

# Transition from PATA optical disc drives to SATA optical disc drives



Transition from PATA optical disc drives to SATA optical disc drives .....	1
Background .....	2
Scope .....	2
Definitions.....	2
Boot to DOS.....	2
Bootable DOS CD-ROM.....	2
Disk On Key (DOK).....	2
DOS CD-ROM driver.....	2
ISOLinux .....	3
SATA emulation modes.....	3
Combined IDE controller .....	3
Separate IDE controller .....	3
ACHI .....	3
RAID+ACHI .....	3
Microsoft Windows Pre-installation Environment (WinPE) .....	3
Mixing PATA and SATA optical drives .....	4
FailSafe Boot Block BIOS recovery.....	4
HP xw4400 Workstation .....	4
Boot to DOS.....	4
DLA.....	4
HP xw6400 Workstation .....	4
Boot to DOS.....	4
DLA.....	5
Update BIOS using the Computer Setup Utility (F10 Setup) .....	5
Auto Boot Order .....	5
HP xw8400 Workstation .....	6
Boot to DOS.....	6
DLA.....	6
Update BIOS using the Computer Setup Utility (F10 setup).....	6
Two identical SATA optical disc drive models connected to the SAS ports.....	6
Auto boot order.....	7
HP xw9400 Workstation .....	7
Boot to DOS.....	7
DLA.....	7
Two identical SATA optical disc drive models connected to the SAS ports.....	7
Overview of Boot to DOS and DLA capabilities by platform.....	8

# Background

In new technology transitions, support for some legacy features is often difficult to manage or remove. In the transition from PATA to SATA optical devices, many companies, including HP, have issues regarding drivers that enable legacy DOS and DOS-based utilities. This paper details various issues relating to the transition from PATA to SATA optical disc drives and provides several workarounds.

Using DOS functionality to image hard drives is one of the features of particular interest to users. Depending on the workstation and the configuration, a variety of workarounds are described in this paper. Notably, the simplest workaround is using a USB drive key to initiate the process. Using a drive key might be the most effective solution because of its increased use, continued capacity expansion, and reduced price.

## Scope

This document is intended to help consolidate all of the known issues and workarounds concerning the transition from PATA optical disc drives to SATA optical disc drives with the primary purpose of covering the ability to use bootable DOS CD-ROMs for imaging and troubleshooting.

## Definitions

### Boot to DOS

Boot to DOS is the ability to use a Bootable CD-ROM to boot into a DOS environment. This does not include the ability to assign a drive letter to the CD-ROM drive.

### Bootable DOS CD-ROM

There are several ways to create a bootable CD. The most common way is to use floppy emulation. The CD-ROM is recognized and boots in the same manner that a floppy disk does. You can also use no emulation or hard drive emulation to create a bootable CD.

### Disk On Key (DOK)

A USB flash drive that is capable of booting a computer into a DOS or WinPE environment that has been correctly configured.

### DOS CD-ROM driver

The DOS CD-ROM driver is loaded as a device in config.sys. It creates a named 'driver' to be used by a DOS CD-ROM redirector, such as mscdex.exe, to provide drive letter access. The most common DOS CD-ROM driver is oakcdrom.sys. This driver will detect and address most PATA optical disc drives. In most cases oakcdrom.sys will not detect SATA optical disc drives (with the exception of when SATA emulation is set to Combined IDE Controller mode). There are 3rd party drivers available on the Internet that will detect and address SATA optical disc drives.

### Drive letter access (DLA)

Drive letter access is used to assign a drive letter in DOS to a CD-ROM drive. This enables access to the data on the extended area (not the bootable area) of a CD-ROM. There are two components required for accessing the extended area of a CD-ROM. You must have a DOS CD-ROM driver, such as oakcdrom.sys, and a DOS CD-ROM redirector, such as mscdex.exe.

## ISOLinux

ISOLinux is a boot loader for Linux/i386 that operates off ISO 9660/El Torito CD-ROMs in No emulation mode. No emulation mode avoids the need to create an emulation disk image with limited space (for floppy emulation) or compatibility problems (for hard disk emulation.) ISOLinux can be used to wrap a DOS boot disk to enable the ability to boot to DOS using various SATA emulation modes.

## SATA emulation modes

HP workstations use the following SATA emulation modes. Booting to DOS and DLA are affected by which SATA emulation mode you are in.

### **Combined IDE controller**

Makes the SATA controller look like an IDE controller and offers the best IDE compatibility. Only two SATA ports (0 and 2) are available in this mode. This mode is available on the HP xw4400, xw6400, and xw8400 Workstations.

### **Separate IDE controller**

Offers standard SATA support. Only four SATA ports (0, 1, 2, and 3) are available in this mode. This mode is available on the xw4400, xw6400, and xw8400.

### **ACHI**

Offers full SATA and SATA II functionality. In addition, you also gain the capability of Native Command Queuing (NCQ). There is no support for RAID in this mode. This mode is available on the xw4400.

### **RAID+ACHI**

Both the RAID and ACHI Option ROMs execute during the boot process. This emulation mode offers the best performance and the most functionality. This mode is available on the xw4400, xw6400, and xw8400.

## Microsoft Windows Pre-installation Environment (WinPE)

A lightweight version of Windows® XP, Windows Server™ 2003, or Windows Vista® that is used for the deployment of workstations and servers. WinPE can also be used as an alternative to MS-DOS as an operating system by booting from a CD or USB flash drive instead of booting from a floppy or hard disk. WinPE is available free of charge from Microsoft:

[www.microsoft.com/downloads/details.aspx?FamilyID=c7d4bc6d-15f3-4284-9123-679830d629f2&DisplayLang=en](http://www.microsoft.com/downloads/details.aspx?FamilyID=c7d4bc6d-15f3-4284-9123-679830d629f2&DisplayLang=en)

## Mixing PATA and SATA optical drives

When mixing PATA and SATA optical drives in a workstation, the system first detects the PATA optical drive. For example, if the first optical drive is a SATA drive and second optical drive is a PATA drive, then the system detects the PATA optical drive first. This detection order results in the PATA optical drive being assigned the lower drive ID or drive letter by the operating system.

## FailSafe Boot Block BIOS recovery

SATA optical drives are not supported for a Boot Block ROM Flash. One of the following alternatives must be used:

- Use a floppy drive or PATA (ATAPI) optical drive.
- Use a USB Disk On Key for xw6400, xw8400, and xw9400 workstations.

## HP xw4400 Workstation

The following topics are specific to the HP xw4400 Workstation.

### Boot to DOS

The xw4400 can boot from a bootable DOS CD-ROM in all of the available SATA emulation modes.

### DLA

In combined mode, oakcdrom.sys detects and addresses the SATA optical disc drive so that mscdex.exe can assign a drive letter to the drive to provide DLA. In separate mode, a 3rd party DOS SATA CD-ROM driver will detect and address the SATA optical disc drive so that mscdex.exe can assign a drive letter to the drive to provide DLA.

In both AHCI and RAID+AHCI modes, neither oakcdrom.sys nor the 3rd party DOS SATA CD-ROM driver will detect or address the SATA optical drive, and therefore no DLA is available. The following are suggested workarounds:

- Develop and use a WinPE based CD-ROM or DOK or
- Develop and use a DOS bootable DOK or
- If DLA is required to access tools and/or utilities, use ISOLinux to 'wrap' your current bootable DOS CD-ROM, and place these files on a network share or
- Change SATA emulation settings to either combined or separate mode.

If the SATA emulation mode is changed for the purpose of imaging, then be sure the setting is reverted to the emulation mode on which the image was created.

There are no plans to correct this issue on the xw4400.

## HP xw6400 Workstation

The following topics are specific to the HP xw6400 Workstation.

### Boot to DOS

The xw6400 can boot from a bootable DOS CD-ROM in combined or separate modes. Boot to DOS currently does not work in RAID+AHCI mode. The following are suggested workarounds:

- Develop and use a WinPE based CD-ROM or DOK.

- Develop and use a DOS bootable DOK.
- Change SATA emulation settings to either combined or separate mode.
- If DLA is not required, then use ISOLinux to wrap your current bootable DOS CD-ROM.

If the SATA emulation mode is changed for the purpose of imaging, then be sure the setting is reverted to the emulation mode on which the image was created.

HP is investigating possible solutions to the limitations that currently exist in RAID+AHCI mode.

## DLA

In combined mode, oakcdrom.sys will detect and address the SATA optical disc drive, therefore mscdex.exe will be able to assign a drive letter to the drive to provide DLA. In separate mode, a 3rd party DOS SATA CD-ROM driver will detect and address the SATA optical disc drive, therefore mscdex.exe will be able to assign a drive letter to the drive to provide DLA.

As you cannot boot to DOS when in RAID+AHCI, DLA is not available in this mode. Suggested workarounds for this problem are:

- If DLA is required to access tools and/or utilities, then use ISOLinux to wrap your current bootable DOS CD-ROM and place these files on a network share.
- If the SATA emulation mode is changed for the purpose of imaging, then be sure the setting is reverted to the emulation mode on which the image was created.

HP is investigating possible solutions to the limitations that currently exist in RAID+AHCI mode.

## Update BIOS using the Computer Setup Utility (F10 Setup)

When the SATA configuration mode is set to RAID/AHCI mode, the system BIOS cannot be updated from the SATA optical drive using the Computer Setup Utility (F10 setup). The following are suggested workarounds:

- Update the system BIOS using a USB Disk On Key (DOK) and the Computer Setup Utility (F10).
- Update the system BIOS using a PATA optical drive, if one is installed, and the Computer Setup Utility (F10).
- Temporarily change SATA Emulation to Separate IDE Controller to update the BIOS from the SATA optical drive. If SATA Emulation is changed to update the BIOS, then the SATA optical drive must be attached to a functional SATA port.

HP is investigating possible solutions to the limitations that currently exist in RAID+AHCI mode.

## Auto Boot Order

If two SATA optical disc drives are installed on an xw6400, then the machine can only auto boot to the drive connected to the lowest SATA port number. A suggested workaround is to choose the Optical Drive option by pressing F9 during POST. This issue will be corrected in a later revision of the system BIOS.

# HP xw8400 Workstation

The following topics are specific to the HP xw8400 Workstation.

## Boot to DOS

The xw8400 can boot from a bootable DOS CD-ROM in combined or separate modes. Boot to DOS currently does not work in RAID+AHCI mode or when the SATA optical disc drive is connected to a SAS port. The following are suggested workarounds:

- Develop and use a WinPE based CD-ROM or DOK.
- Develop and use a DOS bootable DOK.
- Change SATA emulation settings to either combined or separate mode.
- If DLA is not required, then use ISOLinux to wrap your current bootable DOS CD-ROM.

HP is investigating possible solutions to the limitations that currently exist when a SATA optical disc drive is attached to an onboard SAS port.

HP is investigating possible solutions to the limitations that currently exist in RAID+AHCI mode.

## DLA

In combined mode oakcdrom.sys will detect and address the SATA optical disc drive, therefore mscdex.exe will be able to assign a drive letter to the drive to provide DLA. In separate mode a 3rd party DOS SATA CD-ROM driver will detect and address the SATA optical disc drive, therefore mscdex.exe can assign a drive letter to the drive to provide DLA.

As you cannot boot to DOS when in RAID+AHCI, DLA is not available in this mode. Suggested workarounds for this problem are:

If DLA is required to access tools and/ or utilities, then use ISOLinux to wrap your current bootable DOS CD-ROM, and place these files on a network share.

If the SATA emulation mode is changed for the purpose of imaging, then be sure the setting is reverted to the emulation mode on which the image was created.

HP is investigating possible solutions to the limitations that currently exist in RAID+AHCI mode.

## Update BIOS using the Computer Setup Utility (F10 Setup)

When the SATA configuration mode is set to RAID/AHCI mode, the system BIOS cannot be updated from the SATA optical drive using the Computer Setup Utility (F10 setup). The following are suggested workarounds:

- Update the system BIOS using a USB Disk On Key (DOK) and the Computer Setup Utility (F10).
- Update the system BIOS using a PATA optical drive, if installed, and the Computer Setup Utility (F10).
- Temporarily change SATA Emulation to Separate IDE Controller to update the BIOS from the SATA optical drive. If SATA Emulation is changed to update the BIOS, then the SATA optical drive must be attached to a functional SATA port.

HP is investigating possible solutions to the limitations that currently exist in RAID+AHCI mode.

## Two identical SATA optical disc drive models connected to the SAS ports

If you have two identical SATA optical disc drives connected to SAS ports on an xw8400, the SAS controller might not initialize properly, and either of the drives might not be available for use. A delay occurs when loading the Option ROM of the SAS controller, which can take up to two minutes. A suggested workaround is to move one of the drives to a SATA port. There are no plans to correct this issue on the xw8400.

### Auto boot order

If two SATA optical disc drives are installed on an xw8400, the machine will auto boot to the drive connected to the lowest SATA port number. A suggested workaround is to choose the Optical Drive option by pressing F9 during POST. This issue will be corrected in a later revision of the system BIOS.

## HP xw9400 Workstation

The following topics are specific to the HP xw9400 Workstation.

### Boot to DOS

The xw9400 can boot to DOS when SATA RAID is enabled or disabled. If SATA RAID is enabled, then you must ensure that RAID is disabled on the SATA port that the SATA optical disc drive is connected to. You cannot boot to DOS if the SATA optical disc drive is connected to a SAS port.

HP is investigating possible solutions to the limitations that currently exist when a SATA optical disc drive is attached to an onboard SAS port.

### DLA

With RAID mode disabled a 3rd party DOS SATA CD-ROM driver will detect and address the SATA optical disc drive, therefore mscdex.exe will be able to assign a drive letter to the drive to provide DLA. With RAID mode enabled, neither oakcdrom.sys nor a 3rd party DOS SATA CD-ROM driver will detect the SATA optical disc drive, therefore no DLA is available. Workarounds for when RAID mode is enabled are:

- If DLA is required to access tools and/or utilities, then place these files on a network share.
- Change SATA RAID settings to a mode that meets your needs for imaging.

If the SATA RAID mode is changed for the purpose of imaging, then be sure the setting is reverted to the emulation mode on which the image was created.

## Two identical SATA optical disc drive models connected to the SAS ports

If you have two identical SATA optical disc drives connected to SAS ports on an xw9400, then the SAS controller might not initialize properly, and either of the drives might not be available for use. A delay occurs when loading the Option ROM of the SAS controller, which can take up to two minutes. A suggested workaround is to move one of the drives to a SATA port. There are no plans to correct this issue on the xw9400.

# Overview of Boot to DOS and DLA capabilities by platform

**Note:** In all SATA emulation modes and platforms, DOS boot and DLA capabilities can be achieved by using a USB Disk On Key (DOK).

	SATA Emulation Mode	Boot to DOS	DLA	Workarounds	Planned Fix
xw4400	Combined	Yes	Yes <sup>1</sup>	N/A	N/A
	Separate	Yes	Yes <sup>2</sup>	N/A	N/A
	AHCI	Yes	No	A, D, E	None Planned
	RAID+AHCI	Yes	No	A, D, E	None Planned
xw6400	Combined	Yes	Yes <sup>1</sup>	N/A	N/A
	Separate	Yes	Yes <sup>2</sup>	N/A	N/A
	RAID+AHCI	No	No	A, B, C, D, E	Under Investigation
xw8400	Combined	Yes	Yes <sup>1</sup>	N/A	N/A
	Separate	Yes	Yes <sup>2</sup>	N/A	N/A
	RAID+AHCI	No	No	A, B, C, D, E	Under Investigation
	SAS	No	No	A	Under Investigation
xw9400	Raid Disabled	Yes	Yes <sup>2</sup>	N/A	N/A
	Raid Enabled <sup>3</sup>	Yes	No	A, E, F	None Planned
	SAS	No	No	A	Under Investigation

<sup>1</sup> Oakcdrom.sys\* is able to detect and address the SATA CD-ROM.

<sup>2</sup> Requires a 3rd party DOS SATA CD-ROM driver.

<sup>3</sup> The SATA port that has the SATA optical disc drive attached must have RAID disabled.

- A) Develop and use a DOS bootable USB Disk On Key (DOK).
- B) Develop and use a WinPE based CD-ROM or DOK.
- C) If DLA is not required, then use ISOLinux to 'wrap' your current bootable DOS CD-ROM.
- D) If DLA is required to access tools and/or utilities, use ISOLinux to 'wrap' your current bootable DOS CD-ROM, and place these files on a network share.
- E) Change SATA emulation and/or RAID settings to a mode that meets your needs for imaging.
- F) If DLA is required to access tools and/or utilities, place these files on a network share.