Assessing and Comparing HP Parallel SCSI and HP Small Form Factor Enterprise Hard Disk Drives in Server Environments

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purpose

This paper provides guidance and best case-scenarios for customers when deciding to implement hp capacity parallel SCSI (P-SCSI) or hp small form factor enterprise hard drive technology in enterprise server environments. This paper only addresses the P-SCSI HDDs and small form factor enterprise HDDs, and does not include parallel ATA or Fibre Channel hard drive technology.

introduction

In today's distributed enterprise with larger, more complex applications than ever before, an increase of mission-critical data moving to the server and continued server consolidation, storage has become more important than ever.

HP delivers the highest quality products to ensure the integrity and availability of customers' data. A major component of this process is HP's commitment to deliver the highest quality hard drives in the industry.

At hp, we realize the hard drive is a core component of customers' primary storage system, which contains everything from the most critical data to the operating system upon which equipment depends.

parallel SCSI HDDs

Today's HDD business primarily focuses on 3.5" products with universal ProLiant, StorageWorks, and Alpha servers. The 3.5" HDD offers 10K and 15K HDD with 146GB and continues to grow with new capabilities to be available.

P-SCSI hard drive (3.5") technology has been one of the industry standard hard drive technologies because of its reliability. HP provides unique values for P-SCSI hard drive technology such as Universal Architecture, optimized firmware, and superior testing and quality standards. Customers generally choose P-SCSI hard drive technology for higher data integrity, performance, reliability, and its hot-plug capability.

small form factor enterprise HDDs

Tomorrow's HDD business will introduce the 2.5" products with a Serial Attached SCSI (SAS) interface and will provide a key factor of higher I/O per U. Small form factor enterprise, a new hard drive technology to be available in the second half of 2004, is a 2.5" hard drive that right sizes the capacity glut.

customers have a choice

It is critical for customers to be aware how to choose the right hard drive technology for their requirements. Customers should study the characteristics of both technologies in order to comprehend the benefits and tradeoffs for each hard drive feature to determine which is best for their specific requirements.

The tables below illustrates the comparison between hp P-SCSI and hp small form factor enterprise hard drive technology.

Table 1. Choosing the appropriate hp hard drive technology

If you are looking for:	Then consider:
Low power consumption	Small form factor enterprise hard drive technology
Optimized performance due to maximizing number of spindles per given space	Small form factor enterprise hard drive technology
Smaller size	Small form factor enterprise hard drive technology
Lower price per GB	P-SCSI hard drive technology
Higher spindle speed	P-SCSI hard drive technology

Table 2. Specifications of hp P-SCSI HDD vs. hp small form factor enterprise HDD

Attributes	P-SCSI	Small form factor enterprise
Performance	less than 5ms seek times	less than 5ms seek times
Spindle speed	Up to 15,000 RPM	Up to 10,000 with a future path to 15,000 RPM
Transfer rate	320MB/s (Ultra 320)	300MB/s (full duplex)
Scalability	15 drives per channel	4096 drives per channel
Reliability (Mean Time Between Failure – MTBF)	1.2M hours	1.2M hours
Dimensions (inches)	4W x 1H x 5.75D	2.75W x .59H x 3.9D
Serviceability	Hot-pluggable	Hot-pluggable
Manufacturers' Warranty[1]	3-year	3-year

[1] Subject to change without notice

overview of hp parallel SCSI HDDs

P-SCSI enterprise hard drive technology continues to be the focus for mainstream server environments. P-SCSI disks are designed and manufactured to meet the enterprise requirements of high reliability and high mean-time-between failure (MTBF). SCSI drives are tailored to support mission-critical data in applications where reliability and availability are key requirements.

For customers looking for reliability and performance in server environments, the hp small form factor enterprise HDDs offer the highest performance and the highest reliability.

Feature Benefits of hp P-SCSI hard drive technology

P-SCSI hard drive technology is used for mission critical issues. The following features of hp SCSI hard drive technology are advantageous to customers who are looking for:

- Spindle speed up to 15,000 RPM

- Lowest dollar per GB

overview of hp small form factor enterprise HDDs

Small form factor enterprise hard drive technology continues to be the focus for mainstream server environments. For customers looking for reliability and performance in server environments, hp small form factor enterprise HDDs offer the highest performance and highest reliability.

HP small form factor enterprise hard drives are installed primarily in multiprocessor workstation and server platform environments that are characterized by multi-drive configurations, and multi-threaded, I/O-intensive operations. Usually, these environments require large storage capacity as well as fast time-to-data and high-bandwidth data transfer capabilities.

In addition, HP small format factor hard drives will offer Universal Architecture, providing the ability for the same hard drive to be operational on all HP ProLiant server platforms utilizing SAS. HP Universal hard drives provide customers the highest levels of data integrity, reliability, and investment protection.

Feature Benefits of hp small form factor enterprise hard drive technology

- Allows more drives in a server

- Lowest power consumption

- Allows system more space for airflow given the same number of HDDs

- More spindles equaling high performance

- Industry-leading extensive reliability testing to ensure quality and to give customers peace of mind

- Universal SAS hot-plug architecture that rapidly deploys all of HP's server and storage platforms, allowing a customer to have only one drive across all segments

- Supports future growth to 15K rpm

- Designed for I/O-intensive environments

- Enables RAID 5 in a 1U space due to the smaller size. Today one can only fit (2) 3.5" in a 1U server. Mirrored.

Customers, however, should also be aware of the tradeoffs of utilizing small form factor enterprise hard drive technology. They include:

- More expensive than capacity hard drive technology per $/GB

- Trading off capacity for lower power and   smaller size

The following figures illustrate the advantages of hp small form factor HDD, including scalability.

NOTE: *These figures are examples and not plan-of-record designs for the servers shown.*

Figure 1. Specifications of hp P-SCSI hard drive technology vs. hp small form factor enterprise hard drive technology
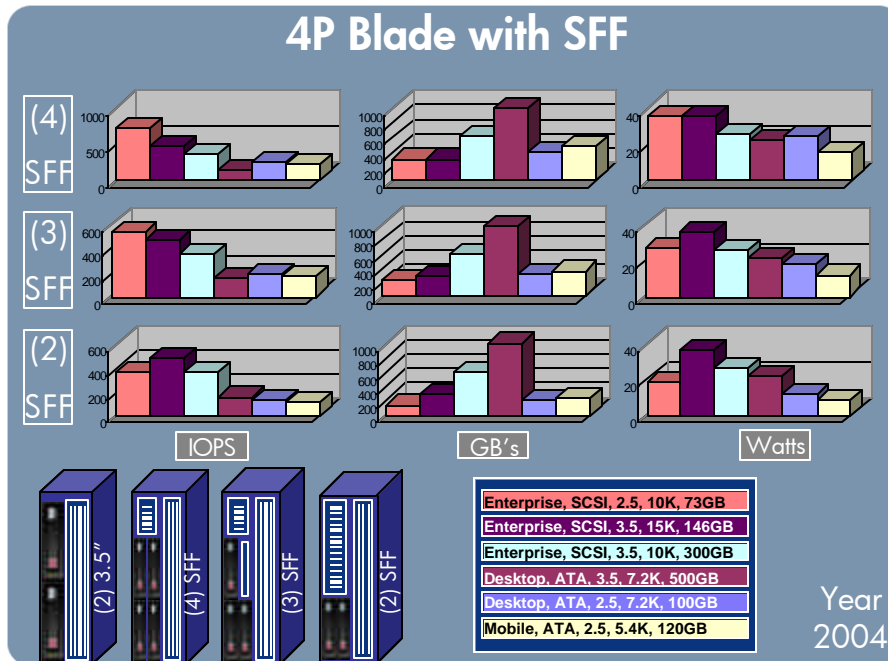

Small Form Factor HDD: Does size matter?

- Significantly higher I/O's per U with 2.5" SFF vs 3.5" factor

- High density & low power requirements support shifts to SFF

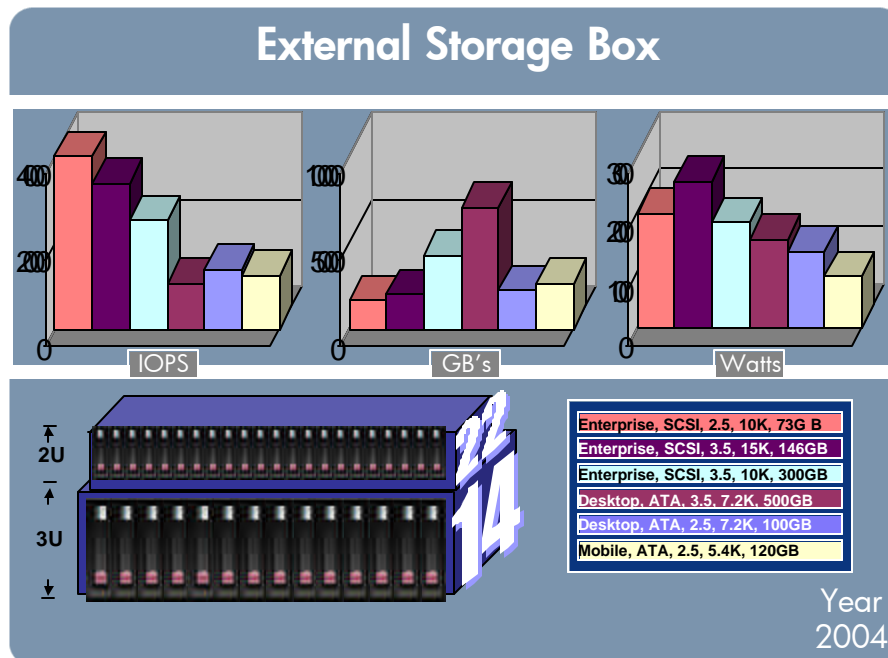- SFF uses space more efficiently today & supports future expansion

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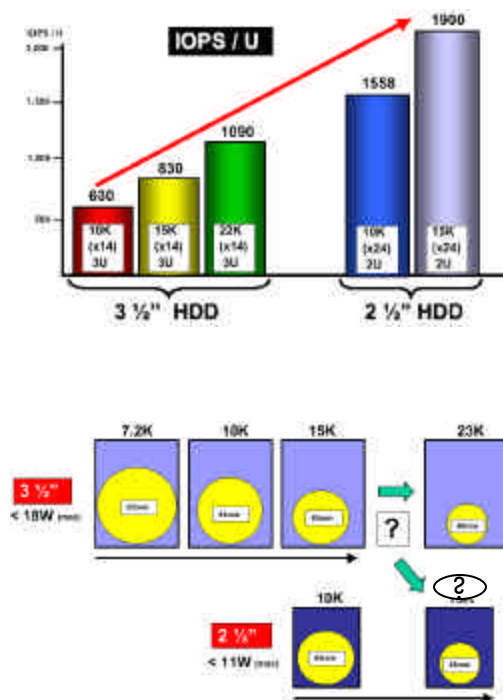
the scalability advantage

The following figures below compare scalability, using small form factor enterprise hard drives for ProLiant blade servers, ProLiant dense, and ProLiant 500 Series servers.

4P Blade with SFF

Legend:
- Enterprise, SCSI, 2.5, 10K, 73GB
- Enterprise, SCSI, 3.5, 15K, 146GB
- Enterprise, SCSI, 3.5, 10K, 300GB
- Desktop, ATA, 3.5, 7.2K, 500GB
- Desktop, ATA, 2.5, 7.2K, 100GB
- Mobile, ATA, 2.5, 5.4K, 120GB

Year 2004

Figure 2. Comparing a 4P blade with one small form factor enterprise hard drives to a 4P blade with 2, 3, and 4 small form factor enterprise hard drives.

Measurements include IOPS, GBs, and Watts.

External Storage Box

Legend:
- Enterprise, SCSI, 2.5, 10K, 73G B
- Enterprise, SCSI, 3.5, 15K, 146GB
- Enterprise, SCSI, 3.5, 10K, 300GB
- Desktop, ATA, 3.5, 7.2K, 500GB
- Desktop, ATA, 2.5, 7.2K, 100GB
- Mobile, ATA, 2.5, 5.4K, 120GB

Year 2004

Figure 3. Comparing storage analysis per U with P-SCSI drives and small form factor enterprise drives. Measurements include IOPS, GBs, and Watts.
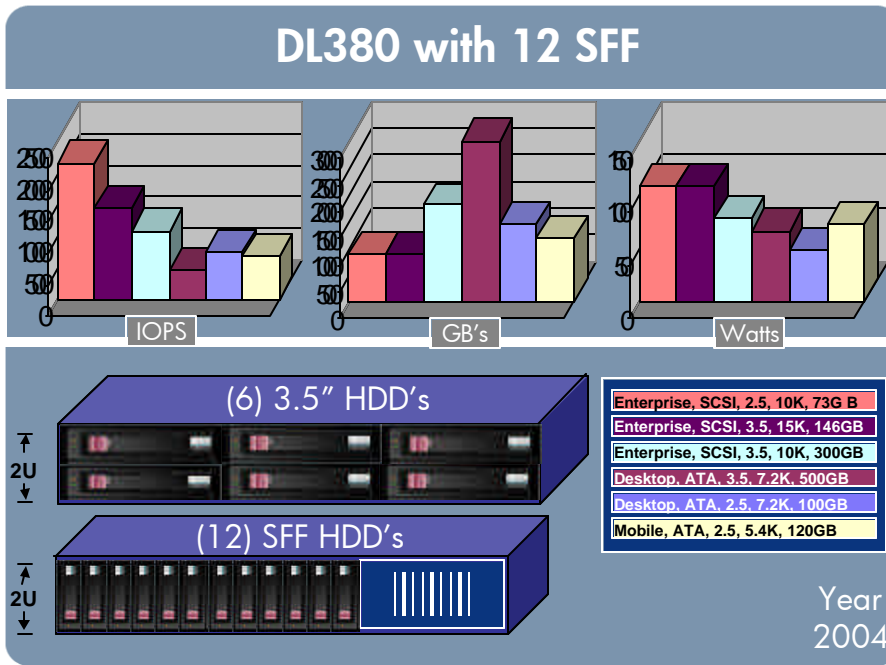
DL380 with 12 SFF

IOPS   GB's   Watts

(6) 3.5" HDD's

2U

| Enterprise, SCSI, 2.5, 10K, 73G B |
| Enterprise, SCSI, 3.5, 15K, 146GB |
| Enterprise, SCSI, 3.5, 10K, 300GB |
| Desktop, ATA, 3.5, 7.2K, 500GB |
| Desktop, ATA, 2.5, 7.2K, 100GB |
| Mobile, ATA, 2.5, 5.4K, 120GB |

(12) SFF HDD's

2U

Year 2004

Figure 4. Comparing the scalability of a ProLiant DL380 dense server with 12 small form factor enterprise drives vs. 6 SCSI drives regarding IOPS, GBs, and Watts.
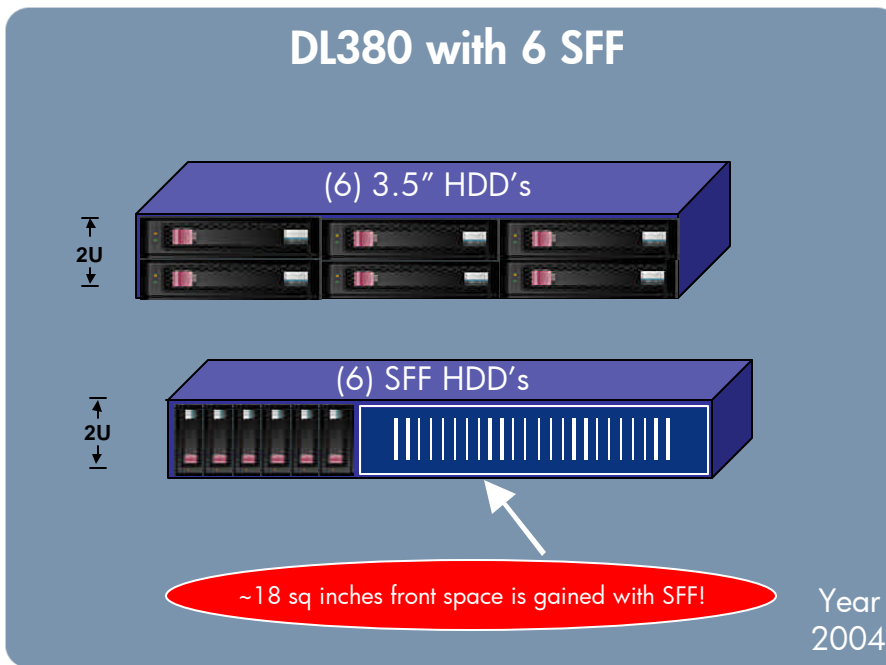
DL380 with 6 SFF

(6) 3.5" HDD's

2U

(6) SFF HDD's

2U

~18 sq inches front space is gained with SFF!

Year 2004

Figure 5. Showing the front space gained on a ProLiant DL380 with 6 small form factor enterprise drives vs. 6 SCSI drives.
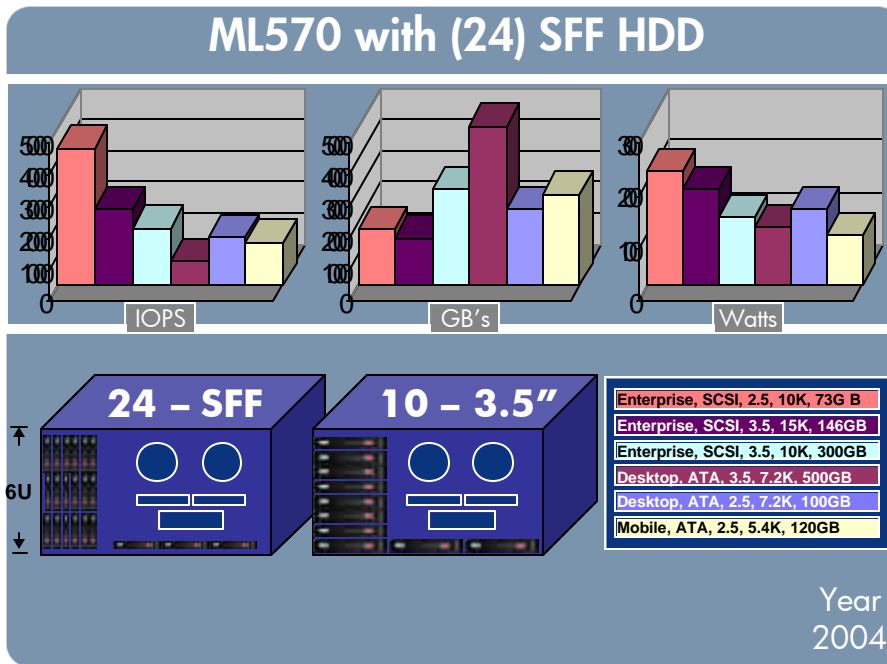
Figure 6. Comparing the scalability of small form factor enterprise hard drives vs. SCSI drives using the ProLiant ML570. Measurements include IOPS, GBs, and Watts server.

other hard disk drive considerations: 15K vs. 10K

In other HDD considerations, hp recommends 15K hard disk drives for increased storage performance. The figure below compares the mechanical latency of 7200, 10K, and 15K hard drives. In addition, most applications can benefit from using the 15K HDD.
Four of the most common applications are:

- File & Print
- Database
- E-mail
- Web or Media Servers
- On-Line Transactional Processing (OLTP)

A key contribution for improved performance is a decrease in mechanical latency. The following figure shows a reduction in performance moving from 7200 to 10K and then to 15K rpm HDDs.

Figure 8. Mechanical Latency comparison between HDDs.

Mechanical Latency
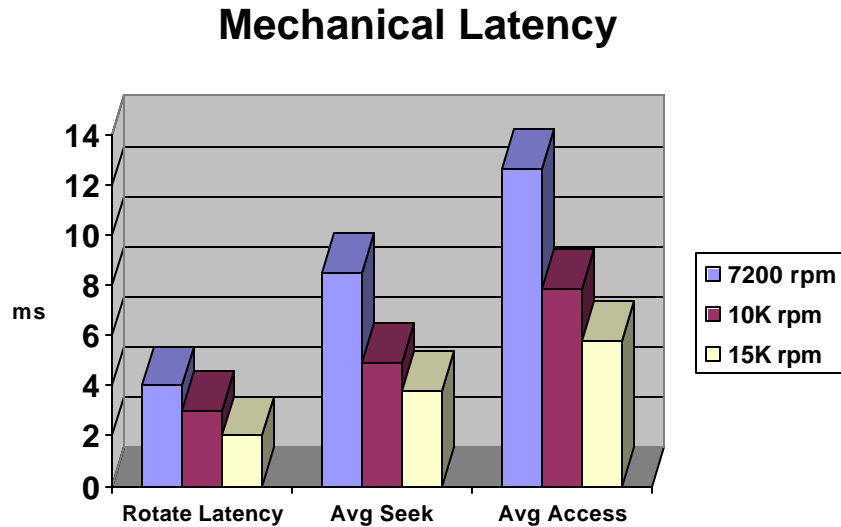
summary

HP P-SCSI and hp small form factor enterprise hard drive technology are two of the hard drive technology of choice for server platform environments.

HP P-SCSI customers are generally price-sensitive and are looking for basic server functionality, such as static web-page delivery, entry-level file/print, or shared Internet access that run up to 15K rpm. Customers generally choose hp small form factor enterprise hard drive technology for low power and higher performance due to more spindles in a given space. The speed of the HDDs should also be considered; hp recommends 15K rpm drives.

Customers should study the feature benefits and tradeoffs of each hard drive technology in order to best determine the appropriate hard drive technology for their requirements.

for more information

If you would like to provide feedback, please mail to:
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Capacity and small form factor enterprise hard drive information is located at:
http://www.hp.com/products/harddiskdrives
and http://www/hp.com