

# WHITE PAPER

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## Compaq Portable PC Card Support for Microsoft Windows NT 4.0

*Compaq delivers the highest quality portable computer solutions for Windows NT 4.0 Workstation. The purpose of this White Paper is to describe unique features Compaq provides with respect to PC Card functionality.*

*To enable CardBus PC Card functionality for Windows NT 4.0 on portable platforms, Compaq provides CardWare® 5.0 licensed from Award Software International. PC Card support is an area of hardware functionality where only a limited feature set is inherently supported by the operating system. CardWare® 5.0 is an award winning application that greatly expands the level of PC Card functionality under Windows NT 4.0. This White Paper will highlight supported Compaq platforms and key features, as well as other initiatives that contribute to a comprehensive PC Card solution for Compaq portable customers using Windows NT 4.0.*

*This is the second edition of the document. This edition includes minor updates to include the Armada 4200 as well as the Armada 7800 platform.*

***This document is intended for external audiences with a need for information about the Compaq implementation of PC Card support under Windows NT 4.0.***

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**NOTE:**

Direct enablers are basic software drivers provided by a PC Card vendor. These drivers allow the peripheral to be used under native Windows NT 4.0. Contact your PC Card vendor directly for information about the level of Windows NT 4.0 support offered.

**PLATFORM PC CARD SUPPORT**

Microsoft Windows NT 4.0 is pre-installed on select models within the Armada 1500, Armada 7300, Armada 7700 and Armada 7800 families. The operating system is supported on all models within the Armada 1500, Armada 4100, Armada 4200, Armada 7300, Armada 7700, Armada 7800 and LTE 5000 families. Table 1 summarizes which versions of CardWare® 5.0 are supported on each portable family. Note that PC Card features inherently supported by Windows NT 4.0 are supported across all product families (see the section titled Supported PC Card Features for more information). Using a PC Card under Windows NT 4.0 without CardWare® 5.0 requires basic software drivers for the PC Card peripheral called *direct enablers*<sup>1</sup> and that the PC Card be inserted into the slot prior to turning on the notebook. Using a direct enabler offers support for a specific PC Card and only for a limited set of features and functionality when compared with PC Cards operating under CardWare® 5.0. Hot PC Card insertion, auto-configuration and CardBus are examples of features not supported through the use of a direct enabler, but are supported by CardWare. See the section titled *Supported PC Card Features & Card Types* for more information about PC Card features supported under CardWare® 5.0 versus those offered by the native operating system.

**SUPPORTED PLATFORMS**

Supported Platforms	Windows NT 4.0 Native PC Card Support	CardWare® 5.0 for Windows NT 4.0 (v2.0x)	CardWare® 5.0 for Windows NT 4.0 (v2.1x)
LTE 5000 Family	✓	✗	✓
Armada 4100 Family	✓	✗	✓
Armada 4200 Family	✓	✗	✓
Armada 1500 Family	✓	✓	✓
Armada 7300 Family	✓	✓	✓
Armada 7700 Family	✓	✓	✓
Armada 7800 Family	✓	✗	✓

Table 1 - PC Card support by Compaq portable computer family

**SUPPORTED PC CARD FEATURES**

CardWare® 5.0 greatly expands the set of PC Card features over those inherently offered by Windows NT 4.0. Table 3 summarizes major features by specific versions of CardWare® 5.0 and compares this expanded feature set with the limited set offered by Windows NT 4.0. The following is a discussion of key areas where CardWare® 5.0 provides additional value and makes PC Card technology, namely CardBus and enhanced power management, more usable for Compaq portable customers.

**CardBus Support**

One of the key hardware technology advancements introduced with the Armada 1500, Armada 4200, Armada 7300, Armada 7700 and Armada 7800 families is CardBus support, which paves the way for higher performance PC Card devices. CardBus is based on the widely accepted PCMCIA Association industry standard for 32-bit PC Cards. These devices are able to take advantage of

<sup>1</sup> Due to the way *direct enablers* are designed, they can compromise system integrity and render other PC Cards unusable. Compaq recommends caution when using direct enablers.

internal bus speeds that can be as much as four to six times faster than with 16-bit PC Cards in certain configurations. CardBus devices continue to use the same, well known, PC Card form factor and support many of the features that make PC Cards ideally suited to the portable platform such as hot swapping support.

CardBus is not inherently supported by Windows NT 4.0, but is supported on Compaq portable platforms through CardWare® 5.0.

## CARDBUS FEATURES & BENEFITS

Feature	Benefit
Uses PC Card form factor	Provides the benefits of higher performance in the convenient form factor users have come to expect from the PC Card standard. Portable platforms with PC Card slots that are CardBus enabled also allow backward compatibility for 16-bit PC Cards.
3.3 volt power consumption	Extends battery life in most configurations.
33MHz PCI Bus	Provides up to 132MB per second peak transfer rates to support high performance peripherals such as 100Mbps Ethernet network interface cards and up to 40Mbps Ultra SCSI PC Card interfaces.
Bus mastering capability	Reduces processor overhead improving overall system performance.

Table 2 - CardBus features & benefits summary

## Enhanced Power Management

Standby and hibernation states are important power saving features portable users rely on to conserve battery power. Under Windows NT 4.0 PC Card devices are not able to respond to power management events such as entering standby mode. As such, power management functionality can lead to unexpected results when PC Cards are in use under native Windows NT 4.0. The way a particular PC Card behaves in response to power management events depends to a large extent on the direct enabler provided by the PC Card vendor. Contact your PC Card vendor directly for more information should you have a need to use a particular device without the benefit of CardWare® 5.0.

Another key feature CardWare® 5.0 delivers is full support for the Advanced Power Management (APM) specification, version 1.2. PC Cards used in conjunction with CardWare® 5.0 operate more reliably when responding to power management events.

The only notable exceptions to the power management support with PC Cards are local area networking (LAN) and SCSI interfaces. These types of devices typically do not support standby or hibernation modes with or without CardWare® 5.0. This limitation is not the result of any shortcoming in CardWare® 5.0, but rather lack of a widely accepted standard for developing power management-aware software drivers.

The PCMCIA is an industry association responsible for developing PC Card standards. The Association recently ratified an addendum to the PC Card standard that defined a workable solution for to more reliable PC Card operation in response to power management events. This addendum, known as *Proposition 187 – The NT Bindings Proposal* is new and many PC Card vendors have yet to release updated software drivers that incorporate this latest addition to the PCMCIA specification. Customers who require the highest levels of reliability and performance on Compaq portable platforms should insist on PC Card vendors whose products have been designed to meet the PCMCIA specification. For more information on selecting PC Card solutions recommended by Compaq, refer to the section titled *Compaq PC Card Solutions Program*.

**NOTE:**

Standby and hibernation are not fully supported when connected to a local area network or using a PC Card SCSI interface. Compaq recommends removing these types of devices from the PC card slots before entering either of these states.

## Extended Feature Set

Beyond CardBus support and enhanced power management, CardWare® 5.0 adds a number of features not included in basic PC Card support provided by Windows NT 4.0. This extended feature set greatly improves the overall usability of PC Card devices on Compaq portable products. Table 3 summarizes all major PC Card features supported on Compaq portable platforms using Windows NT 4.0. The table compares those features provided with CardWare® 5.0 and compares with the basic PC Card feature set provided by Windows NT 4.0

### SUPPORTED FEATURES

Supported Features	Windows NT 4.0 Native PC Card Support	CardWare® 5.0 for Windows NT 4.0 (v2.0x)	CardWare® 5.0 for Windows NT 4.0 (v2.1x)
PC Card-16	✓	✓	✓
32 Bit CardBus Cards <sup>2</sup>	✗	✓	✓
APM 1.1	✓	✗	✗
APM 1.2	✗	✓	✓
Multi Volt Cards	✓	✓	✓
5.0 Volt Cards	✓	✓	✓
3.3 Volt Cards	✗	✓	✓
Socket Naming	✗	✓	✓
Socket Power on/off	✗	✗	✓
Windows System Tray Icon	✓	✗	✓
Configuration on Card Insertion & Automatic Application Launch	<sup>3</sup>	<sup>4</sup>	✓ <sup>5</sup>
Hot PC Card Insertion	✗	✓	✓
Hot PC Card Removal <sup>6</sup>	✗		
Recognition Beeps	✗	✓	✓
Docking Station PC Card Slot Support	✓	✓	✓
Ring Resume <sup>7</sup>	✗	✗	✗
Standby with PC Cards <sup>8</sup>	✗		

<sup>2</sup> Under CardWare® 5.0, hot card removal and auto card configuration requires drivers that specifically support these features. Customers should contact their CardBus PC Card vendor for information about the latest drivers.

<sup>3</sup> Automatic configuration under native Windows NT 4.0 is only supported with ATA PC Card devices and only when the device is inserted prior to power-on.

<sup>4</sup> Automatic configuration under CardWare® 5.0 version 2.0x is not supported with LAN, SCSI or CardBus PC Cards.

<sup>5</sup> Automatic configuration of CardBus PC Cards under CardWare® 5.0 version 2.1 requires software driver support from the card vendor. Contact your PC Card vendor directly for information on level of support for automatic configuration.

<sup>6</sup> Hot PC Card removal under CardWare® 5.0 is supported for modem, ATA, SRAM and Flash PC Cards. Hot removal for LAN, SCSI and CardBus type PC Cards is only available under CardWare® 5.0 if there is card specific driver support for this feature. Contact your PC Card vendor directly for information on the level of support for hot removal.

<sup>7</sup> Windows NT 4.0 does not support ring resume.

<sup>8</sup> When resuming from standby mode, behavior may vary depending on the type of PC Card inserted and the level of power management support by the card driver.

**NOTE:**

The Supported Features table uses “●” symbol to denote features that are supported with known exceptions or limitations. Refer to the footnotes for more detail.

Supported Features	Windows NT 4.0 Native PC Card Support	CardWare® 5.0 for Windows NT 4.0 (v2.0x)	CardWare® 5.0 for Windows NT 4.0 (v2.1x)
Hibernation with PC Cards <sup>9</sup>	x		

Table 3 - CardWare® 5.0 Feature Comparison by Version

## SUPPORTED PC CARD TYPES

Table 4 summarizes the various types of PC Card devices supported by CardWare® 5.0 as compared with those supported by native Windows NT 4.0. Note that all card types referenced in the table, with the exception of CardBus PC Cards, refer to PC Card-16 (i.e. 16-bit) devices. CardBus PC Cards are generally restricted to LAN, SCSI and emerging technologies such as video conferencing PC Cards.

## SUPPORTED PC CARD TYPES

Supported PC Card Types	Windows NT 4.0 Native PC Card Support	CardWare® 5.0 for Windows NT 4.0 (v2.0x)	CardWare® 5.0 for Windows NT 4.0 (v2.1x)
CardBus PC Cards	x	✓	✓
Modem	✓	✓	✓
LAN <sup>10</sup>	✓	✓	✓
SCSI <sup>11</sup>	✓	✓	✓
ATA	✓	✓	✓
SRAM	x	✓	✓
FTL Flash <sup>12</sup>	x	✓	✓
FFS Flash	x	x	x
Multi-Function Cards <sup>13</sup>	x	✓	✓
DMA Cards	x	x	x

Table 4 - Supported PC Cards - Windows NT 4.0 versus CardWare® 5.0

## CARDWARE® 5.0 AVAILABILITY

CardWare® 5.0 is pre-installed on select models within the Armada 1500, Armada 7300, Armada 7700 and Armada 7800 families. It is also available on the Compaq Software CD specific to each Armada notebook computer family. For a small fee, this CD is available through Compaq Customer Service & Support and includes all software for your Armada notebook. For customers who only require CardWare® 5.0 and would prefer not receive it on CD, Compaq Customer Service

<sup>9</sup> When resuming from hibernation, behavior may vary depending on the type of PC Card inserted and the level of power management support by the card driver.

<sup>10</sup> LAN cards under CardWare® 5.0 do not support hot removal without card-specific software driver support.

Consequently, resuming from standby or hibernation mode may lead to unexpected results. Compaq does not recommend using standby and hibernation with a LAN card under CardWare® 5.0.

<sup>11</sup> SCSI cards under CardWare® 5.0 do not support hot removal without card-specific software driver support.

Consequently, resuming from standby or hibernation mode may lead to unexpected results. Compaq does not recommend using standby and hibernation with a SCSI card under CardWare® 5.0.

<sup>12</sup> FTL devices formatted under Windows 95 and CardWare® 5.0 under Windows NT 4.0 on Compaq portable platforms are fully interoperable.

<sup>13</sup> Multi-function PC Cards requires PC Card specific software driver support for Windows NT 4.0 with CardWare® 5.0. Contact your PC Card vendor directly for information about Windows NT 4.0 support.

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& Support is also able to send the application on diskette. Finally, CardWare® 5.0 Version 2.1x will be made available on the Compaq Web site at <http://www.compaq.com>.

### DELIVERY MECHANISM

Delivery Mechanism	CardWare® 5.0 for Windows NT 4.0 (v2.0x) <sup>14</sup>	CardWare® 5.0 for Windows NT 4.0 (v2.1x)
Pre-installed <sup>15</sup>	✓	✓
LTE 5000 Software CD	✗	✓
Armada 1500 Software CD	✓	✓
Armada 4100 Software CD	✗	✓
Armada 4200 Software CD	✗	✓
Armada 7000 Software CD	✓	✓
Armada 7800 QuickRestore CD	✗	✓
Compaq SoftPaq Diskettes	✓	✓
Compaq WWW Site	✗	✓

Table 5 - Summary of the various ways to obtain a copy of CardWare® 5.0

## ADDITIONAL PC CARD SUPPORT RESOURCES

### PCMCIA Association

Based in San Jose, California, PCMCIA is a not-for-profit trade association founded in 1989 to establish technical standards for PC Card technology. It is made up of representatives from more than 300 leading PC Card vendors and personal computer manufacturers worldwide. Compaq has been an active participant since the Association's inception and is responsible for introducing a number of technical and marketing initiatives focused on improving usability of PC Card devices and evangelizing adoption throughout the industry. For more information about PCMCIA or PC Card technology in general refer to the Association's Web site at <http://www.pc-card.com>.

### Compaq PC Card Solutions Program

The Compaq PC Card Solutions Program is an initiative started in 1995 with the mandate of identifying proven PC Card solutions to Compaq commercial portable customers. The PC Card Solutions Lab tests a wide variety of PC Card devices from a number of different manufacturers. PC Card products are qualified for inclusion on either the Premier List or Standard List of products. A Premier PC Card is tested by Compaq and meets the most stringent criteria for compatibility and reliability across all Compaq portable products including the LTE Elite, Contura 400, LTE 5000 and the complete Armada family of notebook computers<sup>16</sup>. Standard PC Cards are vendor-tested in the Compaq PC Card Solutions Lab on the latest Compaq portable platforms. The Standard List is a useful resource for customers looking for a PC Card solution proven on a specific portable computer running a specific operating system.

The PC Card Solutions Program is yet another way Compaq delivers on its promise to provide the most usable and reliable Windows NT 4.0 PC Card support in the industry.

<sup>14</sup> Available 3Q97.

<sup>15</sup> CardWare® 5.0 is currently being preinstalled on the Armada 7800, Armada 7700, Armada 7300, Armada 1500.

<sup>16</sup> The Compaq Presario portable computer family does not participate in the PC Card Solutions Program.

#### Tip:

The PC Card Solutions program can be reached on the Compaq Web site at <http://www.compaq.com/support/techpubs/pcmcia/pccardlist.html>

## World Wide Web Resources

Many PC Card vendors who participate in the PC Card Solutions Program can be reached on the Web. Refer to Table 6 for information on how to reach participating vendors on the World Wide Web.

### PC CARD SOLUTIONS PARTICIPANT ON THE WEB

Vendor	Category	World Wide Web Site
3Com	Modems, Ethernet & Token Ring Network Cards	<a href="http://www.3com.com/client/mcd/products/index.html">http://www.3com.com/client/mcd/products/index.html</a>
Adaptec	SCSI Interface Cards	<a href="http://www.adaptec.com/portcon/d_sheets/1460a-2Features.html">http://www.adaptec.com/portcon/d_sheets/1460a-2Features.html</a>
Angia	Modems, ISDN Cards	<a href="http://www.angia.com/web/products/isdn/">http://www.angia.com/web/products/isdn/</a>
Avatar	External Read/Write Removable Rotating Media	<a href="http://www.goavatar.com/products/shark250/index.html">http://www.goavatar.com/products/shark250/index.html</a>
Compaq	Modems, Ethernet & Token Ring Network Cards	<a href="http://www.compaq.com/support/files/NPD/netelligent/nic/tx/index.html">http://www.compaq.com/support/files/NPD/netelligent/nic/tx/index.html</a>
IBM	Ethernet & Token Ring Network Cards	<a href="http://www.networking.ibm.com/trc/trcprod.html">http://www.networking.ibm.com/trc/trcprod.html</a>
Intel	Memory Cards	<a href="http://www.intel.com/">http://www.intel.com/</a>
Lasat	Modems	<a href="http://www.lasat.com/products/">http://www.lasat.com/products/</a>
Madge	Ethernet & Token Ring Network Cards	<a href="http://www.madge.com/product/adapt/spcmcia.htm">http://www.madge.com/product/adapt/spcmcia.htm</a>
Megahertz	Modems	<a href="http://www.megahertz.com/">http://www.megahertz.com/</a>
Motorola	Modems	<a href="http://www.mot.com/MIMS/ISG/Products/mariner/">http://www.mot.com/MIMS/ISG/Products/mariner/</a> <a href="http://www.mot.com/MIMS/ISG/Products/montana/">http://www.mot.com/MIMS/ISG/Products/montana/</a>
Nogatech	Video Conferencing	<a href="http://www.nogatech.com/">http://www.nogatech.com/</a>
Ositech	Modems, Ethernet & Token Ring Network Cards	<a href="http://www.option.com/">http://www.option.com/</a>
Proxim	Ethernet & Token Ring Network Cards	<a href="http://www.proxim.com/">http://www.proxim.com/</a>
Pision Dacom	Modems	<a href="http://www.psiondacom.com/">http://www.psiondacom.com/</a>
SanDisk	ATA Storage Devices	<a href="http://www.sandisk.com/">http://www.sandisk.com/</a>
TDK	Modems, Ethernet & Token Ring Network Cards, CardBus Cards	<a href="http://www.tdksystems.com/PROINFO/PRODDTL/pccy5600.htm">http://www.tdksystems.com/PROINFO/PRODDTL/pccy5600.htm</a>
Viking Components	Modems, ATA Storage Devices	<a href="http://www.vikingcomponents.com/56K/336pccardmodems.html">http://www.vikingcomponents.com/56K/336pccardmodems.html</a> <a href="http://www.vikingcomponents.com/products/flash.html">http://www.vikingcomponents.com/products/flash.html</a>

Xircom	Modems, Ethernet & Token Network Cards, CardBus Cards	<a href="http://www.xircom.com/Products/ce3/">http://www.xircom.com/Products/ce3/</a>
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Table 6 - Web sites for participants in the Compaq PC Card Solutions Program

## FREQUENTLY ASKED QUESTIONS

### Will Compaq continue to offer CardWare® 5.0 under Microsoft Windows NT 5.0?

At the time of this printing it is unclear as to the level of PC Card support inherent in Windows NT 5.0. Compaq will continue to bring the highest levels of functionality and usability to portable customers choosing to use either Windows NT 4.0 or Windows NT 5.0. This means a commitment to ensure that PC Card support meets or exceeds the level of functionality currently provided under Windows NT 4.0 with CardWare® 5.0. Whether this will require the use of a third-party application or simply ensuring that all PC Card features of Windows NT 5.0 are enabled remains to be seen.

### Will standby and hibernation features work while connected to a local area network using a PC Card network interface card?

Compaq does not recommend entering standby or hibernation with a PC Card local area network interface installed. Doing so may lead to unexpected behavior and potentially result in loss of data. Certain PC Card vendors who choose to adopt the latest *Proposition 187 – NT Bindings Proposal* in their software drivers will perform more reliably when responding to power management events such as standby. Contact your PC Card vendor for more information on the level of support offered for power management in their PC Card software drivers.

### What is the best way to choose PC Cards most suited for use with my Compaq LTE Elite, Contura 400, LTE 5000 or Armada portable computer?

In 1995 Compaq unveiled its PC Card Solutions Program; an initiative to help customers choose PC Card devices found to be most compatible with Compaq portable computers. The Program tests a wide variety of PC Cards from many different manufacturers. These test results are published quarterly with PC Cards qualifying for either the Premier List or Standard List.

Premier cards meet stringent compatibility and reliability criteria across all Compaq commercial portable platforms under Windows NT 4.0, Windows 95, Windows 3.1x and MS DOS 6.2x. The result is a list of proven PC Card solutions customers can purchase with confidence.

Standard List PC Cards have been vendor tested on select Compaq portable computer models under some, but not necessarily all, operating systems supported by Compaq. This is yet another resource for customers who are looking for PC Card solutions.

### Are Zoomed Video PC Cards supported under Windows NT 4.0?

Due to a limitation in the operating system, Windows NT 4.0 does not support Zoomed Video PC Card devices with or without CardWare® 5.0.

### Who do I call to receive technical support for CardWare® 5.0?

If you have difficulty with installation, setup or configuration of CardWare® 5.0, contact Compaq Customer Service & Support. Customer Service & Support is also able to provide support for installation, setup and configuration of Premier List qualified PC Card solutions. Customers should contact their PC Card vendor directly for support on devices not included on the Premier List.

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