



## Achieving Flexible Storage Scalability

### **The Case for Enterprise Modular Storage Arrays**

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## ACHIEVING FLEXIBLE STORAGE



### Introduction

**Data is on an explosive growth curve. Email, imaging, IP telephony, regulatory retention and multimedia are contributing to the steady surge of global data. With this emerging mountain of information, IT departments must continually expand storage systems to meet demand often disrupting data availability.**

**When the storage needs of tomorrow are generally uncertain, can existing solutions scale to meet requirements? Is it possible to non-disruptively scale capacity, availability and performance?**

**To address these challenges, businesses are turning to enterprise modular storage arrays. Designed with the flexibility of modular storage and the capabilities of enterprise class solutions, enterprise modular storage arrays easily scale to meet the changing needs of any business.**

**With enterprise modular storage arrays, businesses can invest in modestly priced storage systems and economically scale to meet the most demanding storage requirements of the future.**

**This white paper will examine the storage challenges faced by IT and reveal the many advantages of enterprise modular storage arrays.**

### Storage Trends

The tremendous growth of data is one of the biggest trends facing IT. In 2006, 161 billion gigabytes of information were stored. To understand this massive amount of data, take all the information from every book ever written and multiply it by 3 million.

Data storage needs are continuing to expand. IDC estimates that the data warehouses of one in five organizations will double this year alone. Some key trends driving data growth include IP telephony, imaging, multimedia and regulatory archival requirements.

**One out of five businesses will double their storage requirements this year, according to IDC**

As storage needs mushroom, IT managers will see their responsibilities considerably enlarged. Forrester senior analyst Anders Lofgren said, "*In general, the headache is that storage continues to grow—and although hardware prices continue to decline, what doesn't is the cost of managing storage.*"

"*Storage spending is clearly trending upward as organizations strive to stay ahead of their information storage demands,*" stated Brad Nisbet from IDC.

"*Organizations worldwide, large and small, whose IT infrastructures transport, store, secure and replicate these bits, have little choice but to employ ever more sophisticated techniques for information management, security, search and storage,*" stated an IDC report.

1/ Gantz, J., et. al. (March 2007). IDC. *The expanding digital universe: A forecast of worldwide information growth through 2010.*

2/ Ibid.

3/ Lyman, J. (October 29, 2003). TechNewsWorld. *Researchers: Digital data drives storage explosion.*

4/ Francis, B. (June 10, 2005). InfoWorld. *Storage growth spins upward.*

5/ IDC. (May 2006). *Worldwide disk storage systems 2006-2010 forecast and analysis.*

6/ Gantz, J., et. al. (March 2007). IDC. *The expanding digital universe: A forecast of worldwide information growth through 2010.*

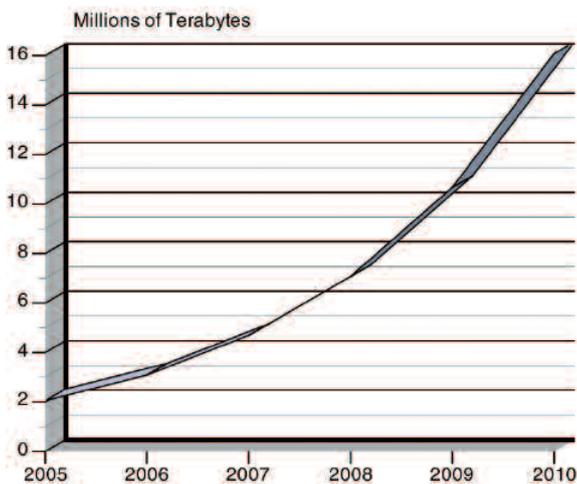


Figure 1: Shows global data growth in millions of terabytes through 2010.

## Storage Growth Challenges

For businesses on a data growth path, the management of storage creates numerous problems, including business disruptions when upgrading and the need for greater availability and scaling flexibility.

### Upgrading disrupts the business

When the time comes to add more storage, existing systems must be brought down. With the massive growth in enterprise data, this process is occurring more frequently.

Upgrading storage can create significant down time and require significant resources. Typical tasks include:

- Allocating rack space
- Performing physical installation and cabling
- Bringing business applications offline
- Configuring and provisioning
- Migrating data
- Bringing business applications back online

The entire process is very disruptive to the business and there are no guarantees everything will go as planned.

### Adding storage is a time consuming process that sidetracks IT personnel

Adding storage also means more devices to manage. If new storage is not compatible with older systems, IT personnel must also learn to install and manage new systems.

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### Data availability drops when failures occur

As data repositories grow, so do the risk of failures. Hard drives are electromechanical devices. More moving parts means more problems are likely to occur.

With newer drives approaching terabyte levels, a failure of a single drive can bring data delivery to a crawl as large amounts of data are recovered. When two drives fail in most storage arrays, the result is disastrous as all data is lost.

### When a drive fails, availability is significantly reduced as arrays attempt to rebuild data

For businesses that rely on databases or online transaction processing, high availability and performance are essential, even when failures do occur. To keep availability and performance high, redundant systems are essential.

### Scaling limitations

As data requirements change, IT needs to enterprise modularly respond. Some businesses invest in costly enterprise class storage systems with the vision that storage needs will eventually grow and the power of these solutions will be utilized in the future. However, the cost of such investments is beyond the reach of many businesses.

### Businesses need the capabilities of enterprise class storage with the price of modular storage solutions

Other companies invest in smaller, less costly modular storage solutions, later to find that they have exceeded the capabilities of these systems. Thus, smaller storage solutions tend to lack performance, connectivity and capacity flexibility. Larger storage solutions offer all of these capabilities, but at an exorbitant cost.

The ideal solution should allow businesses to start where their needs are today and scale performance, connectivity and capacity to enterprise levels as needed.

### The green factor

IT is facing monumental power and cooling requirements. As systems shrink in size, they take up less space in the data center. Thus, the data center becomes populated with more systems. As data center density increases, significantly more power and cooling is necessary. Factoring in the high cost of electricity, utility expenses have become an issue for IT.

With hard drives spinning all the time, whether in use or not, storage consumes significant power. This also creates heat, increasing cooling requirements.

### Power and cooling costs are a major challenge for today's data centers

Major power companies are starting to provide incentives to data centers that reduce their power consumption. For example, Pacific Gas and Electric in Silicon Valley recently offered rebates of up to \$4 million dollars per site for data centers that improve power consumption. The need for green storage solutions will only increase.

<sup>1</sup>/PG&E. (November 8, 2006). Press release. PG&E collaborates with Silicon Valley companies to announce rebates for new energy efficient server technology.



## The Evolution of Storage

Storage technology has evolved significantly over the past ten years. Before the year 2000, most enterprise data delivered the same levels of availability. There was little distinction between mission critical data and less frequently accessed information. Most data shared space in high performance, highly scalable and pricey Fibre Channel storage solutions.

Scalable, lower cost modular storage solutions emerged that allowed IT to pay as they grew. As the Sarbanes Oxley act passed, tiered storage grew in popularity, along with data lifecycle management. The need to store data for long-term access led to the call for for varying levels of data availability.

More frequently accessed data needed to be stored on highly available storage systems, while other data was stored on less costly and slower devices. These tiers of storage helped reduce costs, but also created significant management challenges.

**With the introduction of Sarbanes Oxley, tiered storage solutions that migrated data to lower cost, slower performing storage grew in popularity**

New storage management systems are combining the benefits of distributed storage with the scalability of large enterprise solutions.

## The Solution: Enterprise Modular Storage Arrays

Designed to eliminate the disruptive process of upgrading storage and provide unprecedented levels of scalability, enterprise modular storage arrays are a new class of storage array technology.

Combining the feature set of enterprise storage with the flexibility and low cost of modular storage solutions, enterprise modular storage arrays empower IT to meet a wide range of storage requirements.

**Capacity, performance and availability can be scaled to meet changing needs**

Enabling IT to start with as little as three drives, enterprise modular storage arrays can economically scale to more than 1,500 drives, without the enormous upfront investment common with enterprise storage solutions.



*Figure 2: Enterprise modular storage arrays allow IT to start very small and scale to achieve enterprise-level capacity, availability and performance*



The enterprise modularflexible nature of these arrays also allows connectivity and availability to be independently scaled from capacity. Scaling is non-disruptive, ensuring data remains fully available during upgrades.

Media, such as Serial-attached SCSI (SAS) and Serial ATA (SATA), can also be intermixed.

Enterprise modular storage arrays allow IT to scale using a building block concept as follows:

- **Capacity:** Any increment of storage modules can be added at any time to satisfy growing storage needs.
- **Performance:** Host bus interfaces and cache can be scaled to meet growing performance requirements.
- **Availability:** RAID-6 double parity, RAID triple mirror and double-mirrored cache can be implemented to ensure the highest levels of availability and redundancy.

Capacity, performance and availability can scale independent of each other to create a unique storage configuration that meets the changing needs of the business.

### Business Benefits

Enterprise modular storage arrays provide a number of significant benefits to IT, such as:

- Eliminates the need to pre-invest in expensive enterprise storage solutions to scale to high levels of capacity, performance and availability.
- Ensures upgrades occur online without impacting business applications.
- Avoids the need to replace equipment or perform forklift upgrades to grow capacity.
- Ensures the highest levels of availability are achieved with innovative RAID capabilities.
- Achieves high levels of performance with advanced cache mirroring.
- Reduces power and cooling costs by spinning down inactive drives
- Enables a single storage investment to respond to the changing needs of the business.
- Reduces management costs with a central point of control.
- Minimizes the need to conduct data rebuilds and the impact if rebuilds occur.



## What to Look for in a Enterprise Modular Storage Arrays

When seeking an enterprise modular storage array, be sure to examine the following important requirements:

- Scales on multiple dimensions: Look for the ability to scale capacity, performance and availability in parallel or independent of one another, ensuring a single storage architecture investment will meet future needs.
- Maintains availability during a failure: Seek a solution that will deliver acceptable levels of availability and performance should a drive failure occur. Ask how a failure will impact availability.
- Cache failure does not hinder availability: The ideal solution should offer two sets of mirrored cache for the ultimate in availability.
- Unified storage management infrastructure: A single management tool should manage both entry level and high performance storage solutions to reduce management costs and streamline productivity of IT personnel.
- Self-healing drives: Seek a storage solution that utilizes intelligent drives that are able to identify, isolate and repair problems on their own—before small problems become big issues.
- Green energy efficiency: Look for features designed to reduce power consumption, such as the spinning down of inactive drives. Seek government eco mark ratings.
- Long storage history: Work with a company that has a proven track record in the storage industry with decades of experience to ensure the quality and maturity of products and solutions.
- More than storage: Seek a company that understands the full range of enterprise and IT requirements.
- International presence: Look for a company that can meet the needs of multinational organizations.

## The Solution: NEC Storage D-Series Arrays

NEC pioneered the concept of enterprise modular storage arrays with its new NEC Storage D-Series storage arrays. The NEC Storage D-Series is the first platform to combine the benefits of modular and enterprise storage into a single highly scalable solution.

Built to accommodate a wide range of storage requirements, from archival to demanding online transaction processing, the NEC Storage D-Series can meet the growing storage needs of any business.

The D-Series also empowers IT to avoid costly upfront investments while providing the same enterprise-class features common with more costly alternatives.



*Figure 3: NEC Storage D-Series storage building block*

With the NEC Storage D-Series, IT can achieve tremendous scalability, high levels of availability and an impressive return on investment. The NEC Storage D-Series' enterprise modular architecture allows IT to scale capacity, performance and availability independently.



The NEC Storage D-Series can scale as follows:

**Capacity:** Storage can scale from as few as three drives to more than 1,500 in any increment. SAS and SATA drives can be intermixed at the enclosure level.

**Performance:** The NEC Storage D-Series can accommodate up to 64 4-gigabit Fibre Channel host bus interfaces with mirrored cache, which can scale up to 128 gigabytes of memory.

**Availability:** RAID triple mirror, RAID-3 double parity, RAID-6 and two sets of mirrored cache can be added for high levels of availability.

Built to maintain high levels of performance and availability during a failure, the NEC Storage D-Series will ensure business continuity is maintained at all times. The D-Series includes a wide range of high availability options:

**RAID triple mirror:** Data is mirrored to two separate drives, ensuring availability if two drives fail.

**RAID-3 double parity:** Enables two drive failures as data is striped and parity is written twice to dedicated parity drives.

**RAID-6:** Enables up to two drive failures as data is striped and parity is written twice across the drive set.

**Cache mirror continuity:** Two instances of mirrored cache operate in parallel to maintain high levels of availability if a cache failure occurs.

## NEC Storage D-Series

NEC Storage Manager provides a web-based, unified management platform to manage all NEC storage solutions.

NEC disk drives utilize patented self-healing technology, known as Phoenix, to analyze, isolate and repair disk issues automatically.

NEC also offers power savings capabilities with its MAID (massive array of inactive disks) technology that can spin down inactive drives, lowering power consumption by up to 30 percent.

The NEC Storage D-Series has been extensively tested by major OEMs to ensure the highest quality standards.

Invest in an economical storage solution that will meet the needs of today and tomorrow with NEC's D-Series.

To learn more about the **NEC Storage D-Series**, visit  
[www.nec-computers.com](http://www.nec-computers.com)

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