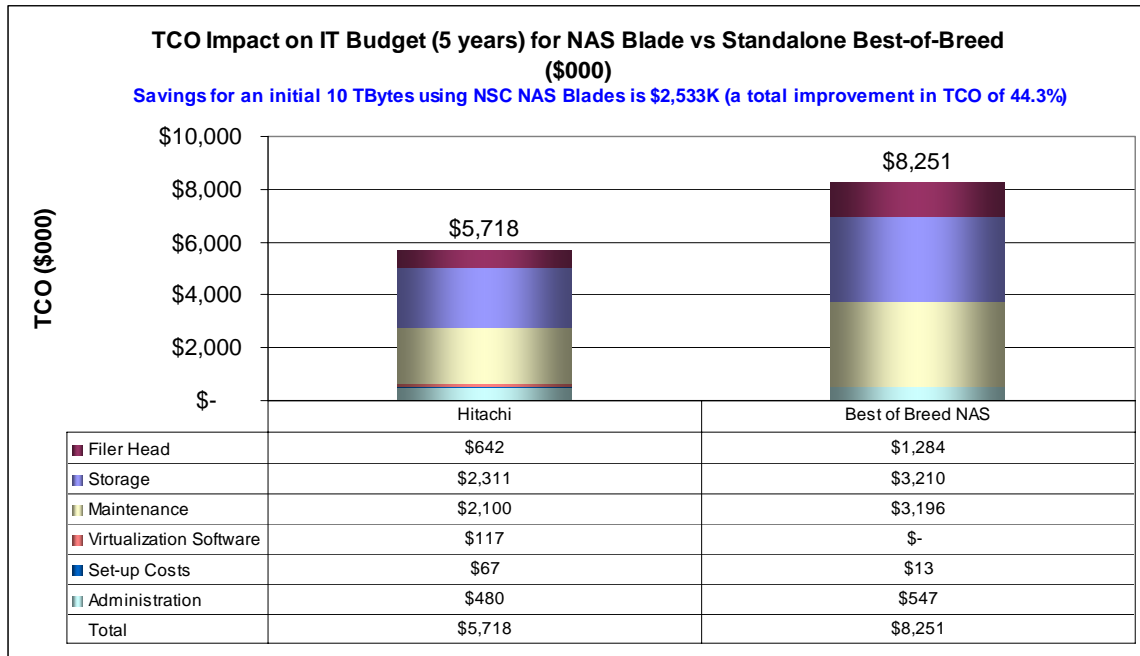


Figure 5 - The Total Business Benefit of Migrating NAS Silo to Hitachi Data Systems NAS Blade

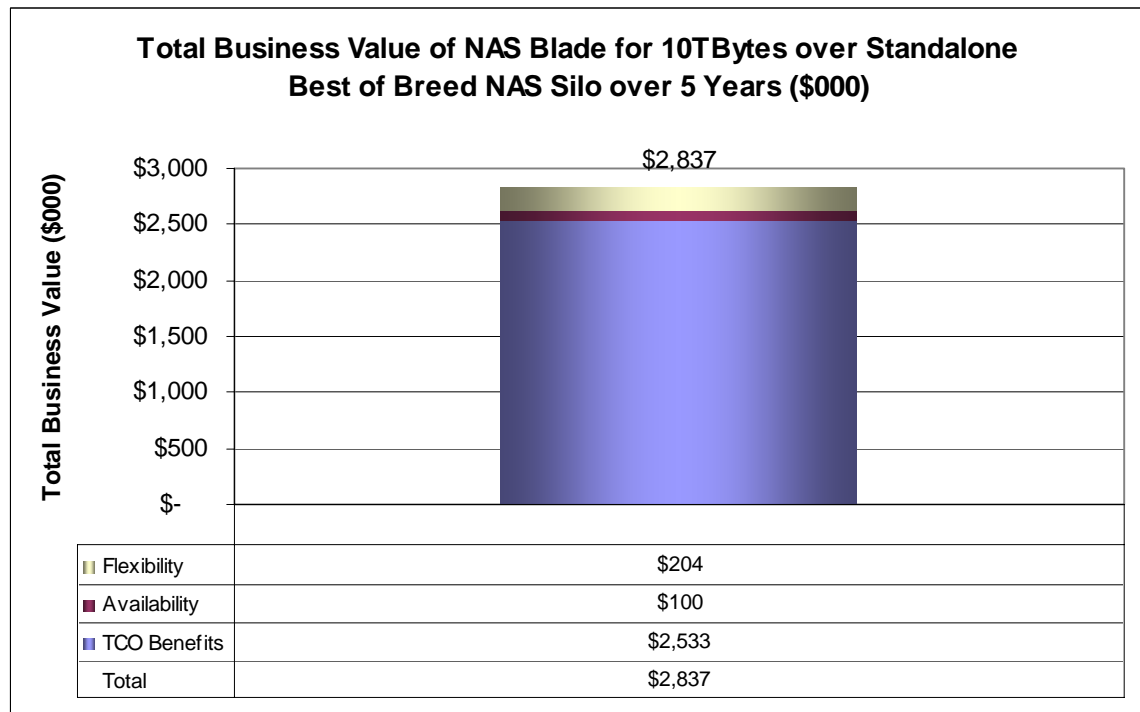




Figure 6 – The Detailed Business Case for Migrating NAS Silo to Hitachi Data Systems NAS

Delta Business Case for NAS Blade on NSC (10TB) vs Best of Breed NAS Silo							
Project Costs		Startup	Year 1	Year 2	Year 3	Year 4	Year 5
	Additional Cost of NAS NSC Blade & Maintenance	\$280,000	\$56,000	\$156,800	\$178,640	\$201,572	\$225,651
	Cost of NSC Virtualization Software		\$14,000	\$17,640	\$22,226	\$28,005	\$35,287
	NAS Set up Costs		\$8,000	\$9,147	\$10,458	\$11,957	\$13,670
	Total Costs	\$280,000	\$78,000	\$183,587	\$211,324	\$241,534	\$274,608
Benefits							
	Reduced Storage Administration Cost		\$10,000	\$11,433	\$13,072	\$14,946	\$17,088
	Savings from Better Utilization & Performance Mapping of Storage		\$470,400	\$219,520	\$250,096	\$282,201	\$315,911
	Cost of Alternative NAS Filer & Maintenance		\$672,000	\$313,600	\$357,280	\$403,144	\$451,301
	Improved Availability		\$19,200	\$19,584	\$19,976	\$20,375	\$20,783
	Improved Flexibility		\$39,273	\$40,058	\$40,859	\$41,677	\$42,510
	Total Benefits		\$1,210,873	\$604,196	\$681,283	\$762,342	\$847,593
Financial Analysis							
	Net Value	-\$280,000	\$1,132,873	\$420,609	\$469,959	\$520,808	\$572,985
	Cumulative Value	-\$280,000	\$852,873	\$1,273,482	\$1,743,441	\$2,264,249	\$2,837,234
	Net Present Value	\$2,346,494					
	Annual ROI	168%					
	IRR	349%					
	Payback Period (months)	6.0					
	Net Present Value (IT Budget Benefits)	\$2,096,038					
	Annual ROI (IT Budget Benefits)	150%					
	IRR (IT Budget Benefits)	325%					
	Payback Period (IT Budget Benefits) (months)	6.1					

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Conclusions and Recommendations

Hitachi Data Systems has a clear and compelling vision for managing NAS storage as integrated with other storage, with an inclusive and cooperative approach.

NAS is an important and fast growing component of enterprise storage solutions. Hitachi Data Systems is making its presence known in the NAS space and signaling its intention to compete aggressively to establish itself as a major player.

In the near term, the company's biggest strength is leveraging its TagmaStore virtual storage controllers with a NAS Blade strategy to manage data center storage under a single pane of glass. For organizations requiring a centralized storage management approach, the simple and technically elegant controller-based storage architecture is a sound basis for developing the advanced virtualization and software functionality required for tiered storage and total management of all storage.

Hitachi Data Systems has a clear and compelling vision for managing NAS storage as integrated with other storage, with an inclusive and cooperative approach. Customers have indicated the attractiveness of specific storage being independent of the storage management software and architecture. Based on direct customer feedback, the company's multi-vendor virtualization works very well, providing the basis for users to apply a common set of storage management software functionality where and when needed. While managing NAS under this umbrella is new, ITCentrix is confident Hitachi Data Systems will deliver the same quality of functionality with NAS as it has with SAN.

Although an effective strategy, it will take time before this is accepted by storage executives. IT organizations that retain the current storage silo approach for NAS in the data center, but want to remain flexible enough



to move to an integrated strategy in the future should consider Hitachi Data Systems standalone modular NAS products. They are built on the same architecture and technology as the NAS Blades, and run the same software. Any processes and procedures used to manage these will migrate effectively to the NAS Blade environment.

The company's standalone, head-to-head NAS filer strategy is rapidly emerging. At the moment, Hitachi Data Systems effectively addresses pure UNIX or UNIX dominant environments today, and will likely have to:

- Aggressively price its filers and storage to compete for market share
- Introduce additional improvements to its CIFS functionality in order to address wider market spaces
- Introduce large clustered NAS file servers

Hitachi Data Systems has the key NAS strategic relationships in place, particularly with Microsoft to provide CIFS enhancements. Further, the company has excellent technical and services capabilities, and the tools and expertise to analyze and give independent advice on what types of storage should be supporting what applications.

Sometimes NAS vs. SAN becomes a religious war. IT executives should be able to rely on suppliers such as Hitachi Data Systems to have the expertise to have done the testing to determine which type of storage will work best with which application, and to have the necessary range of storage solutions available to propose and implement those solutions.

Hitachi Data Systems impressive track record, emphasis on software function, new management, and product road map, if executed properly, will make it a significant player in the NAS market over the next two to three years. IT executives of all data centers should examine the Hitachi Data Systems NAS offerings, and include them in storage evaluations. In particular, they should take advantage of the extremely aggressive initial pricing.

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Appendix I

ITCentrix uses a two dimensional methodology to assess the impact of different storage management strategies on organizations.

Methodology Used to Analyze the Case Studies

ITCentrix uses a two dimensional methodology to assess the impact of different storage management strategies on organizations. The method includes a total cost of ownership (TCO) approach that captures a customer's current equipment, software, and staffing costs and projects potential change based on complexity of environment, staff skills, and technology deployed.

To evaluate availability and flexibility benefits (so-called "intangibles"), ITCentrix uses a Value Flow methodology that establishes the value of service levels and flexibility to the organization today, and projects potential improvement based on a consolidated infrastructure.

ITCentrix evaluates a business case by taking as a starting point the existing storage management environment and assessing its current costs and business value; and then projecting the case for using the new Hitachi Data Systems approach by forecasting the potential for benefit and the cost of achieving that benefit over a planning horizon (three years for this study). See Appendix A for a list of variables used as input for this analysis.

The process is automated by using a proprietary and patent-pending ITCentrix Storage Model independently developed by ITCentrix. Use of the model also ensures that inputs are used to create results in a consistent, objective, and repeatable manner. As a sanity check, ITCentrix uses its ValueBase industry database of cost and value metrics to compare results against industry averages. More information on the methodology can be obtained from the ITCentrix website (www.itcentrix.com).

The final step of the process was to validate the conclusions by interviewing the storage management professionals in three medium sized storage operations.

The quantifiable benefits from storage enhancement fall into three main categories:

- **Operational Costs Benefits** – Savings from factors such as increased staff efficiencies, as well as lower acquisition, maintenance, software, and space/power/cooling costs.
- **Service Level Improvements** – Additional user productivity from higher application availability and costs associated with planned and unplanned downtime and security enhancements.
- **Flexibility Enhancements** – Additional benefit from speeding the time to develop and introduce new applications or application function that customers, employees, and constituents can exploit.



Appendix II

The model used by ITCentrix uses a very large number of variables to evaluate the business impact of changes in NAS Storage Technology.

Table 1 – Some Variables in the ITCentrix Model

Some Variables in the ITCentrix Model
% Allocation
Terabytes
Cost of NAS Filer Head (as % of Total Cost)
% Replication
% Universal Replicator
% Shadow Image / Snapshot
Number of Logical Partitions
Installed Type of Storage
Proposed Type of Storage
Cost/Storage Administrator
Relative Efficiency of Storage Administration
Terabytes/Administrator
Number of Administrators
Cost of Administration
Number of Terabytes managed by USP Controller (Max)
% Savings in Storage Administration from USP
Savings in Storage Administration from USP
Number of Servers
Terabytes/Server
Cost of Storage (\$/Terabyte)
Storage Savings with USP NAS Blade
Average Number of Connections/Server
\$Cost/Connection
Cost of Server to Storage Connection
Cost of Storage Operations (Other)
Total Cost of Storage Operations
Total Storage Operational Savings with USP
Application Value supported by IT
Value of Inflexibility
Days earlier Impact of USP NAS Blade on Flexibility
Business Benefit of Flexibility from USP NAS Blade
Performance (impact on Response time) from USP NAS Blade
Business Benefit of Performance Enhancement from USP
Impact on Productivity of an outage on Users while using IT
Business Benefit of Improved Availability from USP
Opportunity Cost of Security
Business Benefit of Improved Security from USP
Cost of Hitachi Software
Cost of Competitive Software
Distance for remote replications
Peak I/Os per Terabyte
Read/write ratio
Peak to average IO ratio
Cost of 1 hour of downtime
Cost of 1 hour of lost data
Cost of Competitive Software



About ITCentrix

ITCentrix, which serves the needs of IT audiences, is a division of Barometrix Software Corporation. Barometrix is a privately held software company founded in 1999 by leading business and technology professionals. The company develops enterprise decision management and collaboration software designed to increase company performance through improved resource allocation and management.

The company's software products are used at several hundred organizations in North America, Europe, the Asia/Pacific region and other emerging countries to focus investments on returning optimal business value.

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