Operating System and Device Driver Support for 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset

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Abstract

This paper is intended to provide business and IT professionals with an overview of operating system and device driver support for the 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset.

Introduction

Device drivers are required for proper functioning of devices included with computers. Some device driver support is included with the operating system; however, newer devices frequently require additional device drivers that were not available when the operating system was introduced. HP packages device drivers in Softpaq format and places them on an HP Web site for the customers' convenience.

The Intel 915 Express chipset is known by the Intel code name "Grantsdale" and features PCI Express, DDR1 or DDR2 memory support, support for up to four SATA storage devices, and the next generation Intel integrated graphics. For more details refer to the Intel Web site.

For this paper, the 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset include these specific models:

- HP Compaq Business Desktop dx6100 microtower
- HP Compaq Business Desktop dx6100 slim tower
- HP Compaq Business Desktop dc7100 convertible minitower
- HP Compaq Business Desktop dc7100 small form factor
- HP Compaq Business Desktop dc7100 ultra-slim desktop

Acronyms used

- **48-Bit LBA** – Logical block Addressing. 28-bit LBA allows the use of hard drives up to 137 GB. 48-bit LBA allows the use of hard drives significantly over 137 GB. For more information see
  http://support.microsoft.com/default.aspx?scid=kb;en-us;303013 or
  http://support.microsoft.com/default.aspx?scid=kb;EN-US;305098

- **APM/APCI** – APM (Advanced Power Management) is a legacy power management scheme that was first widely supported in Microsoft® Windows® 95. Most of the interesting functionality for APM is in a machine-specific BIOS that is hidden from the operating system. APM is a legacy solution that has been superseded by ACPI (Advanced Configuration and Power Interface), which is the robust scheme for power management and system configuration supported in the Windows 98 and Windows 2000 family of operating systems. Windows XP uses ACPI. For more information see:

  http://www.microsoft.com/whdc/archive/apm.mspx

  http://www.microsoft.com/whdc/archive/w2apm.mspx

- **APIC** – an advanced programmable interrupt controller (APIC) scheme used by all PCs currently in production. It consists of a local APIC which delivers interrupts to a specific processor and an I/O APIC which collects interrupt signals from I/O devices and sends messages to the local APICs when those devices need to interrupt. Each I/O APIC has an arbitrary number (typically 24) of interrupt inputs. For more information see:

  http://www.microsoft.com/whdc/system/sysperf/IO-APIC.mspx

  http://www.microsoft.com/whdc/system/sysperf/apic.mspx

- **BIOS** – Basic Input/Output System: The system's firmware which allows the power up of various devices during boot for the OS to load properly.

- **HP** – means that these device drivers are available from the HP Web site:
  http://h18007.www1.hp.com/support/files/index.html

- **HP/WU** – means that drivers are available from both the HP Web site (Softpaq) and from Windows Update. HP has tested and validated that the device drivers on the HP Web site function as expected with the operating systems that are listed as supported in **Table 3 Operating System Support Definitions**.

- **HPQFlash** – HPQFlash is a BIOS update utility used from within Windows from Hewlett-Packard that updates the read-only-memory (ROM) chip on the system board.

- **N/R** – means "not recommended."

- **OS** – means that support is included with the operating system.

- **PIC** – A programmable interrupt controller (PIC) scheme first used in the IBM PC/AT from the 1980s that used two Intel 8259 programmable interrupt controllers. Each 8259 had eight interrupt inputs (IRQs). The second interrupt controller was connected to the first interrupt controller leaving fifteen interrupt inputs available for all devices in a PC.

- **ROMPAQ** – ROMPAQ is a BIOS update utility on a bootable diskette from Compaq (now Hewlett-Packard) that updates the read-only-memory (ROM) chip on the system board.

- **SP** – Service Pack

- **98SE** – refers to Microsoft Windows 98 Second Edition

- **Me** – refers to Microsoft Windows Millennium Edition

- **NT4** – refers to Microsoft Windows NT 4.0

- **2000** – refers to Microsoft Windows 2000 Professional

- **W2K-SP3** – refers to Microsoft Windows 2000 Professional Service Pack 3

- **W2K-SP4** – refers to Microsoft Windows 2000 Professional Service Pack 4

- **WXP-SP1a** – refers to Microsoft Windows XP Service Pack 1a

- **WXP-SP2** – refers to Microsoft Windows XP Service Pack 2

- **XP** – refers to Microsoft Windows XP Professional and Windows XP Home Edition

Preinstalled operating system availability by model

HP has designed, developed, and tested preinstall images for the different 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset as shown below. Due to licensing restrictions, customers should order computers with the intended operating system. HP has also received Microsoft WHQL (Windows Hardware Quality Lab) logo certification for the various models as shown in the table below.

Table 1 Operating System Availability by Model

	98SE	Me	NT4	2000	XP
HP Compaq Business Desktop dx6100 microtower	-	-	-	-	Yes
HP Compaq Business Desktop dx6100 slim tower	-	-	-	-	Yes
HP Compaq Business Desktop dc7100 convertible minitower	-	-	-	-	Yes
HP Compaq Business Desktop dc7100 small form factor	-	-	-	-	Yes
HP Compaq Business Desktop dc7100 ultra-slim desktop	-	-	-	-	Yes

PC OEM's are no longer allowed to ship personal computers with Windows 2000 licenses, thus HP will not be providing this operating system preinstalled on the dc7100 or dx6100 series. HP will continue to provide software support for Windows 2000 Professional with Service Pack 3 and Service Pack 4. Software drivers to support the dc7100 and dx6100 series for Windows 2000 are available for download from www.hp.com within 30 days of product launch. As a service, HP can install Windows 2000 on new PCs using a customer provided Windows 2000 image via the HP PC Customization Services (PCCS) process. Interested customers should contact their HP account manger.

Table 2 Operating System Support Matrix

	Windows 95, Windows Me, Windows 2003 Server, OS/2	Windows 98 Second Edition	Windows NT 4.0 SP6	Windows 2000 Professional SP3	Windows 2000 Professional SP4 / Windows XP Home Edition (SP1) / Windows XP Professional (SP1)	Windows XP Home Edition (Gold)	Windows XP Professional (Gold)	Windows XP Home Edition SP1	Windows XP Professional SP1	Linux
HP Compaq Business Desktop dx6100 microtower	NS	TD	TD	LS	SUP	LS	LS	PI	PI	TD
HP Compaq Business Desktop dx6100 slim tower	NS	TD	TD	LS	SUP	LS	LS	PI	PI	TD
HP Compaq Business Desktop dc7100 convertible minitower	NS	TD	TD	LS	SUP	LS	LS	PI	PI	TD
HP Compaq Business Desktop dc7100 small form factor	NS	TD	TD	LS	SUP	LS	LS	PI	PI	TD
HP Compaq Business Desktop dc7100 ultra-slim desktop	NS	TD	TD	LS	SUP	LS	LS	PI	PI	TD

Table 3 Operating System Support Definitions

PI	**Preinstalled** – Operating system offered preinstalled by HP. All hardware devices supported.
SUP	**Supported** – Operating system not offered preinstalled by HP but most hardware devices supported. Note that some hardware subsystems may not be supported by the operating system manufacturer.
LS	**Limited Support** – Operating system not offered preinstalled by HP but basic hardware devices supported. Note that some hardware subsystems may not be supported by the operating system manufacturer.
TD	Operating system is **tested, documented**, and is not supported. No driver development will be undertaken by HP. Many subsystems will not function when a device driver is not available. Problems are documented with customer advisories as appropriate. No integration testing is performed. HP does not provide phone and e-mail support. Please refer to the section titled "Known issues with running Windows NT 4.0 and Windows 98 Second Edition" later in this document for help loading Windows NT 4.0 and Windows 98 Second Edition.
NS	**No support.** HP does not load the operating system, does not perform testing with the operating system, and does not document issues with the operating system. The operating system may work with limited functionality. HP does not provide phone and e-mail support. HP provides no support for operating systems not explicitly listed in the operating system support matrix table above.

Device driver availability by device class

In the tables on subsequent pages, the entry within each cell denotes the availability of device driver support and does not imply that the operating system itself is supported by HP. See **Table 3 Operating System Support Definitions** to determine if a particular operating system is supported by HP for a particular model.

Audio

98SE	Me	NT4	2000	XP
-	-	-	HP/WU	HP/WU

The audio devices shipped with 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset were all designed, tested, and fabricated after the initial release of Windows XP and all earlier Windows operating systems. None of these devices will function without a device driver. There are no device drivers included with the operating system that will enable these devices to fully function.

The 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset ship with Windows XP which has digital audio enabled so the analog audio cable for the CD-ROM drivers is not included. To enable digital audio with Windows 2000, perform the following steps:

1. From the **Start** menu, click **Settings** > **Control Panel**.

2. Double click the **Sounds and Multimedia** icon.

3. Select the **Hardware** tab.

4. Locate the CD-ROM device and click the **Properties** button.

5. Select the **Properties** tab.

6. Check the box **Enable digital CD audio for this CD-ROM device**.

7. Click **OK**. You may be prompted to reboot the PC.

Graphics

98SE	Me	NT4	2000	XP
-	-	-	HP/WU	HP/WU

The Intel graphics device shipped with 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset is designed, tested, and fabricated after the release of Windows XP and all earlier Windows operating systems. Graphics will not function without a device driver. There are no device drivers included with the operating system that will enable these devices to fully function[1]. A graphics driver will have to be downloaded from http://www.hp.com to enable sound.

Optimum 3D graphics support requires Graphics Address Remapping Table (GART) support that is not included with the OS and requires both a graphics driver and a chipset driver update from what is provided natively by the OS.

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[1] Windows does include a graphics driver that provides limited unaccelerated functionality at low resolutions and color depths, e.g. 640x480 with 16 colors.

Networking

98SE	Me	NT4	2000	XP
-	-	-	HP/WU	HP/WU

The integrated LAN on motherboard (LOM) devices shipped with 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset were all designed, tested, and fabricated after the release of Windows XP and all earlier Windows operating systems. None of these devices will function without a device driver. There are no device drivers included with the operating system that will enable these devices to fully function.

Wireless LAN

98SE	Me	NT4	2000	XP
-	-	-	HP/WU	HP/WU

The optional wireless network interface controller (802.11) devices shipped with 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset were all designed, tested, and fabricated after the release of Windows XP and all earlier Windows operating systems. None of these devices will function without a device driver. There are no device drivers included with the operating system that will enable these devices to fully function.

Modems

98SE	Me	NT4	2000	XP
-	-	-	HP/WU	HP/WU

The optional modem devices shipped with 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset were all designed, tested, and fabricated after the release of Windows XP and all earlier Windows operating systems. None of these devices will function without a device driver. There are no device drivers included with the operating system that will enable these devices to fully function.

HP ProtectTools Embedded Security

98SE	Me	NT4	2000	XP
-	-	-	HP	HP

Windows does not include a device driver for the optional HP ProtectTools Embedded Security solution.

To function, a device driver is required to be installed separately from the operating system. HP provides device drivers for Windows 2000 Professional and Windows XP Professional on the HP Web site (http://www.hp.com). Support is not provided for Windows XP Home Edition since that operating system does not include some required security features such as the Encrypting File System (EFS).

For each of the 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset, the table immediately below indicates whether the HP ProtectTools Embedded Security is an available option or not. Models with this feature listed as an available option have a connector on the system board for the optional TPM security hardware used by the HP ProtectTools Embedded Security solution.

HP ProtectTools Embedded Security Support

HP Compaq Business Desktop dc7100 convertible minitower	Available Option
HP Compaq Business Desktop dc7100 small form factor	Available Option
HP Compaq Business Desktop dc7100 ultra-slim desktop	Available Option
HP Compaq Business Desktop dx6100 microtower	Option not available
HP Compaq Business Desktop dx6100 slim tower	Option not available

Storage

	98SE	Me	NT4	2000	XP
CD-RW[2]	-	-	-	-	OS
48-bit LBA[3]	-	-	-	W2K-SP3 or later	WXP-SP1 or later
MultiBay (ICH6)[4]	-	-	-	HP	HP
SATA[5]	-	-	-	HP	HP

USB

	98SE	Me	NT4	2000	XP
USB Keyboard/Mouse	OS	OS	BIOS only[6]	OS	OS
Drive Key	-	-	-	OS	OS
USB1.x Host Controller	OS	OS	-	OS	OS
USB2.0 Host Controller	-	-	-	W2K-SP4 or later	WXP-SP1 or later

Generic device class support included with the operating system is used for USB host controllers and peripherals.

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[2] Windows XP includes limited support for CD-RW writing for CD-RW drives that support the IMAPI standard. All CD-RW drives included with HP Compaq 2004 Business Desktop Computers with the Intel 915 Chipset support IMAPI. IMAPI allows an application to stage and burn a simple audio or data image to CD-R or CD-RW devices. Depending on the model configuration, Roxio CD-burning software may or may not be included.

[3] 48-bit LBA support allows the use of hard drives larger than 137 GB.

[4] Multibay is an available option for the dc7100 models and is not available as an option for the dx6100 models.

[5] When using Windows 98 SE, Windows Me, NT, and Linux, the BIOS must be configured to the non-default setting of **Combined IDE Controller (Compatibility Mode)**.

[6] To enable earlier operating systems to be installed, the system BIOS includes support for USB keyboards and USB mice. Depending on the particular computer and particular peripheral, the system BIOS may also support booting from a USB floppy drive or USB drive key.

With each new release of Windows, additional USB device classes have become supported by the operating system.

IEEE 1394

98SE	ME	NT4	2000	XP
OS	OS	-	OS	OS

Generic device class support included with the operating system is used for IEEE 1394 host controllers.

With each new release of Windows, additional IEEE 1394 device classes (e.g. digital video camera or optical drives) have become supported by the operating system.

Bluetooth

98SE	ME	NT4	2000	XP
HP	HP	-	HP	HP

Generic device class support included with the operating system Bluetooth devices.

With each new release of Windows, additional Bluetooth device classes have become supported by the operating system.

Interrupt controller support

	98SE	Me	NT4	2000	XP
APIC	-	-	Yes	Yes	Yes
PIC	Yes	Yes	Yes	Yes	Yes

- APIC supports more interrupt lines so it is more likely a device will have its own interrupt line.
- If PIC support is used instead, PCI devices typically will share interrupts.
- All 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset include support for APIC.

Power management support

	98SE	Me	NT4	2000	XP
ACPI	Yes	Yes	-	Yes	Yes
APM	-	-	-	-	-

Microsoft recommends using ACPI instead of the earlier version of power management (APM) on Windows 2000 and Windows XP. All 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset include support for ACPI and do not include support for the obsolete APM interface.

Hyper-Threaded processor support

	98SE	Me	NT4	2000	XP
Hyper-Thread Processor Support [7]	-	-	-	N/R	Yes

- Hyper-Threading makes a single physical Hyper-Thread enabled Pentium 4 processor appear as two logical processors to the operating system.
- Due to application compatibility concerns, HP recommends Windows XP -SP1 or later be used when Hyper-Threading is enabled. Some Linux versions also support Hyper-Thread.
- Windows 2000 supports up to two processors. Business Desktops do not support 2 processors.
- Optimizations for Hyper-Threading are not included in Windows 2000 Professional so performance will be lower with Hyper-Threading enabled.
- Support for Hyper-Threading is available for both Windows XP Professional and Windows XP Home Edition. Some Linux versions also support Hyper-Thread.
- Windows XP Home Edition provides support for one physical processor.
- Windows XP Professional provides support for one or two physical processors.
- For more information on Hyper-Threading from Intel and Microsoft:

  http://www.intel.com/support/platform/ht/os.htm

  http://www.microsoft.com/hwdev/platform/proc/ht-windows.asp

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[7] The Hyper-Threading feature is a new technology designed to improve performance of multi-threaded software products; please contact your software provider to determine software compatibility. Not all customers or software applications will benefit from the use of Hyper-Threading technology. Visit http://www.intel.com/info/hyperthreading/ for more information.

BIOS update support (reference list of Acronyms at the top of the document for legend)

	DOS	98SE/Me	NT4	2000	XP
HPQFlash and System Software Manager (SSM) (Windows-based BIOS image and BIOS settings update utilities)	-	-	HP	HP	HP
ROMPAQ (bootable diskette or bootable CD-ROM DOS-based BIOS image update utility)	HP	-	-	-	-
Remote ROM Flash Utilities (DOS-based utility that can be used with a remote configuration tool such as Altiris eXpress to update the system BIOS image)	HP	-	-	-	-
Business Desktops BIOS Utility for Replicated Setup (DOS-based BIOS settings update utility).	HP	-	-	-	-

DVD playback software

98SE	Me	NT4	2000	XP
-	-	-	HP	HP

For the 2004 HP Compaq Business desktops, HP provides WinDVD playback software on the HP Web site for DVD drives included with the computer.

Management software

98SE	Me	NT4	2000	XP
HP	-	HP	HP	HP

HP provides the following software on the HP Web site:

- HP Client Manager Software from Altiris. For more details, see http://h18000.www1.hp.com/im/client_mgr.html
- HP System Software Manager (SSM) (utility that supports unattended upgrade/installation of drivers, system agents, and system ROM on multiple PCs simultaneously from a centralized file store without implementing a software distribution infrastructure). For more details, see http://h18000.www1.hp.com/im/ssmwp.html
- HP Diagnostics for Windows and HP Remote Diagnostics Enabling Agent

Known issues with running Windows NT 4.0 and Windows 98 Second Edition

Windows NT 4.0 and Windows 98 Second Edition have been loaded and tested with "will it run" criteria. No driver development will be undertaken by HP. Many subsystems will not function when a device driver is not available. Problems are documented with customer advisories as appropriate. No integration testing is performed. HP does not provide phone and e-mail support.

1) While running Microsoft Windows 98 Second Edition and Microsoft Windows NT 4.0 on 2004 HP Business Desktop Computers with the Intel 915 Chipset, the following subsystems will not function since device drivers are not available from either HP or Microsoft: audio, graphics, NIC, wireless LAN, modem, PC card, HP ProtectTools Embedded Security (TCPA TPM), USB 2.0, networking, and Multibay (hot-swapping). While running Microsoft Windows NT 4.0 on 2004 HP Business Desktop Computers with the Intel 915 Chipset, the following subsystems also do not have available device drivers so these subsystems will not work: USB 1.X, IEEE 1394, ACPI, and Bluetooth. Support is also not built into Windows NT4.0 and Windows 98 Second Edition for CD-RW burning and disk drive support for disk drives larger than 137 GB. To get higher resolutions, higher color depths, or accelerated performance, a third-party add-in PCI graphics card must be added while running Windows NT4.0 or Windows 98 Second Edition. HP does not provide support for third-party add-in cards.

   While running Windows 2000 or Windows XP, the 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset support two parallel ATA (PATA) devices and four serial ATA (SATA) devices. The 2004 HP Compaq Business Desktop Computers with the Intel 915 Chipset ship with a SATA hard drive and with one or two PATA optical drives.

   Users attempting to boot to the hard drive or OS installation CDs with Windows NT4.0 (the original version through Service Pack 5; Service Pack 6 is not impacted by this issue) will observe their systems either reboot or experience a blue screen error message (STOP 0x3E) during the initial text-based setup. Microsoft Windows NT 4.0 does not comprehend the latest Intel processors which are hyper-threading capable. Windows NT 4.0 believes that the system has dual, mis-matched processors. To work around this issue, change the "Limit CPUID Maximum Value to 3" BIOS setting option to enabled.

   While running another operating system (e.g. Windows 98 SE, Windows Me, Windows NT, and Linux), the BIOS must be configured to use the non-default setting of **Combined IDE Controller** for compatibility mode which supports two PATA devices and two SATA devices. HP also recommends the other two BIOS setup options while running Windows 98 SE, Windows Me, Windows NT, and Linux:

   a) Set **Storage** > **Storage Options** > **SATA Emulation** to **Combined IDE Controller**.

   b) Set **Advanced** > **Power-On Options** > **Hyper-Threading** to **Disable**.

   c) Set **Advanced** > **Power-On Options** > **ACPI/USB Buffers at Top of Memory** to **Disable**.

   d) Set **Advanced** -> **Power-On Options** -> **Limit CPUID Maximum Value to 3** to **Enable**

2) Users may experience hangs or reboots after installing the Intel chipset support package for Windows 98 Second Edition if other device drivers were loaded first, e.g. NIC, audio, or graphics. To work around the issue:

   a) In F10 (BIOS) Setup **Advanced** > **PCI Devices**, change the first two USB controllers (2658 and 2659) to **Disabled**.

   b) Save changes, exit, and reboot.

   c) Run the chipset support package setup.

   d) Reboot the system.

e) Allow devices to enumerate.

f) Reboot as required.

g) Make sure all devices are finished enumerating.

h) Reboot, re-enter F10 Setup, and change the first two USB controllers back to their original IRQs (10 and 11). Alternatively, user can save default settings and exit.

The user should no longer see any issues once this initial enumeration is complete.

Microsoft recommended minimum configurations

Windows XP Professional System Requirements:

http://www.microsoft.com/windowsxp/pro/howtobuy/upgrading/sysreqs.asp

Windows 98 Second Edition:

http://support.microsoft.com/default.aspx?scid=/support/windows/readme/win98SE/w98sesetuptiptxt.asp

Minimum Hardware Requirements to Install Windows Millennium:

http://support.microsoft.com/default.aspx?scid=kb;en-us;253695

Installing Windows 2000 Professional:

http://www.microsoft.com/technet/treeview/default.asp?url=/technet/prodtechnol/windows2000pro/reskit/part2/proch04.asp

For more information

To learn more about preinstalled software with OS support, contact your local HP sales representative or visit our Web site at http://www.hp.com.