



IT@Intel Technology Tips

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Intel IT creates and publishes articles for Intel employees to educate them on a variety of information technology subjects. Our goal is to help them improve productivity, take advantage of new IT services and raise awareness on other IT topics of interest. We've modified these articles from their original version for sharing with external audiences.

Newer, faster SSDs go mainstream for Intel IT laptops

How the first major change in hard drive technology in two decades impacts you

Hard drive technology has been evolving at a rapid pace over the last decade—more capacity, higher speeds and smaller sizes. But in the last couple of years, a whole new approach to storage technology has landed: the Intel® solid-state drive (SSD). These new SSDs are faster, lower power, and more reliable than the traditional magnetic media drives (a.k.a. hard disk drives or HDDs) that have been the standard for more than 20 years at Intel.

Here's a high-level education about SSD technology to improve your "geek IQ," a look into why Intel IT is putting them in every new laptop PC at Intel (and retrofitting existing PCs), and a few other things you probably want to know about SSDs.

The nuts and bolts of hard drives and SSDs

First, some background on the hard drive. The classic hard drive has a motor that spins a set of platters that contain magnetic recording layers. Mechanical arms float just above the surface of the platters and read and write data (see Figure 1). Because of the moving parts, hard drives are sensitive to movement and vibration, and are especially vulnerable when they are powered on, which is why you can do a lot of damage by walking with your laptop powered on. Any heavy jolt to a running hard drive can cause the heads to strike the platters, which usually destroys the data stored there.

By comparison, an SSD uses solid-state memory chips to store data, similar to a portable flash drive or memory card. Because there are no moving parts, solid-state memory is more reliable, not susceptible



Figure 1: Data in a hard disk drive (HDD) is recorded on a rotating disk, which is vulnerable to sudden impact or temperature changes.

to movement issues and can result in faster, smoother data exchange.

With no moving parts, the battery power required to run the drive is considerably less. In fact, research shows that in the same system, with the same user, doing the same tasks, you can get up to 60 minutes more battery life in a laptop with an SSD. But it's not just the moving parts issue; an SSD also goes into a low-power state immediately once read/write activity is done, which is where a lot of the power savings comes from.

The performance factor

With no moving parts, you would expect that a solid-state drive would be faster, and it is...in most cases. In a hard drive, there are many ways to measure performance and lots of debate about this topic. For our purposes, let's keep it simple and use sequential read and write speed. In a typical Intel laptop hard drive, that's about 70 MB per second, whereas sequential read speed for a SSD is about 250 MB per second. Sequential work would be like saving a 1-gigabyte video file to your drive, as an example.

But the average user doesn't do a ton of that kind of work all day long.

What we **DO** perform is a lot of "random reads and writes" –things like opening and closing documents, saving e-mails to a folder, running virus scans in the background, opening and closing applications. This "random" work is where an SSD really shines, with anywhere from ten to 100 times improved performance over a hard drive.

With this kind of performance improvement, your SSD-based PC could be running a full virus scan, for example, and you would probably not notice much of a performance hit. If that happens with a hard drive, performance comes to a crawl!

A few other SSD benefits

Now that the performance item is covered, let's look at a few of the other benefits of an SSD:

- Start up or shut down faster: Faster startup, standby, and resume functions, leading to an easier (and quicker) ability to move between locations and safely transport the laptop while it's on.
- Reliability: IT and industry testing shows there is a 90 percent lower expected failure rate with an SSD, which means your data is safer and Intel saves money by not having to replace hard drives as often. Of course, that doesn't mean you should stop doing backups! File corruptions and other mishaps can still occur on your PC.
- Same drive size: Even though the physical space required for an SSD is less than a traditional hard drive, SSD manufacturers (including Intel) are making the drives in the same size as traditional hard drives, with the appropriate plugs, allowing for quick swaps (see Figure 2).



Figure 2: The Intel® solid-state drive (SSD) is becoming the standard data system in laptops in 2010.

Final note: Capacity

When it comes to hard drive space, HDDs have the upper hand, for now. While standard hard drives routinely top the 1 terabyte (1,024 GB) barrier, common SSDs are hovering in the 80-160 range (and, as you might guess, there is a substantial price difference between the two—up to 20 times more per gigabyte for SSD vs. HDD). But, with all the other benefits of an SSD, the added cost is very much worth it.

Where to learn more

1. The Solid State Drive Info Center on www.Intel.com
2. IT@Intel white papers and videos on the benefits of Solid State Drives on www.Intel.com/IT

For more straight talk on current topics from Intel's IT leaders, visit www.intel.com/it.

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