

USB Flash Drive FAQ

“The flash drive has taken over the portable storage medium”

by Pete Choppin

Remember when we used to take a disk that measured 3.5 inches and had the data capacity of just 1.44MB and inserted it into a slow, clunky disk drive? Floppy disks, they were called, and they were as common as DVD discs are today. They're still in use. However, like the DVD, their days are numbered.

Enter the USB flash drive—the next replacement portable storage medium for the floppy disk. Launched almost 10 years ago, USB flash drives have revolutionized the way we transfer files between computers. With an ever-expanding storage capacity, near universal compatibility and enhanced durability, it's this wonderful plug-and-play technology that was finally able to kill the abomination known as the floppy drive.

Even though the flash drive has taken over the portable storage medium, there are questions about some of the technology, usage, and what is in store for the future.

In this FAQ, we answer a few of the most common questions and concerns about flash drives and attempt to explore the vast number of hardware solutions currently available.

What Is a Flash Drive?

Rather than give a beginner's lesson on flash drive technology, I thought I'd discuss the purpose, uses and advantages of flash drives.

With the availability of broadband Internet, Web-based e-mail and online file-storage solutions, file transfer and storage is often handled without using any physical device. So why are flash drives still so widely used? There's something about being able to take a file from a computer and physically carry it with you. Even though I am very familiar with Internet storage services and I have no problem working with computer networks, I still use flash drives. They're easy to use, fast and reliable. Or perhaps it's simply an old habit from the days of floppy disks.

The "flash" in flash drives refers to flash memory, a solid-state storage medium that's both inexpensive and durable. In fact, it is similar in technology and performance to the cache RAM built into most CPUs. This type of RAM has historically been quite expensive, relative to the less expensive SDRAM, which is commonly known as computer memory. Flash-type memory is slower than cache speed due to the limitations of USB 2.0; however, this does not seem to be a significant performance hit, as the mechanical hard drive is much slower than USB.

It should be noted that while newer solid state drives (SSDs) share the flash memory medium with traditional USB flash drives and sometimes come equipped with a USB interface, it is common to keep the two terms distinct from one another due to the large differences in physical size, speed and price.

What Types of Flash Drives Are Available?

There are many types of flash drives available to suit all different kinds of use, but to keep things simple we'll break things down into five different categories: Generic, High Performance, Ultra Durable, Secure and Novelty. Of course, these categories are not all mutually exclusive. For example, a secure flash drive with hardware encryption may also be durable enough to withstand the crushing forces of a Honda Accord.

What we like to think of as "generic" flash drives are the most common type sold, built for economy and raw capacity but not necessarily speed, and almost always encased in plastic. With the exception of a few manufacturers like Kingston, just about any flash drive with a product name that doesn't have a cliché suffix like "Extreme," "Lightning," "GT," "GTR," "Turbo" or "Ultra" will typically fall into this category. Likewise, any product that has such a suffix or is labeled as a high-end model would fall into the High Performance category and will employ higher-binned flash memory chips and better memory controllers to increase transfer speeds.

The Voyager GTR 128GB Flash Drive on the left; 32GB on the right.

Ultra Durable flash drives can be either fast or slow, but are by far the most interesting in the way of their casings and enclosures. These can be encased either in rubber or a metal alloy to protect against impacts, and they may or may not have a watertight seal for the USB cap. Depending on the design, manufacturer's claims, and your definition of common sense, these babies can withstand drops/throws from the top of a building to a concrete surface below, are more likely to survive several rounds in the washer and dryer (if allowed ample time to dry before use), and without any adverse effect, can survive being submerged at the bottom of a diving pool. Better still, some can deflect bullets up to a .50 caliber, or withstand the almighty crushing forces of Honda automobiles.

Secure flash drives include any flash drive that provides hardware encryption for ensuring the confidentiality and integrity of the stored data. These drives employ an on-board co-processor to handle the encryption algorithms, thus allowing the drive to maintain moderate read and write speeds compared to generic drives used with software encryption utilities. A secure flash drive's authentication method of choice can vary from a simple username and password logon to more secure biometric fingerprint scanners and funky combination locks.

Other secure flash drive features may include self-destruct sequences, tamper-evident designs and centralized remote management. The U.S. National Institute of Standards and Technology (NIST) has published a document outlining [cryptographic security levels in FIPS 140-2](#), and many drive manufacturers that wish to do business with large corporations or government entities will certify their drives against these standards.

Novelty flash drives, last but not least, include any drive that stands out from the rest of the crowd either through the design or the inclusion of bundled features. A few examples would be insanely small and key-shaped drives, split-drives, a funky drive covered with Swarovski crystal, beer drives, coin drives, Darth Vader-lookalike flash drives, or a biometric flash drive built into a Swiss Army Knife with Bluetooth presentation controls.

How Should I Format My Flash Drive?

This largely depends on your intended use for the drive. Most thumb drives come preformatted as FAT32 for cross-platform compatibility with Windows, Mac and Linux. Unfortunately this formatting scheme limits the size of any given file to 4GB.

If you want to avoid this 4GB limit, we recommend reformatting the flash drive to NTFS, which allows for larger file sizes and also offers much improved reliability. NTFS is natively supported by all versions of Windows since NT/2000, and is also available on Mac and Linux thanks to the [NTFS-3G project](#). Most Linux distributions made within the last year already have NTFS-3G installed and ready to go; Mac users already have read-only support built into the operating system, but will need to install either the free Catacombae driver or the commercial Tuxera NTFS for Mac driver if write support is needed. Unfortunately, NTFS is not yet supported by many embedded devices such as televisions or media players due to the fact that NTFS is a proprietary system owned by Microsoft and requires licensing.

What Are the Latest Hot Trends Surrounding USB Flash Drives?

The biggest trend that everyone's looking forward to is USB 3.0, of course! [Super Talent](#) has already released three SuperSpeed USB flash drives that take advantage of the new interface with reported speeds that are five to eight times faster than the fastest USB 2.0 flash drives. Expect more USB 3.0 drives from other manufacturers to follow shortly.

Super Talent SuperCrypt USB 3.0.

Another big development with flash drives is how hardware encryption is becoming more of a commodity than a luxury or enterprise feature, being built into flash drives from a range of manufacturers for as little as \$20. Drives certified against the FIPS 140-2 standard are almost as cheap, now available at the \$60 price point from online retailers.

How Do I Secure the Data on My Flash Drive?

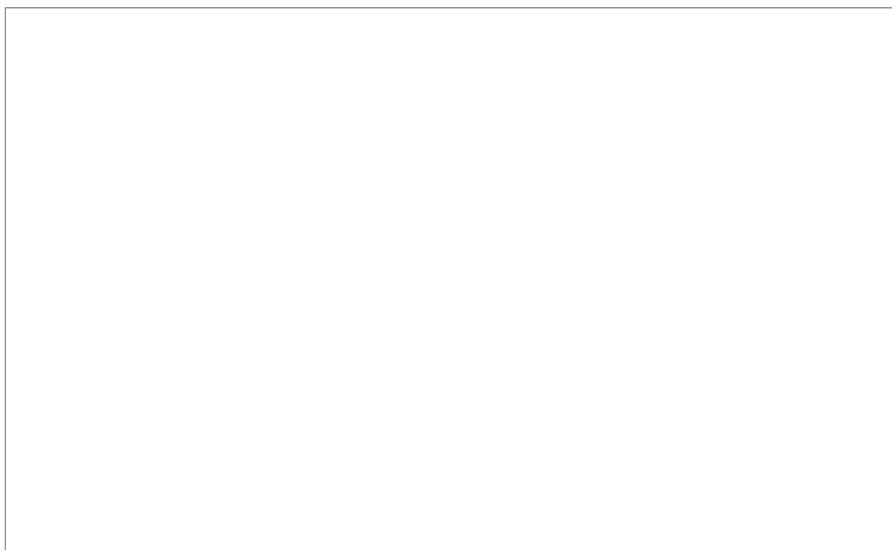
While the best security (and speed) often comes from hardware-secured flash drives with their built-in cryptologic co-processors, anyone can secure their regular flash drive through the use of a free open-source program called [TrueCrypt](#). TrueCrypt offers a large array of encryption algorithms to choose from, including 256-bit AES, Serpent and TwoFish, or any combination of all three, and is available for Windows, Mac and Linux operating systems.

An alternative to TrueCrypt is Microsoft's [BitLocker To Go](#), a full-disk flash drive encryption technology that's limited to Windows 7 Enterprise and Ultimate editions and Windows Server 2008 R2. Unlike TrueCrypt, BitLocker To Go doesn't require administrative rights to install or use. BitLocker uses AES 128/256-bit encryption.

Also unlike TrueCrypt, BitLocker does not have [plausible deniability](#), and Microsoft actively aids law enforcement with recovery in certain scenarios. In a nutshell, don't leave your computer running because the encryption keys are stored in RAM and can be accessed using forensic software. This is a vulnerability shared by many drive-encryption programs and should not be viewed as actually cracking BitLocker. In an enterprise environment, if the

volume recovery keys are stored in Active Directory and the system administrator has loose lips or gets handed a subpoena by the authorities, you can be compromised. [Cryptome](#) hosts a copy of Microsoft's BitLocker lawful spying guide on its Web site. If you're interested, search for "win7-bit-spy."

Remember, there's no way to keep your data 100 percent secure if the computer you're using has been compromised, so be cautious of accessing your private data at public computers such as those in a PC cafe.



The weakest link in security is always the human factor, Randall Munroe, <http://xkcd.com/about/>

Why Shouldn't I Pick Up Any Flash Drive I See Lying in the Parking Lot? Should I Ever Use an Unknown Flash Drive?

If you do happen to encounter a stray flash drive and have the unrelenting itch to use it, you may want to take a few precautions. First, make sure you've disabled auto-run on your computer. Next, access the drive from within a sandboxed environment such as VMware or the freeware VirtualBox, and make sure that if it's a U3 drive, the virtual CD-ROM partition isn't compromised. If it is, you're better off simply destroying the drive. Next, check the data partition for viruses. If you suspect there might be any, you'll want to format the drive. Congratulations on your newly found (and unpaid for) flash drive!

On a serious note, this actually happened to me. I was asked by someone to take a look at "something" on their flash drive and what ensued was a cascade of errors, virus infections and odd behaviors such as hijacking of my entire desktop. In short, the computer I used was rendered useless and had to have the operating system reloaded.

Keep in mind, though, that not all misplaced flash drives are out to get you. Some might actually be lost and sought after by their owners. Others could be part of an elaborate marketing promotion. Always use your best judgment and caution.

Can I Boot My Computer to a USB Flash Drive?

Yes! A bootable flash drive can be the ultimate tool for recovering a downed computer, or perhaps your easiest means of upgrading a netbook's operating system without a CD-ROM drive. Because there are so many potential uses and ways to make a flash drive bootable, unfortunately we won't be able to go in depth for the purposes of this FAQ. To get you started in the right direction, however, here's a handful of scenarios and their associated walkthroughs that we feel are well-written and easy to follow.

- [Boot the Ultimate Boot CD \(UBCD\)](#) repair tools from a flash drive.
- [Boot Clonezilla](#) (Norton Ghost alternative) from a flash drive.
- [Boot/Install Ubuntu 9.10 Linux](#) from a flash drive.
- [Boot Windows XP](#) from a flash drive .
- [Boot Windows 7](#) from a flash drive.
- [Install Windows 7](#) from a flash drive.

Obviously, the USB flash drive is here for the foreseeable future. They're getting better, more secure, and have more storage capacity—all on inexpensive, easy-to-use and cross-compatible storage media. Flash storage technology is the future of mass storage. As the technology improves and becomes more efficient and reliable, we will only see more technologies emerge such as solid state drives. Older mechanical drives as well as optical storage will eventually be phased out.

Hopefully this FAQ has helped clear up some questions about flash drive technology. Feel free to submit your own questions. We'll post them and hopefully be able to find some good answers.