
Advanced Format Drives

The Move to 4K Drive Sectors



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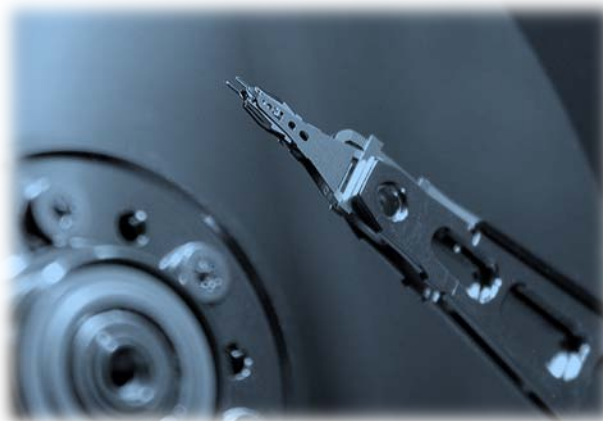


An Overview

- Beginning in 2009 and accelerating into 2011, all major hard drive manufacturers will be releasing hard drive platforms based on an innovative technology called “Advanced Format.”
- Advanced Format drives will increase the smallest unit of organized data on a hard drive (known as a “sector”) from 512 bytes to 4096 (or 4K) bytes.
- Among other things, 4K sectors will increase format efficiency, enable more robust error correction, and facilitate larger and faster hard drives.

Although there is good reason to migrate from 512-byte hard drives to advanced format hard drives, customers must be mindful of the transition to avoid any potential pitfalls. Here at Computer 1, we are committed to making this transition as smooth and easy as possible and believe that educating our customers is a great first step toward this goal.

The rest of this guide will take you through some common questions and concerns that advanced format technology raises and will provide you with the resources and information you need to make the transition.





The Move to 4K

- On January 1, 2011, all major hard drive manufacturers will have completely migrated to the new 4K standard and these will be the only hard drives shipped in new laptop and desktop systems.
- Among other things, this will render 512-byte hard drives obsolete.
- While old systems will still function properly, those who are looking to upgrade must be aware of the following issues:
 - Because the vast majority of software and computer systems are built around 512-byte logic, there are potential negative performance impacts to using Advanced Format drives. These risks depend on how the drive manages misalignment conditions (**see [page 4](#) for more information**).
 - To avoid restricted performance and get the most out of Advanced Format hard drives, users need to be running 4K aware operating systems (**see [page 5](#) for more information**).





Speaking the Language: 512-byte Emulation

The move to 4K hard drive sectors will rely heavily on a process called 512-byte emulation. While this process is fairly technical, it boils down to a few key points:

- Although 4K drives represent the future of storage, the computers of today still identify different hard drive sections in 512-byte chunks
- To successfully communicate between the 512-byte labeling system and the 4K physical sectors on Advanced Format hard drives, computers have to be able to translate between the two languages
- The key to avoiding slow downs in this translation process is to ensure that hard drive partitions are aligned
- New 4K-aware operating systems and disk utilities are able to format hard drives in such a way that aligns the computer's 512-byte labeling system with the 4K storage sectors found on Advanced Format hard drives (see diagram and explanation below)

4096 Byte Block 0								4096 Byte Block 1							
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

figure 1

Hard drive partition alignment refers to the alignment of 512-byte logical block addresses (LBA's) used to identify different locations on the hard drive to the larger 4K storage sectors that are found on Advanced Format drives. Figure 1 depicts an aligned configuration.

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Are You 4K Aware?

- The single most important aspect of managing the transition from 512-byte hard drives to Advanced Format drives is to ensure that hard drives are being partitioned with utilities that are 4K-aware (4K-aware refers to the ability of the partitioning utility to align the hard drive's 4K sectors with the 512-byte labeling system used by the computer)
- While there are a number of third-party disk utilities that offer partitioning capabilities, hard drives are most often partitioned within the Operating System (OS)
- Because Microsoft was involved in the community that developed Advanced Format hard drive technology, they have designed their more recent OS's to support 4K hard drives. Below is a list of Operating Systems and a specification that indicates if they are 4K-aware or not.

Operating System	4K Aware?
Windows XP	No
Windows Vista – Pre Service Pack 1	No
Windows Vista – Post Service Pack 1	Yes
Windows 7	Yes
Mac OS	Yes

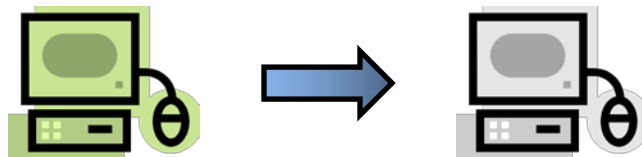
figure 2



Making the Transition

Although the transition will be gradual for most computer users and will not take place right when Advanced Format hard drives hit the market, at Computer 1 we believe that educating our customers is the first step toward a smooth transition. As a result, the following list is a number of steps you can take to ensure that when the time does arrive, your transition to 4K is as smooth as possible:

- ✓ Use Windows Vista (Service Pack 1 or later) or Windows 7 to create hard drive partitions
- ✓ When using third-party utilities to create hard drive partitions, check with your vendor to ensure that they are 4K-aware
- ✓ Purchase products such as Seagate® SmartAlign™ hard drives to ensure that you don't run into misaligned hard drive conditions that can significantly impact performance
- ✓ If you own Windows XP or another operating system that lacks Advanced Format hard drive support, consider upgrading to Windows 7 or use a hard drive utility to realign your disk partitions



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Resources and Technical Briefs

For more information on Advanced Format hard drive technology, please view the following pdfs:

- Seagate
 - [The Transition to Advanced Format 4K Sector Hard Drives](#)
 - [FAQ - Advanced Format 4K Sector Transition](#)
 - [Deploying the Next Generation of High-Capacity Hard Drives](#)
 - [High-Capacity Storage Readiness](#)
 - [SmartAlign Technology for Advanced Format Hard Drives](#)
- Western Digital
 - [Advanced Format Technology White Paper](#)



Please don't hesitate to contact us with any questions or concerns you may have.