FAST STORAGE ISSUE

Performance for the new digital life

SSHD Steps Up for the Desktop

Bringing the Benefits of SSHD to a Visionary Product Line

The Sunny Side of Buying SSHD on Newegg

and more...

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FAST STORAGE

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The leading consumer electronics e-retailer in the U.S., Newegg offers more than three million products on its website. Many of its customers want the latest technology. Together, Newegg and Seagate satisfy demand. Read more ▸

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Learn more about SSHD performance in the first edition of *FAST Storage.*

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READ SECOND EDITION
In the second edition of *FAST Storage,* we tell why SSHD is taking the market by storm.

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p19 SSHD Steps Up for the Desktop

A few years ago, 2.5-inch form factor SSHDs for laptops entered the market. Recently, Seagate introduced the 3.5-inch form factor SSHD. How does this new product perform in the real world?

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Most people don't know enough about storage to make informed decisions that optimize how they're using their technology. That's what the Storage Products Association (SPA) aims to fix. Read more ▸

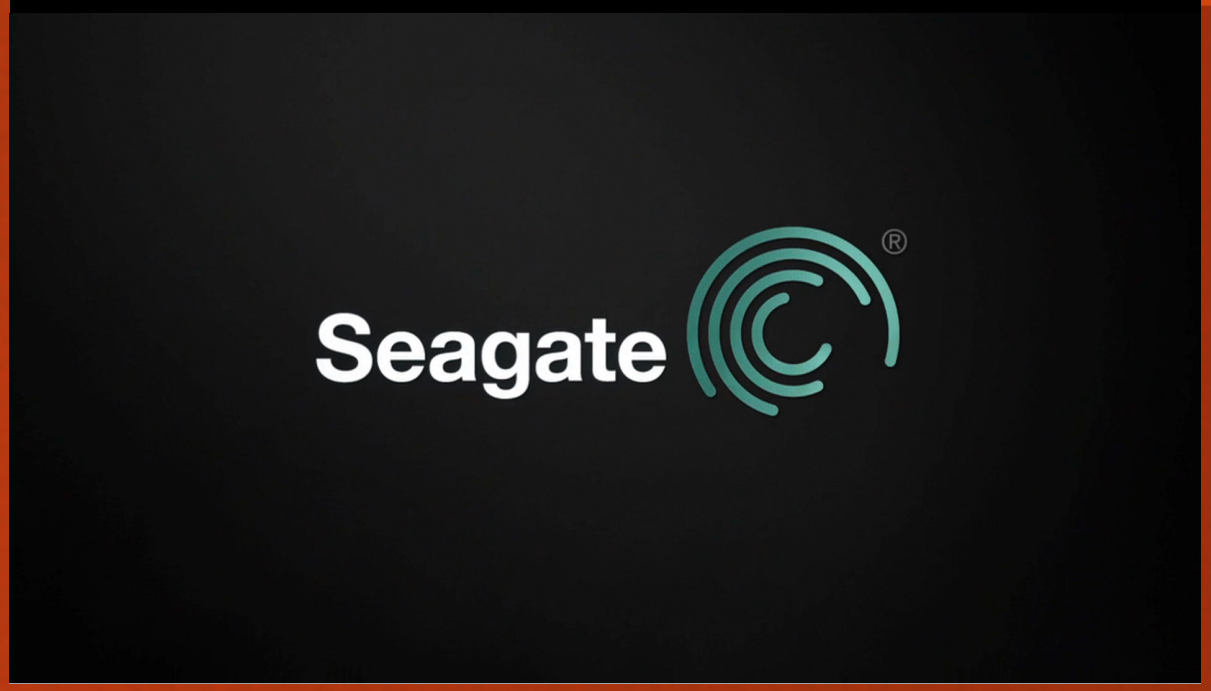
p37 A Powerful Weapon for Online Gaming

Because he depends on his laptop for work and play, Jonathon Sze, director of games management at Infocomm Asia Holdings, upgraded performance and processing capability with a 750GB Seagate® Laptop SSHD. Read more ▸

The Sunny Side of Buying SSHD on Newegg

As the leading consumer electronics e-retailer in the U.S., Newegg offers more than three million products on its award-winning website. The company's loyal customers have trusted Newegg to feature top brands since 2001, and the website now boasts more than 18 million registered users. ►

VIDEO. Seagate Solid State Hybrid 500GB Hard Drive Overview



Appealing to the Newegg Prosumer

So who is the Newegg customer? Fred Huang, director of product management at Newegg, provides insight into the company's most dedicated shoppers.

"Newegg.com consists of the *prosumer* type of customer. Many of these customers are first adopters – they want to try the latest and the greatest.

"Our community is also known for gamers," Huang continues. "People who want the best of the best. If there's anything that's new, they want to try it."

It goes without saying that the typical Newegg customer is tech-savvy with a detailed understanding of how his or her systems work. With their eyes on upcoming technologies and trends, Newegg's tech-guru shoppers are always drawn to new and exciting products. And Seagate helps satisfy their expectations.

The Allure of SSHD Technology

As one of seven *Featured Brands* on Newegg.com, Seagate offers the Newegg prosumer a variety of enticing products, including an increasingly popular line of solid state hybrid drives (SSHD).

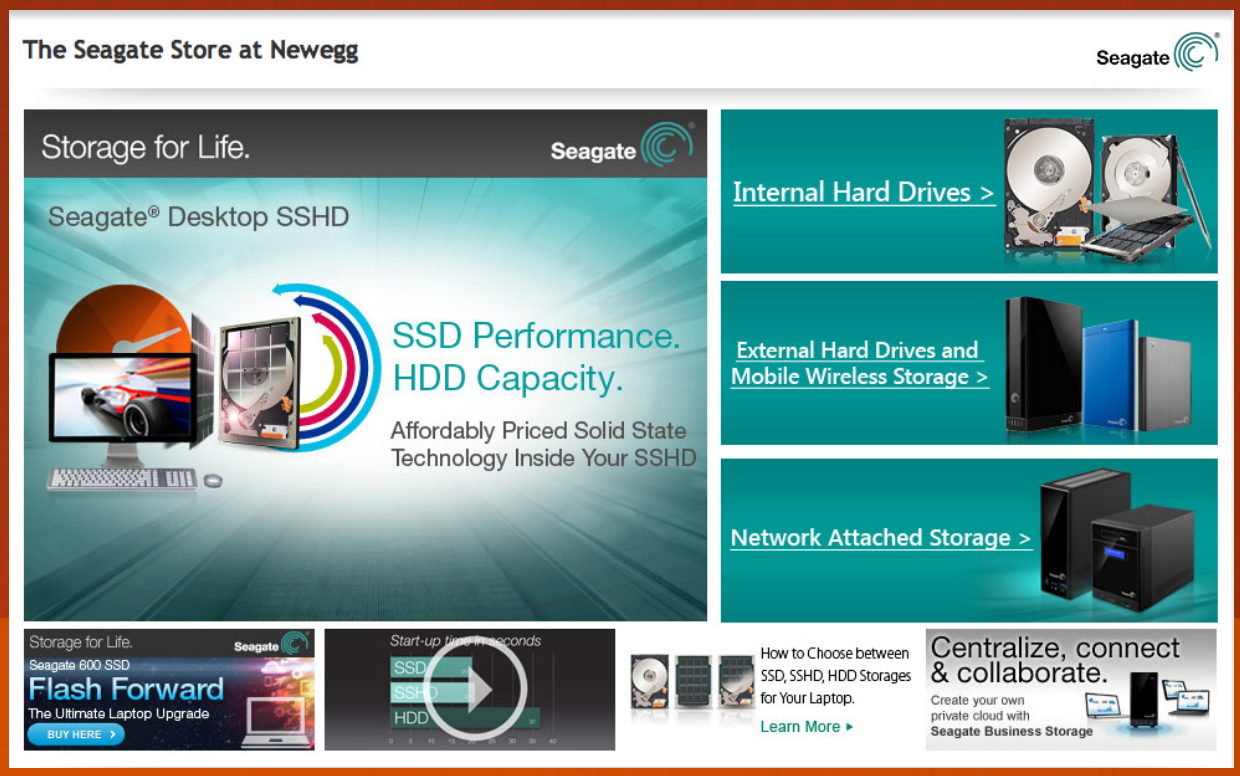
One of Newegg's significant focuses is providing cutting-edge options for customers to upgrade their systems. SSHD technology from manufacturers like Seagate offers Newegg shoppers an innovative opportunity for storage upgrades to both laptop and desktop computers.

"A lot of our customers have already adopted SSD technology," says Huang. "They know the speed, the performance gain, and how much time they can save. But the downside for them is the limited capacity of SSDs."

While solid state storage has earned a reputation for speedy performance, it can also be quite expensive per gigabyte. An SSHD solution is more economical. Currently, for 128GB of SSD storage, users can get 1TB of capacity with an SSHD – that's nearly 10x the storage for the same price.

"People who want the best of both worlds – speed as well as high storage capacity – look for the best bang for their buck," Huang emphasizes.

http://www.newegg.com/Seagate/BrandStore/ID-1305



Not only does Seagate's line of SSHDs give Newegg prosumers the speed improvements they seek, it also offers high storage capacities, designs for both ultrabook and standard laptops, as well as one-of-a-kind, 3.5-inch options for desktops and all-in-one systems.

Offering the Latest and Greatest in SSHD Technology

Customers who decide to go with a Seagate SSHD can benefit from buying their products on Newegg.com. With special product bundles and combo savings, exclusive *Shell Shocker* sales and *Featured Daily Deals*, Newegg consistently offers competitive prices.

The company also ensures top customer satisfaction by providing a variety of consumer resources, including informative product videos and photo galleries, educational product tours and the EggXpert.com community forum. Before purchasing a product, Newegg customers can browse reviews from technology professionals and novices alike.

Newegg prides itself on efficient, on-time logistics and shipping, with customer service associates available 24x7 via phone, email and online chat. The company guarantees both its service and featured products, helping shoppers reach the best possible buying decision for their needs.

Current news for Newegg and Seagate

–Newegg and Seagate participated in the annual BlizzCon gaming conference

–Newegg featuring a limited-time Seagate SSHD Desktop Bundle

What Newegg Shoppers Say about Seagate SSHDs

"Very fast drive, ultra quiet."

"Wow, the cache really does make a big difference in the performance of this drive."

"Performance drive with a budget price."

"Fast boot up, decent price, and all the benefits of an SSD and a conventional hard drive."

"Nice compromise of size, speed and price."

"The drive was a stellar performer."

"SSD-like speed with 1TB capacity – best of both worlds."

tom's HARDWARE

Caching is King

BY TOM'S HARDWARE

Assessing Top PC Storage Options for Tomorrow

In a perfect world, supersized solid state drives (SSD) would run in all of our systems, and everyone could afford to upgrade them every year or two. Currently, there's a price-per-gigabyte disparity of roughly US$0.80 for SSD compared to US$0.05 for HDD when buying the highest capacity available. Obviously, people buy SSDs for performance and HDDs for inexpensive capacity, and the gap between these two has held fairly steady in recent years. ▸

Between these two storage options, however, a rising number of caching technologies are vying to provide a happy medium. Do any of these approaches make sense for your current and future systems? Let's find out.

The Two-Pronged Approach

In this context, caching entails using NAND flash (solid state) memory as a high-speed storage repository for frequently accessed files. Meanwhile, the majority of files, most of which may go untouched for weeks—even years—can reside on standard magnetic platters.

NAND flash can be implemented in different ways. One approach that's been popular since low-capacity SSDs became more affordable involves using an SSD as the system boot drive, where the operating system and most commonly accessed applications are installed. This configuration helps accelerate boot and application load times when compared to performing the same operations from a hard drive.

However, only a fraction of OS and application files are needed during loading. Many users install at least 80GB or 120GB SSDs to accommodate their software, but these loading operations require far less capacity.

People often pay more per gigabyte than necessary to achieve their acceleration goals.

A more moderate approach involves a smaller version of the conventional SSD using the mini-SATA (mSATA) port rather than the conventional SATA interface. In appearance, mSATA looks like a conventional mini-PCIe connection, but it uses different electrical signaling to communicate with the system's SATA controller. The BIOS must have the drive set to RAID mode, and up to 64GB of mSATA storage can be allocated for caching. Similar yet competing caching schemes exist for mSATA drives, but Intel® is the most prevalent in the consumer market.

mSATA drives aren't always meant for caching. With a 480GB option, mSATA is a perfectly viable 2.5-inch SSD replacement. As tablets and other ultramobile devices need high speed and capacity, the physical volume advantages of mSATA should become obvious. In fact, next-generation form factor (NGFF) cards already stand poised to replace mSATA later this year. The mSATA design measures 51×30×4.85mm while NGFF at its smallest measures just 42×22×2.75mm. (Longer, double-sided options reach 110mm in length and 3.85mm thick.) Despite the downsizing, NGFF designs like Intel's SSD 530 Series will specify 6Gb/s SATA connections, 128-bit AES encryption, sequential read/write speeds of up to 550/520 MB/s, and capacities up to 480GB.

Intel's 530 Series uses single-layer cell (SLC) memory, while higher-capacity mSATA options use multilayer cell (MLC), which stores two bits per NAND cell, or even tri-layer cell (TLC) memory. The more bits per NAND cell, the lower the cell's endurance.

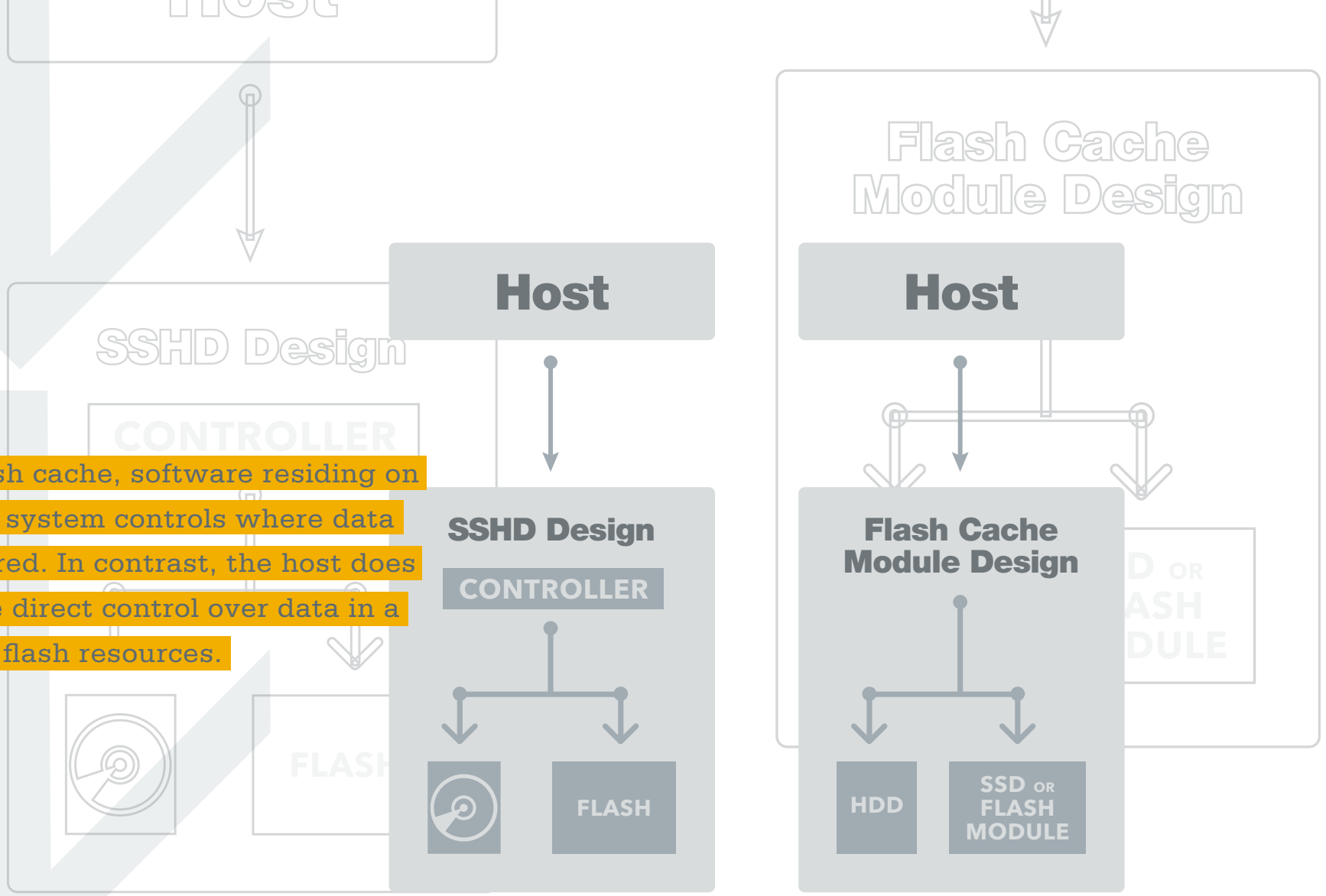
Seagate incorporates NAND flash memory and spinning magnetic media in the same 2.5-inch form factor as conventional laptop hard drives.

The oxide layer that protects the cell's integrity by keeping the stored electrons in place wears down more quickly. An SLC cell might endure 50,000 write cycles before it can no longer hold data. A TLC cell may last only 1,000 cycles. When employed in a caching role meant for the most repetitive, high-use storage tasks, this reliability issue shouldn't be ignored.

Reliability aside, pricing remains a key issue. mSATA drives are currently listed for nearly US$5 per gigabyte. Unless the drive is meant for an embedded application, that investment still requires the user to buy another drive for regular storage.

Solid state hybrid drives (SSHDs) offer an intriguing alternative. Hybrids are traditional hard drives with what is effectively an SSD mounted on their circuit boards. Functionally, the hybrid design mirrors an mSATA combined with a hard drive. The onboard NAND serves as a high-speed cache for frequently accessed files.

The cost benefits of a hybrid approach are obvious. As of early November, Newegg was offering the latest 1TB Seagate® Laptop SSHD (model ST1000LM014) for US$120. The drive incorporates 8MB of MLC NAND, 64MB of conventional disk cache, a 5400-RPM spin rate, and a 6Gb/s SATA interface. Of the major drive vendors, Seagate has been the pioneer and leader in hybrid designs, so we're confident discussing the Laptop SSHD as a prime example of what's in store for 2013-2014.



With flash cache, software residing on the host system controls where data gets stored. In contrast, the host does not have direct control over data in a hybrid's flash resources.

Comparing the Two Approaches

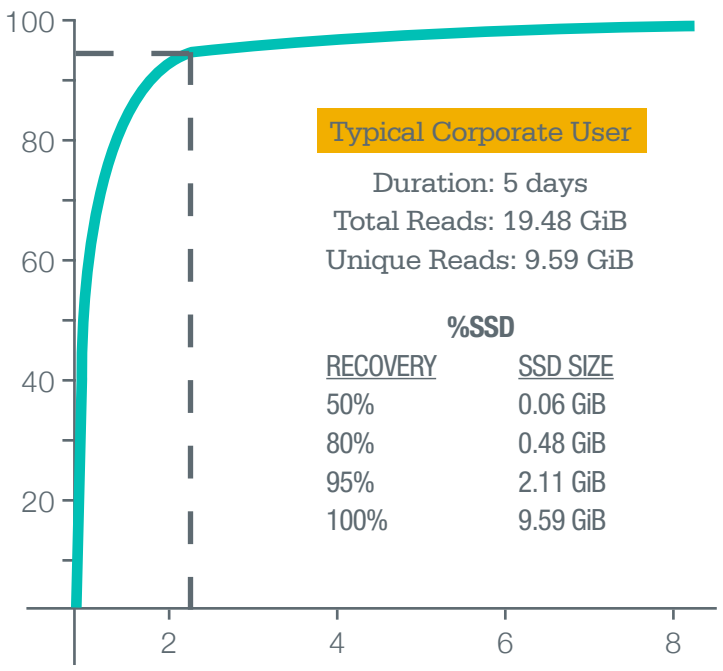
On the surface, the hybrid and mSATA+HDD approaches sound similar: NAND flash in front with magnetic media in back. However, some fundamental differences must be examined.

With mSATA+HDD, software on the host system controls where data is stored. This is principally a function of the operating system and drivers monitoring LBA accesses. This approach allows for some design flexibility. For example, the flash memory could reside on the SATA bus, the PCIe bus, an easily upgradeable plug-in card, or be mounted on the system motherboard.

In contrast, the host doesn't have direct control over data in a hybrid's flash resources. Hybrid drives carry their own storage controller within the drive. The controller—and specifically the algorithms running within it—dictates what data should reside in the cache and whether incoming read requests should seek from the NAND or magnetic media. Recent advances by Microsoft® and its storage partners allow the host to offer the hybrid controller *hints* based on the LBA accesses that it's still monitoring, but the SSHD controller decides whether data on the platters needs to be copied into cache for faster accessing.

Considering these alternatives, all judgment calls boil down to: it depends. Consider system integration. A hybrid is one component rather than two, meaning easier installation and a smaller physical volume requirement. In cases where drive images must be copied onto new systems, there is more chance of complications and incompatibilities when flash cache components change.

Generally speaking, hybrids are more efficient. Because of tighter integration with HDD resources, the SSHD's controller knows which data accesses require the longest rotational and seek latencies. Such factors are considered when deciding which data to keep in flash, thus making better use of available resources.



More importantly, data transfer between the flash media and platters is done within the hybrid drive and controlled via onboard ASICs. In the flash cache model, the CPU must handle such transfer loads, and either the SATA or PCIe buses must shoulder the traffic bandwidth, leaving fewer resources for other tasks.

With only one component in play, hybrid solutions can cost less. For OEMs, there's no need to redesign systems to accommodate additional flash modules. Hybrids have the flash controller integrated into the HDD controller, so fewer chips are involved.

Furthermore, if users need to upgrade the storage subsystem, they can simply replace the HDD and leave the mSATA SSD in place—decreasing upgrade cost. However, this advantage presumes a notable price disparity between standard HDDs and hybrids. If a system's use-model changes and more NAND cache suddenly becomes advantageous, then an mSATA-based approach could be preferable. Of course, this presumes users remember to mirror the flash cache's data before upgrading. Failure to do this may result in significant data loss. SSHDs are designed such that all data in flash also resides on the HDD.

To address these questions, consider how much NAND is needed for storage acceleration. Seagate researchers have determined that the average office worker needs considerably less than 8GB of flash to realize the majority of storage acceleration benefits. More NAND may increase endurance, but the average user is unlikely to gain more performance for the added cost. Even with just 8GB, users are unlikely to meet NAND endurance thresholds within 10 years.

Conclusion

As flash cache and SSHD options expand, the price gap against conventional HDDs will likely continue to narrow. At some point—and we may be there in the mobile space—users will struggle to justify why they should buy a traditional hard drive with no flash acceleration. Compared to paying for more RAM or a faster CPU, having NAND flash integrated into the HDD subsystem cost-effectively delivers the necessary acceleration.

Users will need to consider related factors, including platform compatibility, upgradeability, cost and size when evaluating whether flash cache or the SSHD solution makes sense for their situations. Either way, consumers are poised for some of the biggest value gains they've seen in a long time. ■

Xi3 CORPORATION:

Bringing the Benefits of SSHD to a Visionary Product Line

Xi3 Corporation is taking the computer world by storm with a true departure from the traditional PC. The innovative Xi3® Computer Architecture has a cubed (modular) design that features solid state storage and packs the same punch as standard PCs – all in about a quarter of the size. Complementary products from Xi3 – particularly *SLID3*™ Storage Solutions – help users enhance the overall computing experience. ►


5.531h”
1.875h”
3.656d”
4.875w”

VIDEO. Xi3 Corporation - Moving Boundaries with the Help of SSHD Technology

Maximum Performance in a Small Size and Elegant Package

The Xi3 modular design empowers users to build on their computers' capabilities without sacrificing space or style. Understanding the consumer need for low-cost bulk storage, Xi3 created *SLID3* Storage Solutions. Capable of housing SSHDs, *SLID3* solutions can deliver the advantages of consistent performance and higher capacity to any of Xi3's computers.

A Game-Changer for Home Entertainment

Xi3's soon-to-be-released PISTON™ Console is one product that can certainly benefit from *SLID3* drives. This highly anticipated gaming console also serves as a modular computer with multiple functions, including gaming, high-performance computing, home theater and home automation control. While PISTON offers 128GB of SSD storage, many home entertainment computers require even higher capacities to store pictures, music, TV shows, videos and other multimedia (Figure 1). Furthermore, it's not uncommon for a single game to consume up to 15GB of storage space.

SLID3 drives help PISTON users meet storage needs – delivering up to 2TB of extra capacity per *SLID3* device. PISTON can support two separate *SLID3* drives, which fit stylishly with the console's sleek design.

A Storage Boost for Enterprises and Organizations

The X7A Modular™ Computer is yet another of Xi3's new products that is well complemented by *SLID3* solutions. With high capacities and high bandwidth, the X7A system fulfills heavy-duty computing, whether for departmental servers or performance desktops. These computers feature between 64GB and 1TB of SSD storage. Yet various enterprises and organizations require

WHAT CAN YOU STORE?

Note: Quantitative usage examples for various applications are for illustrative purposes. Actual quantities will vary based on various factors, including file size, file format, features and application software.

FIG 1. WHICH HARD DRIVE IS RIGHT FOR YOU?

Capacity	Digital Music (hours)	Digital Photos (files)	Digital Videos (hours)	DVD Quality (movies)	HD Videos (hours)
320GB	up to 5,000	up to 100,000	up to 320	up to 80	up to 80
750GB	up to 12,000	up to 240,000	up to 750	up to 180	up to 180
1TB	up to 16,600	up to 320,000	up to 1,000	up to 250	up to 250
2TB	up to 33,320	up to 640,000	up to 1,000	up to 500	up to 500
3TB	up to 49,980	up to 960,000	up to 3,000	up to 7550	up to 750
		Average file size using camera's highest-resolution JPEG mode		Based on typical two-hour movie	Based on H.264 compression at 6.7MB/s bitrate

Source: Bestbuy.com, "Which Hard Drive is Right for You?", 2013


Ethernet
Display Port
DL-DVI + VGA
19Vdc 3.3A
Range 12-24Vdc
Xi3 Corporation
© 2010-2012
U.S. Patents
7,075,784 7,242,574
7,256,991 7,733,635
7,764,506 7,817,412
Other Patents Pending
www.Xi3.com
RoHS
recycle.Xi3.com
SOUND
IN
OUT
MIC
USB
MADE IN USA
eSATAp
(default)
S/N:
Xi3 Corporation
© 2010-2011
U.S. Patents
7,256,991 7,764,506
7,817,412 Other
Patents Pending

SLID3 solutions fit seamlessly with the attractive packaging of the X7A unit – achieving maximum capacity in a very small footprint.

additional storage capacity, as 15 out of 17 [business] sectors in the U.S. have more data stored per company than the U.S. Library of Congress.

SLID3 solutions accommodate this need for more storage. Like PISTON, the X7A computer can support two *SLID3* devices, enabling up to 4TB of extra capacity. *SLID3* solutions fit seamlessly with the attractive packaging of the X7A unit – achieving maximum capacity in a very small footprint.

A Creative Solution for Tight Security

Military and aerospace organizations utilizing Xi3 Modular Computers have also discovered a resourceful application for *SLID3* solutions: top-notch data security.

A number of customers in these markets have chosen to eliminate the internal SSD in the Xi3 computers, opting instead to store and run all data using external *SLID3* drives. In these scenarios, *SLID3* drives let security-focused customers maintain high levels of performance and capacity without storing critical data on the local computer, where it is vulnerable to theft or breach.

Harnessing the Power of SSHD

According to Jan Bjernfalk, vice president of product marketing at Xi3, SSHD products like the Seagate® Laptop SSHD are an excellent fit for Xi3 *SLID3* solutions. "This is something that takes advantage of the same solid state technology that makes the Xi3 Modular Computer cube what it is," Bjernfalk says of the SSHD.

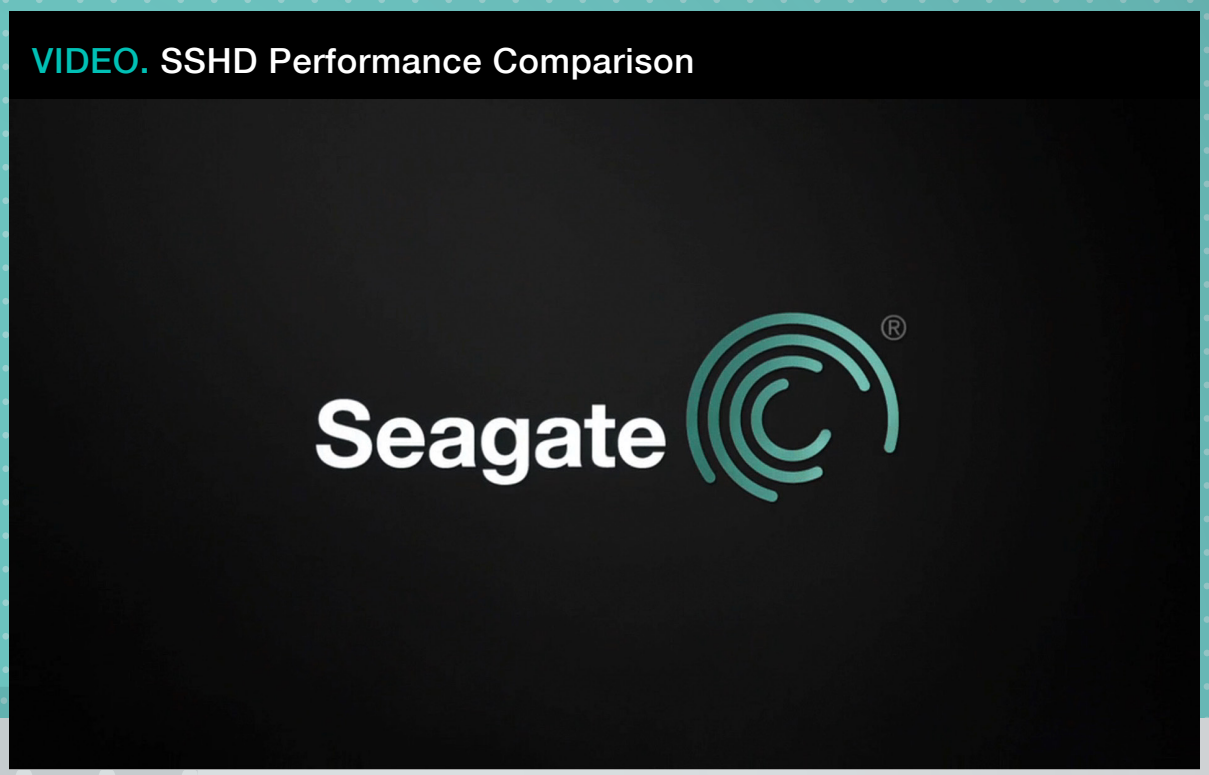
At their core, Seagate SSHDs bring the benefits of performance, capacity and affordability to the *SLID3* line. ■

Seagate Laptop SSHD: Favorable Features for *SLID3* Storage Solutions

- ✓**Enhanced capacity at a reasonable price** – up to 1TB of storage per drive, at a much lower cost than SSDs
- ✓**Performance** – SSD-like performance, up to 5x faster than traditional HDDs
- ✓**Power savings** – deliver on the Xi3 promise of low energy consumption
- ✓**Size** – built to accommodate small form factors

SSHD steps up for the desktop

VIDEO. SSHD Performance Comparison



Solid state hybrid drives (SSHDs) entered the market a few short years ago with Seagate being the sole provider of 2.5-inch form factor SSHDs for laptop computers. Three years later, both Toshiba and Western Digital have also entered this market, both shipping 2.5-inch form factor products targeted at the laptop computer market. ►

3.5 INCH FORM FACTOR

SSHD for desktops and workstations

Seagate is the first company to begin shipping SSHD product in the 3.5-inch form factor, which is traditionally sized for the desktop and workstation market. The new Seagate® Desktop SSHD is available in 1TB, 2TB and 4TB configurations, which use the same architecture that made their Laptop SSHDs very popular.

To demonstrate the fact that the Desktop SSHDs are every bit as fast as the laptop family, Seagate tested the new products alongside their own 7200-RPM Desktop HDD, a competitive 5400-RPM desktop HDD and an Intel® 320 SSD. All tests were run on the same non-branded desktop platform built on an Intel Core® i5 processor equipped with 4GB of DRAM cache. Testing was completed on the Windows® 7 operating system.

How we benchmark for performance in the real world

Each storage device was evaluated using the following test software:

- PCMark Vantage has been widely used as a synthetic benchmark to focus only on storage device performance.
- SysMark is another synthetic benchmark with a focus on total system performance.
- Boot testing has long been a key measure for PC performance that matters a great deal to end users.
- Application testing automates the launching, loading and some tasks of common PC applications and was developed by Seagate to simulate a real-world experience that is closely related to storage performance.
- Time-to-ready testing measures how long it takes for a storage device to start up after a power cycle and begin transferring data to the operating system. This test is becoming more important because Windows 8 now has a requirement for this category of four seconds or less.

Each device was tested, and the results compared to evaluation performance. When testing the SSHD, the tests were run four consecutive times to allow the device to develop an initial basis of data usage. Again, this simulates how the drive runs in the real-world environment.

PCMark Vantage

PCMark Vantage is a commonly used performance benchmark focused on storage performance. As Figure 1 illustrates, the third-generation Seagate Desktop SSHD product yields performance substantially faster than either 5400- or 7200-RPM hard drives and is competitive with the Intel 320 SSD.

FIGURE 1

SysMark

SysMark is a system-level benchmark that takes into consideration all key components, not only storage. This benchmark tells a similar story (see Figure 2). SSHDs are much faster than HDDs and approach SSD performance.

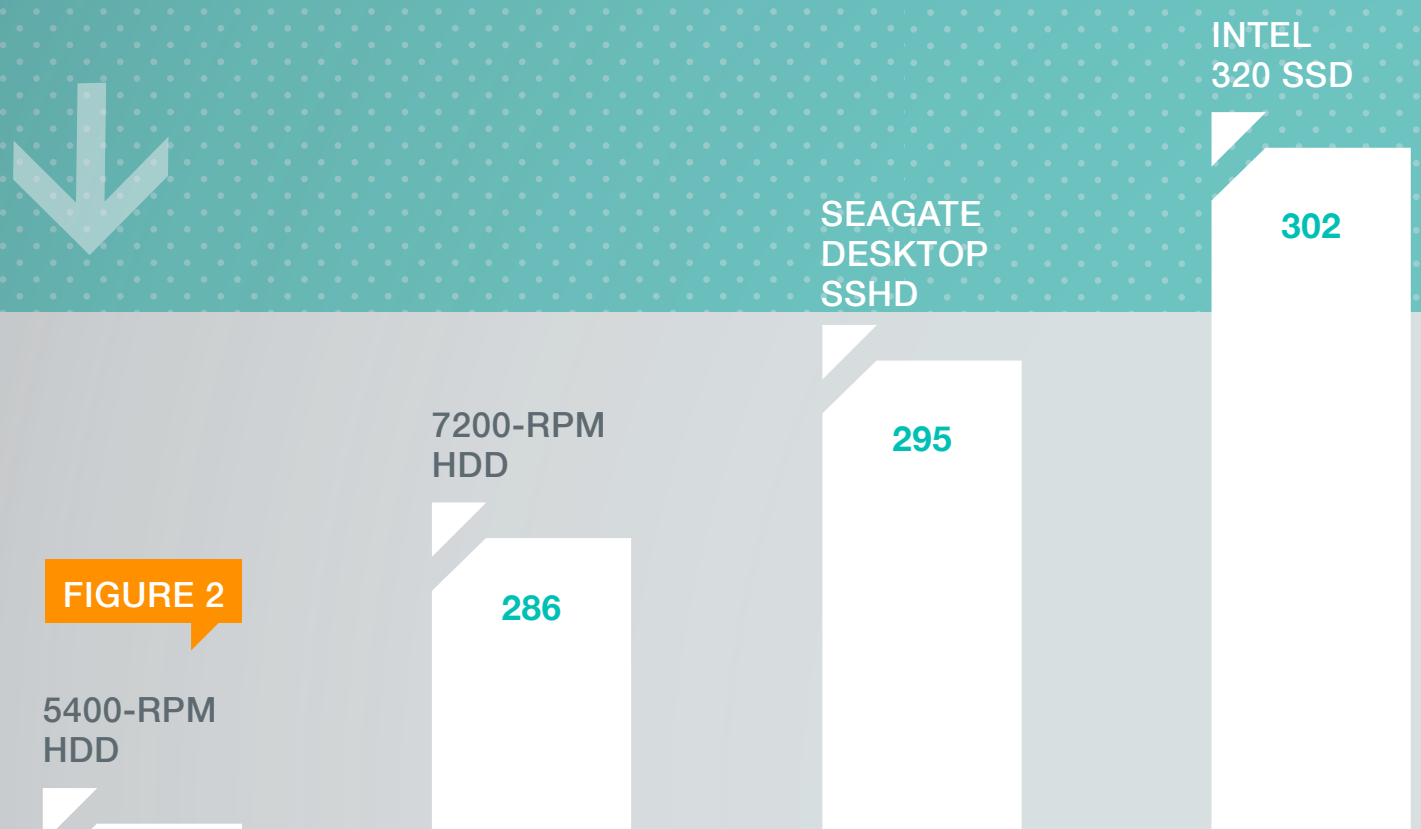


FIGURE 2

Boot and application load

The boot and application load data illustrates real-world performance. Boot times with SSHD technology are fairly competitive to the SSD. Application load tests are achieved using automated macros, which launch and load common applications and associated data including Acrobat Reader, iTunes, QuickTime, Internet Explorer, Office, Photoshop and Premier Elements. Again SSHD performance is substantially better than the HDD and not substantially behind that of the SSD (see Figure 3).

FIGURE 3

Time to ready

Note the time-to-ready numbers. Since desktop drives have more mass, they typically take longer to spin up the platters and come ready. But since SSHDs access start-up data in NAND flash memory, you don't have to wait for the platters. A great benefit to Seagate SSHD products is that they all achieve a time-to-ready speed of about 0.5 seconds (see Figure 4).

This capability is particularly important, as Microsoft is moving aggressively to require that storage devices achieve a time-to-ready performance of four seconds or less. This is going to be a very tough goal for other hard drives to achieve, especially 3.5-inch form factor products.

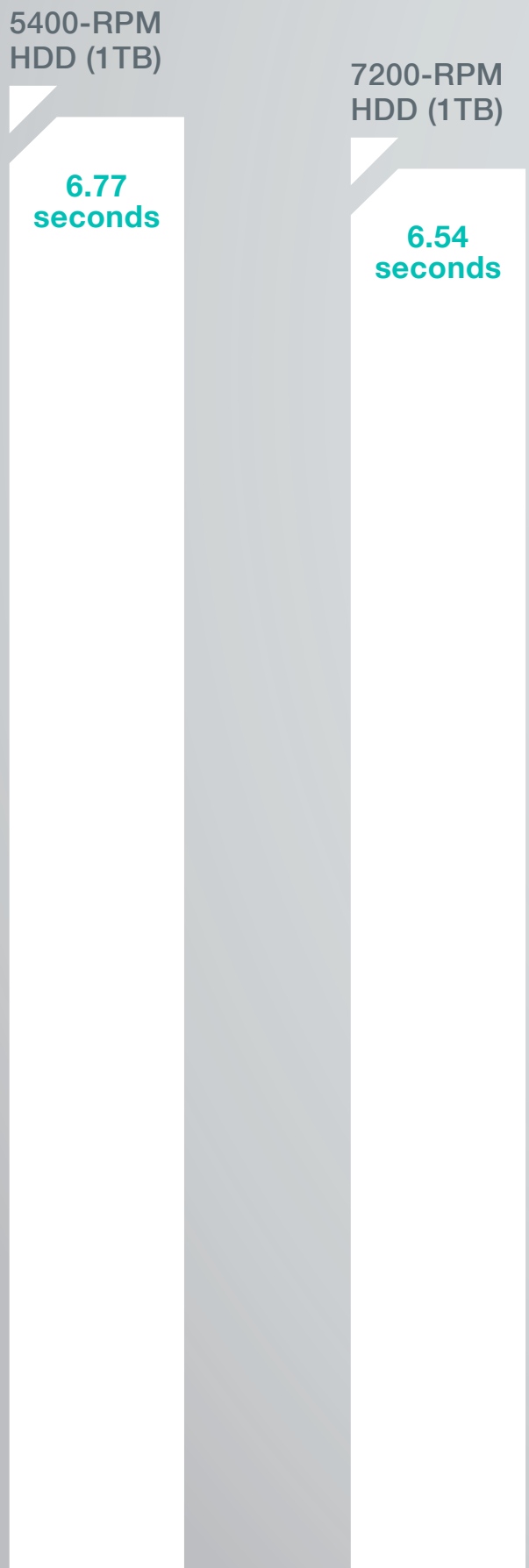


FIGURE 4

VIDEO. How to upgrade a desktop drive from HDD to SSHD

Thorough testing makes the case for SSHD

The results of testing reveal a pretty compelling story for the Desktop SSHD.

– SSHDs deliver substantially better performance than either 5400- or 7200-RPM desktop hard drives. This is true in every category of testing, although it is most compelling when looking at boot data and application load data, which virtually every end user can relate to.

– SSDs yield the overall best performance, yet the margins of improvement in the real-world testing of booting, launching and loading applications are not as dramatic as the PCMark Vantage results would suggest.

– The SSHD really shines when its combination of performance, capacity and price are evaluated together. For users who are looking for incremental performance and system responsiveness, SSHDs are much faster than standard HDDs. Users also need substantial capacity for their digital lives and, again, SSHDs clearly rise to the top. When you combine the fact that an SSHD is just slightly more expensive than a traditional HDD, the appeal of SSHD grows quickly.

Desktop SSHD performance is very similar to Laptop SSHD performance. And while this is officially the first-generation Seagate Desktop SSHD product, Seagate is clearly learning from its two previous generations of Laptop SSHD drives.

Overall, customers are also benefiting from these latest results. They have continued to see productivity gains with noticeably better performance and quicker response times from their computers that have SSHDs installed on them. ■

STAY INFORMED

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SHOP SEAGATE SSHDs

LEARN MORE ›

They'd like to teach the world to choose the right storage.

Introducing the Storage Products Association.

Michael LoBue (MB)

Executive Director, SPA

Jeff Burke (JB)

Vice President: Strategic Marketing and Research, Seagate Technology LLC & Executive Management Committee member, SPA

Sachin Piplani (SP)

Director of Global Marketing, HGST & Executive Management Committee member, SPA

Don Jeanette (DJ)

Senior Director for HDD and SSD Marketing, Toshiba & Executive Management Committee member, SPA

Ted Deffenbaugh (TD)

Senior Director Engineering at WD & Executive Management Committee member, SPA

When it comes to computing technology, storage literally makes the world go ‘round.

The thing is most people don’t know enough about storage to make informed decisions that optimize how they’re using their technology. Throw in all the hype about SSD lately, and people are generally choosing storage that does not fit their needs. And that’s what the Storage Products Association (SPA) aims to educate consumers about. ►

In this conversation with the leading experts from the SPA executive management committee, we discuss the ideas that led to forming the organization, what makes SPA unique, and how the organization plans to use education to change the world of technology.

Q. What was the driving force around the formation of the SPA?

A. Michael LoBue (MB), executive director, SPA

It's really simple. SPA was formed to help users understand the growing importance of storage. Let's look at how radically computing has changed recently. Who would've thought 10 years ago that workers would be doing corporate spreadsheets on their 5-inch mobile screens? Or that an upstart online bookseller named Amazon would become the biggest cloud services provider?

A. Sachin Piplani (SP), director of global marketing, HGST and executive management committee member, SPA

What's really changed, too, is the speed and rate at which data is created and consumed. Now it's on-tap, on-demand. So one of the forces behind SPA is that we are entering a time where data generates more data. With all the cloud services, Internet content providers, social networks and enterprise big data, people want to store everything. And that's driving the need for reliable, high-performance storage with the best total cost of ownership.

With that in mind, we formed SPA to work together to educate end users and customers about the evolving storage mix and how to choose the right solutions.

A. Jeff Burke (JB), vice president, strategic marketing and research, Seagate Technology LLC and executive management committee member, SPA

There's an opportunity here to start thinking about how each company can do storage better for its customers, and to think about ideas and solutions that can help people do storage more effectively and more cheaply. We can use SPA to help companies and consumers solve problems in better ways. It's not just hard drives. All the available storage technologies can coexist to do things better while continuing to drive down the cost of storage.

A. Don Jeanette (DJ), senior director, HDD and SSD marketing, Toshiba and executive management committee member, SPA

I'm in a unique position in that I deal with both types of storage technologies: SSD and hard disk drives. And a lot of times you hear the question, "Aren't solid state drives taking over the world?" The answer to that question is no, and SPA is here to help end users understand usage models, use cases, and why you would use certain storage technologies for certain applications as opposed to just hearing about SSDs all the time. We can help people

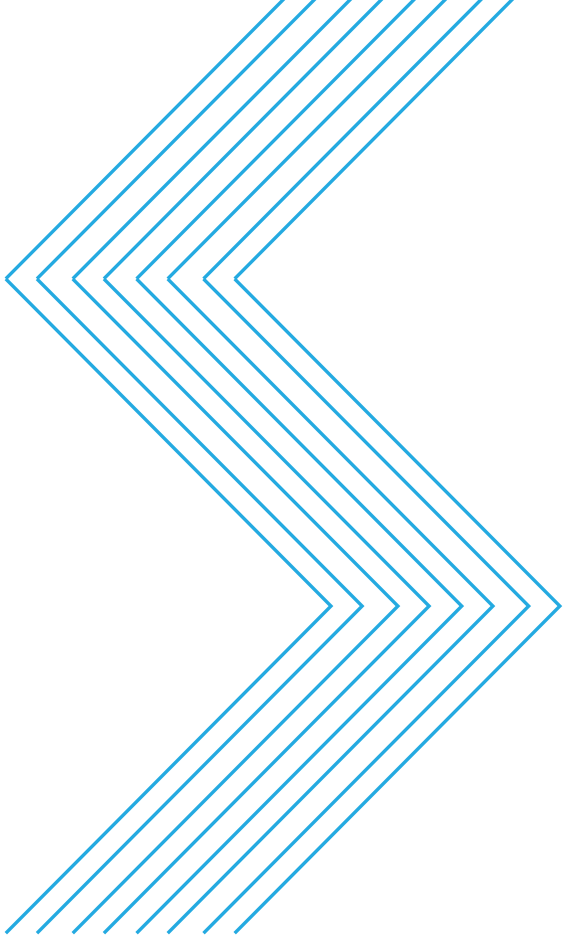
STORAGE PRODUCTS ASSOCIATION

Seagate

HGST a Western Digital company

TOSHIBA

Western Digital



SPA is an aspirational organization that helps people understand the importance of storage in their lives.

understand how and why they need both HDD and SSD. SSD certainly plays a critical role in storage, but we can help educate users where those devices fit and for what purposes.

A. Ted Deffenbaugh (TD), senior director, engineering, WD and executive management committee member, SPA

Let's not forget, too, that storage companies are also giving people better ways to live their lives by helping them understand how they access their data. There is a bunch of really, really cool storage technologies out there, and at the same time, there is a bunch of incredibly pressing needs for end customers. Those people don't necessarily know all there is to know about how they match their needs with all that really cool technology. So it would be really good to try to reach all the way down to the end customers and start talking about some of the really cool technologies and solutions that are out there.

Q. How is SPA different than other existing technology or storage-focused organizations?

A. (TD) SPA is an aspirational organization that helps people understand the importance of storage in their lives. SPA is combining aspiration and action through storage technology education. SPA fundamentally believes that people are defined by the memories they store. Computers are nothing until you start putting data through them. It's like how your memories define who you are as a person. What did you grow up with? What were your dreams? What were your thoughts? Same with computers. What differentiates one computer from another really has little to do with the architecture. It has to do with the stored data – the memories – that are behind the architecture. SPA wants to help people make the most of that data.

A. (ML) Indeed, Ted. Let me continue that thought. None of the other organizations are focused on addressing consumer needs in what users of storage are going to need to know, given the rapid pace of innovation in today's evolving storage mix. Listen. The value of just about any innovation is that it allows users to do new things. Things that couldn't be done before. At SPA, our principal focus is

education. We want to make sure end users understand their choices in storage – and how to make better choices for themselves around the changing paradigms of storage.

A. (SP) SPA is unique in how it came to be. It's really about addressing the best storage solution for businesses and consumer end users, and educating them on the variety of solutions that are available. It's not a "this OR that" solution. We want to educate about this AND that solution. How everything works together. Most industry organizations are very technical, working on new interfaces or standards for a particular technology platform. What was missing is an association that educates consumers about the variety of storage solutions and the role they play in the overall storage ecosystem.

A. (JB) Other industry groups are very, very specific around very specific topics. Storage is a really broad and increasingly important category. We want to create an inclusive group that looks at storage as an overriding issue that consumers could be better educated about. Everyone is welcome in SPA. SPA wants to get the ideas about how to use this technology out into the public domain.

A. (DJ) SPA is talking to the end users using use-case, industry messaging for all types of storage devices. SPA wants to talk directly to end users about storage education so that we can create more knowledge in the market around the types of storage devices they know they need for a certain situation.

Q. How would you describe the target audience for SPA? Whom do you really want to communicate with?

A. (DJ) SPA is talking to any user making a decision about storage. End users. IT managers. Anyone out there choosing which type of storage they are going to populate their systems with. They have options, and SPA wants to make sure that we help them realize and understand the benefits they can get with each option.

A. (TD) Exactly, Don. SPA is targeting the full gamut of end users and helping them make more intelligent decisions. And that's a broad audience. There's only one high-tech integrated product that sells more than storage, and it's the cell phone. So SPA is reaching a full range of audiences with slightly different messages that are all about making more intelligent decisions with their end goals in mind.

A. (ML) The entire storage ecosystem is SPA's target audience. ISVs. OEMs. End users. Cloud service providers. Data centers. And ultimately,

even individual end users. Because a lot of these choices are made across the value chain, everyone needs to know the attributes and benefits as storage evolves and changes.

A. (SP) SPA is also very focused on the evolution of cloud computing within the storage ecosystem. The cloud is bringing a whole different dimension to how storage is consumed, deployed and even implemented. We want to listen to these consumers very closely so we can continue to understand their issues and improve our education about the storage ecosystem moving forward. The more connected SPA is with the pulse of the storage ecosystem, the better we can execute the objectives of SPA.

A. (JB) Everyone is welcome. SPA is about finding storage solutions. SPA wants forward thinkers to get these ideas out into the public domain. There's nothing but good that can come out of that.

Q. What project is SPA currently focused on?

A. (SP) SPA has a number of projects on the table right now. These projects directly address the evolution in the storage ecosystem. We're connected with cloud and its evolution. Data center growth and challenges. Certainly the upcoming needs that reflect the data lifecycle of Create, Store, Connect and Share. SPA is taking a focused approach as it tackles one project at a time given the priorities of the audience.

A. (MB) Of course, the first project is focused on the idea of hybrid drives called solid state hybrid drives (SSHD). Expect other projects to be announced in the very near future.

A. (JB) As a new organization, SPA is taking purposeful steps for its projects. Yes, SPA has a number of ambitious plans, but SPA wanted our first project to be something that made the most sense to pursue. Hybrid drives are the perfect way to start our conversation.

A. (DJ) SSHDs are the initial project, the client-based drive for notebook systems. The technology is out there,

The cloud is bringing a whole different dimension to how storage is consumed, deployed and even implemented.

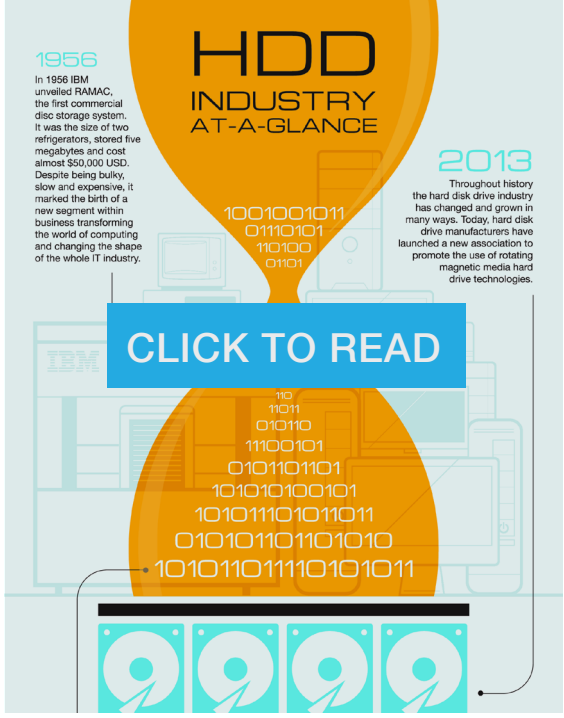
it's shipping, and it's a new technology that people ought to be more educated about. There are 170 million laptops built every year, the majority of those have standard hard drives. About 20+ million have SSDs in them. We know – and the manufacturers know – there are compelling reasons for an SSHD. Our focus is on educating customers why SSHDs are so appealing.

A. (TD) The single major thing about SSHD is that it can move data three to four times faster than what people have been traditionally doing. So with our efforts at SPA, we're very excited to educate people about how SSHD can enable cost-effective laptops that deliver high performance. That is what I mean by making the world better.

Q. How will SPA look in five years?

A. (ML) SPA will be seen as a trusted source of credible information about technologies, use models, and associated consumer benefits of digital storage products. That vision really speaks to the core purpose and objective of the organization. And by achieving that vision, we'll make sure we have members who support SPA's mission.

A. (DJ) You know, SPA was started by hard drive companies. But in reality, most of our members are already dealing with both HDD and SSD. In the future, our membership will likely include



SSD-specific companies. Maybe some OEM customers to get their input on pressing initiatives. Going forward, SPA will expand its programs into other areas, obviously still maintaining its focus on storage use cases and educating end users where storage technologies are going.

A. (SP) SPA's scope is broad, but on the other hand, the best way to succeed is to have a focused approach. So, we want to address the storage ecosystem by expanding SPA's membership, interacting with other industry associations and prioritizing SPA's projects based on the evolving mix of storage technologies. But SPA, as an association, plans to grow so the overall vision is not lost.

A. (TD) SPA wants to be defined as the organization that helps people understand the role storage plays in how they interact with their data. Storage technology, which goes well beyond just the hard disk drive, is an important part of the overall user experience. With SPA's education, people hopefully will be better able to make very intelligent decisions about making their lives better with the most appropriate choice of storage.

SPA wants to be defined as the organization that helps people understand the role storage plays in how they interact with their data.

A. (JB) Going forward, two or three things I can see is that SPA has grown its membership to include everyone from systems to customers to even analysts. We'll talk about ways to educate consumers about open solutions like OpenStack. SPA is showing people how consumers can have better experiences through home NAS and things that take a combination of storage technologies. And most importantly, people get it. That would be great.

Through the education, advocacy and growth of the SPA, exciting times are ahead for storage.

Be sure to visit with SPA at the 2014 Storage Visions conference at The Riviera in Las Vegas, January 5-6, 2014. ■

IAHGames

Seagate® Laptop and Laptop Thin Solid State Hybrid Drives (SSHDs):

A Powerful Weapon for Online Gaming

Jonathon Sze depends on his laptop for work and play. For this reason, he decided to upgrade the performance and processing capability of his laptop by purchasing a 750GB Seagate® Laptop SSHD.

Sze is the director of games management at Infocomm Asia Holdings Pte Ltd (IAHGames), publisher and distributor of popular online games in Southeast Asia, including Korea, China and Taiwan.

CHALLENGES

–Slow PC boot-up

–Sluggish launch of applications

SOLUTIONS

–Seagate Laptop SSHD (up to 1TB) for robustness, data integrity and capacity

IMPACT

–Extremely fast boot-up

–Improved response and load times based on usage

–Increased data integrity and reduced wear and tear

–Overall improvement in performance, and faster application launch times

A workaholic with a passion for games, Sze is constantly on the go. It is therefore a requirement that his laptop is robust, boots up quickly and holds all his data. As a hardcore gamer, he also needs the extra computing power and additional space required by some of the latest applications and games he uses. Upgrading to the Laptop SSHD allows Sze to move quickly between programs without having to wait for pages and applications to load, as he did in the past.

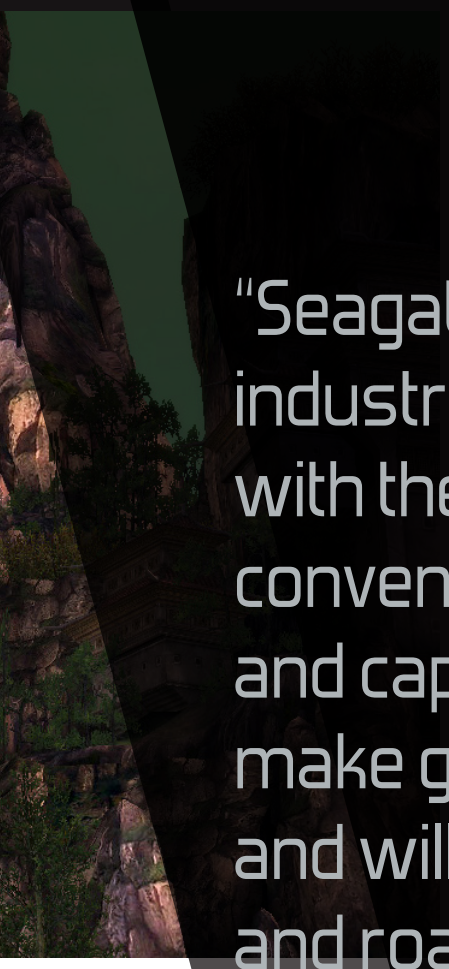
Prior to the upgrade, his laptop, though fairly new, took time to boot up and was slow in launching the latest applications and games. Sze did not want to sacrifice capacity for performance, so he did his research and ultimately decided to go with Seagate. The main clincher, he pointed out, is the quality and reliability of the Laptop SSHD, which provides excellent performance to road warriors who depend on their laptops for speed, robustness and the best data integrity possible.

The SSHD provides the best of the two worlds – it bridges the gap between solid state drive (SSD) speed and HDD value, performance and capacity.

According to Sze, “This hybrid drive combines both the hard drive and the SSD into a single hybrid drive, thereby giving me the speed of an SSD with the capacity and price of a traditional hard drive.”

For Sze, the installation process was simple, and his new Laptop SSHD operates quietly and smoothly in his laptop. He can move effortlessly and efficiently between commonly used applications, such as PowerPoint, Chrome, Explorer, Excel, Word and IAH games. File access and transfers are also performed quickly.

Sze is ecstatic with the results of the upgrade. “After trying out the Seagate Laptop SSHD, I am honestly blown away. The concept of a hybrid drive is very intriguing to me, and to see it come into fruition as it has makes me



"Seagate SSHDs will redefine the gaming industry. Games can run much faster with the Seagate SSHD than they can on conventional PCs. In fact, the performance and capacity boosts of Seagate SSHDs can make gaming that much more attractive and will ignite the imagination of gamers and road warriors alike." *Jonathon Sze, director of games management, Infocomm Asia Holdings*

confident for the future of hybrid drives. Also, the SSHD is priced competitively. Anything that can lower the GB/$ value and not give up anything in terms of performance is a big deal in my book."

The good thing about this hybrid technology is that it is system agnostic and integrates easily into any computer, Mac or PC, with no additional drivers.

In addition, with Seagate Adaptive Memory™ technology, boot times and application speeds are dramatically improved because the Laptop SSHD learns to cache your most frequently used data, unleashing your system's performance.

"The bottom line for users is that we want to boot up fast and be able to depend on our PCs to perform whenever we need them. A drive has to have data integrity," Sze said. For almost any user who has turned to the SSHD, the speed boost and performance are addictive.

"Anyone who is on the fence on whether or not to get a hybrid drive should go for it. They will not be disappointed."

By and large, the SSHD opens new possibilities and frontiers for gamers and the gaming sector. "Seagate SSHDs will redefine the gaming industry. Games can run much faster with the Seagate SSHD than they can on conventional PCs. In fact, the performance and capacity boosts of Seagate SSHDs can make gaming that much more attractive and will ignite the imagination of gamers and road warriors alike."

The Seagate Laptop SSHD features up to 1TB of capacity and 8GB of NAND flash for accelerating the most commonly used PC applications and delivering desktop performance with the storage capacity needed for any computing scenario.

Advantages of the Seagate SSHD

Features

–Adaptive Memory technology delivers SSD-like response from applications and the most frequently used files. The drive addresses this data by copying it to the flash portion of the drive, then tracking its relevancy and keeping the flash current. You get the instant response from your system that you need to perform at your best.

–It boots and performs like an SSD.

–It features SATA 6Gb/s with NCQ for interface speed.

–All-in-one design delivers simplicity and ease of installation.

–Installs and works just like a traditional hard drive in any laptop or PC and with any OS and application. Now available in a thinner, 7mm z-height model for ultra-thin, ultra-light laptops.

–Seagate SSHDs are backed by a three-year limited warranty.

Choose the Seagate drive that is right for your laptop or desktop computer. ■

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