



Marketing Bulletin

Advanced Format 4K Sector Transition

Frequently Asked Questions

What is Advanced Format?

Advanced Format is the name adopted by IDEMA (The International Disk Drive Equipment and Materials Association) for a new data structure format that defines an increase in the basic sector size used on the media of hard drives. This new IDEMA standard mandates that a hard drive sector size will change from 512 bytes to 4096 (4K) bytes.

Does Seagate support the Advanced Format standard?

As an active member of IDEMA, Seagate supports the adoption of Advanced Format as a needed change and enabling factor of hard drive technology that will drive higher capacities and more robust error correction into the future. All hard drive companies in the IDEMA organization have agreed that beginning January 1, 2011, all new product platforms for desktop and laptop drives sold through distribution channels will be Advanced Format compatible. Products for OEM customers and for the enterprise markets do not apply to this agreement and may or may not be Advanced Format compatible.

What are the benefits of Advanced Format?

Advanced Format will help the hard drive industry deliver higher-capacity hard drives with more robust error correction capabilities. This is accomplished by increasing the size of a sector from 512 bytes to 4096 bytes, thereby reducing the total amount of space used for sector separation and addressing and increasing the space used for error detection and correction codes.

Is there a downside or side effect to using an Advanced Format hard drive?

There are potential performance impacts to using Advanced Format hard drives. These risks depend on how the drive manages partition misalignment conditions.

The sector size increase, described by Advanced Format, occurs at the hard drive media level. Host systems will continue to request and receive data from the hard

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drive in 512-byte sector sizes. However, the translation from 4096-byte sectors in the hard drive to the 512-byte sectors in the host will be managed in the hard drive. This process is called *512-byte emulation*.

It's important that every drive partition start with an LBA offset that is aligned to the drive's physical 4K sector. If partitions are un-aligned, then hard drive performance will be degraded.

How can partition misalignment conditions be managed?

The first management step is to avoid misaligned conditions in the first place. This can be achieved by creating hard drive partitions with a *4K aware* version of your operating system or through a hard drive imaging software product. The table below shows how common operating systems create partitions with respect to Advanced Format (4K) awareness and aligned or misaligned partitions.

Operating System Release	Advanced Format, 4K Aware?	Results
Windows XP	No	Creates primary partition with Alignment 1 condition (misaligned)
Windows Vista—Pre Service Pack 1	No	Large sector-aware but creates partitions incorrectly (misaligned)
Windows Vista—Post Service Pack 1	Yes	Creates partitions with Alignment 0 condition (aligned)
Windows 7	Yes	Creates partitions with Alignment 0 condition (aligned)
Mac OS	Yes	Creates partitions with Alignment 0 condition (aligned)

For More Information

Read the Seagate technology paper, *SmartAlign™ Technology for Advanced Format Hard Drives, Paving the way to a hassle-free adoption of the 4K sector standard*, TP615.

The second method to managing misaligned partitions is to use partition-alignment software to identify and fix misaligned partitions. This technique should be used during the hard drive integration process.

The easiest way to manage partition misalignment conditions is to use a Seagate® Advanced Format drive with SmartAlign™ technology. SmartAlign technology automatically resolves partition misalignment conditions in real time while preserving consistent hard drive performance. SmartAlign technology makes Advanced Format drives look just like legacy hard drives.

When will Seagate transition to Advanced Format hard drives?

Seagate introduced the first Advanced Format hard drive with SmartAlign technology in May, 2010, with the 750GB Momentus® laptop product. In the coming months, and in accordance with agreements established within IDEMA, Seagate will continue to offer new Advanced Format products. Our goal is to utilize Advanced Format to achieve higher capacity points sooner for Seagate customers while making their transition to the Advanced Format standard easy and hassle-free.

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