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How to Switch to a Cypress Customized Mass Storage Driver in a Windows Operating System

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Various Windows operating systems provide a default mass storage class driver. However, you may need to switch from this default driver to a customized driver, such as Cypress' customized mass storage driver for AT2LP™. This application note describes how to install the new driver and switch from the default mass storage driver provided in Windows operating systems.

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Introduction

The various Windows operating systems (OS) require a USB mass storage class (MSC) device driver to communicate with a USB connected mass storage device. Windows 2000, Windows XP, and Windows Vista, all have an MSC driver built into them and do not require a different driver. While these OS do not require a different driver, users may need an added functionality, not provided in the Microsoft driver, but available in custom MSC drivers. For example, Cypress provides customized mass storage drivers. On enumeration, the mass storage device uses the OS class driver; therefore, you need to specify a different driver. This document explains how to install the new driver and switch from provided plug-and-play driver in these operating systems. This document assumes that you have a functional USB host controller, basic knowledge of the Windows operating system, and a plug-and-play driver for your device.

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Getting Started

This document has different sections for Windows 2000 and Windows XP operating systems. Screenshots are included in each section. Your screen may appear different from the images in this document because you can configure your operating system differently. Before using the Cypress driver with a given device, the driver files must be modified to contain the connected device's Vendor Identifier (VID) and Product Identifier (PID). The VID is specific to each vendor and is distributed by USB-IF (www.usb.org). The PID is determined by the vendor and is usually different for each product. The Cypress plug-and-play driver can be downloaded from the Cypress website. This download also includes instructions on how to modify the driver to contain your VID and PID along with custom strings.

The following sections contain step-by-step information about installing and switching to a customized mass storage driver for Windows 2000 and Windows XP. For other Windows operating systems such as Vista and Windows 7, the core information remains the same with some changes in the Windows screen graphics.

Windows 2000

Windows 2000 is a derivation of Windows NT. A key addition to Windows 2000 is that it includes an MSC driver written by Microsoft. This means that running a mass storage device on Windows 2000 does not require any additional drivers. An exception to this is if you have an AT2LP connected to an ATA hard disk drive. The Cypress driver is required for ATAPI-to-ATA translation. To include other features in the Cypress driver, you must specify the driver to be used and its location.

When you connect your USB mass storage device to the USB controller, Windows 2000 loads the Microsoft MSC by default and mounts a drive letter for that device. The following instructions show how to change the MSC driver to the Cypress driver. These instructions assume the system has a functional USB host controller installed.

Open System Properties

The first step in changing the driver is to open the Device Manager. To do this, right-click **My Computer** and select **Properties**, as shown in Figure 1.

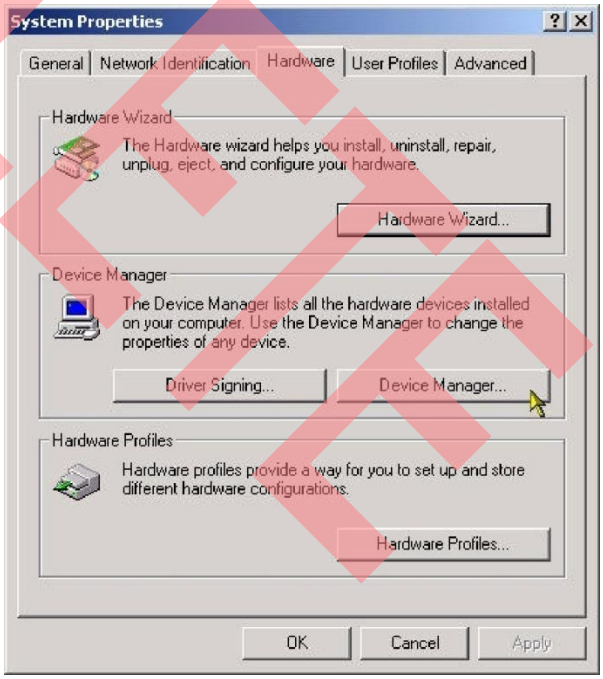
Figure 1. Open Systems Properties



Open Device Manager

The System Properties window is now displayed. Select the **Hardware** tab in this window and click the **Device Manager** button, as shown in Figure 2. Note that there is also a Driver Signing button to the left of the Device Manager button. This can be used to change the level of warning the operating system uses for an unsigned driver. The Cypress driver is an unsigned driver—if you are receiving warnings that you want to eliminate, change the settings by clicking this button.

Figure 2. Opening Device Manager



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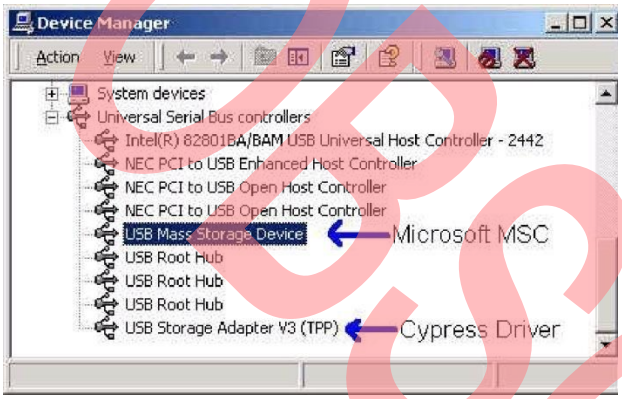
Expand the USB Controllers

Expand the Universal Serial Bus controllers' folder by selecting the **+** next to the folder name. If the MSC is loaded, you should see the string "USB Mass Storage Device." If this line is not displayed, your device may not be functioning correctly. In Figure 3, two devices are connected to the USB bus. One uses the Microsoft MSC driver (USB Mass Storage Device) and the other uses the Cypress driver (USB Storage Adapter V3 (TPP)).

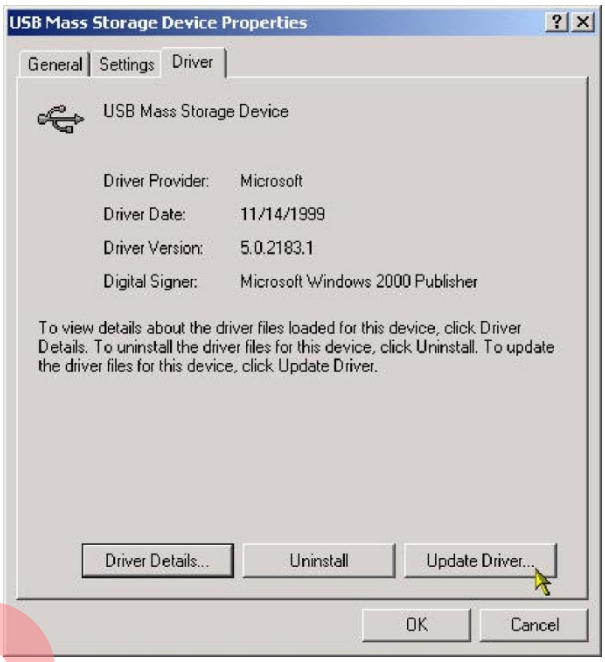
Figure 3. Device Manage in Windows 2000



Update Driver

1. Right-click on **USB Mass Storage Device** in the Device Manager.
2. Select **Properties**; the USB Mass Storage Device Properties window appears (see Figure 4).
3. Select the **Driver** tab at the top of the window.
4. Click the **Update Driver…** button.
5. A new window is displayed, welcoming you to the upgrade Device Driver wizard. Click **Next.**

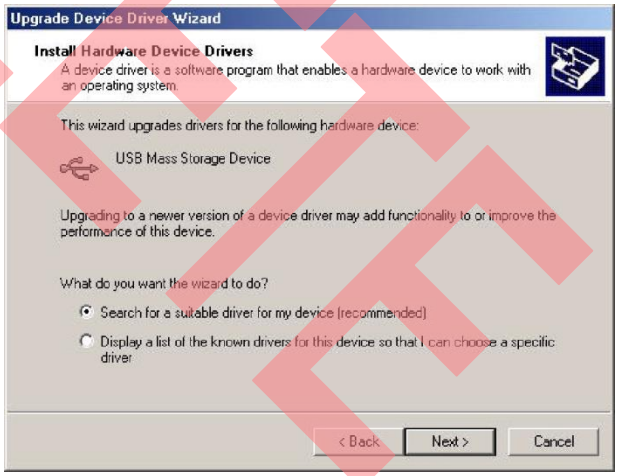
Figure 4. USB Mass Storage Device Properties



Search for Driver

The next step is specify the location of the new driver. Select **Search for a suitable driver for my device (recommended)** and then click the **Next >** button (see Figure 5).

Figure 5. Search for New Driver



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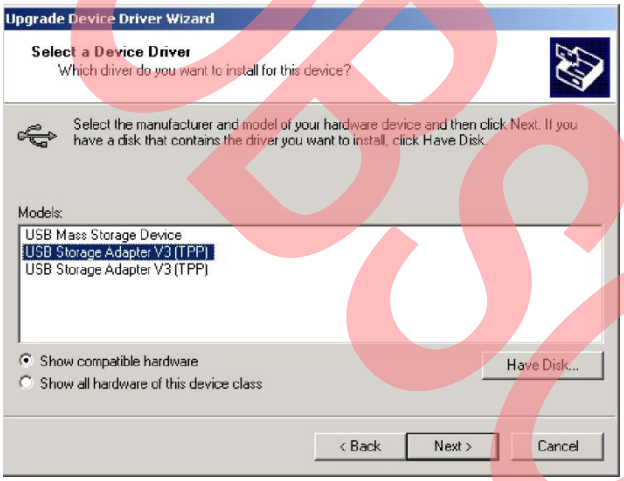
If you select the **Display a list of the known drivers for this device so I can choose a specific driver** option, a window similar to the one in Figure 6 is displayed showing the various drivers that can be used with this device. This is an ideal place to switch between drivers after they are installed on the computer. For example, after you have installed the Cypress driver, you have at least two choices. In the example in Figure 6, the device has two instances of the Cypress driver installed along with the Windows 2000 driver. If you want to install yet another driver, you can click the **Have Disk…** button and navigate to the driver files.

Figure 6. Select a Device Driver



Locate Driver Files

Assuming you chose **Search for a suitable driver for my device** in the previous step and you know the location of the plug-and-play driver, make sure the only box with a check mark is **Specify a location**, as shown in Figure 7. Click **Next.**

Figure 7. Check Specify a Location

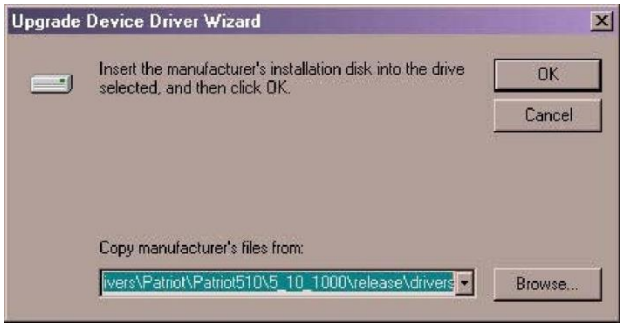


Browse to the Driver Location

You can now browse to the location of the driver.

1. Click the **Browse** button and browse to the directory where you modified the .inf file for your VID and PID.

Figure 8. Browse to Driver Files

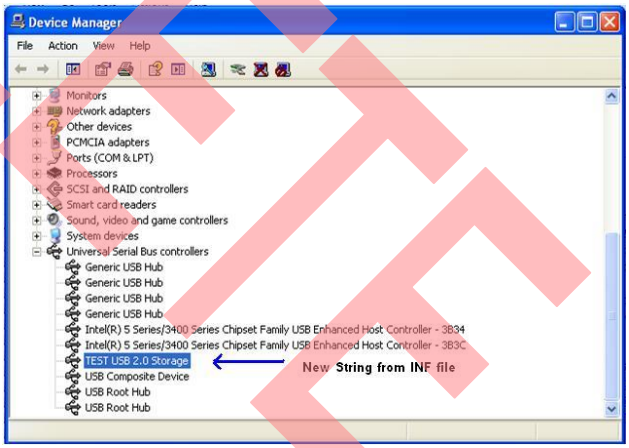


2. Click **Open** and then the **OK** button; follow the instructions on the screen. You will experience a short delay while the operating system updates its registry and re-enumerates the connected device.
3. Close the driver update window. You may have to restart your computer at this time depending on the current status of the OS when the driver was installed.

Verify Driver Switch in Device Manager

The Device Manager window should now show the new strings that you selected and placed in the .inf file, as shown in Figure 9.

Figure 9. Device Manager with New Driver String



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Windows XP

Windows XP is a derivation of Windows NT/2000. A key addition to Windows 2000 was that it included an MSC driver written by Microsoft. Windows XP also has its own MSC. This means that running a mass storage device on Windows XP does not require any additional drivers. An exception to this is if you have an AT2LP connected to an ATA HDD. In this case, the driver is necessary for ATAPI-to-ATA translation. If you want additional features included in the Cypress driver, you need to specify the driver to be used and its location. Windows XP tries to use a signed driver, if possible. Because the Cypress drivers do not have digital signature, Windows XP chooses the Microsoft MSC over the Cypress driver, unless specified by the user. Individual OEM customers can go through the process of getting the driver signed and make the necessary changes to the .cat and .inf files. The driver signing process is covered in a separate application note.

When you connect your USB mass storage device to the USB controller, Windows XP loads the Microsoft MSC driver by default and mounts a drive letter for that device. The following instructions show how to change the MSC driver to the Cypress driver for a device. These instructions assume that the system has a functional USB host controller installed.

Open System Properties

Figure 10 shows a convenient method to open System Properties in Windows XP.

1. Click **Start**; Go to **My Computer**, **r**ight-click and sel**ect Properties.**

Figure 10. Getting to System Properties



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Open Device Manager

1. In the System Properties window, select the **Hardware** tab.
2. Click the **Device Manager** button.

   Note also the Driver Signing button. This can be used to change the level of warning the operating system uses for unsigned drivers. The Cypress driver is an unsigned driver and you receive a warning when loading the driver.

Figure 11. Opening Device Manager

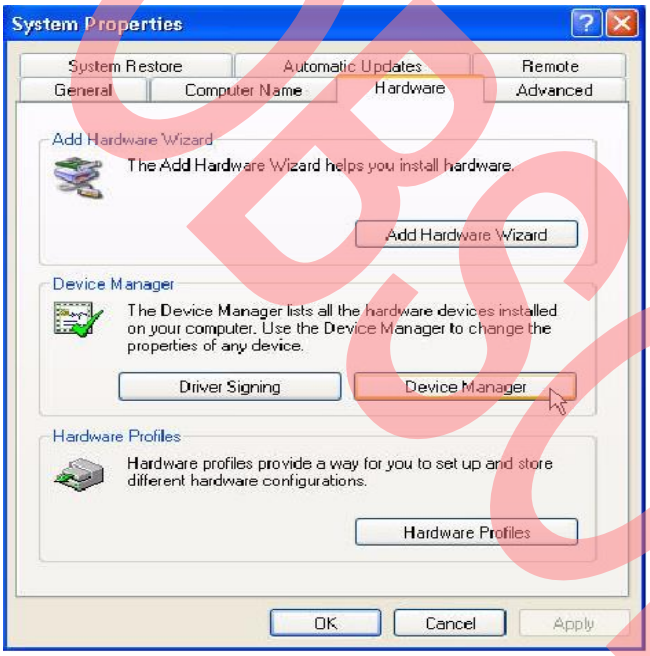


Figure 12 shows a typical Device Manager with the Universal Serial Bus controllers section expanded. Note that in this window, no mass storage devices are enumerated on the system.

Figure 12. Device Manager before Mass Storage



Open Device Driver Properties

In Figure 13, the device is enumerated with the Microsoft MSC driver (USB mass storage device). The actual driver is called *usbstor.sys* and is located in the Windows\System32\Drivers directory. To change the driver to be used, right click **USB Mass Storage Device** and select **Properties**.

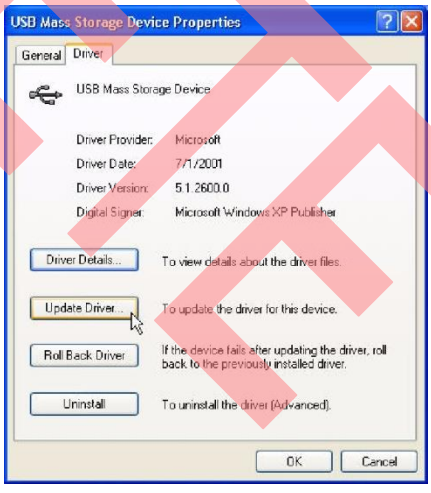
Figure 13. Device Manager with Device Enumerated with Microsoft XP MSC



Update Driver

In the USB Mass Storage Device Properties window, select the **Driver** tab. In this window, you can get driver details such as its version; you can also update the driver (see Figure 14). When you click **Update Driver**, the Update Wizard shown in Figure 15 is displayed.

Figure 14. Update Driver



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Update Wizard

The next step is to point the wizard to the driver location. Select the **Install from a list or specific location (Advanced)** option and click the **Next >** button.

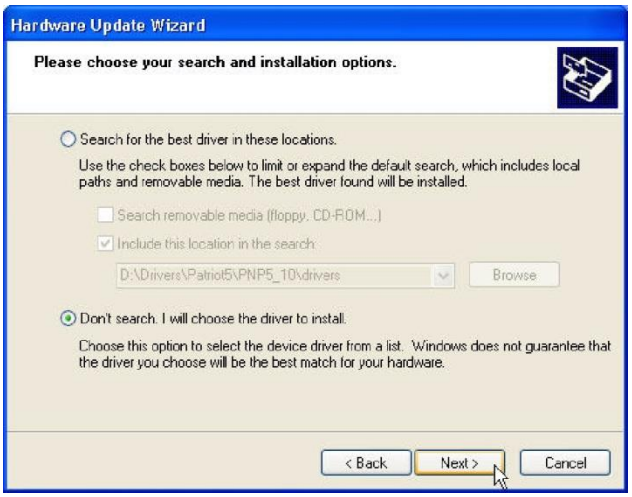
Figure 15. Hardware Update Wizard



Choose Search and Installation Options

Now you should see a dialog box similar to Figure 16. In this example, we do not want the operating system to search for a driver. Instead, we want to point to a particular driver to be installed. To do this, select the **Don't search, I will choose the driver to install** option and click the **Next** button.

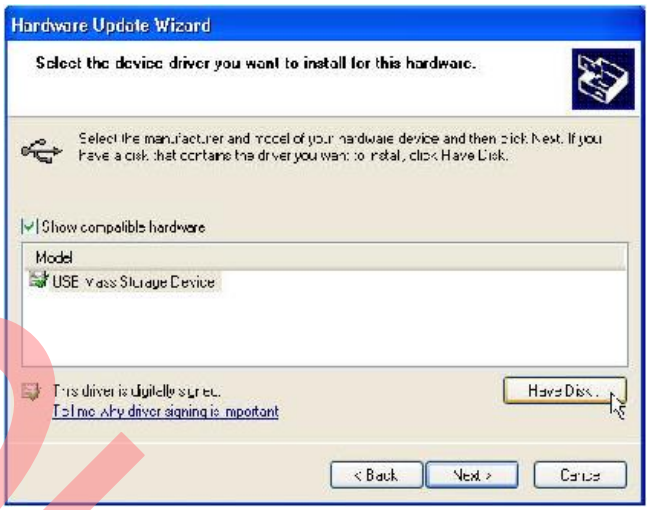
Figure 16. Choose Install Options



Select Driver to Install

The next dialog box displayed is shown in Figure 17. If the operating system recognizes another driver that is associated with this device, it displays the driver in this window. In this example, the only driver available is the class driver built into the operating system (usbstor.sys). When two or more drivers are installed for a device, this is where you switch between the two. In this example, a new driver is installed; click the **Have Disk** button.

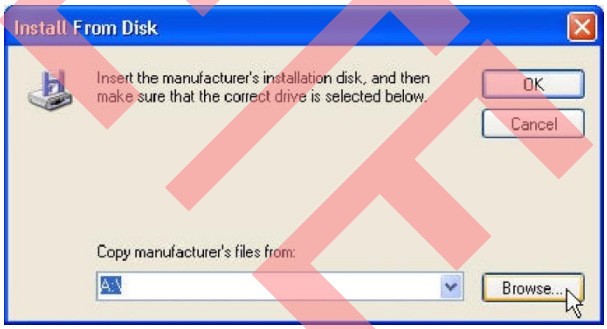
Figure 17. Select Driver to Install – Have Disk



Navigate to Driver

When you click the **Have Disk** button, the dialog box in Figure 18 is displayed. Click **Browse** to navigate to the directory where the modified driver is located.

Figure 18. Navigate to Driver Directory



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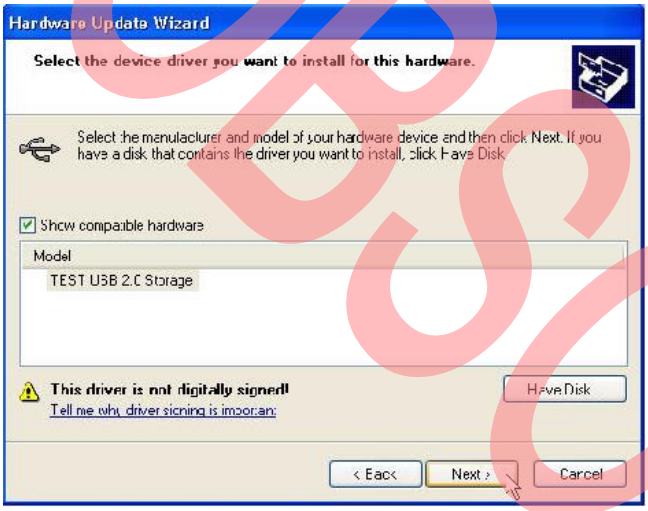
Install the Driver

After you have specified the driver location, the Select Driver window is displayed again, except this time it has your driver string from the .inf file displayed. Figure 19 shows the Test USB 2.0 Storage string, which is associated with the VID/PID in the .inf file. Note the warning in the window about the driver being unsigned. The Cypress driver can be signed, but it is the responsibility of the customer to get their version of the driver signed, if necessary. While Cypress has tested the driver in Windows XP, the customer must verify the driver with their hardware. Click the **Next** button.

Figure 19. Select Driver to Install



Choose Continue Anyway Option

A Hardware Installation warning dialog box is displayed, if the driver does not have a digital signature (see Figure 20). As previously mentioned, Cypress has tested the driver thoroughly and has not found any defect that should prevent the user from continuing with the installation.

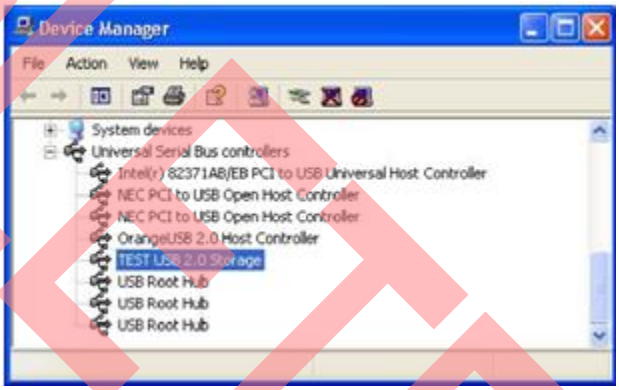
Figure 20. Install Driver Without Signature



Verify Driver in Device Manager

After the driver is installed, open the Device Manager again and verify that the new driver string is displayed (see Figure 21).

Figure 21. Device Manager after New Driver is installed



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Summary

This document explained the installation procedure as well as the procedure for switching from a Windows default mass storage class driver to any other customized MSC driver.

This functionality is useful when installing Cypress' customized mass storage driver for AT2LP.

The procedure is explained only for Windows 2000 and Windows XP operating systems. However, for other Windows operating systems such as Vista and Windows 7, the core information remains the same with minor changes in the Windows screen images.

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**	3176717	SSJO	02/18/2011	New Spec created for this app note as the document is not available in Spec system but available in Cypress site.
*A	4293359	GAYA	03/06/2014	Updated in new template. Completing Sunset Review.
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