HDD's: 15K, Savvio, SAS

V07

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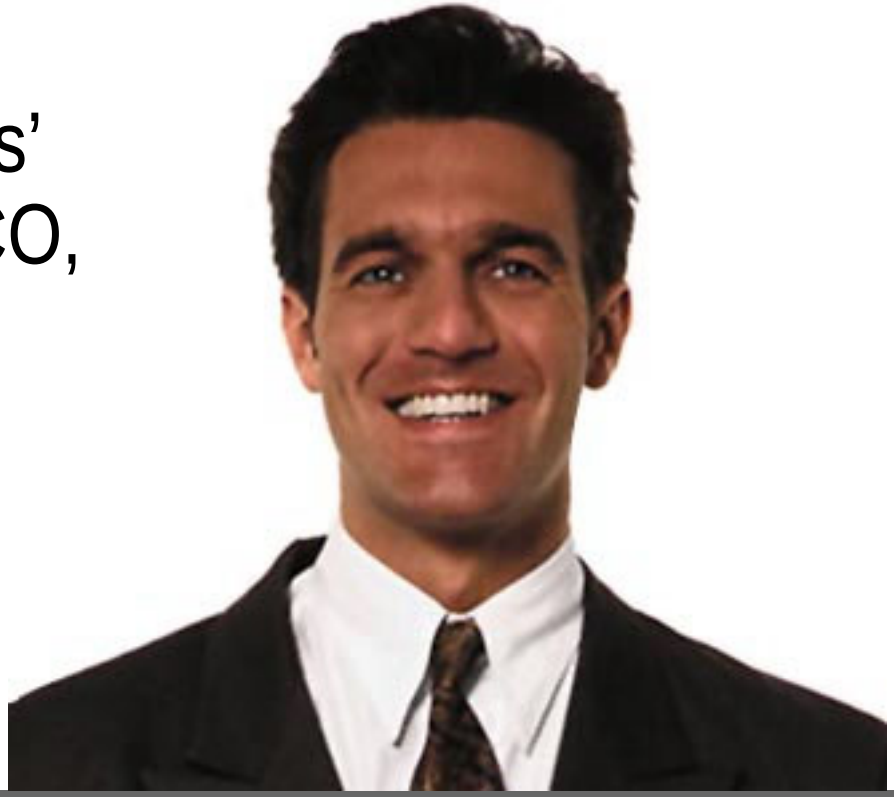
IBM xSeries Goal: 50% of HDD's to be 15K

Why?

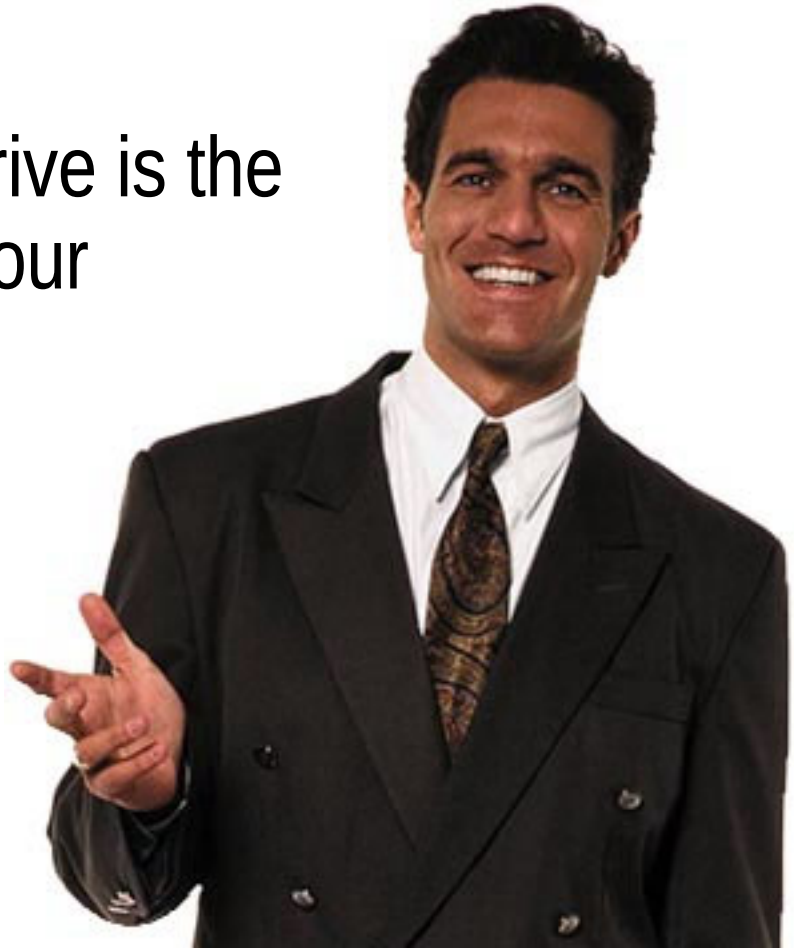
To increase your customers' success and lower their TCO,

while increasing Revenue.

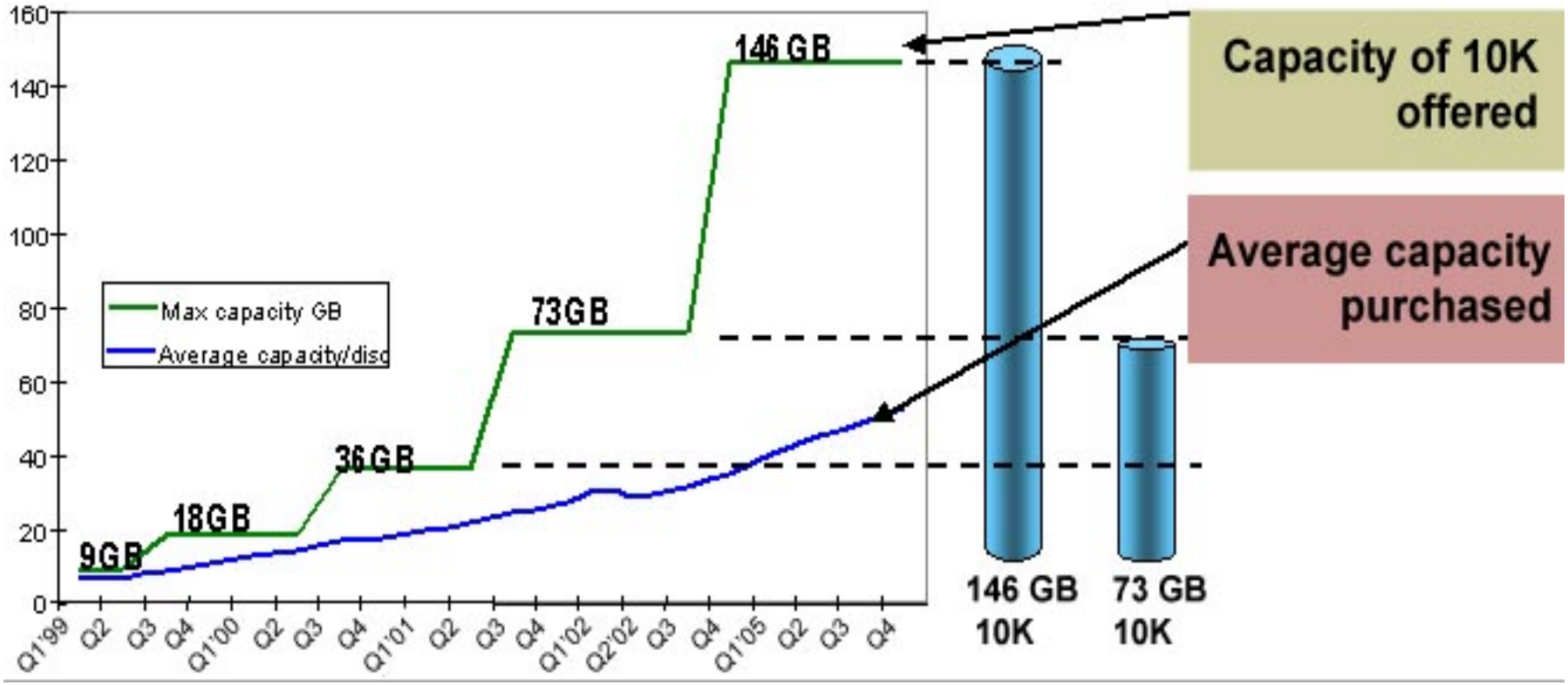


Learn to consult credibly on a question that is raised in almost every sale...

What capacity and RPM of disc drive is the most cost-effective way to meet your customer's needs?



Price/Capacity (GB) vs Price/Performance

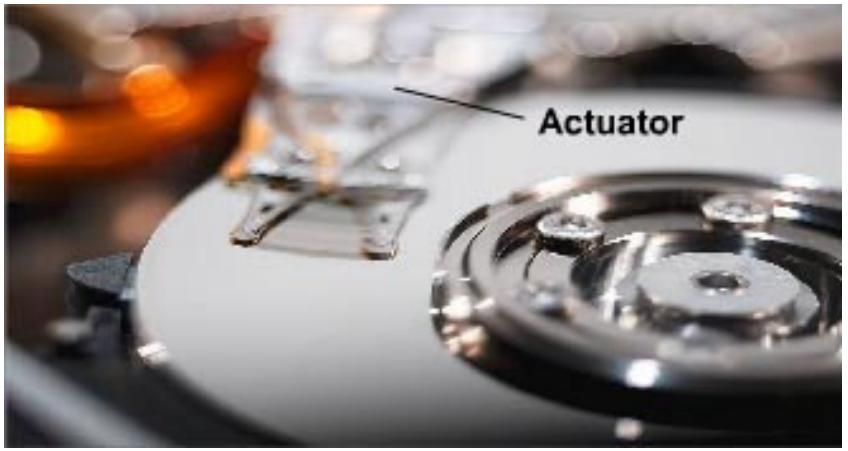


Customers are not buying the lowest price/GB drives.

Why are Customers Buying 36 GB 10Ks?

	1987	2001	Increase
CPU Performance (MIPS)	1	2000	2000x
Memory Size	16 MB	16 GB	1000x
Memory Performance	100 usec	50 nsec	2000x
Drive Capacity	20 MB	72 GB	3600x
Drive Performance (msec)	60	6	10x

Every year the capacity offered on a single drive has dramatically increased, while the number of actuators that access the additional data, inside the drive, stays the same – one per drive.

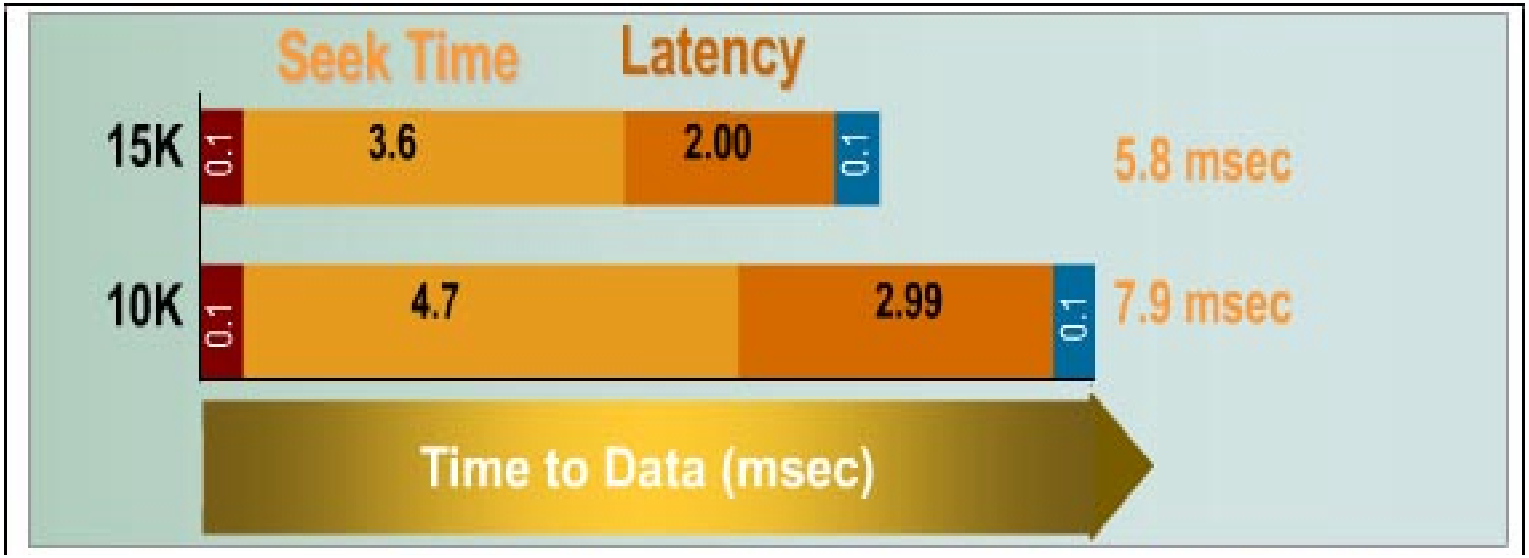


The drive's performance has not kept pace with the drive's capacity.

While an average configured server costs 10% more with 15K drives,

xSeries Servers with 15K drives have

- **32% more IOPS**
- **24% faster Response Times.**



Often many 10K's are used to meet performance needs.

Is there a more cost-effective way?

Drive Comparison	Number of Drives	Capacity (GB)	Performance (IOPS)	Response Time (ms)	Results with 15K Drives
10K 73 GB	16	1174	829	19.3	Same Performance but with 31% Fewer drives
15K 73 GB	11	807	836	19.1	
10K 36 GB	16	587	829	19.3	Same Performance, 37% more Capacity, 31% Fewer drives
15K 73 GB	11	807	836	19.1	

Fewer 15K drives are needed.

Even if 10K's are short-stroked, fewer 15K drives are needed.

Drive Comparison	Short-Stroked to (GB)	Number of Drives	Capacity (GB)	Performance (IOPS)	Response Time (ms)	Results with 15K Drives
10K 73 GB	34GB	15	510	932	17.1	Same Performance Same Capacity 7% Fewer drives
15K 36 GB	Fullstroked	14	514	956	16.7	
10K 73 GB	52GB	14	734	805	19.9	Same Performance Same Capacity 21% Fewer drives
15K 73 GB	Fullstroked	11	807	834	19.2	
10K 73 GB	52GB	13	934	923	17.3	Same Performance Same Capacity 22% Fewer Drives, Fewer Enclosures
15K 73 GB	Fullstroked	14	1026	956	16.7	

Fewer 15K drives are needed.

How Does Needing Fewer Drives Impact Cost?

	Capacity (GB)	Performance (IOPS)	Drives Required	# of EXP400's	SPACE	Reliability (MTBF)
10K 3.5" $/GB	934	923	18	2	6U	67K
15K 3.5" $/Perf	1028	956	14	1	3U	86K
	10% More	4% More	22% Fewer	50% Fewer	50% Less	28% Greater

15K drives lower customers' TCO.

IBM SPC Results

(These results rank above the majority of all OEMs' SPC results.)

Storage Subsystem	Disc Drive	$ per SPC-1 IOPS™	Total ASU Storage Capacity (GB), Total SPC-1 IOPS™, Data Protection Level, SPC-1 Submission Identifier
IBM TotalStorage® FAStT 600 With Turbo Option (non-mirrored)	15K RPM	$9.28	478.43GB, 12102.97 SPC-1 IOPSTM, Mirroring, A00018
IBM TotalStorage® FAStT 600 With Turbo Option (mirrored)	15K RPM	$11.86	9099.86 GB, 478.43 SPC-1 IOPSTM, Mirroring, A00017
IBM TotalStorage® FAStT 900 *(non-mirrored)*	15K RPM	$12.63	24507.22, 1196.09 SPC-1 IOPSTM, Mirroring, A00020

www.storageperformance.org

How Do 15K Drives Effect Overall System Reliability?

See if you can determine if the following statements about the reliability of 10K and 15K disc drives are true or false to uncover additional benefits of 15K drives.

Statement 1: 15K drives require more RAID rebuilds.

☐ True ☒ False

Statement 2: RAID rebuilds can be performed more quickly on 10K drives than on 15K drives.

☐ True ☒ False

Statement 3: A 15K drive has the same reliability rating as a 10K

☒ True ☐ False

Statement 4: 15K has similar or lower power and cooling requirements, acoustics and rotational vibration compared to 10K.

☒ True ☐ False

15 minute 15K Upsell Online Course

How can we maximize attendance to this course?

Example of email with course link:

Achieve greater revenues selling 15K drives today!

With IBM's recently announced mission to upsell 15K, it's a good time to take this course. Every participant will receive a Polo shirt and **As an added bonus, one of every 50 people to complete the course and survey will win a bonus prize!**

Go to, or click http://docentnow.docenthost.com/IBMBP/index.html to enter the course. Click on first time user to register..

The email blast regarding the 15K HDD Upsell course went out under Wayne Flaggs, VP of Sales, last week. Also had the VP of Marketing, Leo Suarez, send it out on the marketing side for the Americas.

Seagate's Innovative 2.5-inch Enterprise Disk Drive

Savvio

Seagate

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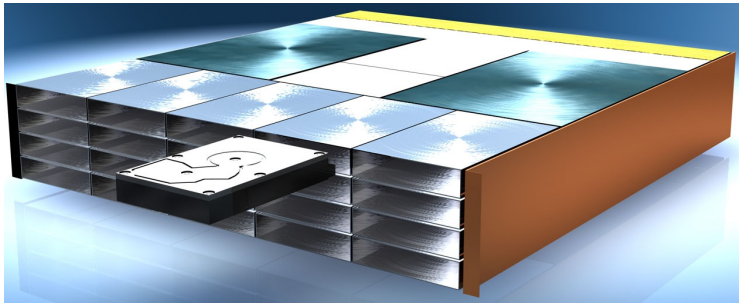
High Density Market Segment

- Constrained today by physical size of 3.5” HDD
- 2.5” HDD enables new market segment
- Consolidation… maximum amount of HDDs in smallest footprint results in high storage and IOPS density
- Rack optimization for increased utilization of physical space

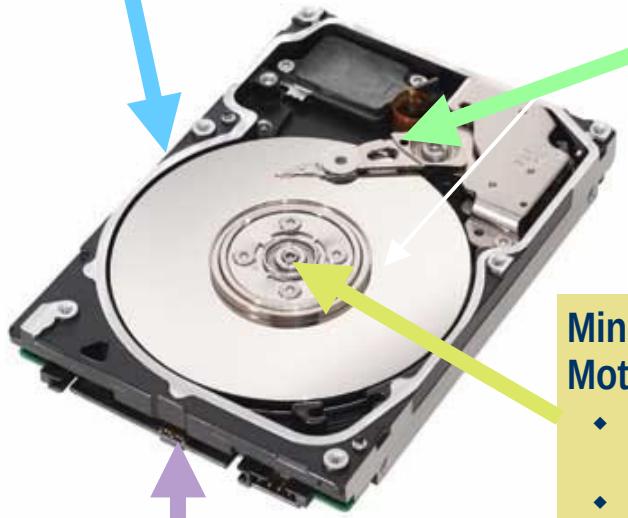
High Density Storage



Savvio Technical Innovation

Smallest Enterprise Drive

- 70% smaller than 3.5-inch drives
- Size equal to deck of playing cards



Actuator Arm Shortened

- 4.1 msec seek time
- Stiffer arm is more durable

Miniaturized 15mm FDB Motor

- Efficient design consumes less power
- 2 disc (max) consumes less power wattage

Serial Attached SCSI (SAS)

- 3 Gbit/sec point to point enhances throughput
- Enables highly dense solutions

Benefits

– More drives integrated into smaller, high density systems significantly speed IOPS performance.

– Fast drive-level seek combined with more drives per system markedly enhance IOPS performance.

– Lower power consumption generates less heat enabling tightly packed drives to operate more coolly.

– Combining small size, low power and fast seek times with Serial Attached SCSI creates breakthrough server and storage systems

Savvio High Density Storage… Target Markets

"Enabling Greater Business Efficiency and Productivity"

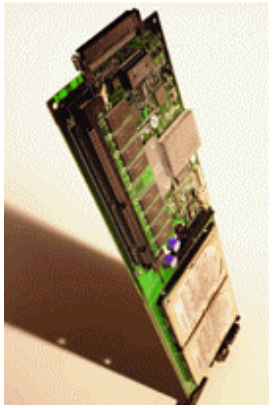
Highest Performance Storage Arrays

- Enables consolidation with smaller arrays
- 70% performance improvement (IOPS per box)
- 150% improvement in performance density (IOPS per U)

1U Servers

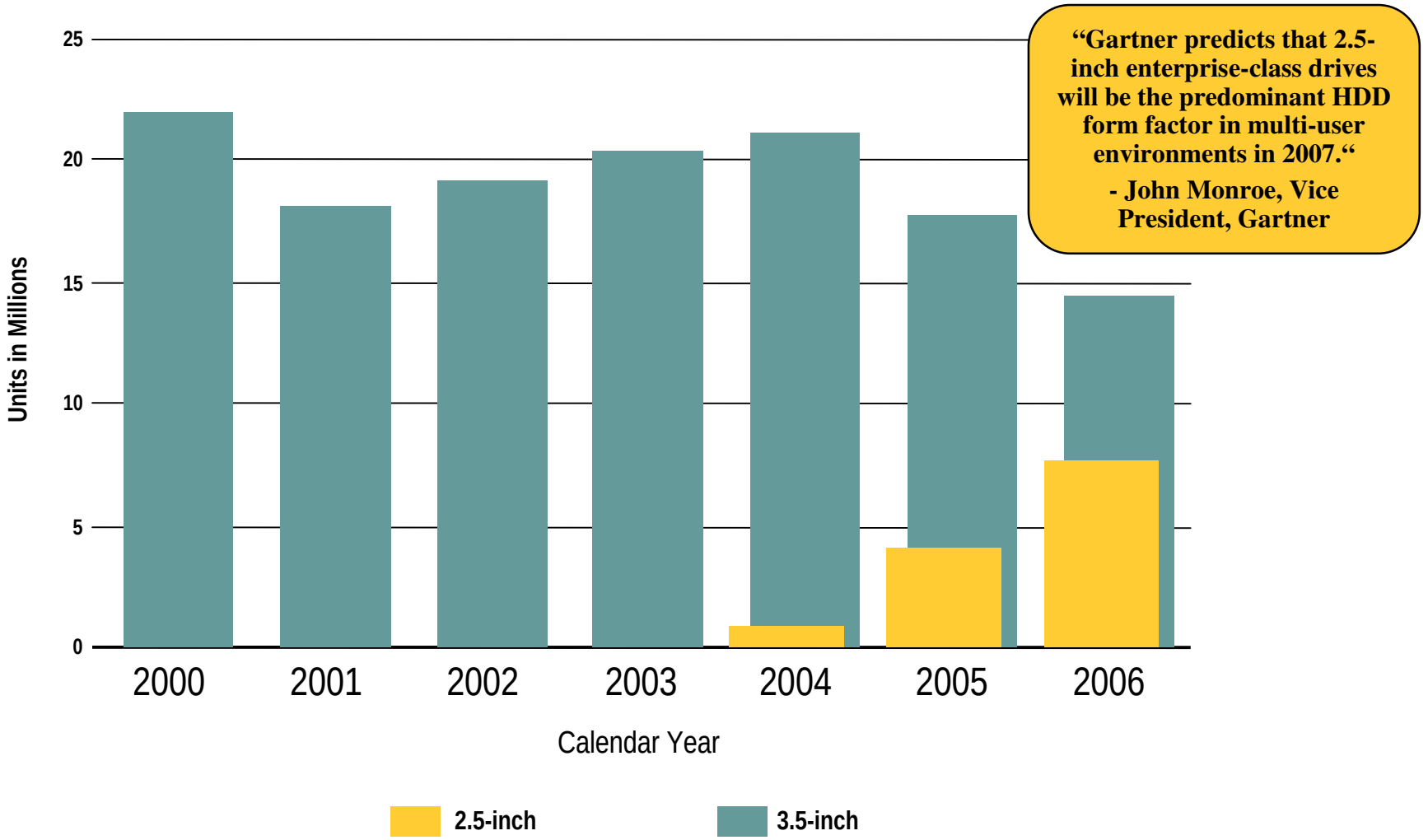
- Enables RAID 5
- 130% more performance
- Workload = 2U or 3U

Blade Servers



- Enterprise-class "Full-Duty" Reliability
- 150% more performance

2.5-inch Form Factor Transition



"Gartner predicts that 2.5-inch enterprise-class drives will be the predominant HDD form factor in multi-user environments in 2007."

- John Monroe, Vice President, Gartner

Source: Seagate Market Research

Seagate's Serial Attached SCSI (SAS)

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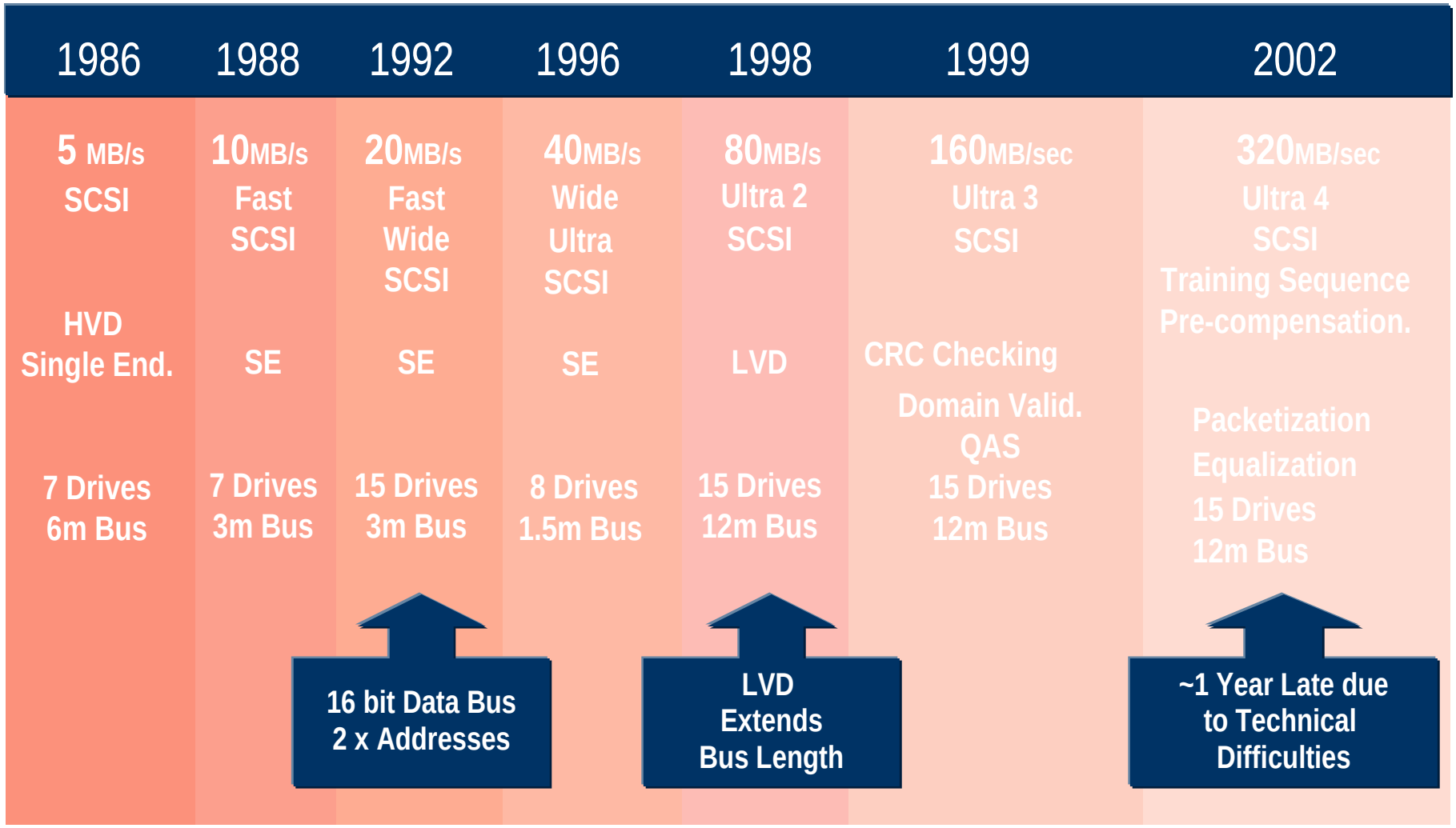
The End of the Road for Parallel SCSI



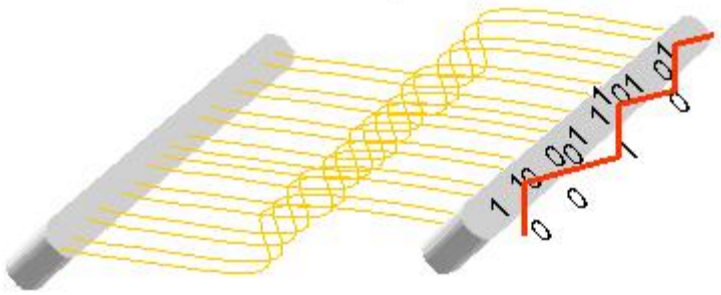
Why SAS?

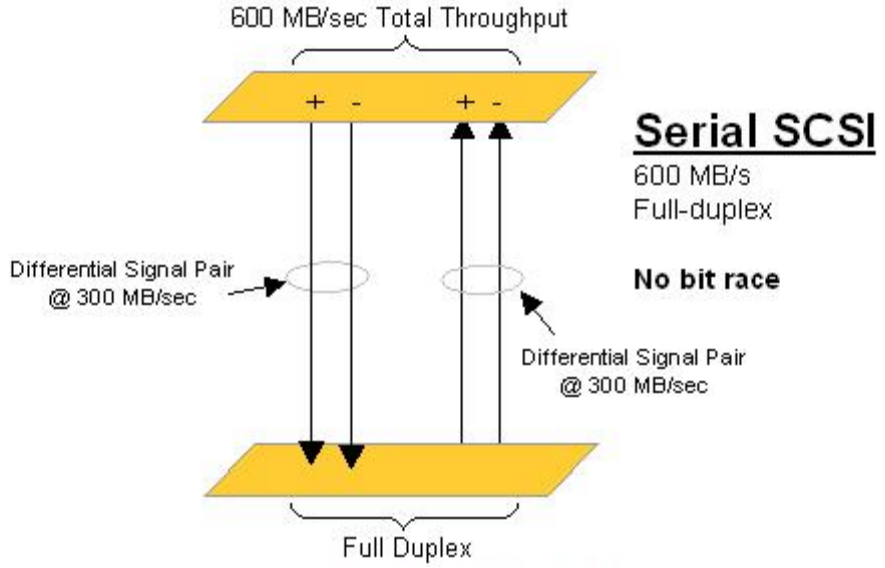
1. Improved Performance over Parallel SCSI and SATA

SAS accelerates storage performance to incredible speeds by utilizing full-duplex, point-to-point architecture with reliable dual-port data rates of 3.0 Gb/s, and by adopting the most advanced command queuing for handling intense enterprise traffic.

Parallel SCSI
320 MB/sec half-duplex

Race condition on bits (skew)





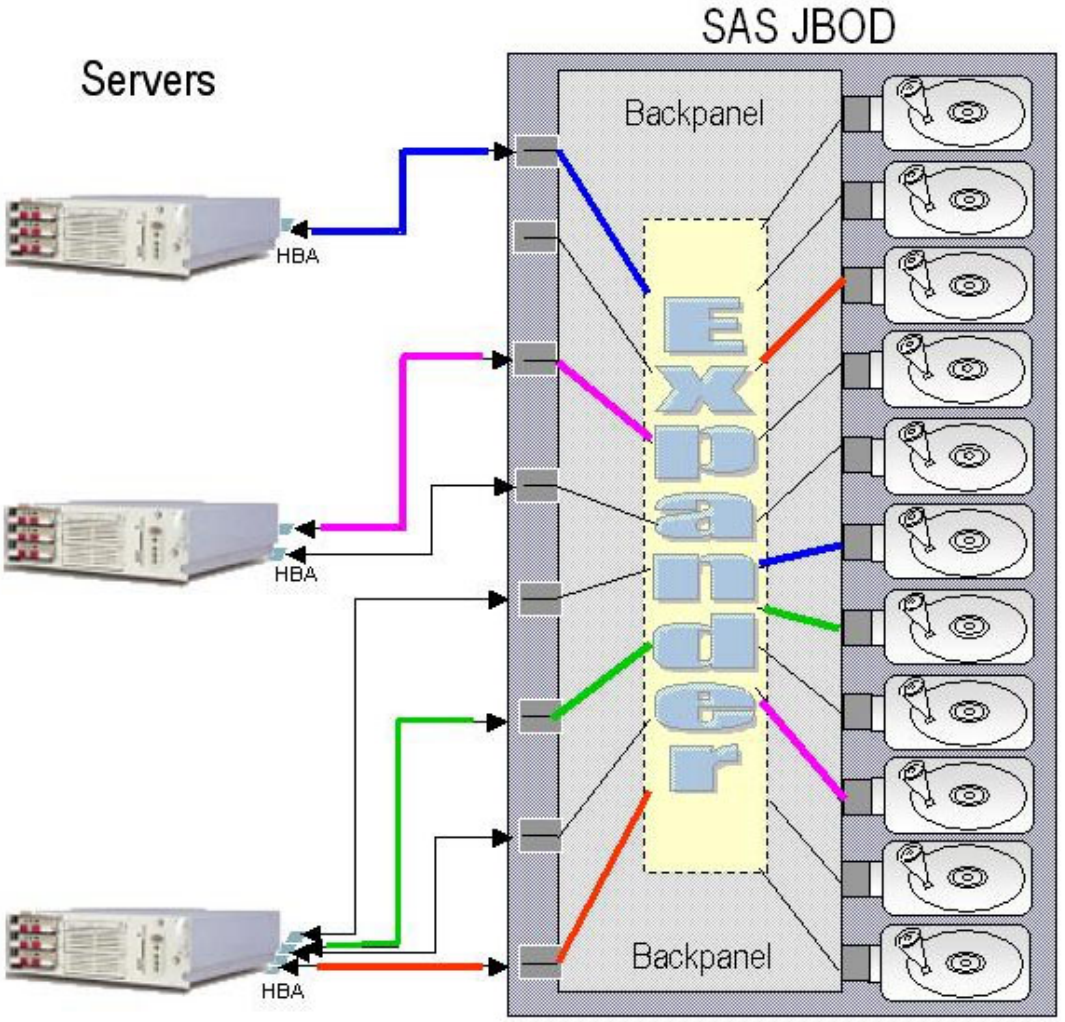
Serial SCSI
600 MB/s
Full-duplex

No bit race

Why SAS?

3. Better Scalability compared to Parallel SCSI

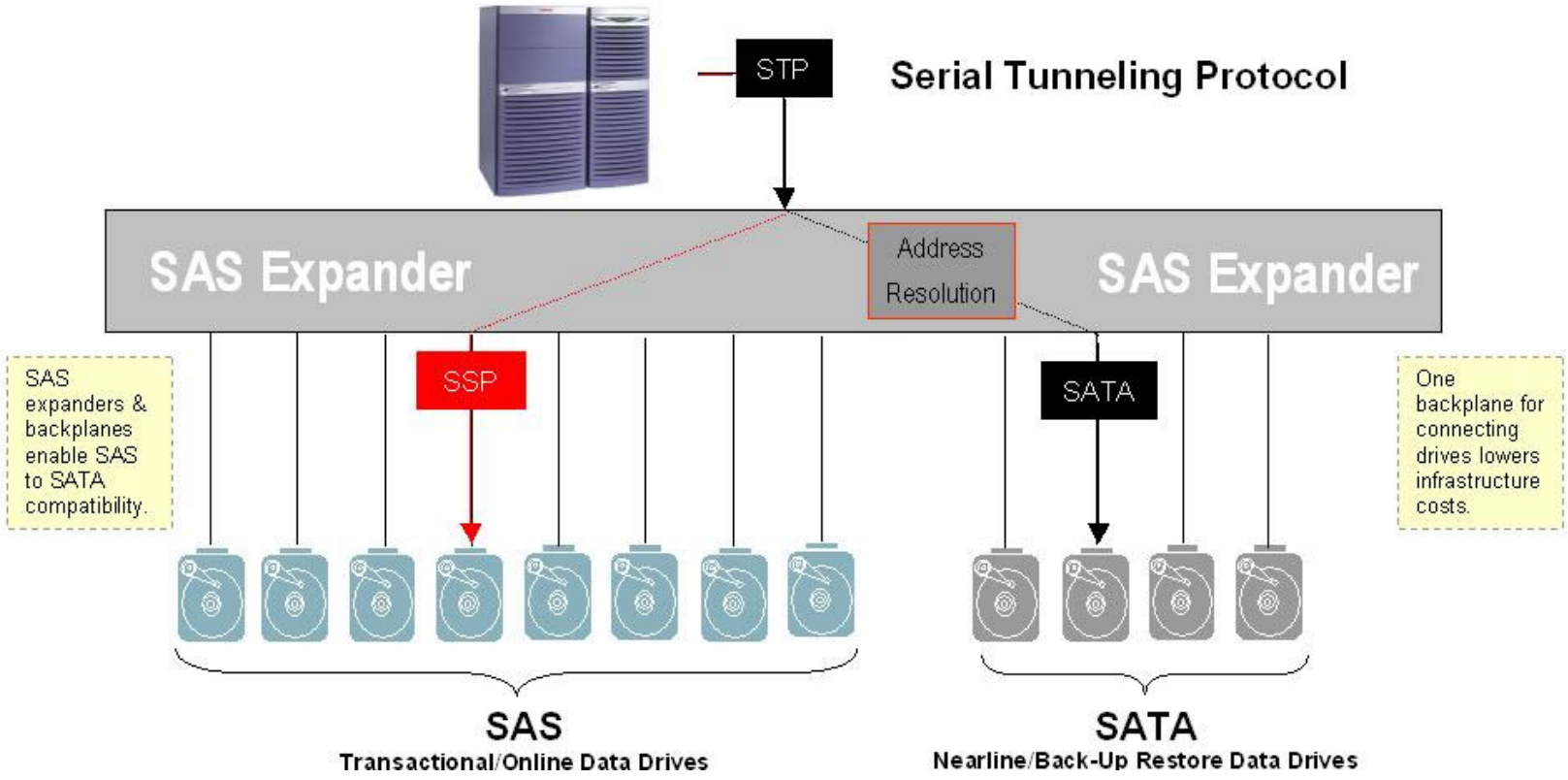
SAS liberates storage from prior scalability restrictions of its parallel predecessor by using low-cost switches known as expanders to aggregate hundreds of drives while preserving performance



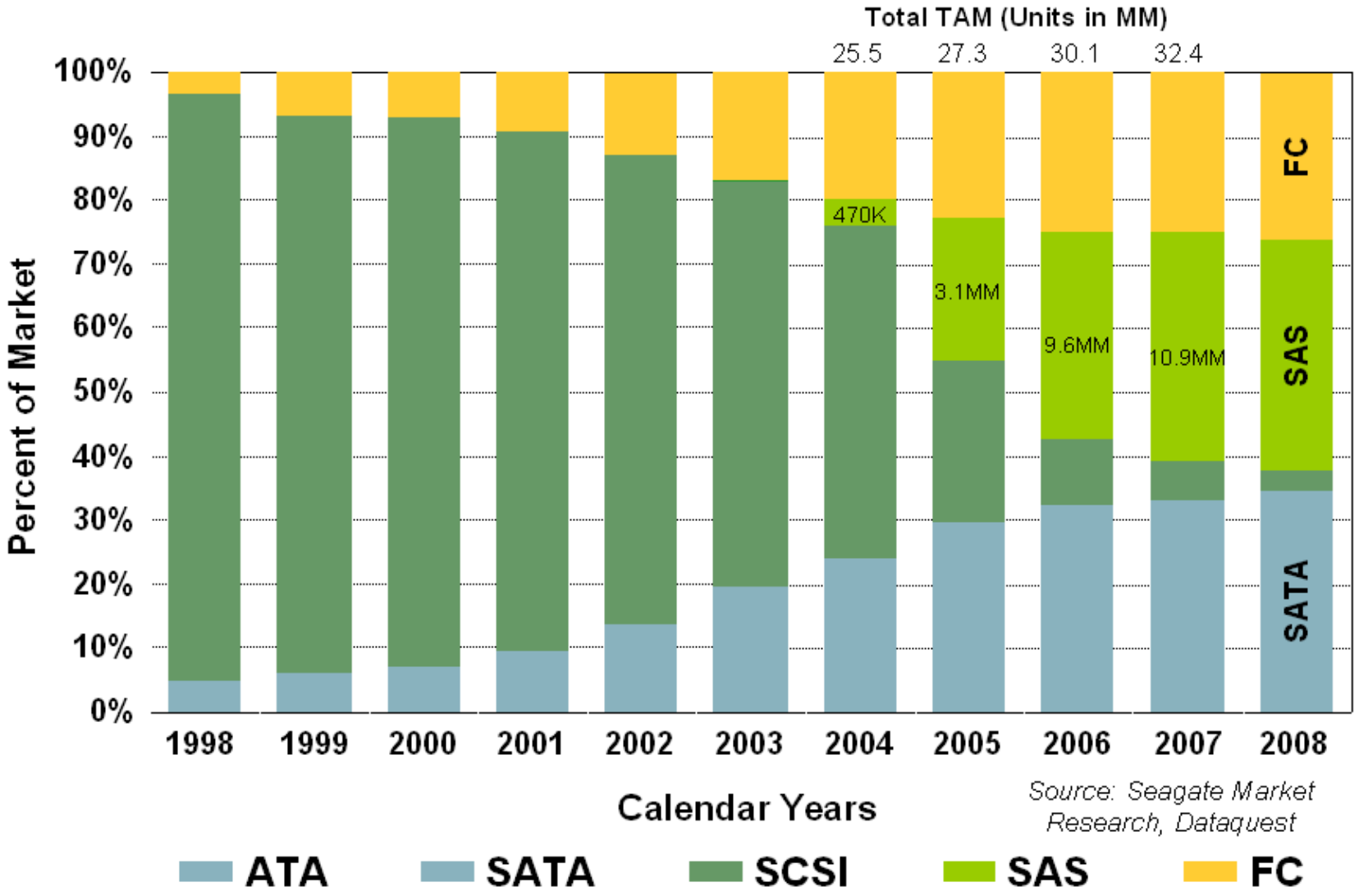
Why SAS?

4. Ultimate Flexibility: SAS enables Compatibility

SAS back planes, host bus adapters and expanders enable compatibility between enterprise-class and desktop-class drives providing system integrators and It departments with greater flexibility in choosing the right drive for their applications.



Market Opportunity (HDD Units)



Thank you!

Don’t forget to turn in your survey

for your free

Polo Shirt!

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Backup

Savvio compared to a 10K 3.5”drive

Features	Savvio – 73 GB	10K 3.5” – 73 GB	Savvio advantage
Form factor (L x W x H)	111 x 70 x 15 mm	147 x 102 x 25 mm	70% less
Weight	.5 lb	1.62 lb	1.12 lb less
Power (operating)	9 watt (FC)	16 watt (FC)	40% less
Interface	SAS, FC, SCSI	FC, SCSI	More choice
Acoustics (idle)	2.6 bels	3.3 bels	Quieter.
Shock (op/non-op)	60/275 G’s	60/225 G’s	20% greater
Seek Time (read)	4.1 ms	4.7 ms	15% faster
Reliability (MTBF)	1.4M hrs. (7X24X365)	1.2M hrs. (7X24X365)	Less power, less heat = greater reliability.

Savvio compared to a notebook drive

Features	Savvio – 73 GB	Notebook – 40 GB	Savvio difference
Form factor (L x W x H)	111 x 70 x 15 mm	100 x 70 x 9.5 mm	5.5 mm higher
Weight	.5 lb	.22 lb	.28 more lbs
Power (operating)	9 watt	2.4 watt	6.6 more watts
Interface	SAS, FC, SCSI	ATA	More choice
Acoustics (idle)	2.6 bels	2.3 bels	Both below 2.7 bels
Shock (op/non-op)	60/275 G's	225/800 G's	Savvio will be used in carriers.
Seek Time (read)	4.1 ms	12 ms	192 % faster
Reliability (MTBF)	1.4M hrs. (7X24X365)	600K hrs. (5X8x260)	NB drive is not an ES drive.