Uninstalling Drivers and Devices in Windows Vista

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Abstract

This paper describes how to uninstall drivers and devices in Windows Vista®. It The paper is intended for driver developers who want to provide instructions or tools to their customers.

This information applies for the Windows Vista operating system.

For up-to-date information, see “Device Installation Design Guide” in the WDK documentation at

<http://msdn2.microsoft.com/en-us/library/ms790231.aspx>

The current version of this paper is maintained on the Web at:
 <http://www.microsoft.com/whdc/driver/install/uninstall.mspx>

References and resources discussed here are listed at the end of this paper.

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Document History

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# Introduction

Installed drivers must sometimes be uninstalled. For example, a user might decide to replace the associated device or the driver might need to be uninstalled as part of the process of updating the driver. This paper describes how to uninstall drivers and devices in Windows Vista®. It is intended for driver developers who want to provide instructions or tools to their customers.

# The Installation Process

Before designing a procedure to uninstall a driver, you must first understand the process that Microsoft® Windows® uses to install a driver and how various parts of the process can be undone by an uninstall action. The Windows Vista installation process involves three basic phases. Each phase consists of one or more actions that can be undone later by an uninstall procedure. The actions are numbered for reference later in the paper, but they are not necessarily performed in numbered order.

Phase 1: Create a Devnode for the Device

The Plug and Play (PnP) manager creates a devnode for the device and associates it with the device tree.

Phase 2: Stage the Driver Package in the Driver Store

This phase of installation involves two actions that can be undone separately.

1. All the files in the driver package are copied to the driver store. The process uncompresses any compressed files and duplicates the package's source media directory structure. The PnP manager's internal database is automatically updated with the driver package's metadata.

2. The INF file is copied to the %Windir%\Inf folder.

Phase 3: Install the Driver on a Device

The system state is updated based on the directives in the driver package's INF. Actions can include:

* Copy the driver's binary files to their target destination.
* Call the Service Control Manager (SCM).
* Update registry keys.
* Register components by using COM.

# Uninstall Actions Provided by the PnP Manager and DIFx Tools

This section provides brief descriptions of the three basic types of uninstall actions that can be performed by the PnP manager or the Driver Install Framework (DIFx) tools. These actions include:

* Uninstall a device.
* Delete a driver package from the driver store.
* Delete the installed driver's binary files.

Uninstall a Device

This uninstall action removes the devnode that is associated with the device. After the action is finished, the device instance no longer exists but the device package is still in the driver store. If the device is unplugged and then plugged in again, the PnP manager treats it as a new device.

This uninstall action is done automatically by the PnP manager and undoes Phase 1 of the installation process plus some of the actions of Phase 3.

When the PnP manager uninstalls a device, it simply removes a subset of the system states that were created during installation. For example, it removes the association of the driver files with the device that the SCM controls. This process does not undo some install actions. For example, the driver package and binaries remain where they were and some registry keys that are created by the class or co‑installer and some other registry operations are not changed. However, this uninstall action is sufficient to prevent Windows from loading the driver for all common user scenarios.

Delete a Driver Package from the Driver Store

This uninstall action deletes the package's files from the driver store and removes the associated metadata from the PnP manager's internal database. This action also deletes the package's INF from %Windir%\Inf. After the package has been removed from the driver store, it is no longer available to be installed on a device. It must be restaged from the original source, such as optical media, a network share, Windows Update, and so on.

**Note:** Manually deleting the driver package from the driver store causes an inconsistency between the INF, the driver store catalog, and the driver in the driver store. It might leave the user unable to stage the driver again.

This uninstall action undoes Phase 2 of the installation process. The PnP manager automatically does these actions if users select the **Delete the driver software for this device** option when they start the uninstall process.

Delete the Installed Driver's Binary Files

Delete the driver's binary files from the target folder, typically %Windir%\System32\Drivers.

This uninstall action undoes some of the actions of Phase 3 of the installation process.

The PnP manager does not support this uninstall action; it must be performed with the DIFx tools. DIFx tools check for consistency between the file on the target destination and the file on the driver store; they do not rely on the file path and file name. For this reason, Microsoft strongly recommends that this type of uninstaller be based only on the DIFx tools, which are designed to support robust uninstall procedures.

**Note:** The DIFx tools do not track how many devices depend on a driver binary or whether that binary is in use by other components. When you uninstall a device, the associated driver binaries might still be in use by other devices or applications and removing the binaries usually causes failure. Before removing any driver binaries, an uninstaller must be certain that the binaries are not still being used by any other component on the system and can be safely removed.

# How to Uninstall Drivers and Devices

Two basic tools can be used to uninstall drivers and devices: Windows Device Manager and the DIFx tools. This section discusses how to use these tools to implement the uninstall actions discussed in the previous section.

## Device Manager

Device Manager is a Windows Vista Control Panel application that allows users to manage devices and drivers on their system. Device Manager can be used to uninstall drivers, with some limitations. Users typically do not need to use Device Manager to uninstall devices or driver, but might need to use Device Manager when they troubleshoot a problem with their computer.

**Note:** Uninstalling a device or driver by using Device Manager requires membership in the local Administrators group, or the equivalent.

Uninstall a Device

To uninstall a device with Device Manager:

1. Launch Device Manager.

2. In Device Manager's left panel, open the node that represents the type of device that you want to uninstall and then right-click the device entry.

3. On the shortcut menu, click **Uninstall**.

4. On the **Confirm Device Removal** dialog box, click **OK** to start the uninstall process.

5. When the uninstall process is complete, unplug the device.

With some devices, you must restart the system to complete the uninstall process. The device might continue to function until the system has been restarted. For more detailed information on this process, see the Technet article, *Uninstall a Device*.

Delete a Driver Package from the Driver Store

In step 4 of the previous section, select the **Delete the driver software for this device** option on the **Confirm Device Removal** dialog box to delete the driver package. This is equivalent to the following Pnputil command:

 Pnputil -d -f *PackageName*.inf

Note: This procedure uninstalls the driver only for the specified device. It does not uninstall it for any other operational devices that use the same driver package.

Delete the Installed Driver's Binary Files

Device Manager cannot be used to perform this action.

## DIFx Tools

DIFx includes several tools that can be used to install and uninstall drivers. However, you must use the same tool for both procedures. You cannot, for example, install a driver with Driver Install Framework for Applications (DIFxApp) and uninstall it with Driver Package Installer (DPInst) or use one DIFx tool to uninstall a driver that was installed by using a different tool. For general information on DIFx tools, see "Uninstalling Driver Packages" in the Windows Driver Kit (WDK).

**Important:** Microsoft recommends using only the DIFx tools to create driver uninstallers. Applications that use DIFx tools to uninstall drivers will work correctly with future versions of Windows. Although other approaches might be successful with the current versions of Windows, they are not guaranteed to work correctly with future versions.

### DPInst

DPInst is a relatively simple way to implement a custom device installation application. DPInst also supports uninstalling the devices and drivers that it installs.

Uninstall a Device

Use Device Manager, as discussed earlier in this paper.

Delete a Driver Package from the Driver Store

By default, DPInst adds an entry to the Control Panel **Programs and Features** application for each driver package that it installs. Users can remove the package as follows:

1. In Control Panel, double-click **the Programs and Features** application.

2. Click the entry for the driver package.

3. Click the **Uninstall/Change** button to uninstall the package.

Note: In earlier versions of Windows, the Control Panel **Programs and Features** application was named **Add or Remove Programs**.

You can delete the package by running DPInst.exe from the command line, as follows:

 DPInst.exe /u *PackagePath*

*PackagePath* is the driver package's fully-qualified path name.

Delete the Installed Driver's Binary Files

By default, when a user uninstalls a device with the Control Panel **Programs and Features** application, it removes only the driver package, not the driver's binary files. To have **Programs and Features** also remove the binary files, set the **deleteBinaries** XML element in the DPInst descriptor file to ON. From a user perspective, the procedure is exactly the same as described in the previous section.

You can also have DPInst delete driver binaries by running DPInst.exe from the command line with the /d switch. The following command removes the driver package and associated binaries:

 DPInst.exe /u *PackagePath* /d

For more information on using DPInst to remove drivers and devices, see "Uninstalling Plug and Play Function Drivers," "Setting DPInst Configuration Flags," "Removing Driver Packages," and "DPInst Command-Line Switches" in the WDK.

### DIFxApp

DIFxApp is used for essentially the same purposes as DPInst, but supports more complex installation scenarios. It also supports uninstalling the devices and drivers that it installs.

Uninstall a Device

Use Device Manager, as discussed earlier in this paper.

Delete a Driver Package from the Driver Store

By default, DIFxApp adds an entry to the Control Panel **Programs and Features** application for each driver package that it installs. Users can remove the package as follows:

1. In Control Panel, double-click the **Programs and Features** application.

2. Click the entry for the driver package.

3. Click the **Uninstall/Change** button to uninstall the package.

**Note:** On earlier versions of Windows, the Control Panel **Programs and Features** application was named **Add or Remove Programs**.

For more information on using **Programs and Features** to remove driver packages installed with DIFxApp, see "Uninstalling a Driver Package by Using a Add or Remove Programs Entry" in the WDK.

Delete the Installed Driver's Binary Files

By default, when a user uninstalls a device with the Control Panel **Programs and Features** application, it removes only the driver package, not the driver's binary files. There are two ways to have **Programs and Features** remove the binary files:

* Set the corresponding DIFxApp configuration flag.

To statically set the flag, add 0x0010 to the component's Flags entry in the MstDriverPackages custom table that represents the driver package.

To dynamically set the flag, add 16 to the decimal number in the string that is associated with the DriverFlags.*Component-Name* private property.

* Set the **DriverDeleteFiles** attribute to "yes" in the corresponding Windows Installer XML (WiX) source file.

For more information removing drivers installed by DIFxApp, see "Removing Files when Uninstalling a Driver Package" in the WDK.

### DIFxAPI

DIFxAPI is used to implement custom driver installation applications. DIFxAPI also supports uninstalling the driver.

Uninstall a Device

Use Device Manager, as discussed earlier in this paper.

Delete a Driver Package from the Driver Store

To delete the driver package from the driver store, call the DIFxAPI's **DriverPackageUninstall** function with no flags set. If this operation is part of a driver update procedure, you should first call **DriverPackageInstall** with the updated driver package. Then call **DriverPackageUninstall**.

Delete the Installed Driver's Binary Files

To delete the driver package and the associated driver binaries, call the DIFxAPI's **DriverPackageUninstall** function with the DRIVER\_PACKAGE\_DELETE\_FILES flag set.

For more information on how to uninstall drivers with the DIFxAPI, see "Uninstalling a Driver Package" in the WDK. For more information on how to use **DriverPackageUninstall**, see "DriverPackageUninstall" in the WDK.

# Resources

The following links provide further information about uninstalling devices and drivers.

Device Manager

Uninstall a device

<http://go.microsoft.com/fwlink/?LinkId=78262>

DIFx Tools

Using Driver Install Frameworks (DIFx)

<http://go.microsoft.com/fwlink/?LinkId=78265>

DPInst

DPInst Command-Line Switches

<http://go.microsoft.com/fwlink/?LinkId=78257>

Removing Driver Packages

<http://go.microsoft.com/fwlink/?LinkId=78259>

Setting DPInst Configuration Flags

<http://go.microsoft.com/fwlink/?LinkId=78261>

Uninstalling Plug and Play Function Drivers

 <http://go.microsoft.com/fwlink/?LinkId=78266>

DIFxApp

Removing Files When Uninstalling a Driver Package

<http://go.microsoft.com/fwlink/?LinkId=78260>

DIFx API

DriverPackageUninstall

<http://go.microsoft.com/fwlink/?LinkId=78258>

Uninstalling a Driver Package

<http://go.microsoft.com/fwlink/?LinkId=78263>

Uninstalling a Driver Package by Using a Add or Remove Programs Entry

<http://go.microsoft.com/fwlink/?LinkId=78264>