

# Using eSATA on HP Compaq dc7900 Business PCs



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## Introduction

HP introduced SATA technology for internal mass storage devices in HP Compaq Business PCs in 2003. SATA replaced the old PATA (Parallel ATA) interface as the industry standard interface between a computer system and a mass storage device. This high performance interface has proven to be reliable and is well accepted.

The next logical step in SATA technology is to apply it to external mass storage devices, leading to eSATA (External Serial Advanced Technology Attachment) technology. Both the HP Compaq dc7900 Business PC Small Form Factor (SFF) and Convertible Minitower (CMT) form factors have full eSATA support.

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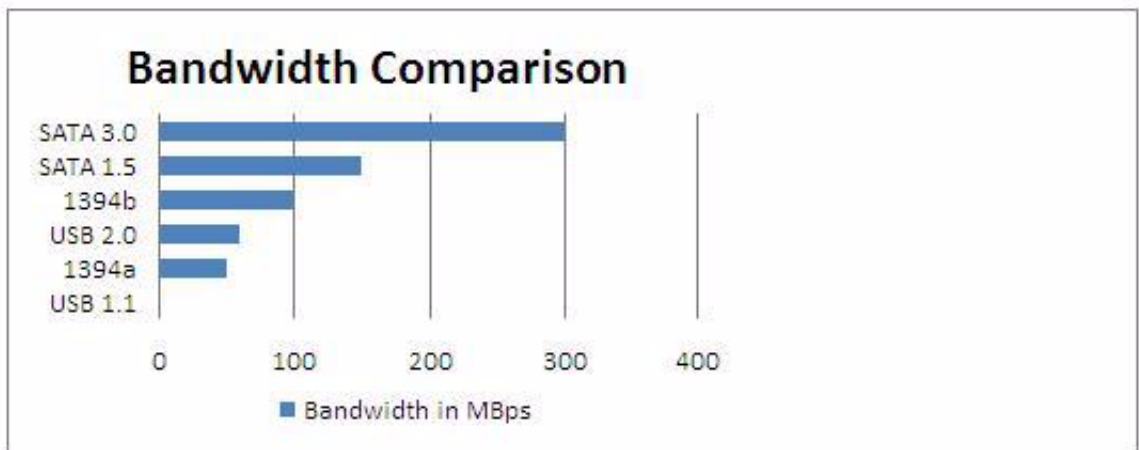
## Benefits of eSATA

There are many competing external storage device interfaces in the market. eSATA provides the following benefits over other interfaces:

- Higher bandwidth
- Up to 2 meter shielded cables and connectors

The following table compares bandwidths between different external storage device interfaces.

**Figure 1** Bandwidth comparison for external hard drive interfaces



## BIOS / Software / Hardware Considerations

### BIOS Interface

The system BIOS enumerates eSATA devices as removable storage devices. There is no F1 notification with the insertion or removal of an eSATA device.

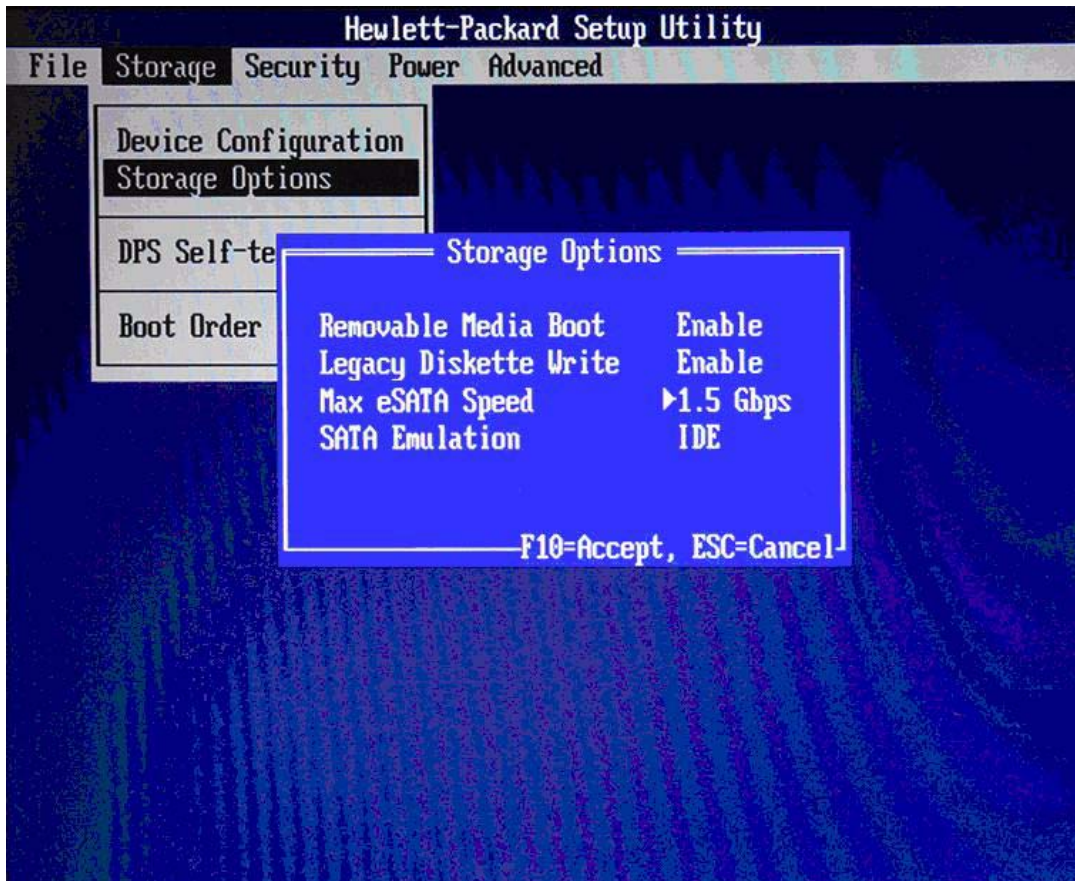
The Removable Media Boot option in F10 Setup applies to eSATA devices and can be set at **Storage > Storage Options > Removable Media Boot**. Default is Enabled.

### Maximum eSATA Speed

The maximum eSATA transfer speed of 1.5Gbps or 3.0Gbps can be set in F10 Setup at **Storage > Storage Options > Max eSATA Speed**. Default is 1.5 Gbps.

The SATA controller and the eSATA device automatically negotiate the proper speed for the eSATA link upon device insertion. However, the default maximum speed is set to 1.5Gbps to maximize reliability.

**Figure 2** Maximum eSATA speed and SATA emulation in F10 Setup



A warning is issued if the maximum eSATA speed is changed.

**Figure 3** Maximum eSATA speed warning



### **SATA Emulation Mode**

The SATA emulation mode can be set in F10 Setup at **Storage > Storage Options > SATA Emulation**. Default is AHCI.

The SATA emulation mode is set to AHCI by default. This differs from previous HP Compaq dc7xxx Business PCs, which had a default SATA emulation mode of IDE (legacy).

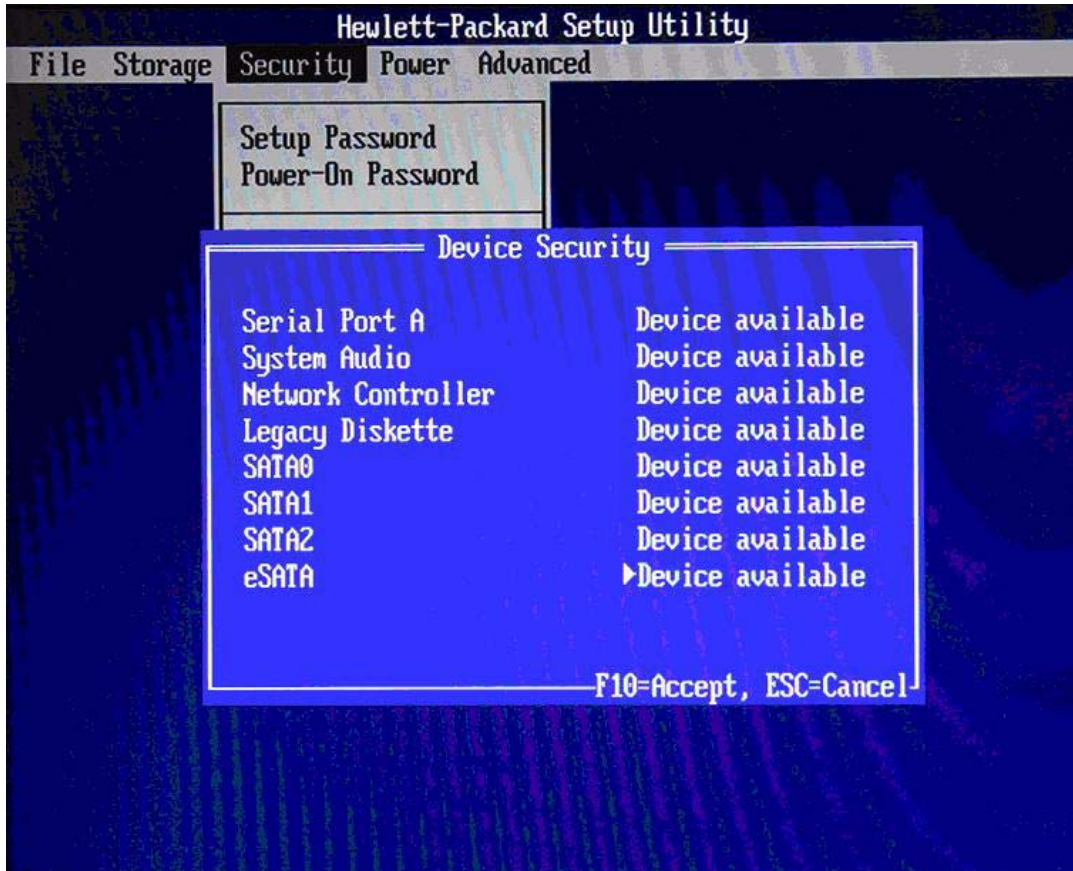
While the eSATA port works in IDE mode, hot-plug functionality is not available. The SATA emulation mode must be set to AHCI or RAID for hot-plug support. In addition, a hot-plug capable AHCI driver must also be loaded in the operating system (see **"Software Drivers" on page 5**) for hot-plug support.

Note, that in IDE or AHCI mode, the system BIOS controls the hard drives so the Removable Media Boot setting applies. In RAID mode, the RAID option ROM controls the hard drives so the Removable Media Boot setting does not apply.

## eSATA Port Availability

The eSATA port can be hidden in F10 Setup at **Security > Device Security > eSATA**. Default is Available.

**Figure 4** eSATA device security



## Software Drivers

The eSATA port does not require a driver to function. However, eSATA hot-plug support does require an AHCI driver with hot-plug support to be loaded in the operating system. In addition, the system must be set to SATA emulation mode of AHCI or RAID in BIOS (See ["BIOS Interface" on page 3](#)).

The Windows XP or Vista image that ships with the HP Compaq dc7900 Business PC has the Intel AHCI driver (iastor.sys) pre-loaded. The system can be freely switched to and from IDE to AHCI.

For customers who do not use the pre-installed HP image, there are several scenarios for using AHCI mode and eSATA hot-plug capability:

1. Existing Windows Vista images.

The Windows Vista native AHCI driver supports eSATA hot-plugging. The system is AHCI and eSATA hot-plug capable. See case #4 for enhancing Windows Vista with the Intel AHCI driver.

## 2. New operating system installation.

A fresh installation of Windows XP or Vista, while in AHCI mode, is the most straightforward way to install the AHCI driver.

Windows XP requires addition of the Intel AHCI driver with the F6 option during installation. Windows Vista has native AHCI support so either the native AHCI driver is used or the Intel AHCI driver can be added.

## 3. Enhancing existing Windows XP images from IDE mode.

Corporate IT may be able to update an existing Windows XP image that was created in IDE mode to be AHCI compatible. The process requires insertion of the AHCI drivers into the image in a pre-installation environment. Thereafter, the system can be safely switched to AHCI mode.

Software required to insert AHCI driver is as follows:

- Windows Preinstallation Environment (WinPE) CD
- Windows OPK (OEM Preinstallation Kit) CD
  - MSDINST.EXE (Mass Storage Device Installer)

The OPK CD is not available for general download. It must be obtained through a Microsoft authorized distributor. MSDINST.EXE is a tool designed to insert mass storage drivers into an offline Microsoft Windows XP image.

For more information and instructions on OPK or MSDINST.EXE go to <http://www.microsoft.com>.

The process is as follows:

- a. Boot into WinPE.
- b. Run MSDINST.EXE from OPK.

MSDINST.EXE is executed from a command line where the location for the .inf file containing the PnP ID of the RAID/AHCI SATA controller of the target system and location of the Windows directory are specified.

For example: Newmsd.inf has the PnP IDs and is in the C:\AddAHCI directory. C:\Windows is the location of the Windows directory.

```
msdinst.exe c:\AddAHCI\newmsd.inf c:\windows /force
```

Newmsd.inf contents:

```
[SysprepMassStorage]
```

```
PCI\VEN_8086&DEV_2822&CC_0104 = C:\AddAHCI\iastor.inf
```

```
PCI\VEN_8086&DEV_3A02&CC_0106 = C:\AddAHCI\iaahci.inf
```

Dev 2822 is the Device ID for Intel(R) ICH8R/ICH9R/ICH10R/DO SATA RAID Controller.

Dev 3A02 is the Device ID for Intel(R) ICH10D/DO SATA AHCI Controller.

- c. Reboot the system.
- d. Enter F10 Setup and change SATA Emulation mode to AHCI.
- e. Reboot the system into Windows XP.





## 6. Enhancing existing Windows Vista images from IDE mode.

Corporate IT may be able to update an existing Windows Vista image that was created in IDE mode to use the Intel AHCI driver. The process requires the Intel AHCI drivers to be inserted into the image in a pre-installation environment.

Required software to insert Intel AHCI driver is as follows:

- Windows Preinstallation Environment (WinPE) CD
- Windows OPK (OEM Preinstallation Kit) CD
  - PKGMGR.EXE (Package Manager)

The OPK CD is not available for general download. It must be obtained through a Microsoft authorized distributor. PKGMGR.EXE is a tool that installs, uninstalls, configures, and updates features and packages for Windows Vista.

For more information and instructions on OPK or PKGMGR.EXE, go to <http://www.microsoft.com>.

The process is as follows:

- a. Boot into WinPE.
- b. Run PKGMGR.EXE from OPK.

For example: HP-AHCI.xml is located in C:\AddAHCI

```
pkgmgr.exe /o:"C:\;C:\Windows" /n:"C:\AddAHCI\HP-AHCI.xml"
```

HP-AHCI.xml contents:

```
<?xml version="1.0" ?>
<unattend xmlns="urn:schemas-microsoft-com:asm.v3" xmlns:wcm="http://
schemas.microsoft.com/WMIconfig/2002/State">
  <settings pass="offlineServicing">
    <component name="Microsoft-Windows-PnpCustomizationsNonWinPE"
      processorArchitecture="x86"
      publicKeyToken="31bf3856ad364e35" language="neutral"
      versionScope="nonSxS">
      <DriverPaths>
        <PathAndCredentials wcm:keyValue="1">
          <Path>C:\AddAHCI</Path>
        </PathAndCredentials>
      </DriverPaths>
    </component>
  </settings>
</unattend>
```

The preinstalled XP AHCI driver is located at C:\Compaq\MSD.

The preinstalled Vista AHCI driver is located at C:\SWSetup\Drivers\MSD.



- c. Reboot the system.
  - d. Enter F10 Setup and change SATA Emulation mode to AHCI.
  - e. Reboot the system into Windows Vista.
6. Updating existing Windows Vista images from Native AHCI to Intel AHCI.
- An existing Windows Vista image using the native AHCI driver can be updated to use the Intel AHCI driver (iastor.sys) locally. The Intel AHCI driver can be downloaded from [www.hp.com](http://www.hp.com).
- Note:** Be careful when moving an image to a system with a different chipset. The Device ID of the AHCI controller must match what is in the INF or the AHCI driver will fail and the system will not boot.

## Hardware

Both SFF and CMT form factors of HP Compaq dc7900 Business PCs have an eSATA connector on the system board.

The following table provides the color coding for the SATA connectors:

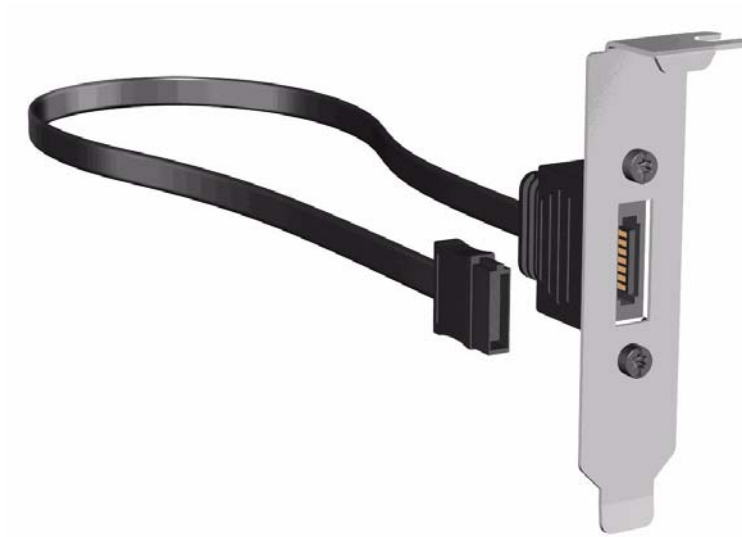
SATA Connector	Color
SATA0	Dark blue
SATA1	White
SATA2	Light blue
SATA3	Orange
eSATA	Black

Note that the SFF has only three SATA ports and one eSATA port. It does not have the SATA3 (Orange) connector.

An eSATA cable connects the eSATA port on the system board with the external eSATA port located at the rear of the system. The system board end of the eSATA cable has the standard SATA L-shaped connector. The eSATA connector is on a bracket located at the rear of the system chassis.



**Figure 5** Internal eSATA cable and bracket



**Figure 6** eSATA connector and bracket on an HP Compaq dc7900 SFF



**Figure 7** eSATA hard drive connecting to the eSATA bracket port



## Limitations

eSATA hot-plugging is available only with BIOS and operating system support. eSATA hot-plugging is not possible in an operating system without an AHCI driver that supports hot-plugging such as DOS, Windows 9x, Windows NT4.0, and older versions of Linux.

The system BIOS cannot determine if an eSATA device is SATA or eSATA if it is plugged into the wrong port on the system board. Therefore, all eSATA devices that are plugged into a SATA (non-black colored) port will be treated as SATA devices and will not support hot-plugging.

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