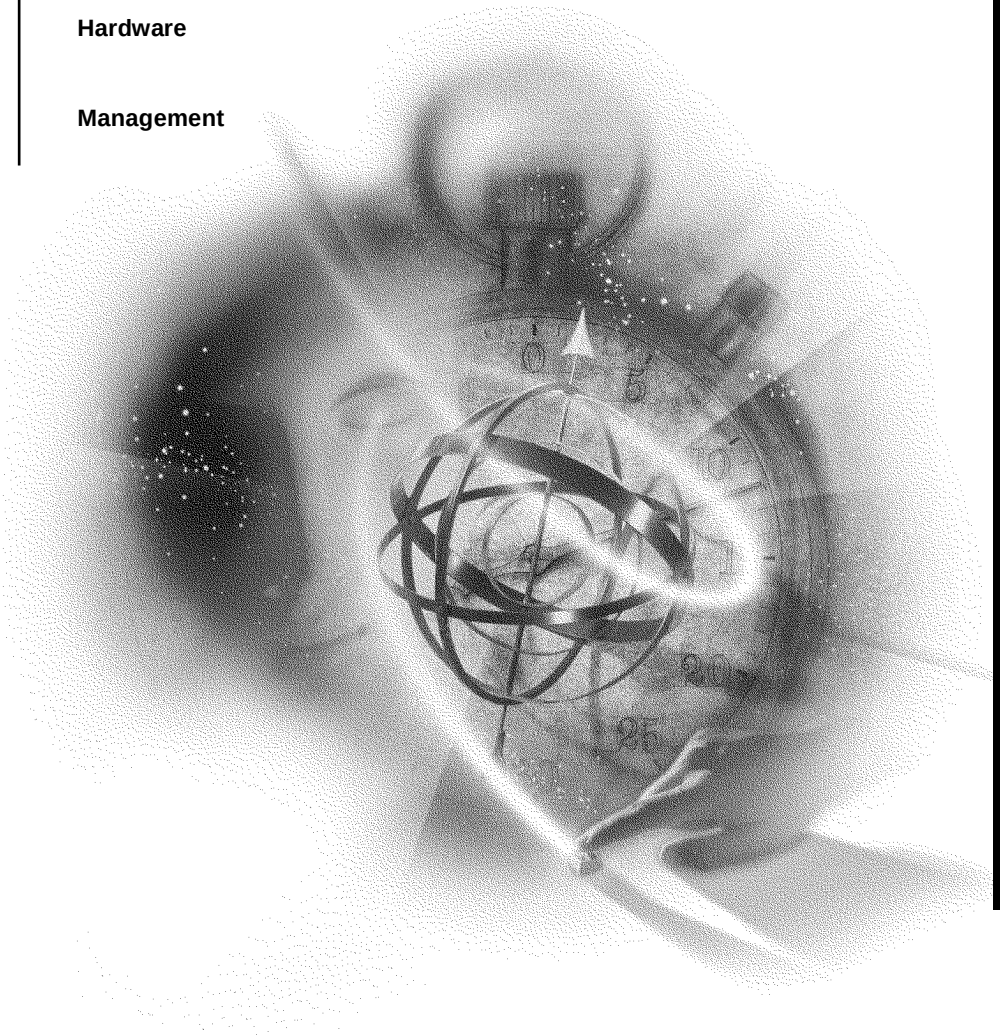
VERSION 5

Hot Plug

Hardware

Management



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NETWORK SOFTWARE

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U.S. Patent Nos. 5,157,663; 5,349,642; and 5,455,932. U.S. Patent Application No. 5,572,528. U.S. and Foreign Patents Pending.

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Overview of Hot Plug

PCI Hot Plug technology allows industry-standard PCI adapters to be added or removed without disrupting the operation of the NetWare® server. This reduces unplanned down time for maintaining or adding disk or LAN adapters.

Features of industry-standard, PCI Hot Plug technology include the following:

- **Uninterrupted service.** You can add or replace network or other I/O controller boards while a system is operating. This can be done through "hot insertion" or "hot removal."

  Hot insertion. The process of physically plugging an adapter into a PCI slot without removing power to the server.

  Hot removal. The process of physically pulling an adapter from a PCI slot without removing power to the server.

- **Compatibility.** Multiple system providers, operating system suppliers, and adapter vendors can implement Hot Plug, which is compatible with existing PCI standards.

- **Backward compatibility.** You can use a mix of Hot Plug and non-Hot-Plug components in the same system. (But non-Hot-Plug components cannot be added or removed without shutting down the server.)

For a general discussion of PCI Hot Plug architecture and components, see "Understanding" on page 1.

To learn how to enable and use the Novell® Configuration Manager to manage Hot Plug devices, see "Managing" on page 9.

chapter 1

Understanding

PCI Hot Plug technology allows industry-standard PCI adapters to be added or removed without disrupting the operation of the server. This reduces unplanned down time for maintaining or adding disk or LAN adapters. To use hot plug technology, your server hardware must be hot-plug capable.

For a general description of Hot Plug architecture, see “PCI Hot Plug Architecture” on page 1. For a description of the Novell Configuration Manager (the interface used to manage Hot Plug devices), see “Introduction to NCMCON” on page 3.

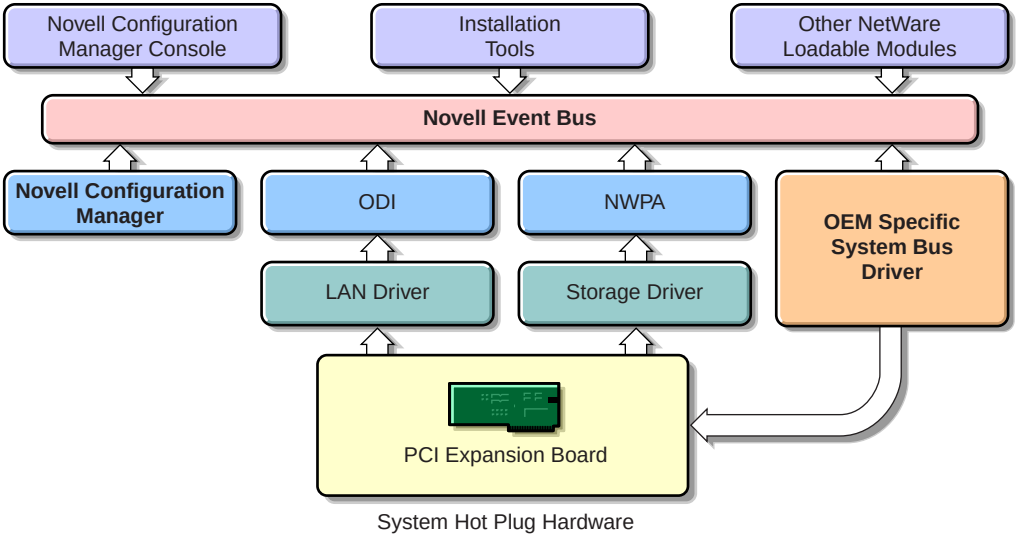
PCI Hot Plug Architecture

The PCI Hot Plug architecture is modular, which minimizes the changes required of third-party adapter software. The system relies on a central component, the Novell Event Bus (NEB), which facilitates communication among different software modules.

The NEB is an integral part of NetWare 5™. It is coded into the operating system so you never need to load the neb.nlm as a separate program.

Figure 1 provides a graphical representation of the NEB architecture.

Figure 1-1
Novell NetWare Hot Plug Architecture



Open Datalink Interface (ODI)

The Open Data-link Interface and the Novell Event Bus have been combined in one module, called odineb.nlm, to enable the NEB to control device drivers. The function of this module is to intercept requests to unload a device driver and ensure that the instance unload function is supported. It prevents false attempts to unload an unsupported driver and eliminates potential failures.

Novell Configuration Manager (ncm.nlm)

For PCI Hot Plug servers, the Novell Configuration Manager manages the Hot Plug system and ensures proper system behavior.

The primary function of the Configuration Manager is to sequence Hot Plug operations by shutting down the adapter's device driver before removing power from the slot. This ensures the stability of the system.

The Configuration Manager also maps hardware resources to device driver software.

System Bus Driver

The system bus driver is the platform-specific implementation of PCI Hot Plug. This driver controls the system hardware necessary to perform Hot Plug functions and is responsible for the following:

- Enabling or removing power from a Hot Plug slot upon request.
- Configuring hardware and assigning such things as memory, PCI, and interrupts of PCI adapters in Hot Plug slots.

NetWare allows multiple system bus driver modules to exist simultaneously. The controller manufacturer provides the system bus driver specific to the PCI Hot Plug hardware. The Compaq system bus driver, cpqsbd.nlm, is included with NetWare 5.

Novell Configuration Manager Console (ncmcon.nlm)

The Novell Configuration Manager console provides the interface for controlling all Hot Plug operations. In addition, it displays slot configuration details, including adapter driver information and status.

The Configuration Manager console consists of three screens: the Main Menu, Slot Options, and Slot Detailed Information.

The Novell Configuration Manager Console is described in detail in "Introduction to NCMCON" on page 3.

Introduction to NCMCON

The Novell Configuration Manager console (NCMCON) allows you to view status information on PCI slots and to remove and add PCI Hot Plug adapters.

The NCMCON interface constantly monitors and displays the status of all slots. If there are any errors, the appropriate error message is displayed.

There are three menus used in the NCMCON interface:

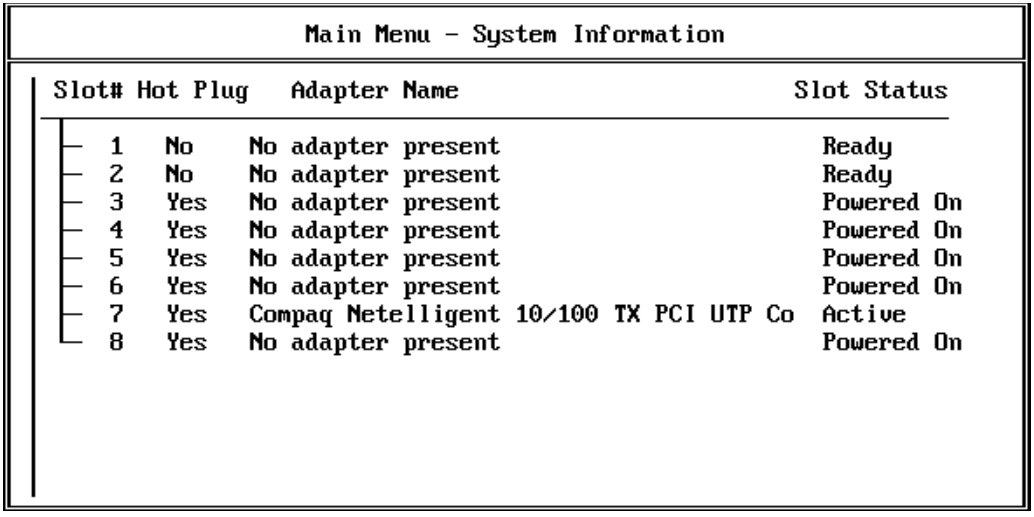
- "The Main Menu" on page 4

- “Slot Options” on page 5
- “Slot Detailed Information” on page 6

The Main Menu

The Main Menu displays a list of all PCI slots in the system.

Figure 1-2
The Main Menu



For each slot, the Main Menu displays the following information:

- The system board slot number
- Whether or not the slot is hot pluggable
- An adapter description field or name
- The status of the slot / adapter, which may include the following:
  - **Powered Off** – The lever is open on the slot and power to the slot is turned off.
  - **Powered On** – The lever has been closed, power is on to the slot, and the slot is empty (this is different from Ready because there is no card in the slot).

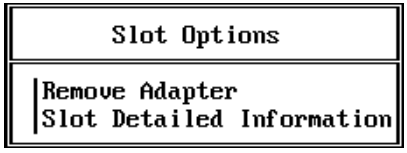
- **Ready** – An adapter is in the slot and ready to be used but there is currently no driver loaded for it.
- **Active** – A loaded driver is using this adapter and the adapter is believed to be in good working order.
- **Failed** – This adapter's driver or Hot Plug driver indicated some type of device failure. The adapter can be removed and a new one added at this time.
- **Degraded** – A device on the multi-device adapter has failed, but other devices on the adapter continue to function.
- **Processing...** – An action is being performed on a slot / adapter.

Pressing <Enter> on a selected slot of the Main Menu displays either the Slot Options or the Slot Detailed Information screen. Online, context-sensitive help is available to guide you through PCI Hot Plug actions.

Slot Options

This menu lists the options available for the highlighted Hot Plug slot (selection of a non-Hot Plug slot automatically displays the Slot Detailed Information screen).

Figure 1-3
Slot Options



Depending on the driver, the state of the slot or adapter, and the capabilities of the system, different options appear on the menu.

The interlock mechanism is one feature that can influence what appears on the Slot Options menu. The interlock is a safety mechanism that shuts off power to a slot if the slot is opened while the power is still on. Not all hardware manufacturers provide an interlock mechanism, and not all interlock mechanisms work the same way. Refer to your hardware documentation for more information.

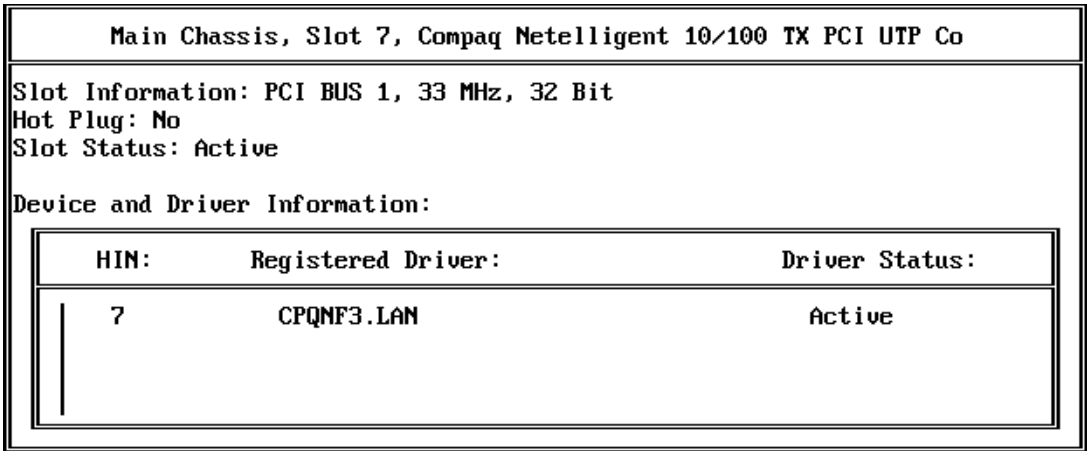
The following table describes the options on the Slot Options menu and the conditions under which they appear.

Menu item	Appears . . .
Add Adapter	When there is no power to the slot, the interlock mechanism is closed, and the driver supports add functionality. (Add functionality means that an adapter can be added to an empty slot or an existing adapter can be replaced with a different adapter.)
Remove Adapter	When the slot is powered on, and an adapter is in the slot.
Replace Adapter	When there is no power to the slot, the driver supports only replace functionality, and the interlock mechanism is either closed or not supported. (Replace functionality means that an existing adapter can be replaced only with an identical adapter.)
Power Off Slot	When the slot is powered on, and no adapter is present in the slot.
Power On Slot	When there is no power to the slot, the driver doesn't support the interlock mechanism, and the driver supports add functionality. (Add functionality means that an adapter can be added to an empty slot or an existing adapter can be replaced with a different adapter.)
Slot Detailed Information	Under all conditions.

Slot Detailed Information

The Slot Detailed Information screen displays information about a specific slot and the adapter in that slot.

Figure 1-4
Slot Detailed Information Screen



Items on the screen include the following:

- Slot number
- Description of adapter in slot
- The bus type (PCI, EISA, or EMBEDDED)
- The bus number of the slot
- Whether or not the adapter is hot pluggable
- The status of the slot / adapter
- The NetWare Hardware Instance Number (HIN) of each device
- Device driver name and status for each HIN. Status possibilities include the following:
  - **Active** - Driver is loaded for the device.
  - **Inactive** - No driver is loaded for the device.
  - **Failed** - The device has failed.

- **Suspended** - The driver is loaded but activity is suspended while the adapter is being added.

Pressing <F2> activates the Slot Options menu, which allows you to take actions such as removing the card from a particular slot.

chapter 2

Managing

To enable PCI Hot Plug Technology, see “Enabling PCI Hot Plug” on page 9.

Once you have enabled PCI Hot Plug Technology on your server, you can use NCMCON (the Novell Configuration Manager console) to manage your hardware.

See “Navigating NCMCON Menus” on page 10 for general information about how to use the NCMCON interface.

See “Adding an Adapter” on page 11 and “Removing an Adapter” on page 11 for step-by-step instructions for managing your hardware adapters.

Enabling PCI Hot Plug

The following four Hot Plug PCI modules are installed when you install NetWare:

- cpqsbd.nlm: The Compaq system bus driver. (You will need to provide a different driver to support other hardware platforms.)
- ncm.nlm: The Novell Configuration Manager, which manages the Hot Plug system.
- ncmcon.nlm: The Hot Plug user interface, called the Novell Configuration Manager Console.
- odineb.nlm: A module combining the Open Data-link Interface and the Novell Event Bus (NEB) that enables the NEB to control device drivers.

If the NetWare installation process determines that your server supports Hot Plug and has the appropriate driver, the installation

process adds the following two LOAD commands to the autoexec.ncf file:

- LOAD sys:\system*driver_name* (for example, LOAD sys:\system\cpqsbd.nlm)

  This command loads the bus driver. After this command is executed, NetWare autoloads ncm.nlm.

- #LOAD sys:\system\ncmcon.nlm

  This command loads the Novell Configuration Manager Console, which, in turn, loads odineb.nlm.

  Note that this command is commented out . If you want NetWare to load the Novell Configuration Manager Console every time the autoexec.ncf file is executed, remove the # sign from in front of the command.

To enable PCI Hot Plug technology, restart the server to execute the autoexec.ncf file. You can also execute the LOAD commands for the driver and NCMCON at the server console prompt.

Navigating NCMCON Menus

To navigate NCMCON menus, follow these guidelines:

- In the Main menu, use the arrow keys to move up and down the list of slots. To select a slot, highlight the slot and press Enter.

  If you select a hot plug-capable slot, the Slot Options menu is displayed.

  If you select a non-hot plug-capable slot, the Slot Detailed Information screen is displayed.

- In the Slot Options menu, select the desired option.

- In the Slot Detailed Information screen, highlight a slot and press F2 to open the Slot Options menu.

- To return to the Main menu, press ESC.

- For online help, press F1.

Removing an Adapter

1. **From the NCMCON Main menu select the slot with the adapter you want to remove.**

   The Slot Options menu is displayed.

2. **Select Remove Adapter.**

   NCMCON processes the remove request.

3. **Once the slot has a status of Powered Off and the slot's green LED is no longer lit, open the lever and take the adapter out of the slot.**

   NCMCON then updates the status of the slot on the screen.

Adding an Adapter

1. **If the slot already contains an adapter, remove the adapter from the slot. See "Removing an Adapter" on page 11.**

2. **Insert the new adapter in the slot and close the lever.**

   The new adapter is detected automatically, and you are prompted to apply power to the slot.

3. **Respond to the prompt to apply power.**

   If you respond Yes: The slot's green LED is illuminated, and you are reminded to attach cables. The system then attempts to autodetect and load drivers for the adapter. Follow any prompts that appear on the screen.

   If you respond No: The console status does not change. Go to Step 4 when you are ready to apply power to the slot.

4. **When you are ready to apply power to the slot, select the slot and adapter from the Main menu.**

5. **From the Slot Options menu, select Add Adapter or Power On Slot (whichever is displayed).**

The Novell Configuration Manager attempts to autodetect and load drivers for the adapter. Follow any prompts that appear on the screen.

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